Long-Term Operation – Draft Environmental Impact Statement

Appendix S – Recreation Technical Appendix

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S.1 Background Information

S.1.1 Trinity River

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

S.1.1.1 Trinity Reservoir

Trinity Reservoir is a Central Valley Project (CVP) facility on Trinity River located approximately 50 miles northwest of Redding, California. Trinity Reservoir is part of the Whiskeytown-Shasta-Trinity National Recreation Area (NRA) and the Shasta-Trinity National Forest. The U.S. Forest Service (USFS) administers recreational facilities and activities at Trinity Reservoir. When the water storage in Trinity Reservoir is at full capacity, it has a surface area of 17,222 acres and 145 miles of shoreline (U.S. Forest Service 2014). Under current conditions, the water levels at Trinity Reservoir vary seasonally but average annual elevations generally remain between 2,275 and 2,325 feet msl and the reservoir achieves full capacity only in very wet years. Average 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 reservoir near Trinity Center. Houseboats, motorboats, and waterskiing primarily occur in the southern part of the reservoir. Appendix S, *Trinity Reservoir Boat Ramps*, Table S-1 summarizes the seven public boat ramps on Trinity Reservoir.

Table S-1. Trinity Reservoir Boat Ramps

Boat Ramp	Access	Usable Elevations [a]
Bowerman	Open year-round or to 45 feet of draw down.	2,370 to 2,324
Cedar Stock (Trinity Reservoir Marina)	Open year-round or to 40 feet of draw down.	2,370 to 2,230
Clark Spring	ADA-accessible boat loading platform. Open May 1 to October 31, or to 41 feet of draw down.	2,370 to 2,329
Fairview	Open year-round or to 52 feet of draw down.	2,370 to 2,318
Minersville	Open year-round or to 200 feet of draw down. Full services offered May 1 to October 31. Boat ramp replacement planned for 2025.	2,305 to 2,170
Stuart Fork	Open to 32 feet of draw down.	2,370 to 2,338
Trinity Center	Open to 75 feet of draw down. Courtesy dock available May 1 to October 1.	2,370 to 2,295

Sources: U.S. Forest Service 2023a; California State Senate Majority Caucus 2023; Google Satellite Imagery 2023; Shasta Recreation Company 2023a.
ADA = Americans with Disabilities Act.
[a] Boat ramps are closed when the water level is lower than the usable elevation (measured in feet mean sea level).

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 (Bureau of Reclamation 2014).

Trinity Reservoir has two marinas and one moorage facility (Trinity Alps Marina 2023; Trinity Reservoir Resort and Marina 2023; and Pinewood Cove 2023). Commercial houseboats are available for rent at the two marinas. Trinity Reservoir shoreline includes approximately 32 miles of houseboating areas, where a density of four houseboats per mile can reside, and 18.5 miles of secondary houseboating areas, where a density of two houseboats per mile can reside. USFS issues permits for houseboats and privately owned recreational occupancy vehicles that use the water overnight. At Trinity Reservoir, up to 99 permits for privately owned vessels and 85 permits for commercially owned vessels may be issued each year (U.S. Forest Service 2014). Table S-2 summarizes the marina and moorage facilities located at Trinity Reservoir.

Table S-2. Trinity Reservoir Marinas and Moorage Facilities

	Number of Slips	
Marina and Moorage Facility	**Commercial**	**Private**
Trinity Reservoir Marina (Cedar Stock)	31 (including 10 houseboats)	220
Pinewood Cove Docks	–	52
Trinity Alps Marina	31 (including 25 houseboats)	63

Sources: U.S. Forest Service 2014; Google Satellite Imagery 2023.
Note: Decreases in each facility's available slips can occur when water elevations drop.

The Trinity Unit of the Whiskeytown-Shasta-Trinity NRA includes many campground sites, including campgrounds for group camping opportunities (U.S. Forest Service 2014), as summarized in Table S-3. There are other campgrounds in the upper elevations of the Trinity Reservoir watershed that are not directly or indirectly affected by changes in surface water elevations, and therefore, are not included in Table S-3.

