Appendix S Recreation Technical Appendix

This appendix documents the recreation technical analysis to support the impact analysis in this environmental impact statement (EIS).

S.1 Background Information

S.1.1 Trinity River

The Trinity River Region includes the area along the Trinity River, including Trinity Lake, the Trinity River between Trinity Lake and Lewiston Reservoir, and Lewiston Reservoir. Many recreational opportunities occur in the Trinity River Region, including motorized and non-motorized boating, camping, day use activities such as wildlife viewing, hiking, swimming, and picnicking, and fishing.

S.1.1.1 *Trinity Lake*

Trinity Lake is a Central Valley Project (CVP) facility on the Trinity River located approximately 50 miles northwest of Redding, California. Trinity Lake is part of the Whiskeytown-Shasta-Trinity National Recreation Area (NRA) and the Shasta-Trinity National Forest. Recreational facilities and activities at Trinity Lake are administered by the U.S. Forest Service (USFS). When the water storage in Trinity Reservoir is at full capacity (water elevation is at 2,370 feet mean sea level [msl]), Trinity Lake has a surface area of 17,222 acres and 147 miles of shoreline (USFS 2014). Under current conditions, the water levels at Trinity Lake vary seasonally but elevations generally remain between 2,275 and 2,325 msl and the lake achieves full capacity only in very wet years. Elevations are such that water access is possible at most recreational locations during the spring and summer when recreational opportunities are in highest demand.

Boating, windsurfing, and fishing primarily occur in the northern part of the lake near Trinity Center. Houseboats, motorboats, waterskiing primarily occur in the southern part of the lake. There are six public boat ramps on Trinity Lake, as summarized in Table S.1-1.

Table S.1-1. Trinity Lake Boat Ramps

Boat Ramp	Comments	Useable Elevations (feet mean sea level)
Bowerman	–	2,370 to 2,320
Clark Spring	Americans with Disabilities Act accessible boat loading platform	2,370 to 2,324
Fairview	–	2,370 to 2,313
Minersville	–	65 to 200
Stuart Fork	–	2,370 to 2,338
Trinity Center	–	2,370 to 2,300

Source: USFS 2014.

A boating safety issue that arises with fluctuations in water levels is the depth to surface of submerged obstacles. When the water level decreases, many rocks, shoals, and islands are much closer to the water

surface and can be easily struck by boats. When the water level rises, debris and obstacles that were previously easily visible may be dangerously out of sight and struck by boats (Reclamation 2014a).

Trinity Lake has three marinas and two moorage facilities; the USFS can permit up to 1,000 boat slips at these facilities (USFS 2014). At Trinity Lake, 637 of the boat slips have been permitted, leaving availability for an additional 363 boat slips. Commercial houseboats are available for rent at four of the marinas. Trinity Lake shoreline includes approximately 32 miles of prime houseboating areas, where a density of 4 houseboats per mile can reside, and 18.5 miles of secondary houseboating areas, where a density of 2 houseboats per mile can reside. USFS issues permits for houseboats and privately-owned recreational occupancy vehicles that use the water overnight. At Trinity Lake, up to 99 permits for privately owned vessels and 85 permits for commercially owned vessels may be issued each year. The three marinas and two moorage facilities located at Trinity Lake are summarized in Table S.1-2.

Table S.1-2. Trinity Lake Marinas and Moorage Facilities

Marina and Moorage Facility	Number
Cedar Stock Resort & Marina	31 commercial and 220 private slips, including 10 commercial houseboats
KOA Campground	15 commercial and 110 private slips
Pinewood Cove Docks	52 private slips
Trinity Alps Marina	31 commercial and 63 private slips, including 25 commercial houseboats
Trinity Center Marina	80 private slips

Source: USFS 2014.

The Trinity Unit of the Whiskeytown-Shasta-Trinity National Recreation Area includes many campground sites, including campgrounds for group camping opportunities (USFS 2014), as summarized in Table S.1-3. There are other campgrounds in the upper elevations of the Trinity Lake watershed that are not directly or indirectly affected by changes in surface water elevations.

Table S.1-3. Trinity Lake Campgrounds

Campground	Comments	Number of Campsites
Alpine View	–	53
Bushytail	–	11
Captain’s Point	Boat-in campground	3
Clark Springs	–	21
Fawn	Group campground	60
Hayward Flat	–	98
Jackass Springs	–	10
Mariner’s Roost	Boat-in campground	7
Minersville	–	14
Ridgeville	Boat-in campground	10
Ridgeville Island	Boat-in campground	3
Stoney Creek	Group campground	10
Stoney Point	–	15
Tannery Gulch	–	82

Source: USFS 2014.

Trinity Lake recreational areas also include day use activities such as picnicking, swimming, and other recreational opportunities, as summarized in Table S.1-4. The locations for shoreline day use activities are limited because of the steep and rocky elevations at the shorelines. To develop two swimming beaches at Trinity Lake, the rocky shorelines were covered with sand and/or decomposed granite at a specific elevation. Seasonal fluctuations in water level make accessing these locations more difficult.

Table S.1-4. Trinity Lake Day Use Areas

Day Use Area	Comments	Number
Clark Springs Day Use and Beach	Picnicking, swimming	34 picnic sites
North Shore Vista	Vistas, interpretative site	–
Osprey Info Site	Vistas, interpretative site	–
Stoney Creek	Picnicking, swimming	4 picnic sites
Tanbark Picnic	Picnicking	8 picnic sites
Trail of Trees	Interpretative trail at Tannery Gulch Campground	1-mile roundtrip trail
Trinity Lakeshore Trail	Trail	8-mile roundtrip trail
Trinity Vista	Vistas, interpretative site	–

Source: USFS 2014.

Trinity Lake is stocked several times per year with non-native fish species, including Smallmouth Bass (*Micropterus dolomieu*), Largemouth Bass (*Micropterus salmoides*), Rainbow Trout (*Oncorhynchus mykiss*), Brown Trout (*Salmo trutta*), Chinook Salmon (*Oncorhynchus tshawytscha*), and Kokanee Salmon (*Oncorhynchus nerka*) (USFS 2014). White Catfish (*Ameiurus catus*), Brown Bullhead (*Ameiurus nebulosus*), Green Sunfish (*Lepomis cyanellus*), Bluegill (*Lepomis macrochirus*), Klamath Smallscale Sucker (*Catostomus rimiculus*), and Pacific Lamprey (*Entosphenus tridentatus*) also are also present but are not generally considered as part of the recreational fishing opportunities. Wildlife viewing opportunities extend throughout the Trinity Lake area, including viewing of bald eagles (*Haliaeetus leucocephalus*), black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), gray squirrel, rabbit, turkey, and California quail (*Callipepla californica*).

S.1.1.2 *Lewiston Reservoir*

Lewiston Reservoir is a CVP facility on the Trinity River located immediately downstream of the Trinity Dam. Lewiston Reservoir is part of the Whiskeytown-Shasta-Trinity National NRA and the Shasta-Trinity National Forest. Recreational facilities and activities are administered by USFS. When the water storage in the Lewiston reservoir is at full capacity (the water elevation is at 1,874 feet msl), the reservoir has a surface area of 759 acres and 15 miles of shoreline (USFS 2014).

The water levels at Lewiston Reservoir are stable because it is used as a regulating reservoir for releases to downstream uses. Water is diverted from the lower outlets in Trinity Lake downstream to Lewiston Reservoir to provide cold water to Trinity River. In addition, Lewiston Reservoir supplies water to Whiskeytown Lake via the Clear Creek Tunnel, which is activated when water levels in Whiskeytown Lake decrease. Recreational opportunities in Lewiston Reservoir include boating and fishing; however, there are fewer opportunities for swimming and waterskiing compared to Trinity Lake. Lewiston Reservoir does not support houseboats. There is one boat ramp, as well as one marina and one moorage facility at Lewiston Reservoir, as summarized in Tables S.1-5 and S.1-6, respectively.

Table S.1-5. Lewiston Reservoir Boat Ramp

Boat Ramp	Comments	Open until Lake Drawdown (feet)
Pine Cove	Open all year	Lake level is constant

Source: USFS 2014.

Table S.1-6. Lewiston Lake Marina and Moorage Facilities

Marina and Moorage Facility	Number
Lakeview Terrace Docks	14 commercial and 7 private slips
Pine Cove Marina	20 commercial and 34 private slips

Source: USFS 2014.

The Whiskeytown-Shasta-Trinity NRA includes campsites near the Lewiston Reservoir shoreline, including campgrounds for group camping opportunities (USFS 2014), as summarized in Table S.1-7. Lewiston Reservoir recreational areas also include day use activities such as picnicking, swimming, and other recreational opportunities, as summarized in Table S.1-8. Because the water surface elevations are more stable in Lewiston Reservoir than Trinity Lake, areas where day use activities occur are more vegetated along the shoreline.

Table S.1-7. Lewiston Lake Campgrounds

Campground	Number of Campsites
Ackerman	51
Cooper Gulch	5
Mary Smith	17
Tunnel Rock	6

Source: USFS 2014.

Table S.1-8. Lewiston Lake Day Use Areas

Day Use Area	Comments	Number
Baker Gulch Trail	Trail	0.2-mile trail
Lewiston Vista	Vistas, interpretative site	–
North Lakeshore Trail	Trail	2-mile trail
Pine Cove	Picnic	2 picnic sites
South Lakeshore Trail	Trail	1-mile trail

Source: USFS 2014.

Lewiston Reservoir fishing opportunities include Smallmouth Bass, Rainbow Trout (stocked annually), Brown Trout, Three-spine Stickleback, Golden Shiner, and Kokanee Salmon (USFS 2014). Klamath Smallscale Sucker, and Pacific Lamprey also are present but are not generally considered as part of the recreational fishing opportunities. Wildlife viewing opportunities extend throughout the Lewiston Reservoir area, including viewing of bald eagles, black-tailed deer, river otter (*Lontra canadensis*), ring-tailed cats (*Bassariscus astutus*), raccoon, California quail, and the occasional western pond turtle (*Actinemys marmorata*). Waterfowl use Lewiston Reservoir throughout the year, with increased populations in the winter.

S.1.2 Sacramento River

Recreational opportunities in the Sacramento Valley upstream of the Sacramento-San Joaquin Delta (Delta) that are influenced by CVP and State Water Project (SWP) operations occur at Shasta Lake; Keswick Reservoir; Whiskeytown Lake; Sacramento River, between Keswick Dam and the Delta; Lake Oroville and Thermalito Afterbay; Yuba River, from between New Bullards Bar and the Feather River; Bear River, between Camp Far West Reservoir and Feather River; Feather River, between Thermalito Dam and Sacramento River; Folsom Lake and Lake Natoma; American River, between Nimbus Dam and Sacramento River; and wildlife refuges that use CVP water supplies.

S.1.2.1 *Shasta Lake*

Shasta Lake is a CVP facility on the Sacramento River that is located near Redding. Shasta Lake is part of the Whiskeytown-Shasta-Trinity NRA and the Shasta-Trinity National Forest. Recreational facilities and activities at Shasta Lake are administered by USFS. When the water storage in the lake is at full capacity (water elevation is at 1,067 feet msl), Shasta Lake has a surface area of approximately 30,000 acres and 365 miles of shoreline (United States Department of the Interior, Bureau of Reclamation [Reclamation] 2014; USFS 2014).

Boating, waterskiing, other water sports, and fishing occur at many locations at the lake. Many types of boats are used, including fishing boats, deck boats, houseboats, cabin cruisers, pontoon boats, personal watercraft, runabouts, and ski boats (Reclamation 2014a; USFS 2014). There are seven public boat ramps on Shasta Lake, as summarized in Table S.1-9.

Table S.1-9. Shasta Lake Boat Ramps

Boat Ramp	Comments	Useable Elevations (feet mean sea level)
Antlers	Americans with Disabilities Act accessible boat loading platforms	1,067 to 992
Bailey Cove	–	1,067 to 1,017
Centimudi	–	1,067 to 857
Hirz Bay	–	1,067 to 972
Jones Valley	–	1,067 to 857
Packers Bay	–	1,067 to 952
Sugar Loaf	–	992 to 907

Source: USFS 2014.

A boating safety issue that arises with fluctuations in water levels is the depth to surface of submerged obstacles. When the water level decreases, many rocks, shoals, and islands are much closer to the water surface and can be easily struck by boats. When the water level rises, debris and obstacles that were previously easily visible may be dangerously out of sight and struck by boats (Reclamation 2014a).

The marinas and moorage facilities located at Shasta Lake are summarized in Table S.1-10. The USFS can permit up to 3,000 boat slips at Shasta Lake (USFS 2014). Of the 3,000 possible boat slips, 2,600 have been permitted, leaving 400 additional boat slips to be permitted. Many commercial houseboats are available for rent at the marinas. Shasta Lake shoreline includes approximately 109 miles of prime houseboating areas and 153 miles of secondary houseboating areas. The USFS issues permits for houseboats and privately-owned recreational occupancy vehicles that use the water overnight.

Table S.1-10. Shasta Lake Marinas and Moorage Facilities

Marina and Moorage Facility	Number
Antlers Resort and Marina	101 commercial and 200 private slips, including 35 commercial houseboats
Bridge Bay Resort	140 commercial and 7,773 private slips, including 92 commercial houseboats
Digger Bay Marina	75 commercial and 145 private slips, including 50 commercial houseboats
Holiday Harbor	95 commercial and 330 private slips, including 70 commercial houseboats
Jones Valley Marina	90 commercial and 99 private slips, including 64 commercial houseboats
Packers Bay Marina	51 commercial slips, including 26 commercial houseboats
Shasta Lake RV Resort	22 private slips
Shasta Marina	54 commercial and 139 private slips, including 24 commercial houseboats
Silverthorn Resort Marina	59 commercial and 113 private slips, including 35 commercial houseboats
Sugarloaf Cottages	16 private slips
Sugarloaf Marina	41 commercial and 40 private slips, including 21 commercial houseboats
Tsasdi Resort	30 private slips

Source: USFS 2014.

The Shasta Unit of the Whiskeytown-Shasta-Trinity NRA includes many campsites, including group campsites (USFS 2014), as summarized in Table S.1-11. Seasonal fluctuations in water elevations change the distance from the campsites to the shoreline. There are other campgrounds within the upper elevations of the Shasta Lake watershed that are not directly or indirectly affected by changes in surface water elevations.

Table S.1-11. Shasta Lake Campgrounds

Campground	Comments	Number of Campsites
Antlers	–	59
Arbuckle Flat	Boat-in campground	11
Beehive	Shoreline campground	No specified number
Bailey Cove	–	7
Dekkas Rock	Group campground	60 group sites
Ellery Creek	–	19
Gooseneck Cove	Boat-in campground	8
Green’s Creek	Boat-in campground	9
Gregory Creek	Shoreline campground	18
Hirz Bay	Individual and group campground	48 individual sites and 200 group sites
Jones Valley (Upper & Lower)	Shoreline campground at inlet	21
Lakeshore East	–	26

Campground	Comments	Number of Campsites
Lower Salt Creek	Shoreline campground	No specified number
Mariners Point	Shoreline campground	No specified number
McCloud Bridge	–	14
Moore Creek	Individual and group campground	12 individual sites, 90 group sites
Nelson Point	Individual and group campground	8 individual sites, 60 group sites
Oak Grove	–	45
Pine Point	Individual and group campground	14 individual sites, 100 group sites
Ski Island	Boat-in campground	23

Source: USFS 2014.

Shasta Lake recreational areas also include day use activities such as picnicking, swimming, and other recreational opportunities, as summarized in Table S.1-12. The locations for shoreline day use activities are limited because of the steep and rocky elevations at the shorelines. Uses of these locations are less desirable when water elevations decline.

Table S.1-12. Shasta Lake Day Use Areas

Day Use Area	Comments	Number
Bailey Cove	Picnic, trail	9 picnic sites, 3.1-mile trail
Clikapudi	Trail	8-mile trail with 1-mile advanced mountain bike loop
Dekkas Rock	Picnic	5 picnic sites
Dry Fork Creek	Trail	4.7-mile trail
Fisherman's Point	Picnic, trail	7 picnic sites, 0.5-mile trail
Hirz Bay	Trail	1.6-mile trail
McCloud Bridge	Picnic	5 picnic sites
Packers Bay	Trail	4 trails: 0.4- to 2.8-miles each
Potem Falls	Trail	0.3-mile trail
Samwel Cave Nature Trail	Interpretative trail	1-mile trail
Sugarloaf	Trail	1-mile trail

Source: USFS 2014.

Recreational opportunities available at the Shasta Dam Visitors Center include picnicking and free tours of Shasta Dam.

Fishing is also popular at Shasta Lake, performed mostly by boat as opposed to from the shoreline. Anglers can catch warm water and cold water fish species year-round, owing to the summer stratification of the lake into a warm layer above a cold water pool (Reclamation 2014a). Shasta Lake warmwater fishing opportunities include Black Bass (*Micropterus salmoides*), Smallmouth Bass, Largemouth Bass, Spotted Bass (*Micropterus punctulatus*), Black Crappie (*Pomoxis nigromaculatus*), Channel Catfish (*Ictalurus punctatus*), and Bluegill (*Lepomis macrochirus*) (USFS 2014). There are many bass tournaments at Shasta Lake each summer. The cooler water strata supports fishing for Rainbow Trout and Chinook Salmon.

S.1.2.2 *Keswick Reservoir*

Keswick Reservoir is a CVP afterbay (a type of reservoir that receives water from an upstream waterbody) that extends 9 miles along the Sacramento River from Shasta Dam to Keswick Dam. Recreational facilities and activities at Keswick Reservoir are administered by the Bureau of Land Management (BLM), Shasta County, and USFS for Reclamation. The maximum water storage elevation at the top of the Keswick Dam spillway is 587 feet msl (Reclamation 2019a). The water level fluctuates frequently in Keswick Reservoir, depending on the operations of Shasta Dam.

Water-related recreational activities include boating, fishing, and water sports. The Keswick boat ramp, operated by BLM, is located on the western shoreline at the south end of the reservoir (BLM 2005).

There are several trails along Keswick Reservoir and areas for off-highway vehicles (OHVs) with camping allowed at one of the locations (BLM 2005; BLM 2010). The Sacramento Rail Trail extends from Moccasin Creek, below Shasta Dam, to Redding, along the western shoreline of Keswick Reservoir and the Sacramento River downstream of Keswick Dam. The Fisherman Trail extends along the shoreline from the lower Sacramento Rail Trail to Keswick Dam. The F.B. Trail extends from the Ribbon Bridge, downstream of the Keswick Dam, to Walker Mine Road, along the eastern side of the Keswick Reservoir. There are several other trails at higher elevations above Keswick Reservoir, including the Hornbeck Trail, Upper and Lower Sacramento Ditch Trails, Flanagan Trail, and Chamise Peak Trail.

The Chappie-Shasta OHV Area provides over 250 miles of roads within approximately 52,000 acres (Reclamation 2014a). The area is accessed through two staging areas. The Chappie-Shasta OHV Staging Area and Shasta Campground includes a staging area for day use activities, including picnics and 27 campsites (BLM 2005). This site is located along the western shoreline of Keswick Reservoir, at the trailhead of the Sacramento Rail Trail at Moccasin Creek. The Copley Mountain OHV Staging Area is located along the western shoreline of Keswick Reservoir, about midway between Shasta and Keswick Dams. This site also provides a staging area for day use activities, including picnics.

Fishing opportunities are primarily for German Brown Trout and Rainbow Trout.

S.1.2.3 *Whiskeytown Lake*

Whiskeytown Lake is a CVP facility on Clear Creek that is located approximately 8 miles west of Redding on the eastern slope of the Coast Range. Whiskeytown Lake is part of the Whiskeytown-Shasta-Trinity NRA. Recreational facilities and activities are administered by the National Park Service (NPS). When water storage in the reservoir is at full capacity (water elevation is at 1,210 feet msl), Whiskeytown Lake has a surface area of 3,250 acres and 36 miles of shoreline (NPS 2012; Reclamation 2019b).

Boating, waterskiing, sailing, kayaking, canoeing, swimming, and fishing occur at many locations at the lake. Boat ramps are available at Oak Bottom, Brandy Creek, and Whiskey Creek, and at marinas at Oak Bottom and Brandy Creek (NPS 2012), as summarized in Table S.1-13.

Table S.1-13. Whiskeytown Lake Boat Ramps

Boat Ramp	Useable Elevations (feet mean sea level)
Brandy Creek	1,210 to 1,190
Oak Bottom	1,210 to 1,195
Oak Bottom Marina	1,210 to 1,198
Whiskey Creek	1,210 to 1,195

Source: NPS 2012.

The lake level is relatively stable and does not affect the functionality of the boat ramps until late summer or early fall.

The Whiskeytown Unit of the Whiskeytown-Shasta-Trinity NRA includes many campsites, including campgrounds for group camping opportunities (NPS 2012), as summarized in Table S.1-14.

Table S.1-14. Whiskeytown Lake Campgrounds

Campground	Comments	Number of Campsites
Brandy Creek RV	–	37 RV sites
Brandy Creek	Primitive campground	2 sites
Coggins Park	Primitive campground	1 site
Crystal Creek	Primitive campground near Crystal Creek	2 sites
Dry Creek	Group campground	2 sites; 50 people each
Horse Camp	Primitive campground	2 sites
Oak Bottom Tent and RV	–	98 tent sites, 22 RV sites
Peltier Bridge	Primitive campground near Clear Creek	9 sites
Sheep Camp	Primitive campground	4 sites

Source: NPS 2012.
RV = recreational vehicle

Whiskeytown Lake recreational areas also include day use activities such as picnicking, swimming, and other recreational opportunities, as summarized in Table S.1-15. Shoreline day use activities are limited at some locations because of the steep and rocky elevations at the shorelines.

Table S.1-15. Whiskeytown Lake Day Use Areas

Day Use Area	Comments	Number
Boulder Creek Falls	Moderate and advanced trails	1-mile (moderate) trail, 2.75-mile (advanced) trail
Brandy Creek Beach and Falls	Picnicking, swimming, 2 moderate trails	1.6- and 1.5-mile trails
Buck Hollow	Easy trail	1-mile trail
Camden Water Ditch	Easy trail	1.1-mile trail
Clear Creek Canal and Vista	Picnicking, 2 moderate trails	2.4- and 4.5-mile trails
Crystal Creek Water Ditch and Falls	Picnicking, easy and Americans with Disabilities Act (ADA)-accessible trails	0.75-mile (easy) trail, 0.3-mile (ADA-accessible) trail
Davis Gulch	Moderate trail	3.3-mile trail
East Beach	Swimming	–
Guardian Rock	Easy and ADA-accessible trails	1-mile (easy) trail, 0.25-mile (ADA-accessible) trail
James K. Carr Trail	Advanced trail	1.7-mile trail
Judge Francis Carr Powerhouse	Picnic	–
Kanaka Peak	Advanced trail	3.6-mile trail
Logging Camp	Easy trail	1-mile trail

Day Use Area	Comments	Number
Mill Creek	Advanced trail	6.1-mile trail
Mt. Shasta Mine Loop	Moderate trail	3.5-mile trail
Mule Mountain Pass	Moderate trail	4.4-mile trail
Oak Bottom Beach	Picnicking, swimming	–
Oak Bottom Ditch	Easy trail	2.75-mile trail
Papoose Pass	Advanced trail	5.5-mile trail
Peltier	Moderate trail	1.75-mile trail
Rich Gulch	Advanced trail	1.8-mile trail
Salt Creek Loop	Moderate trail	1.8-mile trail
Salt Gulch	Advanced trail	1.6-mile trail
Shasta Divide Nature Trail	Moderate trail	0.4-mile trail
Whiskey Creek	Group picnic area, swimming	–

Source: NPS 2012.
ADA = Americans with Disabilities Act

Additional recreational opportunities are provided at the Whiskeytown Visitors Center, including exhibits highlighting the history and development of the Whiskeytown NRA.

Fishing opportunities at Whiskeytown Lake include Brown Trout, Rainbow Trout, Kokanee Salmon, Smallmouth Bass, Largemouth Bass, Spotted Bass, Bluegill, Crappie and Sacramento Pikeminnow (*Ptychocheilus grandis*) (NPS n.d.).

S.1.2.4 *Sacramento River from Keswick Dam to the Delta*

The Sacramento River, from Keswick Dam to the Delta, is divided into three reaches for discussion in this section: Keswick Reservoir to Red Bluff, Red Bluff to the Feather River, and the Feather River confluence with the Delta (near the City of West Sacramento).

S.1.2.4.1 Sacramento River from Keswick Dam to Red Bluff

The upper reach of the Sacramento River flows for approximately 60 miles from Keswick Dam to Red Bluff, California (Reclamation 2004). Water-related recreational activities include motorized and non-motorized boating. Boating opportunities include motorboating, jet skiing, kayaking, canoeing, and whitewater rafting in some locations (Reclamation 2014a; Reclamation and Tehama Colusa Canal Authority 2002). Other activities include picnicking, camping, and wildlife viewing. River flows can increase for short periods when water is being released from the CVP facilities and during and following storm events in the upper Sacramento River watershed. Flows in the late fall months may decrease to levels that are not favorable for boating. Water temperatures in this reach are generally cold throughout the year.

Much of the land along the Sacramento River between Balls Ferry, California and Red Bluff is owned and managed by BLM (Reclamation 2014a). Public access points are provided by the Cities of Redding and Anderson and BLM. Lake Redding Park, Turtle Bay, and Anderson River Park are some of the prominent access areas. Boat launching can occur at eight public boat ramps and two smaller launch facilities, including Turtle Bay, Caldwell Park, and South Bonneyview in Redding; Ball Ferry; the Battle Creek confluence with the Sacramento River; Bend Bridge; and Red Bluff River Park in Red Bluff.

There are two easy whitewater river reaches: between Keswick Dam and the Anderson-Cottonwood Irrigation District Diversion Dam, and between Anderson River Park and William B. Ide Adobe State Historic Park.

Camping facilities include public campgrounds along the Sacramento River at Lake Red Bluff Recreation Area (Reclamation 2014a).

There are trails or trail access and picnicking facilities with access to the river in this reach of the Sacramento River (Reclamation 2014a). Trails include the 13-mile Sacramento River Trail, between Keswick Dam and Turtle Bay Park in Redding. Many of the picnicking locations are managed by local municipalities, including the Cities of Redding, Anderson, and Red Bluff. Coleman National Fish Hatchery, located along Battle Creek near the Sacramento River, provides recreational and educational opportunities.

Fishing opportunities along the upper Sacramento River include Chinook Salmon, steelhead, Rainbow Trout, Sunfish, and Striped Bass (Reclamation 2014a). Fishing can occur from boats positioned along the Sacramento River and at four public fishing access points: Turtle Bay East, Kapusta Property, Deschutes Road, Reading Island. Sites that provide fishing and trail access on are Diestlehorst Pasture River Access, Jellys Ferry, and Sacramento River Island.

The Mouth of Cottonwood Creek Wildlife Area is operated by California Department of Fish and Wildlife (CDFW). This area provides viewing opportunities for Swainson's hawk, bald eagle, ringtail cat, river otter, and other birds and mammals (Reclamation 2014a). Hunting opportunities on BLM land occur at Inks Creek, Massacre Flat, Perry Rifle, Paynes Creek, Bald Hill, and Iron Canyon. Commonly hunted game includes quail, dove, waterfowl, deer, pig, turkey, and bear (Reclamation 2014a).

S.1.2.4.2 Sacramento River from Red Bluff to the Feather River

The middle reach of the Sacramento River flows approximately 160 miles from Red Bluff to the confluence with the Feather River (Reclamation 2004). Water-dependent recreational activities along the middle reach include boating, swimming, and fishing (Reclamation 2005a). Water-contact recreational activities are popular in this section of the river because of relatively warm water. Public access points are provided along this reach by California Department of Parks and Recreation (State Parks), and Tehama, Glenn, Colusa, and Sutter Counties (Reclamation 2004, 2005a). River access in this reach is primarily provided at private fishing access points, marinas, and resorts.

The three State Parks properties along the middle reach include the Woodson Bridge State Recreation Area (SRA), Bidwell-Sacramento River State Park, and the Colusa-Sacramento River SRA (CDFW 2004; Reclamation 2014a). Public access for fishing, hunting, and wildlife viewing also is provided at the CDFW Fremont Weir Wildlife Area (CDFW 2018c).

Fishing opportunities include Chinook Salmon, steelhead, trout, American Shad (*Alosa sapidissima*), Sturgeon, Catfish, and Striped Bass (*Morone saxatilis*) (Reclamation 2005a).

Seasonal game hunting opportunities include ring-necked pheasants, California quail, various species of ducks and geese, mourning doves (*Zenaida macroura*), and mule deer (*Odocoileus hemionus*) (Reclamation 2014a).

S.1.2.4.3 Sacramento River from the Feather River to the Northern Delta Boundary

The lower reach of the Sacramento River flows for approximately 20 river miles between its confluence with the Feather River to immediately downstream of the confluence with the American River (U.S. Army Corps of Engineers [USACE] 1991). Most of this reach of the Sacramento River flows along private property.

Water-related recreational activities in this reach include boating, swimming and beach use, and fishing. Picnicking, biking, and sightseeing are also available. Public access is provided by Yolo County at Elkhorn Regional Park (Yolo County); Sacramento County and the City of Sacramento at Discovery Park and Miller Park, respectively (Sacramento County 2012; Reclamation 2005a); and by the City of West Sacramento at Broderick Boat Ramp (City of West Sacramento 2016).

Fishing opportunities in this area include Chinook Salmon, steelhead, American Shad, Sturgeon, Catfish, and Striped Bass (Reclamation 2004, 2005a).

S.1.2.5 *Sacramento Valley Wildlife Refuges*

Wildlife refuges in the Sacramento Valley that rely on CVP water supplies include the Sacramento National Wildlife Refuge (NWR) Complex; Sacramento, Delevan, Colusa, and Sutter NWRs; and the Gray Lodge Wildlife Area (Reclamation 2012). Water-related recreational activities include wildlife viewing, hiking along the refuge wetlands, and waterfowl hunting. Shoreline fishing opportunities at Gray Lodge Wildlife Area include Black Crappie, Largemouth Bass, Green Sunfish, Logperch, Channel Catfish, and Common Carp (*Cyprinus carpio*) (CDFW 2018a).

S.1.3 Clear Creek

The initial reaches of Clear Creek downstream of Whiskeytown Dam are located within the Whiskeytown-Shasta-Trinity NRA. The remaining portions of Clear Creek flow to the Sacramento River through lands owned by BLM and private owners. All of these reaches are located within Shasta County and the most eastern reaches are within the City of Redding.

BLM has established the Clear Creek Greenway along a large portion of Lower Clear Creek from within the Whiskeytown-Shasta-Trinity NRA to the Sacramento River (BLM n.d.). The area also includes the Horsetown-Clear Creek Preserve, which is a private-public partnership recreation area.

Hiking, picnicking, kayaking, swimming, fishing, and gold panning occur along lower Clear Creek (Sacramento River Watershed Project [SRWP] 2010). The Clear Creek Greenway includes ten trails and eight picnic areas (BLM n.d.). Hunting is allowed in the Swasey and Muletown Road areas of the Clear Creek Greenway. Fishing opportunities include steelhead, Chinook Salmon, carp, suckers, Bluegill, bass, and Sacramento Pikeminnow (SRWP 2010).

S.1.4 Feather River

Antelope Lake, Lake Davis, and Frenchman Lake (located in the Upper Feather River), Lake Oroville and Thermalito Forebay and Afterbay, and the Lower Feather River, are located within areas in the Feather River watershed that could be affected by changes in CVP and/or SWP operations.

S.1.4.1 *Upper Feather River Lakes*

The Upper Feather River lakes, including Antelope Lake, Lake Davis, and Frenchman Lake, are SWP facilities on the Upper Feather River upstream of Lake Oroville. These lakes are part of the Plumas National Forest (California Department of Water Resources [DWR] 2013a). Recreational facilities and activities at all three lakes are managed by private concessionaires under contract with the Plumas National Forest.

When water storage in Antelope Lake is at full capacity (water elevation is at 5,002 feet msl), the lake has a surface area of 930 acres and 15 miles of shoreline (DWR 2013a; USFS 2011). Available recreation activities include boating, waterskiing, swimming, fishing, camping, and picnicking. There is a boat ramp, three fishing access sites, and a picnic area. There are three campgrounds at Antelope Lake, including Boulder Creek, Lone Rock, and Long Point. There are approximately 194 campsites and 4 group campsites at the 3 campgrounds open for use between May and October. Fishing opportunities in Antelope Lake include Rainbow Trout, Brook Trout (*Salvelinus fontinalis*), crappie, Channel Catfish, Smallmouth Bass, and Largemouth Bass. Hunting opportunities around Antelope Lake include mule deer and black-tailed deer.

When water storage in Lake Davis is at full capacity (water elevation is at 5,785 feet msl), the lake has a surface area of 4,030 acres and 32 miles of shoreline (DWR 2013a; USFS 2006a). Recreational activities include boating, fishing, camping, and picnicking. There are boat ramps at Lightning and Honker Cove, a car-top boat launch (used for small water craft that can be transported on the roof of a car or truck) at Mallard Cove, a fishing access site, and a picnic area. There are three campgrounds at Lake Davis, including Grizzly, Grasshopper, and Lightning Tree. There are approximately 180 campsites at the 3 campgrounds open for use between May and October. Fishing opportunities in Lake Davis include Rainbow Trout, German Brown Trout (*Salmo trutta*), Eagle Lake Trout (*Oncorhynchus mykiss aquilarum*), Brown Bullhead, and Largemouth Bass. Hunting opportunities around Lake Davis include mule deer and black-tailed deer.

When Frenchman Lake is at full capacity (water elevation is at 5,588 feet msl), it has a surface area of 1,580 acres and 21 miles of shoreline (DWR 2013a; USFS 2006b). Recreational activities include boating, waterskiing, swimming, fishing, camping, picnicking, and ice fishing. There are two boat ramps (Frenchman and Lunker Point), six fishing access sites, and a picnic area. There are five campgrounds at Frenchman Lake, including Chilcoot, Cottonwood Springs, Frenchman, Spring Creek, and Big Cove. There are approximately 209 campsites and 2 group campsites at the 5 campgrounds open for use between May and October. Fishing opportunities in Frenchman Lake include Rainbow Trout, Brown Trout, Eagle Lake Trout, and Smallmouth Bass. Hunting opportunities around Frenchman Lake include deer and waterfowl.

S.1.4.2 *Lake Oroville and Thermalito Forebay and Afterbay*

Lake Oroville and Thermalito Forebay and Afterbay are SWP facilities on the Feather River. The upper North Fork arm of Lake Oroville is part of the Lassen National Forest, and the upper Middle Fork and South Fork arms of Lake Oroville are part of the Plumas National Forest. The Middle Fork Feather River (from Beckwourth, downstream of Lake Davis, to Lake Oroville) was designated as part of Public Law 90-542 (the Wild and Scenic Rivers Act) to be part of the National Wild and Scenic Rivers system on October 2, 1968. Recreational facilities and activities at the Lake Oroville Complex (including Lake Oroville and Thermalito Forebay and Afterbay) are managed by State Parks as part of the Lake Oroville SRA. When the Lake Oroville water storage is at full capacity (water elevation is at 900 feet msl), the lake has a surface area of 15,810 acres. Thermalito Forebay has a surface area of 630 acres. Thermalito

Afterbay has a surface area of 4,300 acres and 17 miles of shoreline when water elevation is at 136.5 feet msl (DWR 2007a, n.d.).

Recreational activities include boating, whitewater boating, camping, picnicking, and fishing (DWR 2007a). Boat types include kayaks, canoes, and fishing boats. Whitewater boating for intermediate to expert level boaters occurs on the Big Bend area of the North Fork Feather River when Lake Oroville elevations are sufficiently low to expose several miles of river. This portion of the North Fork Feather River forms the Upper North Fork arm of Lake Oroville. Generally, this area is exposed in the late fall months. Another whitewater area is located in the Bald Rock Canyon on the Middle Fork Feather River. This whitewater area is located upstream of the Middle Fork arm of Lake Oroville.

There are 11 boat ramps on Lake Oroville, as summarized in Table S.1-16. Two of the boat ramps are located at marinas (DWR 2007a).

Table S.1-16. Lake Oroville, Thermalito Forebay, and Thermalito Afterbay Boat Ramps

Location	Boat Ramp	Comments	Useable Elevations (feet mean sea level)
Lake Oroville	Bidwell Canyon	Day use area, marina with 280 berths and 400 mooring anchors	900 to 700
Lake Oroville	Dark Canyon	Car-top launching	900 to 765
Lake Oroville	Enterprise	–	900 to 835
Lake Oroville	Foreman Creek	Car-top launching	900 to approximately 700
Lake Oroville	Lime Saddle	Day use area, marina, including houseboat rentals	900 to 702
Lake Oroville	Loafer Creek	Boat-in campground	900 to 775
Lake Oroville	Monument Hill	Day use area	900 to approximately 700
Lake Oroville	Nelson Bar	Car-top launching	900 to 850
Lake Oroville	Spillway	Day use area	900 to 700
Lake Oroville	Stringtown Creek	Car-top launching	900 to 866
Lake Oroville	Vinton Gulch	Car-top launching	900 to 850
Thermalito Forebay	North Thermalito Forebay	Day use area, also used by California State University, Chico	Water elevation does not vary substantially
Thermalito Forebay	South Thermalito Forebay	Day use area	Water elevation does not vary substantially
Thermalito Afterbay	Larkin Road	Car-top launching	Water elevation does not vary substantially
Thermalito Afterbay	Oroville Wildlife Area	–	Water elevation does not vary substantially
Thermalito Afterbay	Thermalito Afterbay Outlet	Unsurfaced boat ramp	Water elevation does not vary substantially
Thermalito Afterbay	Wilbur Road	Unsurfaced boat ramp	Water elevation does not vary substantially

Sources: DWR 2006, 2007a.

There are 16 campgrounds at Oroville Lake and the Thermalito complex (DWR 2007a), as summarized in Table S.1-17. During seasons when water elevations are lower than 850 feet msl, shoreline campgrounds at Bidwell Canyon, Lime Saddle, and Loafer Creek are more difficult to access.

Table S.1-17. Lake Oroville, Thermalito Forebay, and Thermalito Afterbay Campgrounds

Location	Campground	Comments	Number of Campsites
Lake Oroville	Bidwell Canyon	Campground	75
Lake Oroville	Bloomer Cove	Boat-in campground	5
Lake Oroville	Bloomer Group	Boat-in group campground	1 site; 75 people maximum
Lake Oroville	Bloomer Knoll	Boat-in campground	6
Lake Oroville	Bloomer Point	Boat-in campground	25
Lake Oroville	Craig Saddle	Boat-in campground	18
Lake Oroville	Floating Campsites	Boat-in campground	10 different locations; approximately 15 sites per location
Lake Oroville	Foreman Creek	Boat-in campground	26
Lake Oroville	Goat Ranch	Boat-in campground	5
Lake Oroville	Lime Saddle	Campground Group campground	44 6 (3 ADA-accessible)
Lake Oroville	Loafer Creek	Campground Group campground Equestrian campground	137 6 (ADA-accessible) 15
Thermalito Forebay	North Thermalito Forebay “En Route”	RV campground	15
Thermalito Afterbay	Oroville Wildlife Area	Primitive campground, sites not marked	Several

Sources: DWR 2006, 2007a.
ADA = Americans with Disabilities Act

Lake Oroville recreational areas also include day use areas for picnicking, swimming, and other recreational opportunities, as summarized in Table S.1-18. Because the shoreline is steep and rocky, day use activities can be limited during seasons when water elevations are lower than 850 feet msl.

Table S.1-18. Lake Oroville, Thermalito Forebay, and Thermalito Afterbay Day Use Areas

Location	Day Use Area	Comments	Number
Lake Oroville	Bidwell Canyon Saddle Dam trailhead	Trail, picnicking	4.9-mile trail (hiking and bicycling), 21 picnic sites
Lake Oroville	Chaparral Trail	Interpretative trail	0.2-mile trail
Lake Oroville	Dan Beebe Trail Saddle Dam, Lakeland Boulevard, Oro Dam Boulevard, and visitor center trailheads	Trail	14.3-mile trail (equestrian and hiking)
Lake Oroville	Lake Oroville Visitors Center	Visitors center, picnicking	18 picnic sites
Lake Oroville	Lime Saddle	Picnicking	13 picnic sites

Location	Day Use Area	Comments	Number
Lake Oroville	Loafer Creek	Trails, swimming, picnicking	3.2-mile trail (equestrian and hiking), 1.7-mile trail (hiking), 30 picnic sites
Lake Oroville	Model Aircraft Flying Facility	Aircraft staging, picnicking	6 picnic sites
Lake Oroville	Oroville Dam Overlook and Spillway Day Use Area	Trail, picnicking, shoreline fishing	1-mile trail along Oroville Dam crest, 8 picnic sites
Lake Oroville	Potter's Ravine	Trail	5.5-mile trail
Lake Oroville	Roy Rogers Trail	Trail	4-mile (equestrian and hiking)
Lake Oroville	Sewim Bo Trail	Trail (much of trail is outside action area), picnicking	0.5-mile trail (bicycle, equestrian, and hiking), 1 picnic site
Lake Oroville	Wyk Island Trail	Trail (ADA-accessible)	0.2-mile trail
Feather River downstream of Oroville Dam	Feather River Fish Hatchery	Hatchery, picnicking	1 picnic site
Oroville Dam Crest, Diversion Pool, Thermalito Forebay, and Thermalito Afterbay	Brad Freeman Trail Diversion Pool access road, East Hamilton Road, Powerhouse Road, Toland Road, and Tres Vias Road trailheads	Trail loop	41-mile trail (bicycle and hiking)
Thermalito Forebay	North Thermalito Forebay	Picnicking, swimming, en-route camping	117 picnic sites
Thermalito Forebay	South Thermalito Forebay	Picnicking, swimming, shoreline fishing	10 picnic sites
Thermalito Afterbay	Monument Hill	Picnicking, swimming, shoreline fishing	10 picnic sites
Oroville Wildlife Area	Rabe Road Shooting Range	Range and target shooting, picnicking	7 picnic sites
Oroville Wildlife Area	Clay Pit State Vehicular Recreation Area	Off-highway vehicle riding	–
Thermalito Afterbay	Thermalito Afterbay Outlet and Oroville Wildlife Area	Trails, picnicking, shoreline fishing, hunting	Several trails and day use areas

Sources: DWR 2006, 2007a.
ADA = Americans with Disabilities Act

Fishing is popular at the Lake Oroville complex and is performed by boat and from the shoreline (DWR 2007a). Fishing opportunities in Lake Oroville include Smallmouth Bass, Largemouth Bass, Spotted Bass, Red-Eye Bass, Black Crappie, Bluegill, Green Sunfish, Channel Catfish, White Catfish, Coho Salmon, Rainbow Trout, and Brown Trout. In Thermalito Forebay, fish species include Brook Trout, Brown Trout, Rainbow Trout, and Chinook Salmon. In Thermalito Afterbay, fishing opportunities include Smallmouth Bass, Largemouth Bass, trout, Channel Catfish, White Catfish, and carp. Downstream in the Feather River, fishing opportunities include steelhead, Chinook Salmon, American Shad, Smallmouth Bass, Largemouth Bass, and White Sturgeon (*Acipenser transmontanus*).