Table S-3. Trinity Reservoir Campgrounds

Campground	Campground Type	Number of Sites	Access
Alpine View	Individual	53	Closes for winter
Bushytail	Individual	11	Closes for winter
Captain's Point	Boat-in	3	Open year-round
Clark Springs	Individual	21	Closes for winter
Fawn	Group	60	Closes for winter
Hayward Flat	Individual	98	Closes for winter
Jackass Springs	Individual	10	Open year-round; difficult to access in winter
Mariner's Roost	Boat-in	7	Open year-round
Minersville	Individual	17	Open year-round
Ridgeville	Boat-in	10	Open year-round
Ridgeville Island	Boat-in	3	Open year-round
Stoney Creek	Group	10	Closes for winter
Stoney Point	Individual	22	Closes for winter
Tannery Gulch	Individual	82	Closes for winter

Sources: U.S. Forest Service 2014, 2023b; Recreation.gov 2023a; Shasta Recreation Company 2023b.

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

Table S-4. Trinity Reservoir Day Use Areas

Day Use Area	Recreational Activities	Details
Clark Springs Day Use and Beach	Picnicking, swimming	34 sites
North Shore Vista	Vistas, interpretive site	–
Osprey Info Site	Vistas, interpretive site	–
Stoney Creek	Picnicking, swimming	4 sites
Tanbark Picnic	Picnicking	8 sites
Trail of Trees	Interpretive trail at Tannery Gulch Campground	1 mile round trip
Trinity Lakeshore Trail	Trail	8 miles round trip
Trinity Vista	Vistas, interpretive site	–

Source: U.S. Forest Service 2014.

Trinity Reservoir is stocked several times per year with non-native fish species, including smallmouth bass (*Micropterus dolomieu*), largemouth bass (M. *salmoides*), brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), Chinook salmon (O. *tshawytscha*), and kokanee salmon (O. *nerka*) (U.S. Forest Service 2014). White catfish (*Ameiurus catus*), brown bullhead (A. *nebulosus*), green sunfish (*Lepomis cyanellus*), bluegill (L. *macrochirus*), and Klamath smallscale sucker (*Catostomus rimiculus*). Pacific lamprey (*Entosphenus tridentatus*) are also present but are not generally considered as part of the recreational fishing opportunities. Wildlife viewing opportunities extend throughout the TrinityReservoir area, including viewing of bald eagles (*Haliaeetus leucocephalus*), black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), gray squirrel (*Sciurus griseus*), black-tailed jackrabbit (*Lepus californicus*), turkey (*Meleagris gallopavo*), 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. USFS administers the recreational facilities and activities on the reservoir. 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 (U.S. Forest Service 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 Reservoir downstream to Lewiston Reservoir to provide cold water to Trinity River. In addition, Lewiston Reservoir supplies water to Whiskeytown Reservoir via the Clear Creek Tunnel, which is activated when water levels in Whiskeytown Reservoir decrease. Recreational opportunities in Lewiston Reservoir include boating and fishing; however, there are fewer opportunities for swimming and waterskiing compared to Trinity Reservoir. 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 Table S-5 and Table S-6, respectively.

Table S-5. Lewiston Reservoir Boat Ramp

Boat Ramp	Access	Usable Elevations
Pine Cove	Open year-round	Lake level is constant

Sources: U.S. Forest Service 2014, 2023a; Shasta Recreation Company 2023a.
[a] Boat ramps are closed when the water level is lower than the usable elevation (measured in feet mean sea level).

Table S-6. Lewiston Reservoir Marina and Moorage Facilities

Marina and Moorage Facility	Number of Slips	
	Commercial	Private
Lakeview Terrace Docks	14	7
Pine Cove Marina	20	34

Source: U.S. Forest Service 2014.

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

Table S-7. Lewiston Reservoir Campgrounds

Campground	Campground Type	Number of Sites	Access
Ackerman	Individual	51	Open year-round
Cooper Gulch	Individual	5	Open year-round
Mary Smith	Individual	17	Open year-round

Sources: U.S. Forest Service 2014, 2023b.

Table S-8. Lewiston Reservoir Day Use Areas

Day Use Area	Recreational Activities	Details
Baker Gulch Trail	Trail	0.2 miles
Lewiston Vista	Vistas, interpretative site	–
North Lakeshore Trail	Trail	2 miles
Pine Cove	Picnicking	2 sites
South Lakeshore Trail	Trail	1 mile

Sources: U.S. Forest Service 2014, 2023a.