Hunting opportunities occur around Thermalito Afterbay and/or the Oroville Wildlife Area for turkey (in the spring), dove, quail, waterfowl, pheasant, deer, squirrel, and rabbit.

S.1.4.3 *Feather River from Thermalito Afterbay/Oroville Wildlife Area to Sacramento River*

The Feather River flows from Thermalito Dam to approximately 40 miles downstream to the confluence with the Sacramento River (Reclamation 2004). The Feather River Wildlife Area, managed by CDFW, is located along the Feather River near the confluence with the Bear River. The Feather River Wildlife Area includes Abbott Lake, Star Bend, O'Connor Lakes, Lake of the Woods, and Nelson Slough Units, and Bobelaine Audubon Ecological Reserve (CDFW 2018b). The southern boundary of the wildlife area is located adjacent to the Sutter Bypass. In Sutter County, water-related recreational opportunities along the Feather River also include public access at Donahue Road Park, Tisdale Boat Ramp, Boyd's Pump boat ramp, Feather River Parkway, Yuba City Boat Ramp, Riverfront Park in Marysville, and Live Oak Park and Recreation Area (Sutter County 2011). There are several private facilities that offer camping, boating, and river access.

S.1.5 American River

Folsom Lake and Lake Natoma on the American River and the lower American River are located within areas in the American River watershed that could be affected by changes in CVP and/or SWP operations.

S.1.5.1 *Folsom Lake and Lake Natoma*

Folsom Lake is a CVP facility on the American River. The El Dorado National Forest is located in the upper American River watershed upstream of Folsom Lake. The State of California designated the North Fork American River, from the source to Iowa Hill Bridge upstream of Folsom Lake, as part of California's Wild and Scenic Rivers System. Recreational facilities and activities in the Folsom Lake area are within the Folsom Lake SRA or the Folsom Powerhouse State Historic Park that are managed by State Parks. Recreational activities upstream of Folsom Lake occur on or adjacent to many lands owned by BLM, State Parks, and El Dorado County. When the water storage in Folsom Lake is at full capacity (water elevation is at 466 feet msl), it has a surface area of 11,450 acres and 75 miles of shoreline (State Parks and Reclamation 2003, 2007).

The upper extent of Lake Natoma is located about 1 mile downstream of Folsom Dam. Lake Natoma continues from the Rainbow Bridge to Nimbus Dam, about a 4-mile distance (State Parks and Reclamation 2003, 2007). Recreational facilities and activities at Lake Natoma area are part of the Folsom Lake SRA and managed by State Parks. When the water storage in Lake Natoma is at full capacity (water elevation is at 132 feet msl), the lake has a surface area of 540 acres and 14 miles of shoreline.

Water-related recreational activities at Folsom Lake include boating, jet skiing, waterskiing, windsurfing, rafting, sailing, canoeing, kayaking, swimming, and fishing (Reclamation 2005b; State Parks and Recreation 2003, 2007). The South Fork American River has 21 miles of whitewater boating that includes stretches ranging from beginner to stretches that are more appropriate for intermediate to expert boaters. Two reaches (both approximately 10 miles long) are the most popular: Upper Chili Bar to Lotus Shuttle and Lower Salmon Falls to Skunk Hollow (American Whitewater 2017). These reaches are moderately difficult and therefore appropriate for intermediate to advanced level rafters. Parking is available at put-ins and take-outs. Camping is available along the river as well.

Water-related activities at Lake Natoma generally only include paddling, rowing, and fishing because of a 5 mile-per-hour speed limit for motorized watercraft. California State University, Sacramento operates an aquatic center at Lake Natoma (Reclamation et al. 2006).

Folsom Lake Marina at Brown's Ravine is the only marina at Folsom Lake. There are six boat ramp facilities at Folsom Lake and three boat ramp facilities at Lake Natoma, as summarized in Table S.1-19.

Table S.1-19. Folsom Lake and Lake Natoma Boat Ramps

Location	Boat Ramp	Comments	Useable Elevations (feet mean sea level)
Folsom Lake	Beal's Point	Day use area Informal boat ramp	465 to 420
Folsom Lake	Brown's Ravine	Day use area Folsom Lake Marina with 685 wet slips and 175 dry storage slips	466 to 395
Folsom Lake	Folsom Point	–	466 to 406
Folsom Lake	Granite Bay	Day use area Largest boat ramp facility at Folsom Lake	466 to 360
Folsom Lake	Hobie Cove	–	426 to 375
Folsom Lake	Peninsula	Day use area	466 to 410
Folsom Lake	Rattlesnake Bar	–	466 to 425
Lake Natoma	Negro Bar	–	121 to 115
Lake Natoma	Nimbus Flat	Main boat ramp Informal boat ramp	128 to 115 128 to 120
Lake Natoma	Willow Creek	Informal boat ramp	125 to 115

Sources: Reclamation et al. 2006; State Parks and Reclamation 2003, 2007.

Campgrounds are located at Folsom Lake and Lake Natoma, as summarized in Table S.1-20. During seasons when water levels are lower, campsites are farther from the shoreline.

Table S.1-20. Folsom Lake and Lake Natoma Campgrounds

Location	Campground	Comments	Number of Campsites
Folsom Lake	Beal's Point	–	49 campsites, 20 RV sites
Folsom Lake	Peninsula	Campground Boat-in campground	104 campsites
Lake Natoma	Negro Bar	Group campground	3 major campsites

Sources: State Parks and Reclamation 2003, 2007; Reclamation et al. 2006.

Folsom Lake and Lake Natoma recreational areas also include day use areas for picnicking, swimming, and other recreational opportunities, as summarized in Table S.1-21. The locations for shoreline day use areas are limited because of the steep and rocky elevations at the shorelines. These locations are less desirable for use when water elevations are low. The Jedediah Smith Memorial Trail begins at Beal's Point and extends along Lake Natoma to the confluence of the American River and Sacramento River, downstream of Nimbus Dam. The Pioneer Express Trail, which extends from the Auburn SRA to Beal's Point, is part of the Western States Pioneer Express Trail (a National Recreation Trail).

Table S.1-21. Folsom Lake and Lake Natoma Day Use Areas

Location	Day Use Area	Comments	Number
Folsom Lake	Beal's Point	Picnicking, swimming Trailhead for Jedediah Smith Memorial Trail	53 picnic sites in day use area 69 picnic sites at campground
Folsom Lake	Brown's Ravine Trail	Trail (to Old Salmon Falls)	12 miles
Folsom Lake	Darrington Trail	Trail	9 miles
Folsom Lake	Doton's Point ADA Trail	Trail	1 mile
Folsom Lake	Folsom Point	Picnicking, waterskiing Trail (to Brown's Ravine Trail)	50 picnic sites 4 miles
Folsom Lake	Folsom Powerhouse	Historic Site and Museum Trail	10 picnic sites 1 mile
Folsom Lake	Folsom Reservoir River Access Areas	Whitewater rafting (South Fork)	40 commercial rafting outfitters with 67 permits No permits for private boats
Folsom Lake	Granite Bay	Trail Picnicking, Swimming, fishing, equestrian, hiking	Several trails: 1 to 5 miles 100 picnic sites
Folsom Lake	Los Lagos Trail	Trail	1.5 miles
Folsom Lake	Old Salmon Falls	Swimming, equestrian, hiking Trailhead for Brown's Ravine and Sweetwater trails	–
Folsom Lake	Peninsula	Trail Picnicking	1 mile 6 picnic sites in day use area 104 picnic sites at campground
Folsom Lake	Pioneer Express Trail	Trail	21 miles
Folsom Lake	Rattlesnake Bar	Equestrian	–
Folsom Lake	Skunk Hollow and Salmon Falls	Whitewater rafting (South Fork)	–
Folsom Lake	Sweetwater Creek	Trailhead for Sweetwater Trail	–
Folsom Lake	Sweetwater Trail	Trail	2 miles
Lake Natoma	Lake Natoma Trails	Trail	Several trails: 1 to 10 miles
Lake Natoma	Lake Overlook	Trailhead for Lake Natoma Trail	–
Lake Natoma	Negro Bar	Picnicking, fishing, equestrian Trailhead for Lake Natoma Trail	32 picnic sites in day use area 17 at campground
Lake Natoma	Nimbus Fish Hatchery	Hatchery	–

Location	Day Use Area	Comments	Number
Lake Natoma	Nimbus Flat	California State University, Sacramento Aquatic Center Trailhead for Lake Natoma Trail	37 picnic sites
Lake Natoma	Willow Creek	Trailhead for Lake Natoma Trail	4 picnic sites

Sources: Reclamation et al. 2006; State Parks and Reclamation 2003, 2007.
ADA = Americans with Disabilities Act

Fishing is also popular at Folsom Lake and Lake Natoma from boats and the shoreline. Anglers can catch warmwater and cold water fish species owing to the summer stratification of the lake into a warm layer above a cold water pool, especially in Folsom Lake (State Parks and Reclamation 2007). Warmwater fishing opportunities include Smallmouth Bass, Largemouth Bass, Spotted Bass, and Black and White Crappie. The cooler water strata support fishing for Rainbow Trout, Brown Trout, and Chinook Salmon.

S.1.5.2 *American River from Nimbus Dam to the Confluence with Sacramento River*

The American River, which flows 14 miles between Nimbus Dam and its confluence with the Sacramento River, was designated by the Secretary of the Interior to be part of the National Wild and Scenic Rivers system on January 19, 1981. The State of California also designated the Lower American River as a recreational river under Public Resources Code Sections 5093.54 and 5093.545.

The Jedediah Smith Memorial Trail (also known as the American River Bike Trail) continues along the American River from Beal's Point at Folsom Lake, along Folsom Lake and Lake Natoma, and along the Lower American River through Discovery Park to its confluence with the Sacramento River (Reclamation 2005b).

The American River Parkway is a 26-mile green space designated and managed by Sacramento County Parks and Recreation along the Lower American River from Nimbus Dam to the confluence with the Sacramento River at Discovery Park. This parkway provides extensive recreational opportunities, including boating, rafting, kayaking, canoeing, swimming, and fishing (Reclamation 2005b; Sacramento County 2008). Pedestrian access is provided at 87 locations along the parkway. Bicycle access and equestrian access are provided at 65 and 37 locations, respectively. Boat ramps are provided at seven locations and car-top boat ramps are provided at 17 locations. Picnic sites exist at numerous locations along the American River. Fishing opportunities along the Lower American River include Chinook Salmon, steelhead, trout, Striped Bass, American Shad, Largemouth Bass, Bluegill, Crappie, Sunfish, and Catfish (Sacramento County 2008).

S.1.5.3 *Sacramento Municipal Utility District – Rancho Seco Park and Lake*

Rancho Seco Park and Lake, operated by Sacramento Municipal Utility District, is used to store CVP water (Reclamation 2005b). The lake has a surface area of 160 acres. Recreation activities include boating, camping, picnicking, bird watching, and fishing. Facilities available for these activities include two boat ramps and a fish cleaning facility. Game fish species found at the lake include Catfish, Bluegill, Crappie, and trout. Birds that use the area include ducks, geese, hawks, bald eagles, blue heron (*Ardea herodias*), and migratory birds (Sacramento Municipal Utility District 2013).

S.1.6 Stanislaus River

New Melones Reservoir and Tulloch Reservoir on the Stanislaus River and the lower Stanislaus River are located within areas in the Stanislaus River watershed that could be affected by changes in CVP operations.

S.1.6.1 *New Melones Reservoir*

New Melones Reservoir is a CVP facility on the Stanislaus River. Recreational activities and facilities at New Melones Reservoir are managed by Reclamation. When the water storage in the New Melones Reservoir is at full capacity (water elevation is at 1,088 feet msl), it has a surface area of approximately 12,500 acres and 105 miles of shoreline (Reclamation 2010a).

Water-related recreational activities include boating, waterskiing, camping, picnicking, wildlife viewing, spelunking, rock climbing, gold panning, and fishing (Reclamation 2010a). Float planes can land within the north, middle, and south bays of the reservoir. A model airplane club operates an airstrip near New Melones Dam. Cave exploration occurs in the Stanislaus River Canyon. Rock climbing occurs on Table Mountain. The reservoir level varies and in dry years when the reservoir water level is low and the flow of the river quickens, whitewater rafters are able to launch at the Old Camp Nine Bridge. In wet years, when the water level in the reservoir is high, there is not enough flow to create whitewater conditions and whitewater rafting is not available.

There are five boat ramps at New Melones Reservoir, as summarized in Table S.1-22.

Table S.1-22. New Melones Reservoir Boat Ramps

Boat Ramp	Comments	Useable Elevations (feet mean sea level)
Angels Creek	–	1,088 to 975
Glory Hole	Location of New Melones Lake Marina	Several boat ramps: 1,088 to 860
Mark Twain	Unimproved ramp	1,088 to 760
Parrotts Ferry	Unimproved ramp	Several boat ramps: 1,088 to 900
Tuttletown	-	Several boat ramps: 1,088 to 965

Source: Reclamation 2010a.

The New Melones Marina is the only location with mooring facilities and houseboat rentals (Reclamation 2010a). Up to 50 private houseboats on mooring balls, 38 private houseboats in slips, and 20 rental houseboats may be maintained on the reservoir.

Campgrounds are located at Glory Hole and Tuttletown, as summarized in Table S.1-23 (Reclamation 2010a). Some of the campsites are located along the shoreline and the water can be more difficult to access during seasons characterized by low water levels.

Table S.1-23. New Melones Reservoir Campgrounds

Campground	Comments	Number of Campsites
Glory Hole	Two campgrounds	144
Tuttletown	Three campgrounds Two Group campgrounds	161 16

Source: Reclamation 2010a.

New Melones Reservoir recreational areas also include day use areas for picnicking, swimming, and other recreational opportunities, as summarized in Table S.1-24 (Reclamation 2010a). The locations for shoreline day use areas are less desirable when water elevations are low.

Table S.1-24. New Melones Reservoir Day Use Areas

Day Use Area	Comments	Number
Glory Hole Recreation Area (Buck Brush, Black Bart, Osprey Point)	Picnicking, trails	61 sites Several trails: 0.25 to 2.5 miles
Mark Twain	Picnicking, Norwegian Gulch Trail	0.5 miles
Natural Bridges	Trail	0.7 miles
Shoreline	Swimming, recreational gold panning	–
Table Mountain	Trail	Several trails: 1.5 to 4.0 miles
New Melones Lake Visitor	Visitor Center	–
Tuttletown Recreation Area (Heron Point, Eagle Point, Lupine)	Picnicking, trail	52 sites Several trails: 0.4 to 1.7 miles

Sources: Reclamation 2010a, 2010b, 2014b.

S.1.6.2 *Tulloch Reservoir*

Tulloch Reservoir is a reservoir owned and operated by the Oakdale and South San Joaquin Irrigation Districts on the Stanislaus River, downstream of New Melones Reservoir. When the water storage in Tulloch Reservoir is at full capacity (water elevation is at 510 feet msl), the reservoir has a surface area of 1,260 acres and 55 miles of shoreline (Clark Broadcasting Corporation 2013; Tri-Dam Project 2015).

Water-related recreational activities include boating, sailing, windsurfing, jet and waterskiing, and fishing. Camping and picnicking is also available. Most of the shoreline is privately owned, with shoreline access and more than 500 private docks for residents (Tri-Dam Project 2015). Public access is provided at a CDFW marina and campground, with a boat ramp at South Shore Marina & Campground.

S.1.6.3 *Stanislaus River from Tulloch Dam to the San Joaquin River*

Downstream of Tulloch Dam, the Stanislaus River flows to Goodwin Dam, and then continues approximately 40 miles to the confluence with the San Joaquin River. Recreational activities along the lower portion of the Stanislaus River include whitewater rafting, camping, picnicking, swimming, and fishing. Intermediate to expert level whitewater rafting begins at Goodwin Dam and continues almost 4 miles to Knights Ferry (American Whitewater 2014a). Downstream of Knights Ferry, there are seven parks, including Caswell Memorial State Park, a 258-acre park managed by State Parks (Stanislaus County 2015; State Parks 2018). Fishing opportunities on the lower Stanislaus River include Bass, Catfish, and Crappie.

S.1.7 San Joaquin River

S.1.7.1 *Millerton Lake*

Millerton Lake is a CVP facility on the San Joaquin River. Millerton Lake is part of the Millerton SRA. Recreational facilities and activities at Millerton Lake are administered by State Parks. When the water storage in Millerton Lake is at full capacity (water elevation is at 580.6 feet msl), it has a surface area of approximately 4,900 acres and 44 miles of shoreline (Reclamation and DWR 2011).

Recreational opportunities include boating, sailing, waterskiing, jet skiing, swimming, tournament and recreational fishing, camping, and picnicking (Reclamation and DWR 2011; Reclamation and State Parks 2010). Whitewater rafting opportunities for intermediate level rafters occur upstream of Millerton Lake between August and November when low water levels in the lake increase the water flow (American Whitewater 2018). The public boat ramps on Millerton Lake are summarized in Table S.1-25.

Table S.1-25. Millerton Lake Boat Ramps

Boat Ramp	Comments	Useable Elevations (feet mean sea level)
Crow's Nest	On South Shore	580 to 487
Grange Cove	On South Shore	Several Boat Ramps: 580 to 500
McKenzie Point	On South Shore	580 to 472
North Shore	On North Shore	580 to 470
South Bay	On South Shore	580 to 500

Sources: Reclamation and DWR 2011; Reclamation and State Parks 2010.

The marina at Millerton Lake is located at Winchell Cove on the South Shore (Reclamation and State Parks 2010). The marina includes 500 boat slips. There are also eight boat slips at Crow's Nest.

Campgrounds are located along the Millerton Lake North Shore, as summarized in Table S.1-26. Many of these campsites are located along the shoreline. These campsites are less used at low water elevations because the distance from the campsites to the shoreline is increased.

Table S.1-26. Millerton Lake Campgrounds

Campground	Comments	Number of Campsites
Dumna Strand	–	10
Fort Miller	Shoreline campground	36
Group Campsites	Group campground Amphitheater	2 sites with total of 120 sites
Meadows	Campsites Equestrian campsites	59 4 corrals and campsites
Mono	–	16
North Fine Gold Campground	Boat-in campground	15
Rocky Point	–	21
Temperance Flat Boat	Boat-in campground	25
Valley Oak	–	6

Source: Reclamation and State Parks 2010.

Millerton Lake recreational areas also include day use areas for picnicking, swimming, and other recreational opportunities, as summarized in Table S.1-27 (Reclamation and State Parks 2010). The locations for shoreline day use areas are less desirable when water elevations are low.

Table S.1-27. Millerton Lake Day Use Areas

Day Use Area	Comments	Number
Blue Oak	Picnicking and trail along the South Shore	3 sites 4 miles
Buzzard's Roost Trail	Picnicking, trail	2 sites 0.5 miles
Crow's Nest	Picnicking	13 sites
Eagle's Nest	Picnicking, trailhead	2 sites
Fort Miller	Trail	0.25 miles
Grange Grove	Picnicking	74 sites
La Playa	Picnicking, swimming	95 sites
McKenzie Point	Picnicking	–
Meadows	Picnicking	10 sites
Millerton Courthouse	Historic site, picnicking	3 sites
San Joaquin River Trail	Portions along the Millerton Lake shoreline	14 miles
South Bay	Picnicking	9 sites
South Fine Gold	Picnicking, trail	10 sites 11 miles

Sources: Reclamation and State Parks 2010; State Parks 2017a.

S.1.7.2 *San Joaquin River from Friant Dam to the Delta*

The San Joaquin River flows 100 miles from Friant Dam to the Delta. Downstream of Friant Dam, the San Joaquin River flows 23 miles through lands within the San Joaquin River Parkway, which includes parks, trails, and ecological reserve areas between Friant Dam and State Route 145 managed by the San Joaquin River Parkway and Conservation Trust (Reclamation and DWR 2011).

Water-related recreational activities include boating, canoeing, kayaking, whitewater rafting, and fishing (Reclamation and DWR 2011). Camping, picnicking, and hunting are also available. Access and facilities for these activities are available at several locations along and adjacent to the San Joaquin River.

Between Friant Dam and the confluence with the Merced River, beginner level whitewater rafting occurs between Friant Dam to Skaggs Bridge Park at State Route 145 (American Whitewater 2014b). Public access locations are generally located within the San Joaquin River Parkway. Seven boat ramps are located along the San Joaquin River Parkway that are managed by the San Joaquin River Parkway and Conservation Trust and/or CDFW, Fresno County, or private operators. Lost Lake Park, managed by the San Joaquin River Parkway and Conservation Trust and CDFW, provides a nonpowered car-top boat ramp. Sycamore Island Park, managed by San Joaquin River Parkway and Conservation Trust, offers a boat ramp for small boats. River access also is available at Skaggs Bridge Park, managed by Fresno County. Picnicking is provided at most of the public access locations and at several other locations within the parkway. Camping is provided at Scout Island and Lost Lake Park, managed by Fresno County and the private Fort Washington Beach. Trails include the 5-mile-long Lewis S. Eaton Trail.

Downstream of State Route 145, recreational areas include the 85-acre Mendota Pool in Mendota, California; Dunkle and Maldonado parks in the City of Firebaugh; and Las Palmas Fishing Access and Laird Park in Stanislaus County. Public access is provided at all of these sites. A boat ramp is located upstream of Mendota Dam.

The majority of these areas permit fishing. Fishing opportunities in the San Joaquin River include sunfish, crappie, Bluegill, Striped Bass, Largemouth Bass, and catfish (Reclamation and DWR 2011).

S.1.7.3 *San Joaquin Valley Refuges*

Wildlife refuges in the San Joaquin Valley that rely on CVP water supplies include the San Luis NWR (including the San Luis Unit, West Bear Creek Unit, East Bear Creek Unit, Freitas Unit, and Kesterson Unit); Merced NWR; Los Banos Wildlife Area; Volta Wildlife Area; Mendota Wildlife Area; North Grasslands Wildlife Area (including China Island Unit and Salt Slough Unit); and Grasslands Resource Conservation District (Reclamation 2012). Water-related activities include wildlife viewing and hunting. Hunting opportunities include waterfowl, shorebirds, and pheasants (Reclamation and DWR 2011).

Several wildlife areas along the San Joaquin River rely on CVP operations of Millerton Lake to provide water (Reclamation and DWR 2011). West Hilmar Wildlife Area includes 340 acres of wildlife area accessible by boat. The San Joaquin River NWR includes over 7,000 acres of riparian woodlands, wetlands, and grasslands for native wildlife, and the 4-mile long Pelican Nature Trail (U.S. Fish and Wildlife Service [USFWS] 2012).

In the southern San Joaquin Valley, the Kern and Pixley NWRs provide wildlife viewing opportunities.

S.1.8 Bay-Delta

The Delta is located at the terminus of the Sacramento River and the San Joaquin River. Water-related activities in the Delta include boating, sailing, waterskiing, canoeing, kayaking, picnicking, fishing, and hunting. Recreational opportunities exist in many areas of the Delta; however, the analysis in this EIS is related to areas that could be affected by changes in CVP and/or SWP water supply operations and restoration in the Yolo Bypass. The following discussion describes recreation throughout the Delta, followed by more specific discussions of recreation within the Yolo Bypass and Cache Slough.

S.1.8.1 *Delta Recreational Opportunities*

The primary recreational activities in the Delta are related to boating and fishing (Delta Protection Commission [DPC] 2012a). Public recreation facilities are limited within the Delta. Most recreational opportunities are provided by private enterprises, including marinas, restaurants, hunting venues, and wineries and farm visits. Public access is provided at CDFW and USFWS sites.

The most recent survey of boating opportunities in the Delta was completed in 2002 by the California Department of Boating and Waterways (California Department of Boating and Waterways 2014; DPC 2012a). The survey indicated that of the 95 marinas surveyed, three were publicly owned and 92 were privately owned (including 87 that were open to the public and five that were for members). The survey indicated that within the Delta, there were over 11,600 boat slips, 55 boat ramps, 2,182 campsites, and 324 picnic sites.

Public access sites for boating and wildlife and scenic viewing in the Delta include:

- USFWS: Stone Lakes NWR, Antioch Dunes NWR (Antioch 2017).
- CDFW: Calhoun Cut Ecological Reserve, Decker Island Wildlife Area, Lower Sherman Island Wildlife Area, Miner Slough Wildlife Area, Rhode Island Wildlife Area, White Slough Wildlife Area, Woodbridge Ecological Reserve, Fremont Weir Wildlife Area, Sacramento Bypass Wildlife Area, and Yolo Bypass Wildlife Area.
- State Parks: Brannan Island-Franks Tract SRAs, Delta Meadows SRA.

- Department of Water Resources: Clifton Court Forebay.
- The Nature Conservancy/CDFW: Cosumnes River Preserve.
- Solano Land Trust: Jepson Prairie Preserve.
- East Bay Regional Park District (EBRPD): Big Break Regional Shoreline, Antioch/Oakley Regional Shoreline, Browns Island Regional Preserve, Bay Point Regional Shoreline, Martinez Regional Shoreline, Carquinez Strait Regional Shoreline-Crockett Hills Regional Park, and Contra Costa Canal Trail.
- Municipal marinas, boat ramps, and fishing access facilities: City of Antioch Marina and Municipal Boat Ramp; City of Pittsburg Riverview Park; Sacramento County Cliffhouse, Georgiana Slough Fishing Access, Hogback Island Access, and Sherman Island Public Access Facility; City of Sacramento Garcia Bend Park; several public and private marinas in Sacramento County; 12 public and private marinas with over 900 boat slips and boat access within the City of Stockton; San Joaquin County Dos Reis Regional Park, Mossdale Crossing Regional Park, and Westgate Landing Regional Park; and Yolo County Clarksburg River Access.

Several of these sites include launch sites for boats, canoes, and kayaks and trails (DPC 2012a; Delta Stewardship Council 2013; CDFW 2018a, 2018c, 2018d; EBRPD 2013a; Antioch 2017; City of Pittsburg 2010; Sacramento County 2019; City of Sacramento 2018; City of Stockton 2007; Yolo County 2009).

One of the larger bodies of water in the Delta is the SWP Clifton Court Forebay. Fishing is the only recreational opportunity that occurs within the Clifton Court Forebay, and the opportunities here are limited (DWR 2013b). Public access is restricted near the radial gate along West Canal. However, boat access is possible at two locations. There is a small boat dock located at the southern end of West Canal to the east of the radial gate. A second access point is located on the north bank of the intake canal from Clifton Court Road.

Fishing opportunities in the Delta generally include Striped Bass, Smallmouth Bass, Largemouth Bass, Spotted Bass, American Shad, Black Crappie, Chinook Salmon, steelhead, catfish, sunfish, Tule Perch (*Hysterocarpus traskii*), Warmouth (*Lepomis gulosus*), and White Sturgeon (DPC 2012b).

Hunting opportunities for waterfowl, shorebirds, doves, and pheasants occur in many areas of the Delta on privately owned land. Hunting also occurs at several publicly owned sites within the Delta, including:

- USFWS: Stone Lakes NWR.
- CDFW: Decker Island Wildlife Area, Lower Sherman Island Wildlife Area, Miner Slough Wildlife Area, Rhode Island Wildlife Area, White Slough Wildlife Area, Yolo Bypass Wildlife Area, and on some lands owned by DWR (including Sherman and Twitchell Islands and Clifton Court Forebay).

Recreational opportunities in the Bay-Delta region vary depending on CVP and SWP water facility operations (DPC 2012a).

S.1.8.2 *Yolo Bypass and Cache Slough Recreational Opportunities*

The primary recreational activities in the Yolo Bypass and Cache Slough areas are related to wildlife viewing and hunting. Many recreational hunting opportunities occur on private lands, including private

hunting clubs. Areas within Yolo Bypass and Cache Slough that provide public access for wildlife viewing or hunting include:

- Fremont Weir Wildlife Area (CDFW 2018c): Activities include wildlife viewing, fishing, and hunting for pheasant, waterfowl, mourning dove, deer, quail, rabbit, and turkey.
- Sacramento Bypass Wildlife Area (CDFW 2018d): Activities include wildlife viewing, fishing for White Sturgeon, White Catfish, and Black Crappie in the Tule Canal; and Largemouth Bass, Bluegill, and White Catfish in the borrow pits.
- Yolo Bypass Wildlife Area (CDFW 2018e): Wildlife viewing and hiking. Fishing for sturgeon, Striped Bass, Black Bass, and catfish. Hunting for waterfowl, coots, moorhens, snipe, pheasants, and mourning doves. Educational and interpretative programs.
- Calhoun Cut Ecological Reserve (CDFW 2018f): Waterfowl hunting and fishing from a boat.

There are other publicly-owned lands within the Yolo Bypass and Cache Slough that provide habitat or will be restored to provide habitat. However, these lands are generally not available for public access to protect fragile ecosystems.

S.1.8.3 *Suisun Marsh*

Suisun Marsh is 106,511 acres of wetlands located between the Delta and the San Francisco Bay. Water-related activities at Suisun Marsh include waterfowl hunting, boating, kayaking, hiking, wildlife viewing, fishing, and hunting (Reclamation et al. 2011). Water-related recreation occurs within the two major channels (Montezuma and Suisun Sloughs), and several moderately sized channels (Cordelia, Denverton, Nurse, and Hill Sloughs).

The CDFW manages several areas within the Suisun Marsh for public access. These areas include (Reclamation et al. 2011):

- Grizzly Island Wildlife Area: Activities include wildlife viewing, hiking, fishing (February through July, and late September), hunting (August through mid-September, and October through January).
- Hill Slough Wildlife Area: Activities include wildlife viewing and fishing.
- Peytonia Slough Ecological Preserve: Activities include kayaking, wildlife viewing, and fishing.
- Belden's Landing Water Access Facility: Facilities include boat ramp and fishing pier.

Suisun City Marina and Solano Yacht Club, Suisun City Boat Launch, and McAvoy Yacht Harbor and Club also provide boat ramp facilities (Reclamation et al. 2011). Pier fishing opportunities are provided at Suisun City Boat Ramp.

The Solano Land Trust's Rush Ranch also provides opportunities for hiking and picnicking in the wetlands and upland areas near Potrero Hills (Reclamation et al. 2010).

Fishing opportunities within Suisun Marsh include Striped Bass, White Sturgeon, catfish, and carp (Reclamation et al. 2011). Occasionally, Chinook Salmon, steelhead, and Largemouth Bass are caught in Suisun Marsh near Grizzly Island.

Duck hunting generates the most frequent recreational visits in Suisun Marsh (Reclamation et al. 2011). About 37,500 acres of Suisun Marsh are owned and operated by private duck clubs. CDFW manages

about 15,300 acres of public lands in Grizzly Island Wildlife Area for hunting waterfowl, snipe, coots, moorhens, mourning doves, pheasants, rabbits, and Tule elk.

There are other publicly-owned lands within Suisun Marsh that provide habitat or will be restored to provide habitat. However, these lands are generally not available for public access to protect fragile ecosystems.

S.1.8.4 *San Francisco Bay*

The San Francisco Bay Area includes portions of Contra Costa, Alameda, Santa Clara, San Benito, and Napa counties that are within the CVP and SWP service areas. This section describes reservoirs in the San Francisco Bay Area that could be affected by CVP and SWP operations, including the CVP Contra Loma and San Justo Reservoirs; the SWP Bethany Reservoir and Lake Del Valle; the Contra Costa Water District (CCWD) Los Vaqueros Reservoir; and the East Bay Municipal Utility District (EBMUD) Upper San Leandro, San Pablo, Briones, and Lafayette Reservoirs and Lake Chabot. CVP and SWP water is generally not stored in reservoirs within Santa Clara County (Santa Clara Valley Water District 2016).

S.1.8.4.1 Contra Loma Reservoir

The Contra Loma Reservoir is a CVP facility in Contra Costa County that provides offstream storage along the Contra Costa Canal. The recreation facilities are managed by EBRPD. The 80-acre reservoir is part of the 661-acre Contra Loma Regional Park and Antioch Community Park (Reclamation 2014c). Recreational activities include boating, windsurfing, kayaking, picnicking, and fishing. No bodily contact is to occur in Contra Loma Reservoir; therefore, a large swimming pool was constructed for the visitors by EBRPD. There is one boat ramp at the reservoir. Contra Loma Reservoir accommodates fishing all year-round. Fishing opportunities include catfish, Black Bass, Striped Bass, Largemouth Bass, Bluegill, crappie, trout, and Redear Sunfish (*Lepomis microlophus*) (EBRPD 2015).

S.1.8.4.2 San Justo Reservoir

The San Justo Reservoir is a CVP facility in San Benito County that provides offstream storage as part of the San Felipe Division. San Justo Reservoir recreation facilities have been closed to the public since 2009 because of an infestation of zebra mussel. Previously, the recreation facilities were managed by the San Benito County Water District (Reclamation 2015).

S.1.8.4.3 Bethany Reservoir

Bethany Reservoir is a SWP facility located between the California Aqueduct and South Bay Aqueduct in Alameda County. The recreation facilities are part of the Bethany Reservoir SRA and are managed by State Parks. When the water storage in Bethany Reservoir is at full capacity (water elevation is at 243 feet msl), it has 161 acres of surface area and 6 miles of shoreline (DWR 2001). Recreational activities include boating, windsurfing, picnicking, and fishing. There is one boat ramp at the reservoir (State Parks 2013). Fishing opportunities include Striped Bass, Smallmouth Bass, Largemouth Bass, Spotted Bass, White Bass, catfish, crappie, and trout.

S.1.8.4.4 Lake Del Valle

Lake Del Valle is a SWP facility located along the South Bay Aqueduct in Alameda County. The recreation facilities are managed by EBRPD as part of the Del Valle Regional Park. When the water storage in Lake Del Valle is at full capacity (water elevation is at 703 feet msl), it has 708 acres of surface area and 16 miles of shoreline (DWR 2001). Recreational activities include boating, windsurfing,

camping, swimming, and fishing (DWR 2001). There is a boat ramp at the lake (EBRPD 2016a). When the water surface elevation reaches 678 feet msl, boating hazards are exposed. There are seven group campsites for up to 475 people and a family campground (DWR 2001; EBRPD 2016a). Fishing opportunities include trout, catfish, Largemouth Bass, Smallmouth Bass, Striped Bass, and panfish (EBRPD 2016a).

S.1.8.4.5 Los Vaqueros Reservoir

Los Vaqueros Reservoir is a CCWD offstream storage facility in Contra Costa County. Recreation facilities are managed by CCWD. Water-related activities include boating, using rented electrical boats, and fishing (CCWD 2018). The Los Vaqueros recreational facilities include a marina, four fishing piers, 55 miles of trails, several individual and group picnic areas, and an interpretative center. Fishing opportunities include Rainbow Trout, Brown Bullhead, White Catfish, Channel Catfish, Sunfish, White Crappie, Largemouth Bass, Striped Bass, Chinook Salmon, Kokanee Salmon, Green Sunfish, and Sacramento Perch (CCWD 2018).

S.1.8.4.6 San Pablo Reservoir, Lafayette Reservoir, Lake Chabot, and East Bay Municipal Utility District Trails

EBMUD reservoirs in Alameda and Contra Costa County are used to store water within and near the EBMUD service area. Water stored in these reservoirs includes water from local watersheds, the Mokelumne River watershed, and CVP water supplies. Recreation is allowed within the waters of San Pablo and Lafayette reservoirs and Lake Chabot (EBMUD 2016). Recreation is not allowed within the waters of Upper San Leandro and Briones Reservoirs. EBMUD maintains over 26 miles of trails, many of which provide reservoir views, within the watersheds of the reservoirs (EBMUD 2007a).

Recreation facilities at San Pablo Reservoir are managed by EBMUD. Recreational activities at San Pablo Reservoir include boating, picnicking, and fishing (EBMUD 2019a). There is a boat ramp at the reservoir. There are individual sites and nine group picnic areas that can accommodate up to 100 people at each site. Hiking can occur in the San Pablo Reservoir watershed on 8.7 miles of trails, which connect to about 13 miles of trails in the Briones Reservoir watershed (EBMUD 2007b). The surface water of the reservoirs can be viewed from many locations along these trails. Fishing opportunities at San Pablo Reservoir include Rainbow Trout, catfish, Black Bass, Bluegill, and crappie (EBMUD 2019a).

Recreation facilities at Lafayette Reservoir are managed by EBMUD. Recreational activities at Lafayette Reservoir include boating, picnicking, and fishing (EBMUD 2019b). There is a private car-top boat ramp at the reservoir, and 125 picnic sites around the reservoir. Hiking can occur in the Lafayette Reservoir watershed on 7.4 miles of trails. Fishing opportunities at Lafayette Reservoir include Rainbow Trout, catfish, Black Bass, and sunfish.

Recreation facilities at Lake Chabot are managed by EBRPD as part of the Lake Chabot Regional Park (EBRPD 2018). Recreational activities at Lake Chabot include boating, camping, picnicking, and fishing. There is a boat ramp at the reservoir and boat rides are offered on the *Chabot Queen*. Individual and group campsites are located near the southern portion of the park. Picnic sites are located near the Lake Chabot Marina. Hiking can occur along the shoreline on over 9 miles of trails, which connect to more than 17 miles of other trails in the watershed (EBRPD 2018, 2016b). Other recreational activities, including equestrian trails and a marksmanship range, are located in the upper Lake Chabot watershed. Fishing opportunities at Lake Chabot include Rainbow Trout, catfish, Black Bass, crappie, Bluegill, and carp.

S.1.8.5 *Recreational Fishing in San Pablo, Suisun, and San Francisco Bays*

Recreational fishing for sturgeon, Striped Bass, steelhead, trout, and salmon occurs in San Pablo and San Francisco Bays. Of these species, the majority of recreational fishing in the San Francisco Bay Estuary is related to Striped Bass and sturgeon fishing, especially in San Pablo and Suisun Bays (CDFW 2018g).

Recreational fishing for White Sturgeon is limited to three sturgeons per person each year, with a daily bag limit of one fish per day and a size limit of 40 to 60 inches (from the nose tip to fork in the tail). White Sturgeon fishing is not allowed in San Francisco Bay from March 16 through December 31. Green Sturgeon fishing is not allowed at any time. Striped Bass fishing occurs throughout the year with a daily bag limit of two fish per day and a minimum size limit of 18 inches. Salmon sportfishing also occurs within the San Francisco Bay Estuary during periods specified by the National Marine Fisheries Service (CDFW 2019).

S.1.9 CVP and SWP Service Areas

S.1.9.1 *Delta-Mendota Canal*

Delta-Mendota Canal is a CVP facility. The Delta-Mendota Canal includes two fishing sites: one in Stanislaus County and the other in Fresno County (Reclamation 2007). Fishing opportunities include Striped Bass and catfish (Reclamation 2007).

S.1.9.2 *California Aqueduct/San Luis Canal*

The California Aqueduct is a SWP facility. A portion of the aqueduct is also co-located with the CVP San Luis Canal. Fishing is permitted at 12 sites along the California Aqueduct between Bethany Reservoir and Perris Lake in southern California. Fishing opportunities include Striped Bass, Largemouth Bass, catfish, crappie, Green Sunfish, Bluegill, and Starry Flounder (*Platichthys stellatus*) (Reclamation 2007).

S.1.9.3 *San Luis Reservoir State Recreation Area*

The San Luis Reservoir complex includes CVP and SWP offstream storage facilities located south of the Delta. The San Luis Reservoir complex includes San Luis Reservoir, O'Neill Forebay, and Los Banos Creek Reservoir and is located within the San Luis Reservoir SRA. The recreation facilities are operated by State Parks (State Parks 2017b). Los Banos Creek Reservoir is a flood detention basin designed to protect the community of Los Banos and San Luis Canal/California Aqueduct. This reservoir and a similar flood management reservoir that is not within the San Luis Reservoir SRA (Little Panoche Creek Reservoir) are not affected by CVP and SWP operations. Therefore, Los Banos Creek and Little Panoche Creek Reservoirs are not considered in detail in this EIS.

When the water storage in the San Luis Reservoir is at full capacity (water elevation is at 540 feet msl), the reservoir has a surface area of 12,700 acres and 65 miles of shoreline (Reclamation and State Parks 2013; State Parks 2017b).

The O'Neill Forebay is east of the San Luis Reservoir, downstream of San Luis Dam. When the water storage in the forebay is at full capacity (water elevation is at 230 feet msl), the forebay has a surface area of 2,210 acres and 14 miles of shoreline (Reclamation and State Parks 2013; State Parks 2017b).

Within the San Luis Reservoir SRA, recreational activities include boating, camping, picnicking, wildlife and scenic viewing, fishing, and hunting (Reclamation 2007; State Parks 2017b; Reclamation and State Parks 2013).

Boat ramps are available at the Basalt Area and Dinosaur Point in San Luis Reservoir (operational to 340 and 360 feet msl, respectively); the Group Campground and Medeiros Campground at O'Neill Forebay; and at the Los Banos Creek Campground at Los Banos Creek Reservoir.

Camping occurs at the Basalt Area at the San Luis Reservoir (79 sites), O'Neill Forebay (50 sites), the San Luis Creek Area (53 sites and two group campsites with 90 sites), and the Los Banos Creek Area (14 sites) (Reclamation and State Parks 2013).

Picnicking, swimming, and/or hiking occur at the Basalt Area, Medeiros Area, and Los Banos Creek Area (Reclamation 2007; State Parks 2017b; Reclamation and State Parks 2013).

Fishing opportunities in all three reservoirs include Striped Bass, American Shad, and catfish (Reclamation and State Parks 2013). Hunting opportunities occur at San Luis Reservoir for waterfowl, deer, and wild pig (Reclamation 2007; Reclamation and State Parks 2013).

S.1.9.4 *Cachuma Lake*

Cachuma Lake is a facility owned and operated by Reclamation in Santa Barbara County (CCWA 2018). Recreation facilities are managed by Santa Barbara County Parks Department. Water-related activities include boating and fishing within the lake and along the lake shoreline (Reclamation 2010c). Cachuma Lake recreation facilities include a marina with 87 rental boats and a public boat ramp, 94 private boat slips, 520 campsites, equestrian campsites, a family center, an amphitheater, and trails that range from 0.25 to 9 miles in length. Fishing opportunities include Rainbow Trout, Channel Catfish, Black Crappie, White Crappie, Largemouth Bass, Smallmouth Bass, Redear Perch, and Bluegill.

S.1.9.5 *Lake Piru*

Lake Piru is located on Piru Creek, a tributary of the Santa Clara River, in Ventura County (United Water Conservation District [UWCD] 2019). The lake is owned and operated by UWCD. Lake Piru is located within Los Padres National Forest (Parks Management Company [PMC] 2019). The lake is used to store SWP water.

Recreation facilities are managed by a private concessionaire for the district (UWCD 2019; PMC 2019). Recreational activities include boating, camping, and picnicking. The marina includes a boat ramp and private boat slips. There are over 220 campsites, including several group campsites.

S.1.9.6 *Quail Lake*

Quail Lake is a SWP facility in Los Angeles County. Recreation facilities are managed by DWR (DWR 2019a). Water-related activities include fishing within the lake and along the shoreline. Fishing opportunities include Channel Catfish, Striped Bass, Blackfish, Tule Perch, Threadfin Shad, and Hitch.

S.1.9.7 *Pyramid Lake*

Pyramid Lake is a SWP facility located in Los Angeles County and upstream of Castaic Lake on the West Branch of the California Aqueduct. Recreation facilities are managed by USFS (DWR 2000, 2019b). Recreational activities include boating, camping, waterskiing, swimming, and fishing. Boat ramp facilities are available at Vaqueros Beach and Emigrant Landing. A marina and picnic sites are also available at Emigrant Landing. Four picnic and viewing sites are accessible only by boat. Family and group camping are available at two sites. Fishing opportunities include Largemouth Bass, Smallmouth Bass, and Striped

Bass, catfish, Bluegill, crappie, and trout. Reservoir elevations can vary substantially on a daily basis because the lake provides short-term storage for the downstream Castaic Powerplant.

S.1.9.8 *Castaic Lake*

Castaic Lake is a SWP facility located in Los Angeles County at the terminal end of the West Branch of the California Aqueduct. Recreation facilities are managed by the Los Angeles County Department of Parks (DWR 2007b). Recreational activities include boating, waterskiing, jet skiing, wakeboarding, camping, picnicking, swimming at the lagoon/afterbay, and fishing. Fishing opportunities include trout, Largemouth Bass, Striped Bass, catfish, and crappie (DWR 2019c).

S.1.9.9 *Silverwood Lake*

Silverwood Lake is a SWP facility located in San Bernardino County, along the East Branch of the California Aqueduct. Recreation facilities are managed by State Parks as part of the Silverwood Lake SRA (State Parks 2016a). Recreational activities include boating, waterskiing, camping, picnicking, swimming, and fishing. Facilities available for boating include a boat ramp, marina, and waterskiing area. Camping facilities include 136 family sites, seven walk-in sites, and several group sites for up to 120 people. The park includes two swimming beaches and 13 miles of trails. Fishing opportunities include Largemouth Bass, Striped Bass, Bluegill, crappie, and catfish.

S.1.9.10 *Crafton Hills Reservoir*

Crafton Hills Reservoir is a SWP facility located in the City of Yucaipa within San Bernardino County. Recreation facilities are managed by DWR (DWR 2009). Recreational activities near the reservoir are associated with hiking trails in the open space within the Crafton Hills watershed. The surface water of the reservoirs can be viewed from many locations along these trails.

S.1.9.11 *Lake Arrowhead*

Lake Arrowhead is located in San Bernardino County (Lake Arrowhead Community Services District [LACSD] 2019). The lake is owned and operated by Arrowhead Lake Association. LACSD stores SWP water in the lake. Recreation facilities are managed by the Arrowhead Lake Association. Recreational activities include boating, camping, and fishing (Lake Arrowhead 2019).

S.1.9.12 *Lake Perris*

Lake Perris is a SWP facility located in Riverside County at the terminal end of the East Branch of the California Aqueduct. Recreation facilities are managed by State Parks as part of the Lake Perris SRA (State Parks 2016b; DWR 2019d). Recreational activities include boating, camping, swimming, picnicking, and fishing. Boating facilities include a marina and three boat ramps. Other recreational facilities include two swimming beaches, a family campground, seven equestrian campsites, boat-in picnic sites on Alessandro Island, and the Ya'i Hek'i Regional Indian Museum. Fishing opportunities include Largemouth Bass, Catfish, Crappie, Carp, Bluegill, and Redear Sunfish.

S.1.9.13 *Diamond Valley Lake*

Diamond Valley Lake is an offstream storage facility located in Riverside County and is owned and operated by the Metropolitan Water District of Southern California (MWD) (MWD 2013). The lake is used to store SWP water. Water-related activities include boating and fishing. Boating facilities include a marina with boat rentals. Other recreational facilities include a visitor center, the Western Science Center,

and the Valley-Wide Recreation and Park District Regional Aquatic Center and Community Park. Fishing opportunities include Black Bass, bluegill, Redear Sunfish, Rainbow Trout, Blue Catfish, and Channel Catfish (Diamond Valley Marina 2019).

S.1.9.14 *Lake Skinner*

Lake Skinner is an offstream storage facility located in Riverside County and is owned and operated by MWD. Recreation facilities are managed by Riverside County Parks (Riverside County 2018). The lake is used to store SWP water. Recreational activities include boating, camping, and fishing. Other recreational facilities include an amphitheater and splash pad. Fishing opportunities include Striped Bass, Largemouth Bass, Bluegill, Rainbow Trout, Catfish, and Carp.

S.1.9.15 *Dixon Lake*

Dixon Lake is located in the hills above the City of Escondido in San Diego County (City of Escondido 2019a). The lake is owned and operated by the City of Escondido. The lake is used to store SWP water.

Recreation facilities are managed by the City of Escondido (City of Escondido 2019b). Recreational activities include camping, picnicking, and fishing. There are 45 campsites and 22 picnic sites (City of Escondido 2019c, n.d.). Boats are allowed on the lake for fishing. Fishing opportunities include Rainbow Trout, Largemouth Bass, Striped Bass, Bluegill, carp, Channel Catfish, and Black Crappie.

S.1.9.16 *San Vicente, El Capitan, Lower Otay, Hodges, and Murray Reservoirs*

San Vicente Reservoir, El Capitan, Lower Otay, Hodges, and Murray Reservoirs are located in San Diego County (City of San Diego 2016). The reservoirs are owned and operated by the City of San Diego. The reservoirs are used to store SWP water.

Recreation facilities are managed by the City of San Diego (City of San Diego 2019a, 2019b, 2019c). Recreational activities at the reservoirs include boating, picnicking, and fishing (City of San Diego 2019b, 2019c, 2019d). There are 16 picnic sites at Lower Otay Reservoir. Fishing opportunities at Lower Otay Reservoir include Largemouth Bass, Bluegill, Black and White Crappie, Channel Catfish, Blue Catfish (*Ictalurus furcatus*), White Catfish, and Bullhead Catfish (*Ameiurus melas*). Recreational activities at San Vicente Reservoir are temporarily closed during construction to raise the dam (City of San Diego 2019e). Fishing opportunities at El Capitan Reservoir include Largemouth Bass, Bluegill, crappie, Channel Catfish, Blue Catfish, Green Sunfish, and carp (City of San Diego 2019f). Hodges Reservoir provides recreational opportunities including boating, windsurfing, and fishing for Largemouth Bass, Channel Catfish, Black Crappie, Bluegill, Bullhead Catfish, and Carp (City of San Diego 2019b). Murray Reservoir provides recreational opportunities for boating, floating, swimming, and fishing for Largemouth Bass, Bluegill, Channel Catfish, Black Crappie, and trout (City of San Diego 2019c).

S.1.9.17 *Lake Jennings*

Lake Jennings is located in San Diego County (Lake Jennings 2019). The lake is owned and operated by the Helix Water District (HWD). The lake is used to store SWP water.

Recreation facilities are managed by HWD (Lake Jennings 2019). Recreational activities include boating, camping, picnicking, and fishing. There are 96 campsites. There are a variety of picnic sites at Lake Jennings, including Cloister Cove, Siesta Point, Hermit Cove, and Eagle Point. Bird watchers at Lake Jennings can see loons, grebes, cormorants, herons, swans, geese, eagles, hawks, thrushes, warblers, and many other birds. Hikers at Lake Jennings have access to a variety of different trails near the lake,

including a 5.5-mile loop around the lake. Fishing opportunities include Rainbow Trout, bass, Channel Catfish, and Blue Catfish.

S.1.9.18 *Sweetwater Reservoir*

Sweetwater Reservoir is located in San Diego County (Sweetwater Authority 2019). The lake is owned and operated by Sweetwater Authority. The reservoir is used to store SWP water. Recreation facilities are managed by Sweetwater Authority. Water-related activities include shoreline fishing.

S.1.10 Nearshore Pacific Ocean on the California Coast

S.1.10.1 *Recreational Salmon Fishing Along Northern California Coast*

Recreational fishing along California's coast is included in the analysis because changes in CVP and SWP operations could affect fish populations. Chinook Salmon, Coho Salmon, and steelhead are the primary recreational fish species found along the Pacific Coast of Northern California that could be affected by changes in CVP and SWP operations. Pacific salmon fisheries are managed by the Pacific Fishery Management Council (PFMC) from 3 to 200 nautical miles offshore (PFMC 2019). Along the California coast, salmon fisheries are managed by the CDFW from 0 to 3 nautical miles offshore with regulations that are generally similar to those applied by the PFMC. The PFMC analyzes the status of the fisheries each year and defines the length of the fishing season and minimum fish sizes allowed to be caught for commercial, recreational, and tribal salmon fishing activities.

S.2 Evaluation of Alternatives

This section describes the technical background for the evaluation of environmental consequences associated with the Project alternatives and the No Action Alternative.

S.2.1 Methods and Tools

This impact analysis considers changes in recreational resources related to changes in CVP and SWP operations under the alternatives as compared to the No Action Alternative. Specifically, this analysis describes impacts on recreational activities (boating, camping, day use, and fishing access and opportunities) caused by potential changes in average water elevations, river flows, and seasonal fluctuations under the action alternatives, as well as the implementation of habitat restoration and fish intervention measures under Alternatives 1 and 3.

Potential changes in water elevations and flows were modeled for most rivers and reservoirs in the action area. Changes in average water elevations and average flows were analyzed using modeling results of various water bodies within the action area under the No Action Alternative and Alternatives 1 through 4. Each alternative was analyzed compared to the No Action Alternative. Deviations in average water elevation, flow, and seasonal fluctuations were noted as potential impacts to recreation. The modeled changes were also compared to boat ramp elevations to identify changes in the periods that ramps were available. For waterbodies where average water elevations or flows were not modeled, changes were evaluated qualitatively.

Modeling efforts included climate change conditions projected for Year 2030 and were applied consistently across the No Action Alternative and Alternatives 1 through 4. Conditions assumed for Year 2030 include 15 centimeters of sea level rise and the following parameters: inflows, water year types (wet, dry, critical, etc.), runoff forecasts, and Delta water temperature. These modeling results were used

to understand the potential changes in river flows and reservoir elevations and their potential effects on recreational opportunities within the project area.

Impacts to recreation from habitat restoration and fish intervention measures were analyzed by identifying the general location of measure (these measures were programmatic in nature so there was no site specific information), type of measure (habitat restoration, fish facility improvements, etc.), and qualitatively assessing the degree of benefit to fish species and how this could impact recreation. Criteria for determining the degree of benefit to fish species includes habitability and safety. The fish species most likely to benefit from these measures were compared to the fish species that are commonly fished in the action area to assess extent of impact (minor, etc.).

S.2.2 No Action Alternative

Under the No Action Alternative, current CVP and SWP operations would continue. Water elevations in reservoirs would maintain their current patterns of seasonal variation and fluctuation. Water levels are generally lower in the late summer and fall when seasonal drawdowns are greatest and highest in winter when storms are most frequent and in spring when the snows melt.

Currently, seasonal low water levels affect campgrounds located near shorelines at Trinity Lake, Shasta Lake, Whiskeytown Lake, Oroville Lake and Thermalito Forebay and Afterbay, Folsom Lake and Lake Natoma, New Melones Reservoir, and Millerton Lake by increasing the distance between the shoreline and the campsites.

Whitewater rafting on the Sacramento, Stanislaus, San Joaquin Rivers would continue to be affected by seasonal fluctuations caused by current CVP and SWP operations. Low flows in the late summer and early fall limit whitewater rafting opportunities and this impact would continue under the No Action Alternative.

Under the No Action Alternative, current recreational conditions for activities such as boating, camping, day use, and recreational would remain the same so long as there are no major changes to seasonal variations. In dry years, reservoir levels drop and flows decrease, which generally decreases recreational opportunities. Should dry years become more common or get worse, water levels and flows could decrease further, decreasing and negatively impacting recreational opportunities.

There would be no short-term construction impacts and no changes to existing flow and water elevations operations; therefore, current conditions would continue. Recreational activities, including boating, camping, day use, and fishing, would not be affected by construction or changes in water elevation or flows. Because no additional habitat restoration and fish intervention actions would occur under the No Action Alternative, fishing access and success would not change from current conditions. Current procedures regarding recreational fishing, as conducted by recreational management authorities, would not change. Non-native fish species, which are most commonly fished, would continue to be stocked in reservoirs. Therefore, recreational fishing in reservoirs is not likely to be negatively affected under the No Action Alternative. Recreational fishing in reservoirs is not likely to be affected.

S.2.3 Alternative 1

S.2.3.1 *Project-Level Effects*

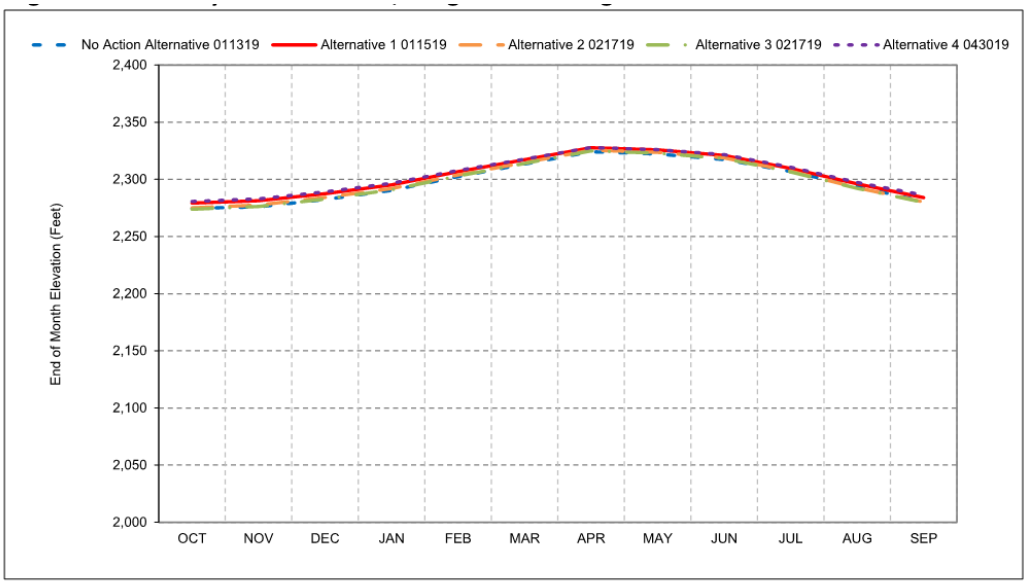
S.2.3.1.1 Potential Changes to Recreational Opportunities

Trinity River

Under Alternative 1, average water elevation at Trinity Lake could be slightly higher, by approximately 5 feet, compared to the No Action Alternative; seasonal fluctuations in water levels would remain approximately the same as the No Action Alternative (Figure S.2-1). There could be minor benefits on boating as there could be more days with access to boat ramps in the winter and summer months.

Camping and day use facilities are located along Trinity Lake. These facilities could potentially be affected by changes in water levels that could increase or decrease the distance from the campsites to the shoreline. Average water elevations could increase slightly under the Alternative 1 compared to the No Action Alternative (Figure S.2-1); therefore, Alternative 1 could have minor benefits on camping, day use opportunities at the campgrounds surrounding Trinity Lake. Increases in water elevation could also benefit recreational fishing access.

Water elevation is generally stable in Lewiston Reservoir because it is used as a regulating reservoir for releases to downstream uses. This condition is not expected to change under Alternative 1, so elevation levels would remain stable and would not affect boating activities and facilities on Lewiston Reservoir. Similarly, the campgrounds and day use facilities near Lewiston Lake that currently experience stable water levels would not be affected under Alternative 1. There would be no impacts to recreational fishing as access and population health and abundance would not change.



*As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
*These results are displayed with calendar year - year type sorting.
*All scenarios are simulated at ELT (Early Long-Term) Q5 with 2025 climate change and 15 cm sea level rise.
*These are draft results meant for qualitative analysis and are subject to revision.

Figure S.2-1. Trinity Lake Long-Term Average Water Level Elevation

Sacramento River

Under Alternative 1, the average water elevation of Shasta Lake would increase slightly (approximately 5–10 feet) from September through December compared to the No Action Alternative but would remain similar to the No Action Alternative from February through August, as shown in Figure S.2-2. The average water elevation would be highest in the spring and lowest in the fall, similar to the No Action Alternative. However, elevations in the fall season would be higher than the No Action Alternative, which would reduce seasonal fluctuations under Alternative 1. Water elevations under Alternative 1 would still be within the useable elevation range for most boat ramps on Shasta Lake during the spring and summer months. The slight increase in elevation could make the Bailey Cove Boat Ramp useable for a longer period during the year and would make Sugar Loaf Boat Ramp useable for less of the year. Because average water elevations would not be likely to substantively change during the spring and summer months, there would be no impact on camping, day use activities, or recreational fishing on Shasta Lake during those seasons. The approximately 5-10 foot elevation increase compared to the No Action Alternative from September to December on Shasta Lake could have minor benefits on camping and day use, as the shoreline would be closer to campgrounds and facilities, as well as activities such as hiking or wildlife viewing, and recreational fishing access.

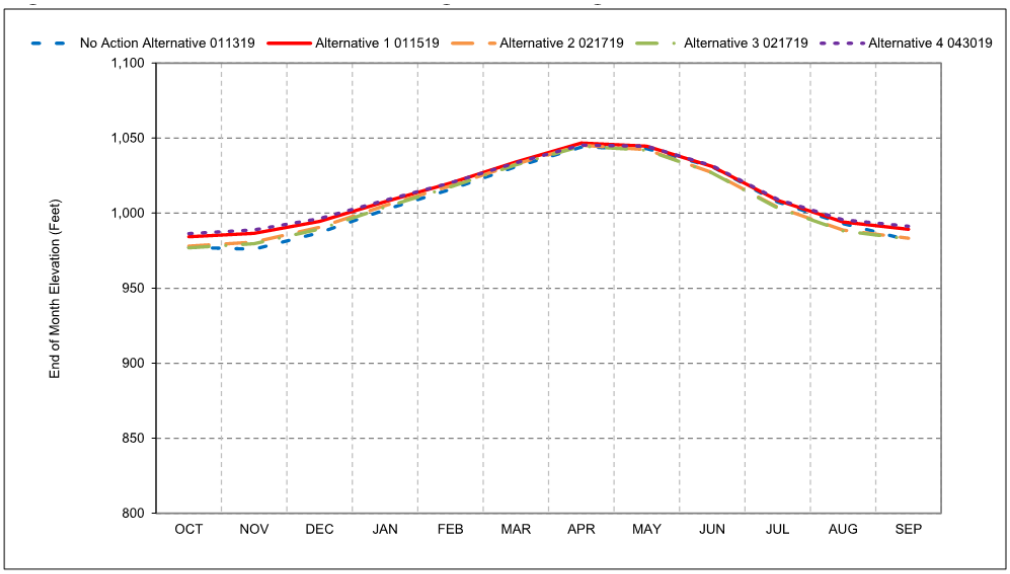


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Figure S.2-2. Shasta Lake Long-Term Average Water Level Elevation

Average water elevations and seasonal fluctuations at Keswick Reservoir are not expected to substantially change under Alternative 1 compared to the No Action Alternative; therefore, impacts on boating activities are not expected. There are no camping opportunities at Keswick Reservoir, so no impacts on camping would occur. Because average water elevations are not expected to change at the Keswick Reservoir, there would be no impacts on day use activities nor recreational fishing opportunities.

Average water elevations and seasonal fluctuations at Whiskeytown Lake are not expected to change under Alternative 1 compared to the No Action Alternative; therefore, no impacts on boating activities or access on Whiskeytown Lake, camping or day use activities near the lake, or recreational fishing opportunities on the lake are expected.

Boating occurs along the Sacramento River, and there are whitewater rafting and kayaking opportunities on the Sacramento River between Keswick Dam and Red Bluff. Average flows on the Sacramento River under Alternative 1 compared to the No Action Alternative would increase from December through March and May through June; flows under Alternative 1 would decrease in September and November compared to the No Action Alternative, as shown in Figures S.2-3 and S.2-4. Slight increases in flow could affect whitewater boating in the spring and summer seasons by potentially increasing the experience for advanced whitewater rafters and decreasing the accessibility for less advanced boaters. Average flows are expected to decrease compared to the No Action Alternative in the fall season, and therefore could affect boating access as well as whitewater rafting by potentially improving the opportunities for less advanced whitewater boaters and decreasing the experience for advanced whitewater boaters.

Public campgrounds, day use activities, and recreational fishing also occur along the Sacramento River. Changes in average flows and flow fluctuations could affect camping, day use, and fishing opportunities along the river as aesthetics and access to the river may change. For example, decreases in flow during the fall season could adversely affect shoreline access for activities such as swimming and fishing, and increases in flow in May and June could improve access to the shoreline.

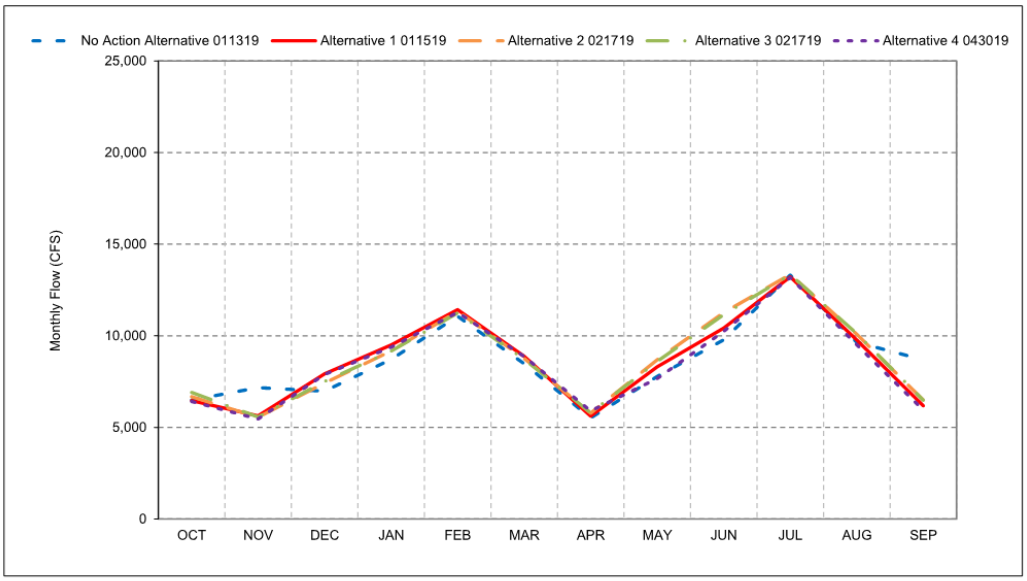

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Figure S.2-3. Sacramento River Long-Term Average Flow Downstream of Keswick Reservoir

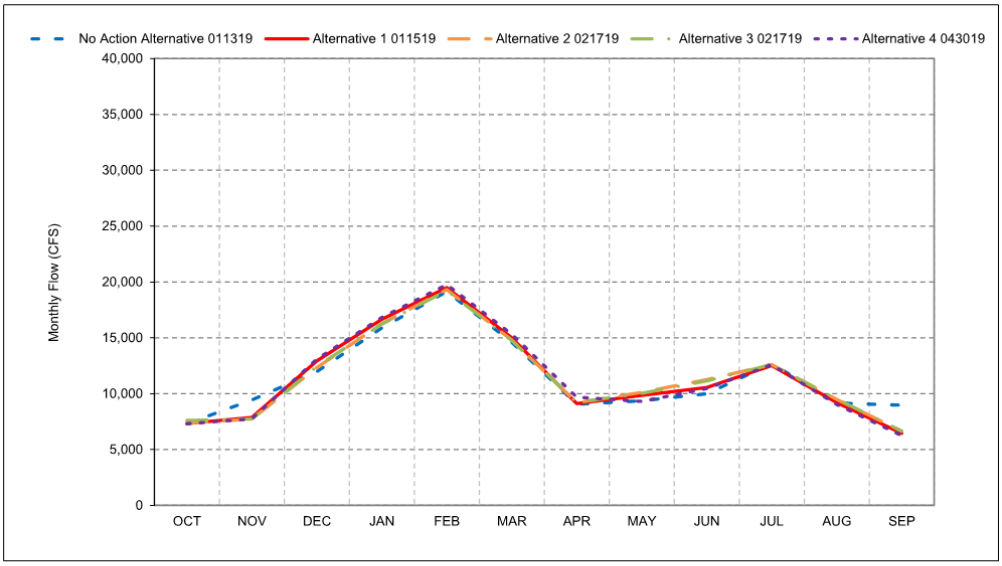

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Figure S.2-4. Sacramento River Long-Term Average Flow Below Red Bluff Diversion Dam

Clear Creek

The average flows and seasonal fluctuations at Clear Creek below Whiskeytown Dam would be approximately the same under Alternative 1 as the average flows and seasonal fluctuations under the No Action Alternative throughout the year, as shown in Figure S.2-5. Therefore, existing kayaking opportunities, day use activities, and recreational fishing opportunities would not change under Alternative 1. There are no camping opportunities at Clear Creek, so Alternative 1 would have no impacts on camping.

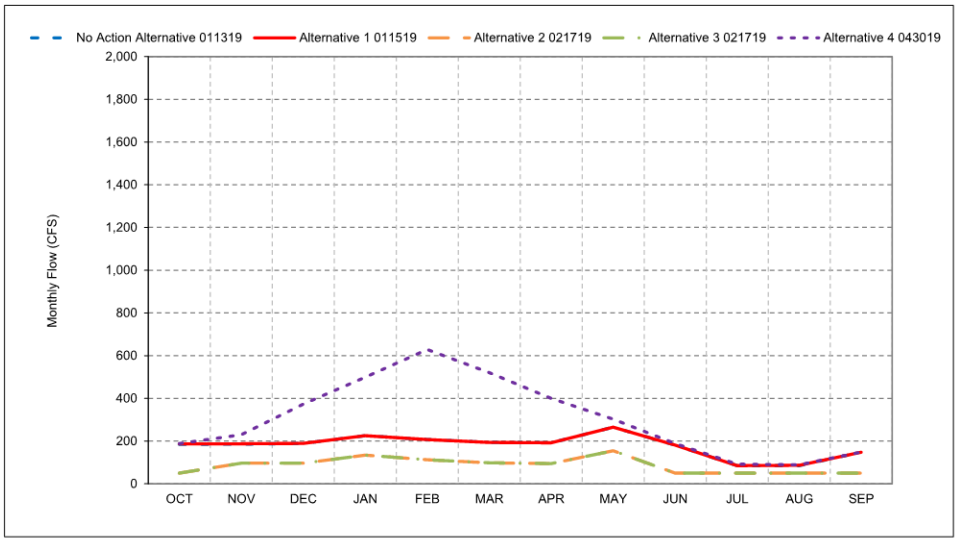

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Figure S.2-5. Clear Creek below Whiskeytown Dam Long-Term Average Flow

Feather River

Boating activities occur on Lake Oroville and Lake Thermalito. Whitewater boating occurs on the Big Bend area of the North Fork Feather River and the Bald Rock Canyon on the Middle Fork Feather River. Under Alternative 1, the average elevation of Lake Oroville would increase compared to the No Action Alternative from September through June with the largest increase occurring in September through January. From June through August, the average elevation under Alternative 1 would be approximately the same as the average elevation under the No Action Alternative, as shown in Figure S.2-6. Thus, seasonal fluctuations would decrease compared to the No Action Alternative. There could be adverse impacts on whitewater boating in the Big Bend Area as boating occurs when Lake Oroville elevations are sufficiently low to expose several miles of river, particularly in the late fall months. However, there could be minor benefits on boating activities or access as more boat ramps could be accessible for a longer period of the year. Increased water elevations could also benefit recreational fishing access. On average, the shoreline would be closer to camping and day use activities, which could have minor benefits on these activities.

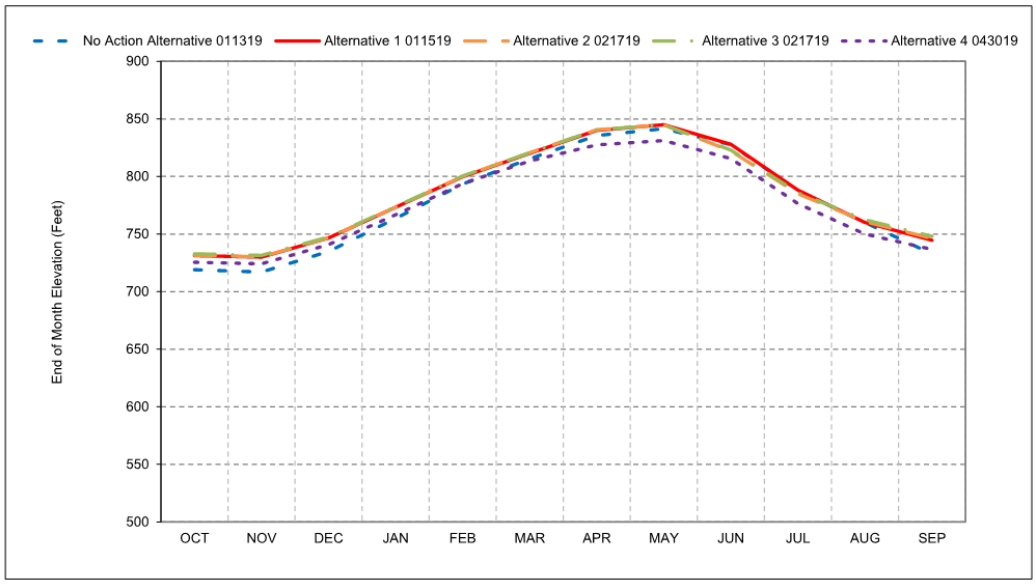

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Figure S.2-6. Lake Oroville Long-Term Average Water Level Elevation

American River

A variety of boating activities, including jet skiing, waterskiing, windsurfing, rafting, sailing canoeing, and kayaking, occur on Folsom Lake. Additionally, whitewater rafting occurs along the South Fork American River upstream of Folsom Lake, and at Skunk Hollow and Salmon Falls. Under Alternative 1, average Folsom Lake water elevations would increase from June through February compared to the No Action Alternative. The largest increase from the No Action Alternative, approximately 10 feet, would occur in October and November. From February through June, the average reservoir storage and elevation under Alternative 1 would be approximately the same as the No Action Alternative, as shown in Figure S.2-7. Thus, the lake would experience less seasonal fluctuation under Alternative 1 than the No Action Alternative. There could be minor benefits from increased average water elevations in the summer, fall, and winter seasons on boating activities and boat ramp access, as well as recreational fishing access. Additionally, there could be minor benefits on camping and day use activities near Folsom Lake as the shoreline would be closer to campgrounds and day use facilities in summer, fall, and winter seasons. Because the average water levels are generally lower during these seasons, it is unlikely that water levels would rise enough to flood nearby facilities or substantively shrink the beach. Water levels upstream of Folsom Lake are not expected to change under Alternative 1, so whitewater rafting would not change.

Under Alternative 1, average water elevation levels and seasonal fluctuations in Lake Natoma could increase in the summer, fall, and winter months, as Lake Natoma is located 1 mile downstream of Folsom Lake and could be influenced by changes in Folsom Lake (see Figure S.2-7). Boating, camping, day use activities, and recreational fishing could experience minor benefits as described above; however, average water elevations and fluctuations at Lake Natoma have not been explicitly modeled.

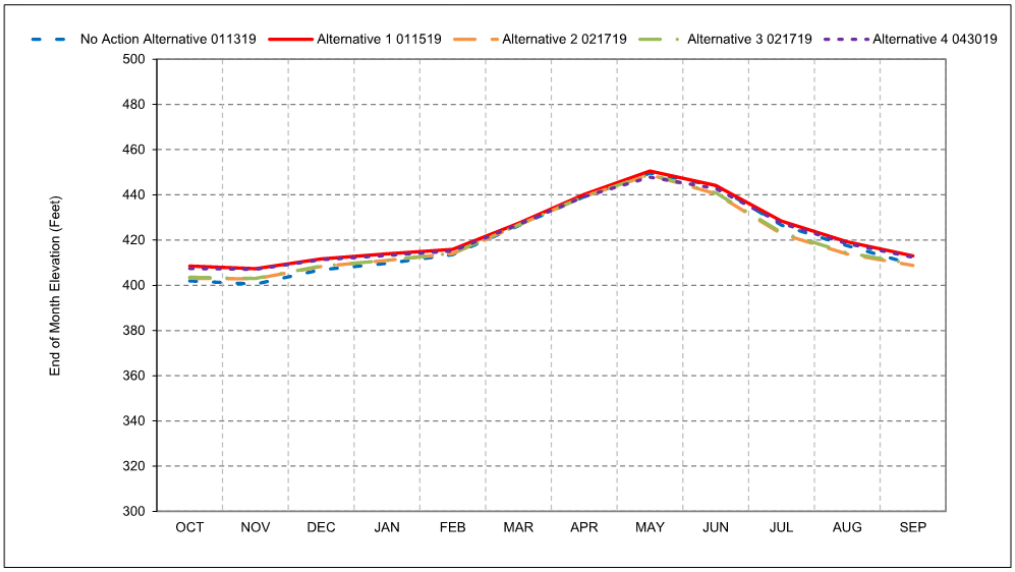

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Figure S.2-7. Folsom Lake Long-Term Average Water Level Elevation

Compared to the No Action Alternative, there could be a slight decrease (approximately 300 cfs) in average flow in July, September, and October of the American River below Nimbus Dam, which is the beginning of the American River Parkway, under Alternative 1; there could also be a slight increase (approximately 100–200 cfs) increase in December through March compared to the No Action Alternative, as shown in Figure S.2-8. Seasonal fluctuations would remain approximately the same as the No Action Alternative with the highest flows occurring in February, and the lowest flows occurring in September and October. Increases in flows in the early spring could make the river more accessible to boating activities. Decreases in flow in July, September, and October (approximately 200–300 cfs), could make the river more accessible to novice rafters but could have minor adverse impacts on boating activities and the experience for advanced whitewater rafters. Day use activities would not be substantially affected by changes in flows. There is no camping along the American River Parkway, so no impacts would occur.

There are no anticipated changes to average water levels or seasonal fluctuations at Rancho Seco Park and Lake under Alternative 1. Therefore, boating, camping, day use activities, and recreational fishing access would not be affected.

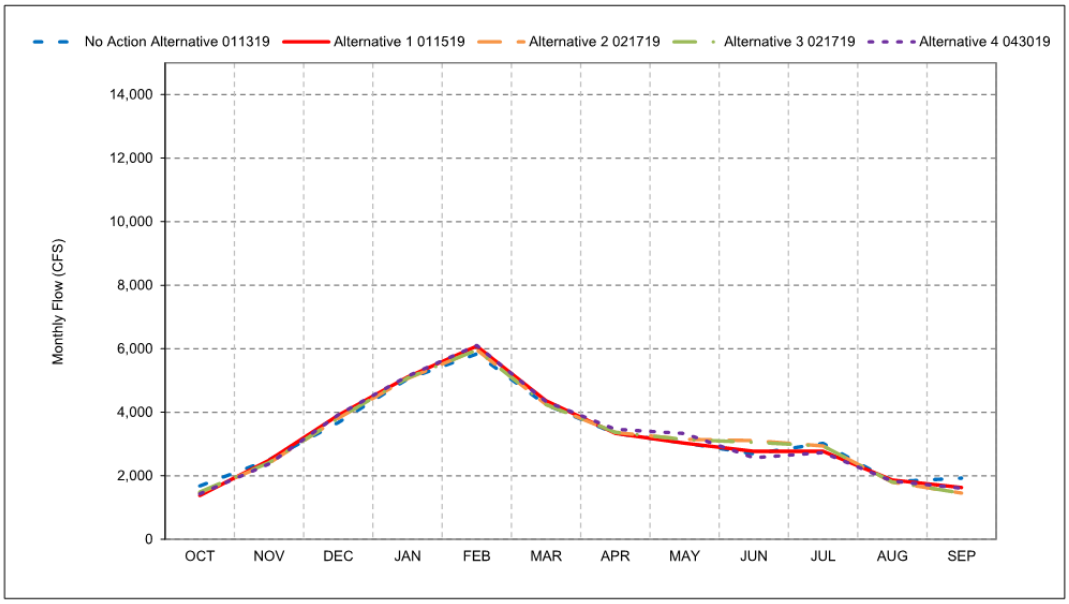

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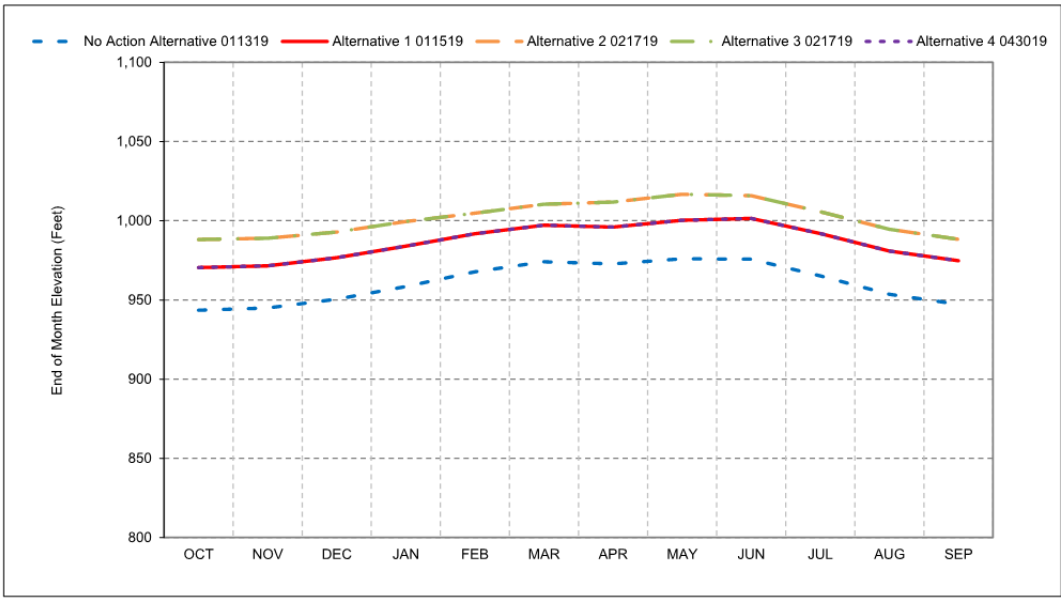
Figure S.2-8. American River Average Flow below Nimbus Dam

Stanislaus River

Boating occurs on New Melones Reservoir and Alternative 1 would increase the average water level elevation of New Melones Reservoir year-round by approximately 20–30 feet, as shown in Figure S.2-9. The average reservoir elevations for Alternative 1 would still be within the useable elevation for boat ramps on the reservoir. Additionally, the elevation increases would make the boat ramp at Angels Creek useable for a longer period. Thus, Alternative 1 could benefit boating and recreational fishing access. Campgrounds and day use facilities at New Melones Reservoir that are located close to the water could be affected by changing water levels. This could benefit the campgrounds and day use activities near the reservoir by bringing the water levels closer to the campgrounds and day use facilities. This average increase in water elevation would not increase the likelihood that campgrounds and day use facilities would be flooded because the maximum elevation of the reservoir, 1,088 feet, would not change. An increase in average water elevations at New Melones Reservoir could benefit day use activities such as swimming, by increasing the size of the swimming area and could make the beach easier to access. This increase would not be expected to affect other day use activities such as hiking or wildlife viewing because the increases would be relatively small.

Tulloch Reservoir is located approximately 6 miles downstream of New Melones Reservoir. The proposed New Melones Reservoir stepped release plan would reduce the required amount of water released from New Melones Reservoir during above-normal and wet years; releases would remain the same for critical, dry, and below-normal water year types. Because these releases would only be reduced in above-normal and wet years, average water elevations are not anticipated to change at Tulloch Reservoir. Thus, there would no substantive impacts on boating, camping, day use activities, or recreational fishing access.



*As defined by the San Joaquin Valley 60-20-20 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
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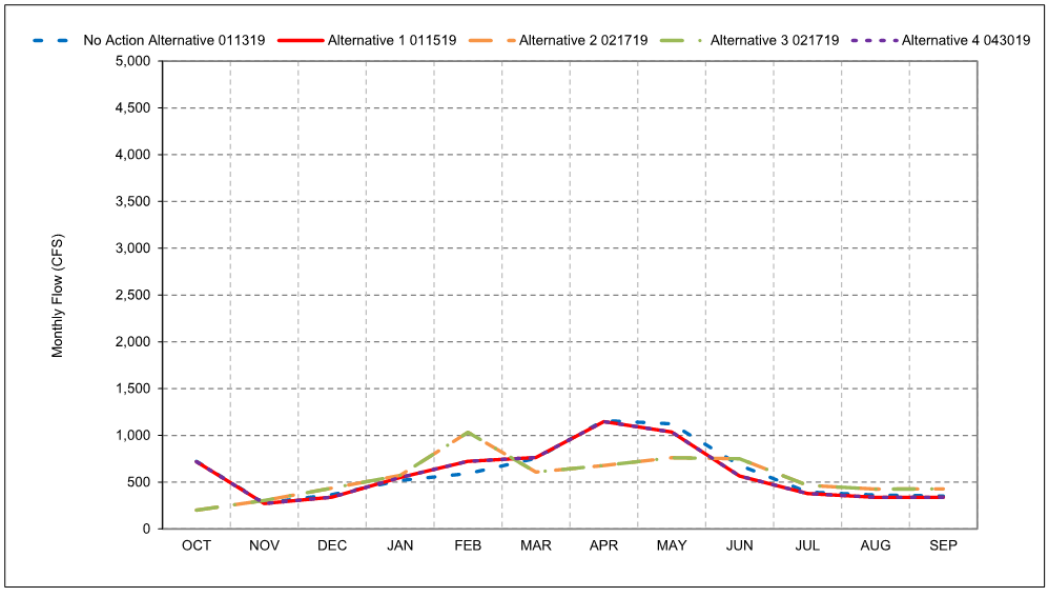
*These are draft results meant for qualitative analysis and are subject to revision.

Figure S.2-9. New Melones Reservoir Long-Term Average Water Level Elevation

Whitewater rafting occurs on the lower stretch of the Stanislaus River, which includes the portion of the river that flows through Goodwin, California to the mouth at the San Joaquin River. Under Alternative 1, flows are anticipated to decrease slightly from April through July and increase between January and mid-March compared to the No Action Alternative, as presented in Figure S.2-10. Slightly weaker flows in the river during the spring and summer seasons could affect whitewater rafting opportunities along the river; slower currents could increase the opportunities for beginner and intermediate-level whitewater rafters and could lessen the experience for more advanced whitewater rafters. Increased flows in the winter and early spring could affect day use activities; for example, increased average flows could wash out hiking trails in very wet years. Increased flows in late winter and early spring could improve recreational fishing by improving fishing access.



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*These are draft results meant for qualitative analysis and are subject to revision.
*New Melones forecasts are used as the basis of water operations.

Figure S.2-10. Stanislaus River Flow below Goodwin Long-Term Average Flow

San Joaquin River

A variety of boating activities occur on Millerton Lake and there are whitewater rafting opportunities upstream of Millerton Lake. As shown in Figure S.2-11, there would be no change in average lake elevations or seasonal fluctuations under Alternative 1 compared to the No Action Alternative, so boating activities would not be affected. Whitewater rafting opportunities upstream of Miller Lake would not be affected, as no changes are anticipated in flows between Alternative 1 and the No Action Alternative. With no expected changes to flows or average water elevations at Millerton Lake, on the San Joaquin River, or at the San Joaquin wildlife refuges, there would also be no impacts on camping, day use activities or fishing.

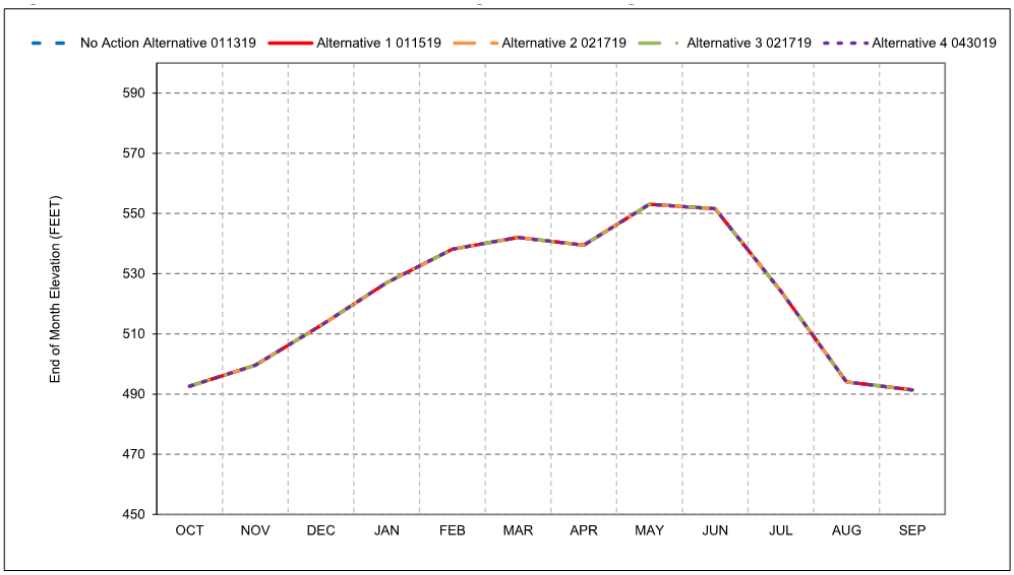

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Figure S.2-11. Millerton Lake Long-Term Average Water Level Elevation

Boating activities occur on the San Joaquin River from Friant Dam to the Delta, and whitewater rafting occurs between Friant Dam and Skaggs Bridge Park, at State Route 145. Average flows on the San Joaquin River are not anticipated to substantively change under Alternative 1 compared to the No Action Alternative. Therefore, no impacts to boating activities or access, camping, day use activities, or recreational fishing would occur.

There are no boating, camping, or recreational fishing opportunities at the San Joaquin Valley Refuges, so no impacts on boating, camping, or fishing would occur. Day use activities would not be affected as flows would not substantively change.

Bay–Delta

It is anticipated that there would be slight changes in Delta outflow under Alternative 1, particularly in September (as shown in Figure S.2-12), but these changes would not be great enough to substantively affect boating, camping, day use activities, or fishing on the Delta.

Although flows would change, there would be no changes in average elevations in the Bay-Delta system under Alternative 1 as compared to the No Action Alternative. Therefore, no impacts on recreation are anticipated at the Yolo Bypass and Cache Slough, or in the San Francisco Bay reservoirs, including Contra Loma Reservoir, Bethany Reservoir, Lake Del Valle, Los Vaqueros Reservoir, San Pablo Reservoir, Lafayette Reservoir, or Lake Chabot. No recreation activities occur on two San Francisco Bay reservoirs, the San Justo Reservoir and the Upper San Leandro Reservoir, so there would be no impacts at these locations.

Under Alternative 1, water transfers would be allowed between July 1 and November 30; transfers could potentially increase average water elevation in the Bay-Delta region during these periods, but the potential impacts have not been explicitly modeled.

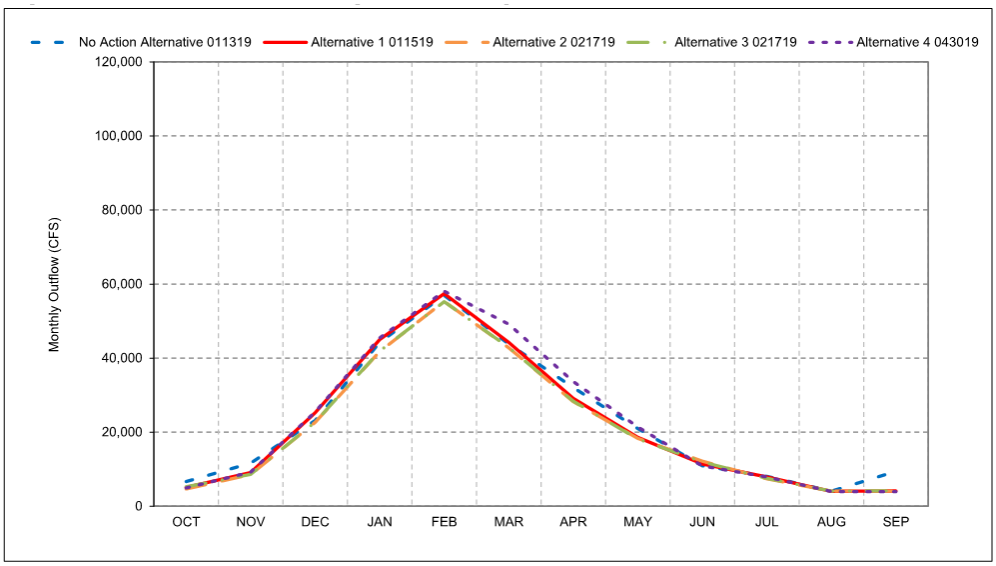

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Figure S.2-12. Bay-Delta Long-Term Average Outflow

If the Summer-Fall Delta Smelt Habitat action includes operations of the Suisun Marsh Salinity Control Gates or a Fall X2 action, the water requirements in summer and fall under Alternative 1 could be greater than shown in the modeling. Alternative 1 indicates minor changes to average water elevations and flows, as described in this section in more detail. In years with the summer or fall actions, these changes would be less than indicated in the Alternative 1 modeling due to the increased water requirements. Thus, benefits and impacts to recreation may be less in these years than what is anticipated under Alternative 1 without these actions.

CVP and SWP Service Areas

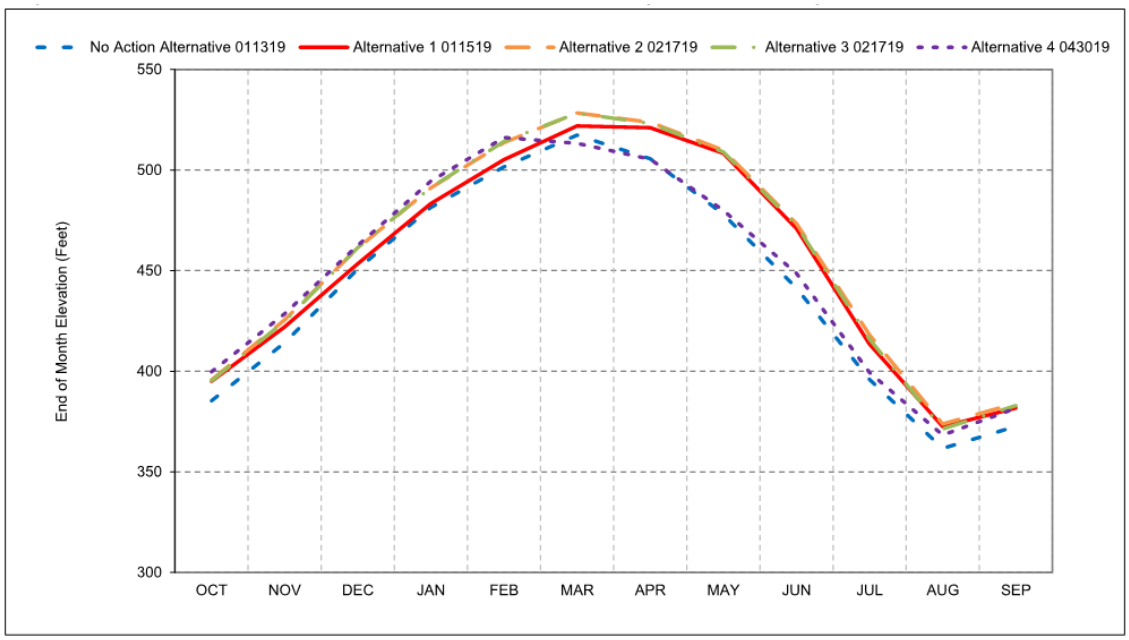
Compared to the No Action Alternative, there are no anticipated changes to average flows, water elevations and seasonal fluctuations in water bodies in the CVP and SWP Service Areas under Alternative 1. Therefore, no changes to recreation are anticipated in this region.

San Luis Reservoir

Compared to the No Action Alternative, average water elevations under Alternative 1 could increase at San Luis Reservoir between mid-March and mid-December, with the largest increases approximately 25 feet) occurring between late April and mid-June (as shown in Figure S.2-13). Between mid-June and December, the average elevation could increase approximately 10 feet as compared to the No Action Alternative. These elevation increases largely follow the existing seasonal fluctuations at San Luis Reservoir. Boat ramps, which are open year-round, would still be usable with the anticipated spring to summer increases. An increase in average water elevations would also benefit boating because the depth to underwater hazards would be increased, making boating near those areas safer for a larger part of the year.

The increase in average water elevations at San Luis Reservoir would benefit camping because access to the lake would improve. Day use activities such as hiking and swimming would also benefit from

increased water levels in spring and summer. Hiking trails are not located directly on the shore and are not likely to be flooded or washed out with the anticipated increase in water levels. The shoreline of San Luis Reservoir can be steep and rocky; therefore, the increase in water levels would benefit swimming by allowing easier access to the water. Indirect benefits to picnicking and hiking are possible because higher water levels could improve the aesthetics and desirability of the area. Additionally, higher water levels would improve recreational fishing access.



*As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
*These results are displayed with calendar year - year type sorting.
*All scenarios are simulated at ELT (Early Long-Term) Q5 with 2025 climate change and 15 cm sea level rise.
*These are draft results meant for qualitative analysis and are subject to revision.

Figure S.2-13. San Luis Reservoir Long-Term Average Water Level Elevation

Nearshore Pacific Ocean on the California Coast

Under Alternative 1, benefits to Fall-Run Chinook Salmon could improve recreational fisheries in the Nearshore Pacific Ocean area.

S.2.3.2 *Program-Level Effects*

S.2.3.2.1 Potential Changes to Recreational Opportunities

Habitat restoration and fish intervention actions would be implemented under Alternative 1 in most river regions. These actions could have short-term construction impacts on recreational opportunities associated with the river, lakes, and reservoirs. Construction impacts, such as exhaust from equipment, noise, and road closures, could temporarily prevent access to or affect the enjoyment of recreational opportunities, including boating, camping, day use activities, and fishing, in the short-term. Long-term benefits for fishing would be created by spawning and rearing habitat restoration and fish intervention actions that increase fish populations and the health of fisheries. In regions where no habitat restoration or fish intervention measures are implemented, there could still be indirect benefits to fish populations and fisheries from habitat restoration and fish intervention measures implemented elsewhere under Alternative 1.

S.2.4 Alternative 2

S.2.4.1 *Project-Level Effects*

S.2.4.1.1 Potential Changes to Recreational Opportunities

Trinity River

Under Alternative 2, the average elevation of Trinity Lake would remain roughly the same compared to the No Action Alternative, as shown in Figure S.2-1. Seasonal fluctuations in water levels would also remain roughly the same throughout the year. There would be no substantive impact on boating, as access to boat ramps, marinas, or moorage facilities would not be affected. Additionally, there would be no substantive impact on camping, day use activities, and fishing at and near Trinity Lake.

The water elevation is generally stable in Lewiston Reservoir because it is used as a regulating reservoir for releases to downstream uses. This is not expected to change under Alternative 2, so elevation levels would remain stable and would not affect boating, camping, day use and fishing at and near Lewiston Reservoir.

Sacramento River

Under Alternative 2, average Shasta Lake elevation levels would increase slightly from September to April and decrease slightly from May through August compared to the No Action Alternative, as shown in Figure S.2-2. However, these expected deviations are small (approximately 1–5 feet), and water elevations under Alternative 2 would remain similar to the No Action Alternative. Therefore, boating activities, camping, day use, and recreational fishing access would not be substantially affected.

Water elevations at Keswick Reservoir and Whiskeytown Lake are not anticipated to change under Alternative 2, so no impacts on boating and day use activities would occur. No camping occurs at Keswick Reservoir, so there would be no impacts on camping at this location.

Average flows at the Sacramento River below Keswick Dam and below Red Bluff Diversion Dam would decrease in September and November and generally increase for the remainder of the year compared to the No Action Alternative; the largest increases in flow would occur in May and June (Figures S.2-3 and S.2-4). Seasonal fluctuations in flows would therefore change compared to the No Action Alternative. Decreases in flow could affect boating and rafting by improving opportunities for less-advanced rafters and decreasing the experience for advanced boaters and rafters in September and November. Increases in flow over the remainder of the year could affect boating activities (including whitewater rafting) by potentially improving the experience for more advanced boaters and decreasing the opportunities for less-advanced boaters, particularly in May and June. Additionally, campgrounds, day use activities, and recreational fishing could be impacted by flow changes as aesthetics and access to the river may change, as described in Alternative 1.

Clear Creek

Under Alternative 2, the average flow at Clear Creek below Whiskeytown would be reduced by roughly half of the average flow under the No Action Alternative from September through June, as shown in Figure S.2-5. This could adversely affect kayaking on Clear Creek. There are no camping opportunities at Clear Creek, so Alternative 2 would have no impacts on camping. The changes in flows that could also adversely impact day use activities, such as wildlife viewing, and recreational fishing, as fish populations could be adversely affected by decreased flows.

Feather River

Water levels at the Feather River lakes are not anticipated to change under Alternative 2 compared to the No Action Alternative. Thus, boating activities, camping, day use, and fishing associated with the Feather River lakes would not be affected by changing water levels.

Under Alternative 2, the average elevation at Lake Oroville would slightly increase compared to the No Action Alternative from September through June. From June through August, the average elevation under Alternative 2 would be approximately the same as the average elevation under the No Action Alternative, as shown in Figure S.2-6. Seasonal fluctuations would decrease compared to the No Action Alternative. These changes are very similar to the changes that would occur under Alternative 1. Therefore, impacts to recreation under Alternative 2 would be very similar to those discussed under Alternative 1.

American River

Under Alternative 2, average Folsom Lake storage would increase slightly from September through February and decrease slightly from May through September compared to the No Action Alternative. The average water elevation would remain roughly the same from February through May under Alternative 2 and the No Action Alternative, as shown in Figure S.2-7. The slight elevation increases under Alternative 2 compared to the No Action Alternative would not be great enough to have substantive impacts on boating access, camping, day use, or recreational fishing access. Additionally, water levels upstream of Folsom Lake are not expected to change under Alternative 2, so whitewater rafting would not be affected. Boating and fishing access could experience minor adverse effects from decreases in water levels during the summer months. Similarly, campgrounds and day use facilities near Folsom Lake could be adversely affected in the summer season, as the shoreline could be slightly farther from facilities.

The average water elevations at Lake Natoma have not been explicitly modeled; however, average elevations may decrease in the summer months, as the lake is 1 mile downstream of Folsom Lake. Thus, there could be minor adverse effects on recreation.

Average flows of the American River below Nimbus Dam (the beginning of the American River Parkway) would be slightly higher under Alternative 2 than the No Action Alternative from November through June, with the greatest difference in flow occurring in June (approximately 420 cfs), as shown in Figure S.2-8. Average flows would decrease in July through November compared to the No Action Alternative, with the largest decrease occurring in November (approximately 470 cfs). The increase in spring and early summer flows would increase the difficulty of whitewater rafting, potentially limiting access to novice rafters. However, the lower flows in summer and fall would make the river more accessible to novice rafters. Increased spring flows could make the river more accessible to boating while lower flows in summer benefit fishing access by maintaining fisheries on the river. No impacts on camping or day use activities are expected to occur.

Average elevation levels and seasonal fluctuations are not anticipated to change Rancho Seco Park and Lake under Alternative 2, so there would be no impact on camping.

Stanislaus River

The year-round average elevation at New Melones Reservoir would increase under Alternative 2 by approximately 35–45 feet (shown in Figure S.2-9). The average reservoir elevations for Alternative 2 would still be within the useable elevation for the boat ramps. Additionally, the elevation increases would make the boat ramp at Angels Creek useable for a longer period. Thus, Alternative 2 could benefit boating. The higher average lake elevations would decrease the distance of campgrounds and day use

facilities to the shoreline and therefore benefit camping. The average increase in water elevation would not increase the likelihood that campgrounds and day use facilities would be flooded because the maximum elevation of the reservoir would not change. The increase to average water elevations could affect day use activities such as swimming by increasing the swimming area and making the shoreline easier to access. Hiking trails situated near the shoreline may be affected if the water elevation increases enough, but this amount of change is not likely. There would not be impacts on other day use activities. The increase to average water elevations at New Melones Reservoir could increase recreational fishing access.

Under Alternative 2, average water elevations or seasonal fluctuations in Tulloch Reservoir are not expected to be affected; therefore, no changes to boating, camping, day use activities, or recreational fishing associated with the Tulloch Reservoir would occur.

Whitewater rafting and fishing occur on the lower stretch of the Stanislaus River. Under Alternative 2, average flows would be higher than the No Action Alternative in November through February and June through September, with the highest increase in flows occurring February (approximately 440 cfs). Average flows would decrease in March through May and October through mid-November, with the largest decreases occurring in October and April (approximately 500 cfs), as shown in Figure S.2-10. Thus, seasonal fluctuations would change compared to existing conditions. Weaker flows could affect whitewater rafting by making the river more accessible to less-advanced rafters and decreasing the enjoyment for advanced rafters. Reduced flows could also adversely impact recreational fishing access. Stronger flows occur in February when recreation is less popular, so there would not be substantive effects.

San Joaquin River

Under Alternative 2, there would be no changes to recreation on Millerton Lake compared to the No Action Alternative, as average water elevations and seasonal fluctuations are not changing (Figure S.2-11).

Average San Joaquin River flows are not likely to be substantively different under Alternative 2 compared to the No Action Alternative. Therefore, there would not be substantive impacts on boating, camping, day use activities, and fishing at this location.

There would be no changes to day use activities at the San Joaquin wildlife refuges under Alternative 2 compared to the No Action Alternative.

Bay–Delta

Similar to Alternative 1, it is anticipated that there would be slight flow changes to Delta outflow under Alternative 2 compared with the No Action Alternative (Figure S.2-12). However, these changes would not be large enough to substantively impact recreation associated with the Delta.

No changes in average reservoir elevations are expected under Alternative 2 compared to the No Action Alternative; therefore, no impacts on boating are anticipated at the Yolo Bypass and Cache Slough, or in the San Francisco Bay reservoirs, as discussed in Alternative 1.

CVP and SWP Service Areas

Similar to Alternative 1, there would be no changes in water bodies in the CVP and SWP Service Areas, and therefore no changes to recreation would occur under Alternative 2.

San Luis Reservoir

Similar to Alternative 1, average water levels under Alternative 2 would increase at San Luis Reservoir, and the seasonal fluctuation would remain similar to existing conditions (Figure S.2-13). Average water levels would be approximately 10 to 25 feet higher year-round compared to the No Action Alternative, with the greatest increases in water elevation anticipated between March and the end of June. During the rest of the year, water levels would be about 10 feet higher compared to the No Action Alternative. Increased water elevations could benefit recreation by improving water access at boat ramps, recreational fishing opportunities, and aesthetics. Day use activities such as hiking, swimming, and picnicking also benefit from these improvements and increases in water levels.

Nearshore Pacific Ocean on the California Coast

Alternative 2 would not benefit Fall-Run Chinook Salmon and could affect recreational fisheries in the Nearshore Pacific Ocean area.

S.2.4.2 *Program-Level Effects*

S.2.4.2.1 Potential Changes to Recreational Opportunities

No additional habitat restoration and fish intervention actions would occur under Alternative 2, so there would be no short-term construction impacts on recreational opportunities. Similar to the No Action Alternative, there would be no long-term beneficial effects on fish populations and the health of fisheries from the implementation of habitat restoration and fish intervention actions.

S.2.5 Alternative 3

S.2.5.1 *Project-Level Effects*

S.2.5.1.1 Potential Changes to Recreational Opportunities

Trinity River

Similar to Alternative 2, no changes in average water elevation or seasonal fluctuations are expected under Alternative 3 at Trinity Lake or Lewiston Reservoir; therefore, no impacts on recreation are anticipated.

Sacramento River

Similar to Alternative 2, average Shasta Lake elevation levels experience small deviations (approximately 1–5 feet) from the No Action Alternative. Therefore, boating activities and access, camping, day use, and fishing would not be substantively affected.

Water elevations at Keswick Reservoir and Whiskeytown Lake are not anticipated to change under Alternative 3, so no impacts to recreation are anticipated.

Under Alternative 3, average flows and seasonal fluctuations in flows would change compared to the No Action Alternative, in very similar ways as Alternative 2. Thus, impacts on recreation would be the approximately the same as those discussed in Alternative 2.

Clear Creek

Under Alternative 3, the average flow at Clear Creek would be reduced compared to the No Action Alternative by the same amount as under Alternative 2. Therefore, the impacts on recreation would be the same as the impacts discussed under Alternative 2.

Feather River

Water levels at the Upper Feather River lakes are not anticipated to change under Alternative 3 compared to the No Action Alternative. Thus, no impacts to recreation would occur.

Compared to the No Action Alternative, the changes in average Lake Oroville elevation and seasonal elevation fluctuations are anticipated to be very similar to the changes that occur under Alternatives 1 and 2. Therefore, potential impacts to recreation under Alternative 3 would be the same as those described in Alternatives 1 and 2.

American River

The same changes in average water elevation, flow, and seasonal fluctuations described in Alternative 2 would occur under Alternative 3; thus, the same impacts to recreation at Folsom Lake, Lake Natoma, and the American River Parkway described in Alternative 2 could occur under Alternative 3.

Stanislaus River

The same changes in average water elevation, flow, and seasonal fluctuations described in Alternative 2 would occur under Alternative 3; therefore, the same impacts to recreation at New Melones Reservoir, Tulloch Reservoir, and the lower Stanislaus River would occur.

San Joaquin River

Under Alternative 3, there would be no substantive changes to average water elevations, flows, or seasonal fluctuations in Millerton Lake, the San Joaquin River, or the San Joaquin wildlife refuges compared to the No Action Alternative. Thus, no impacts on recreation would occur in the San Joaquin River region.

Bay–Delta

Similar to Alternative 1 and 2, it is anticipated that there would be slight flow changes to Delta outflow under Alternative 3 compared with the No Action Alternative. However, these changes would not be large enough to substantively impact recreation associated with the Delta.

No changes in average reservoir elevations are expected under Alternative 3 compared to the No Action Alternative; therefore, no impacts on boating are anticipated at the Yolo Bypass and Cache Slough, or in the San Francisco Bay reservoirs, as discussed in Alternatives 1 and 2.

CVP and SWP Service Areas

Similar to Alternatives 1 and 2, there would be no changes in water bodies in the CVP and SWP Service Areas compared to the No Action Alternative, and therefore no changes to recreation would occur under Alternative 3.

San Luis Reservoir

Under Alternative 3, the changes in average water levels would be similar to Alternative (Figure S.2-13); therefore, the effects would also be similar. Benefits to boating, day use activities like hiking, swimming, and picnicking, and recreational fishing opportunities can be expected from the increased water levels. Nearshore Pacific Ocean on the California Coast

Alternative 3 would not benefit Fall-Run Chinook Salmon and could affect recreational fisheries in the Nearshore Pacific Ocean area.

S.2.5.2 *Program-Level Effects*

S.2.5.2.1 Potential Changes to Recreational Opportunities

Under Alternative 3, habitat restoration and fish intervention actions would be implemented in most river regions. As described in Alternative 1, these actions could have short-term construction impacts on recreational opportunities associated with the river, lakes, and reservoirs. Long-term benefits for fishing would be created by spawning and rearing habitat restoration and fish intervention actions that increase fish populations and the health of fisheries. Regions in which no habitat restoration or fish intervention measures are implemented, could still experience indirect benefits to fish populations and fisheries.

S.2.6 Alternative 4

S.2.6.1 *Project-Level Effects*

S.2.6.1.1 Potential Changes to Recreational Opportunities

Trinity River

Similar to Alternative 1, average monthly water elevation at Trinity Lake could be slightly higher, by approximately 5 feet, compared to the No Action Alternative; seasonal fluctuations in water levels would remain approximately the same under Alternative 4 as the No Action Alternative (see Figure S.2-1). Therefore, Alternative 4 could have minor benefits on recreational opportunities.

The water elevation is generally stable in Lewiston Reservoir because it is used as a regulating reservoir for releases for downstream uses. This is not expected to change under Alternative 4, so elevation levels would remain stable and would not affect recreational opportunities.

Sacramento River

Similar to Alternative 1, the average monthly water elevation of Shasta Lake under Alternative 4 would increase slightly (approximately 4–13 feet) from September through February compared to the No Action Alternative, but would remain similar to the No Action Alternative from March through August (an increase of 1–3 feet), as shown in Figure S.2-2. Thus, minor benefits to boating, camping, fishing, and day use could occur in the fall as discussed in Alternative 1.

Water elevations at Keswick Reservoir and Whiskeytown Lake are not anticipated to change under Alternative 4, so no impacts on boating, day use activities, or recreational fishing would occur. No camping occurs at Keswick Reservoir, so there would be no impacts on camping at this location.

Average flows on the Sacramento River between Keswick Reservoir and Red Bluff would increase slightly (450 cfs) in June and decrease slightly (less than -140 cfs) in May, July, and August relative to the No Action Alternative. The highest decrease in monthly average flows is expected to occur in September (-2,740 cfs). Average flows would increase in winter through early summer months (see Figures S.2-3 and S.2-4). Seasonal fluctuations in flows would therefore change compared to the No Action Alternative. Changes in flows could affect boating, whitewater rafting, camping, day use activities, and recreational fishing as aesthetics and access to the river may change (as described in Alternative 1).

Clear Creek

Under Alternative 4, there would be an increase in average flows from November through May; the highest increase would occur in February, where average flows under Alternative 4 would be more than 400 cfs greater than the average flows under the No Action Alternative, as shown in Figure S.2-5. Average flows would be approximately the same as the No Action Alternative for the remainder of the year. The increase in flow during the winter and spring months could benefit day use activities such as wildlife viewing and recreational fishing, as increased flows could benefit fish populations. Kayaking opportunities may change during this time, as the flows may increase the experience for advanced kayakers and decrease the opportunities for less advanced kayakers.

Feather River

Under Alternative 4, the average water elevations in Lake Oroville would be higher than the No Action Alternative (by approximately 3–7 feet) from September through January, approximately the same as No Action Alternative from February through mid-March, and lower than the No Action Alternative (by approximately an average of 9 feet) from mid-March through August (see Figure S.2-6). Thus, seasonal fluctuations would decrease compared to the No Action Alternative. There could be adverse impacts on whitewater boating in the Big Bend Area, as boating occurs when Lake Oroville elevations are sufficiently low to expose several miles of river, particularly in the late fall months. Additionally, Alternative 4 could have minor impacts on camping, day use activities, and recreational fishing access, as the water levels could be further from the shore in spring and summer months and fishing access may be affected.

American River

Similar to Alternative 1, the average water elevations at Folsom Lake under Alternative 4 would decrease slightly (less than 2 feet) in May and June, increase slightly in the fall and winter months compared to the No Action Alternative, and would be approximately the same as the No Action Alternative in the late summary and spring months (see Figure S.2-7). Thus, there could be minor benefits from increased average water elevations in the fall and winter seasons on boating, recreational fishing access, camping, and day use activities.

Under Alternative 4, average water elevation levels and seasonal fluctuations in Lake Natoma could increase in the summer, fall, and winter months, as Lake Natoma is a regulating reservoir for Folsom Lake and could be influenced by changes in Folsom Lake (see Figure S.2-7). Boating, camping, day use activities, and recreational fishing could experience minor benefits as described above; however, average water elevations and fluctuations at Lake Natoma have not explicitly been modeled.

Compared to the No Action Alternative, there could be a slight increase in average flow of the American River Parkway in December through May and again in August; a decrease in flow is anticipated to occur in June, July, and September (approximately 100–300 cfs on average), as shown in Figure S.2-8. Seasonal

fluctuations would be similar under Alternative 4 and the No Action Alternative; the highest monthly flows are expected to occur in February and lowest in September and October. Increased flows in winter and spring would make the river more accessible to boating activities, including advanced whitewater rafting. Decreases in average flow in June, July, and September could decrease the opportunities for advanced boaters but increase the opportunities for less advanced boaters. Day use activities along the river would not be substantively affected by changes in flows. No impacts to camping would occur, as there are no camping opportunities along the river.

There are no anticipated changes to average water levels or seasonal fluctuations at Rancho Seco Park and Lake under Alternative 4. Therefore, boating, camping, day use activities, and recreational fishing access would not be affected.

Stanislaus River

Under Alternative 4, average water elevations and seasonal fluctuations at New Melones Reservoir (see Figure S.2-9) and average flows in the lower Stanislaus River (see Figure S.2-10) would change compared to the No Action Alternative by the same amount as under Alternative 1. Therefore, the impacts on recreation would be the same as those discussed under Alternative 1 for New Melones Reservoir and the lower Stanislaus River.

Average water elevations and seasonal fluctuations in Tulloch Reservoir are not anticipated to change; therefore, no changes to boating, camping, day use activities, or recreational fishing associated with the reservoir would occur.

San Joaquin River

Under Alternative 4, there would be no changes to recreation on Millerton Lake compared to the No Action Alternative, as average water elevations and seasonal fluctuations are not changing (S.2-11). Thus, no changes to recreation associated with the lake would occur.

Similar to Alternative 1, average flows on the San Joaquin River are not anticipated to substantively change under Alternative 4 compared to the No Action Alternative. Therefore, no impacts to recreational opportunities would occur.

There are no boating, camping, or recreational fishing opportunities at the San Joaquin Valley Refuges, so no impacts on boating, camping, or fishing would occur. Day use activities would not be affected, as flows would not substantively change.

Bay-Delta

It is anticipated there would be flow changes to Delta outflow under Alternative 4 compared to the No Action Alternative; average Delta outflow would increase from December through May and decrease in the fall months, as shown in Figure S.2-12. However, these changes would not be large enough to substantively affect recreation associated with the Delta. No changes in average elevations are expected in the Bay-Delta system under Alternative 4 compared to the No Action Alternative; therefore, no impacts on boating are anticipated at the Yolo Bypass and Cache Slough, or in the San Francisco Bay reservoirs, as discussed in Alternative 1.

CVP and SWP Service Areas

San Luis Reservoir

Under Alternative 4, average water elevation at San Luis Reservoir would generally increase compared to the No Action Alternative (see Figure S.2-13). Increases would be largest between August and March (approximately 7–15 feet), but smaller increases in water levels are anticipated in June and July (approximately 5–10 feet). Water levels would remain consistent with the No Action Alternative between April and May. Seasonal fluctuations in average water levels would not change compared with the No Action Alternative. Similar to Alternatives 1, 2, and 3, the increases in water levels would benefit boating, camping, day use activities, and recreational fishing at San Luis Reservoir.

Nearshore Pacific Ocean on the California Coast

Alternative 4 could benefit Fall–Run Chinook Salmon and could affect recreational fisheries in the Nearshore Pacific Ocean area.

S.2.6.2 *Program-Level Effects*

S.2.6.2.1 Potential Changes to Recreational Opportunities

No additional habitat restoration and fish intervention actions would occur under Alternative 4, so there would be no short-term construction impacts on recreational opportunities. Water efficiency use measures would be implemented under this alternative, but they would be for agriculture and municipal systems so construction would not affect recreational systems.

S.2.7 Mitigation Measures

Under Alternatives 1-4, minor impacts on recreation from changes in average water elevation, river flows, and seasonal fluctuations could occur on recreation (see Table S.2-1). These impacts could have minor beneficial effects or minor adverse effects depending on different factors such as the type of recreation and intensity of the activity (e.g., advanced whitewater rafting versus less-advanced rafting). To mitigate these impacts, recreation information would be updated on websites and other sources to inform the public of changing conditions. However, it is unlikely that impacts would be substantive and recreational facilities would not need to be improved to maintain recreational quality.

Under Alternatives 1 and 3, short-term construction activities would include best management practices (BMPs) to reduce potential construction impacts on environmental resources. Construction BMPs are generally implemented to reduce impacts on water quality, air quality, threatened and endangered species, noise, and hazardous materials. These BMPs would indirectly mitigate effects on recreation sites in the surrounding area. Therefore, no mitigation measures specific to recreational activities would be required.

S.2.8 Summary of Impacts

Table S.2-1 includes a summary of impacts, the magnitude and direction of those impacts, and potential mitigation measures for consideration.

Table S.2-1. Impact Summary

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
Potential Changes to Recreational Opportunities (Project-Level)	No Action	Current conditions would continue unchanged. Seasonal fluctuations would continue to impact recreational activities, including boating, camping, day use, and/or fishing.	–
	1	Potential minor benefits on boating, camping, day use, and/or fishing could occur at Trinity Lake, Shasta Lake, (in the fall), Sacramento River (in the spring), Lake Oroville, Folsom Lake, Lake Natoma, the American River Parkway (in the summer and fall, particularly for floating activities), the New Melones Reservoir, and the San Luis Reservoir. Potential minor adverse impacts on boating, camping, day use, and/or fishing could occur at the Sacramento River (in the fall), Lake Oroville (particularly on whitewater rafting), the American River Parkway (boating only), and the lower Stanislaus River (in the spring and summer). No changes would occur to recreational resources at Lewiston Reservoir, Keswick Reservoir, Whiskeytown Lake, the Upper Feather River Lakes, Clear Creek, Rancho Seco Park and Lake, Tulloch Reservoir, the San Joaquin River region, the Bay-Delta Area, the CVP and SWP Service Areas, or the Nearshore Pacific.	–

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
	2	Potential minor benefits to boating, camping, day use, and/or fishing would occur at the Sacramento River (in the winter, spring, and summer), Lake Oroville, the American River Parkway, New Melones Reservoir, and San Luis Reservoir. Potential minor, adverse impacts boating, camping, day use, and/or fishing would occur at Sacramento River (in the fall season), Clear Creek, Folsom Lake, Lake Natoma, and the Lower Stanislaus River. No changes would occur to recreational resources at Trinity Lake, Lewiston Reservoir, Shasta Lake, Keswick Reservoir, Whiskeytown Lake, the Upper Feather River Lakes, Rancho Seco Park and Lake, Tulloch Reservoir, San Joaquin River region, the Bay-Delta Area, the CVP and SWP Service Areas, or the Nearshore Pacific.	–
	3	Same changes and impacts as described in Alternative 2.	–

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
	4	Potential minor benefits to boating, camping, day use, and/or fishing would occur at the Trinity Lake, Shasta Lake (in the fall), the Sacramento River (in winter, spring, and early summer), Clear Creek (for advanced kayaking, day use, and fishing opportunities in the late fall, winter, and spring), Folsom Lake, and Lake Natoma (in summer, fall, and winter), American River Parkway (in winter and spring), the New Melones Reservoir, San Luis Reservoir, and the Nearshore Pacific. Potential minor adverse effects on boating, camping, day use, and/or fishing would occur at the Sacramento (late summer and fall), Clear Creek (for less-advanced kayaking opportunities in the late fall, winter, and spring), Feather River (for kayaking opportunities in the fall, and camping, day use, and recreational fishing opportunities in the spring and summer), American River Parkway (in the summer and fall). No changes are expected at Lewiston Reservoir, Keswick Reservoir, Whiskeytown Lake, Rancho Seco Park, Tulloch Reservoir, Millerton Lake, San Joaquin River, San Joaquin Valley Refuges, the Bay-Delta area, and the Nearshore Pacific.	–

Impact	Alternative	Magnitude and Direction of Impacts	Potential Mitigation Measures
Potential Changes to Recreational Opportunities (Program-Level)	No Action	Current conditions would continue and there would be no changes to recreation.	–
	1	Short-term construction impacts on recreation could occur; habitat restoration and fish intervention measures could have a beneficial impact on fishing in the long-term in the following regions: the Sacramento River, the American River, the Stanislaus River, the San Joaquin River, and the Bay-Delta.	–
	2	No overall impact on recreation.	–
	3	Short-term construction impacts on recreation could occur; habitat restoration and fish intervention measures could have a beneficial impact on fishing in the long-term in the following regions: the Sacramento River, the American River, the Stanislaus River, the San Joaquin River, and the Bay-Delta.	–
	4	Increased water use efficiency measures could have benefits on fisheries in the long-term.	–

S.2.9 Cumulative Effects

The No Action Alternative would not result in any changes to existing recreation conditions and therefore additional effects on recreation would be avoided by design. As such, the No Action Alternative is not evaluated further in this section.

Changes in average river flows, reservoir levels, and seasonal fluctuations under Alternatives 1-4 could have some minor beneficial and adverse effects on recreational opportunities depending on the location and season (see Table S.2-1). Program-level actions, such as habitat restoration and fish intervention actions could benefit recreational opportunities, particularly recreational fishing, under Alternatives 1 and 3. The water use efficiency measures in Alternative 4 could also have some beneficial effects on recreational fishing opportunities. Thus, this section analyzes the possible cumulative effects of flow, elevation, and seasonal fluctuation changes under all action alternatives and the program-level actions implemented under Alternatives 1, 3, and 4.

The past, present, and reasonably foreseeable projects, described in Appendix Y, *Cumulative Methodology*, may have cumulative impacts on recreation. Most of the projects listed in Appendix Y were reviewed for this analysis. For example, the Shasta Dam Raise Project (part of the Shasta Lake Water Resources Investigation) is expected to increase average water elevations at Shasta Lake, which could affect recreational opportunities in and around the lake. Additionally, resource management plans and programs are being implemented by communities throughout the action area. These plans, such as the *Contra Loma Reservoir and Recreation Resource Management Plan*, the *San Luis Reservoir State Recreation Area Resources Management Plan*, and the *Central Valley Vision*, could support and enhance recreational opportunities.

Proposed restoration projects and measures, such as tidal and wetland restoration projects, fish facility improvements, and flood control improvements, could benefit wildlife, which would improve certain types of recreation (e.g., wildlife viewing, fishing, and hiking) in the action area. Additionally, relicensing projects, such as the SWP Oroville Project, would ensure that recreational opportunities dependent on these facilities are not affected. Additionally, projects that alter average water flows and elevations, such as the Upper San Joaquin River Basin Storage Investigation, North Bay Aqueduct Alternative Intake, and the Semitropic Water Storage District Delta Wetlands, could create beneficial changes in flows for fish populations.

In the short-term, the implementation of Alternatives 1 and 3, resource management plans, and restoration measures could have cumulative construction impacts on recreation in the surrounding area, especially if construction of multiple projects occur at the same time and in the same general area. Construction impacts could include noise, increased heavy vehicle traffic, and road and area closures, among other effects. These impacts could prevent access to recreation areas or reduce enjoyment of activities during construction. Under Alternatives 1 and 3, short-term construction activities would include BMPs to reduce potential construction impacts on environmental resources, as described in Section S.2.7, *Mitigation Measures*. Potential cumulative effects from these alternatives would be minor, localized, and short-term because project construction would be dispersed throughout the project area, and BMPs would be implemented to reduce construction effects.

Depending on the location and season, all action alternatives could cause minor beneficial and/or adverse effects on recreation from changes to average river flows, reservoir elevations, and seasonal fluctuations. Therefore, effects from all action alternatives could have minor contributions to beneficial and/or adverse cumulative impacts on recreation. However, the contribution of the action alternatives to cumulative adverse impacts would not be substantial because only minor changes to recreation would occur and these changes would be dispersed throughout the project area. Additionally, the BMPs described in Section S.2.7 would be implemented to further reduce potential adverse impacts of alternatives. Alternatives 1 and 3 would likely contribute to additional beneficial cumulative effects on recreation in the action area, especially recreational fishing opportunities, as these alternatives include habitat restoration and fish intervention measures in the Sacramento, American, Stanislaus, and San Joaquin River regions and the Bay-Delta area. Alternative 4 could also contribute to beneficial cumulative effects on recreational fishing opportunities from implementation of water use efficiency measures.

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