Lewiston Reservoir fishing opportunities include smallmouth bass, rainbow trout (stocked annually), brown trout, and kokanee salmon (U.S. Forest Service 2014). Klamath smallscale sucker, three-spine stickleback (*Gasterosteus aculeatus*), golden shiner (*Notemigonus crysoleucas*), 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*), ringtail cats (*Bassariscus astutus*), raccoon (*Procyon lotor*), 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 and described in this document occur at Shasta Reservoir; Keswick Reservoir; Whiskeytown Reservoir; Sacramento River, between Keswick Dam and the Delta; Folsom Reservoir and Lake Natoma; American River, between Nimbus Dam and the Sacramento River; and wildlife refuges that use CVP water supplies.

S.1.2.1 Shasta Reservoir

Shasta Reservoir is a CVP facility on the Sacramento River that is located near Redding. Shasta Reservoir is part of the Whiskeytown-Shasta-Trinity NRA and the Shasta-Trinity National Forest. USFS administers recreational facilities and activities at Shasta Reservoir. When the water storage in the reservoir is at full capacity (water elevation is at 1,067 feet msl), the reservoir has a surface area of approximately 30,000 acres and 365 miles of shoreline (Bureau of Reclamation 2014; U.S. Forest Service 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 (Bureau of Reclamation 2014; U.S. Forest Service 2014). Table S-9 summarizes the seven public boat ramps on Shasta Reservoir.

Table S-9. Shasta Reservoir Boat Ramps

Boat Ramp	Access	Usable Elevations [a]
Antlers	ADA-accessible boat loading platforms.	1,067 to 992
Bailey Cove	Open year-round; two lanes in service until the reservoir level drops by 50 feet	1,067 to 1,017
Centimudi	Open year-round; four lane ramp in service by 75 feet of drawdown; three lane ramp in service from 76 to 95 feet of drawdown; two lane ramp up by 210 feet of drawdown	1,067 to 857
Hirz Bay	Open year-round; three lane ramp in service by 75 feet of drawdown; two lane ramp until 95 feet of drawdown	1,067 to 972
Jones Valley	Open year-round; four lane ramp in service by 50 feet of drawdown; two lane ramp until 140 feet of drawdown; one lane ramp until 210 feet of drawdown	1,067 to 857
Packers Bay	Open year-round; four lane ramp in service by 50 feet of drawdown; two lane ramp until 115 feet of drawdown	1,067 to 952
Sugar Loaf	First-come, first-served; two lane ramp in service by 75 feet of drawdown; one lane ramp until 160 feet of drawdown	1067 to 907

Source: U.S. Forest Service 2014, 2023c.
ADA = Americans with Disabilities Act.
[a] Boat ramps are closed when the water level is lower than the usable elevation (measured in feet mean sea level).

Average water elevations at Shasta Reservoir range from approximately 978 to 1,042 feet msl. 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 (Bureau of Reclamation 2014).

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

Table S-10. Shasta Reservoir Marinas and Moorage Facilities

	Number of Slips [a]	
Marina and Moorage Facility	**Commercial**	**Private**
Antlers Resort and Marina	101 (including 35 houseboats)	200
Bridge Bay Resort	140 (including 92 houseboats)	7,773
Digger Bay Marina	75 (including 50 houseboats)	145
Holiday Harbor	95 (including 70 houseboats)	330
Jones Valley Marina	90 (including 64 houseboats)	99
Shasta Marina at Packers Bay	51 (including 26 houseboats)	–
Shasta Lake Recreational Vehicle Resort	–	22
Silverthorn Resort Marina	59 (including 35 houseboats)	113
Sugarloaf Cottages	–	16
Sugarloaf Marina	41 (including 21 houseboats)	40
Tsasdi Resort	–	30

Source: U.S. Forest Service 2014.
[a] Decreases in each facility's available slips can occur when water elevations drop.

The Shasta Unit of the Whiskeytown-Shasta-Trinity NRA includes many campsites, including group campsites (U.S. Forest Service 2014), as summarized in Table S-11. Seasonal fluctuations in water elevations change the distance from the campsites to the shoreline. Campgrounds within the upper elevations of the Shasta Reservoir watershed that are not directly or indirectly affected by changes in surface water elevations and are not listed here.

Table S-11. Shasta Reservoir Campgrounds

Campground	Campground Type	Number of Sites	Access
Antlers	Individual	59	Closes for winter
Arbuckle Flat	Boat-in	11	Open year-round
Beehive	Shoreline	–	Open year-round
Bailey Cove	Individual	7	Closes for winter
Dekkas Rock	Group	1 (60 person max)	Open year-round
Ellery Creek	Individual	19	Closes for winter
Gooseneck Cove	Boat-in	8	Open year-round
Green's Creek	Boat-in	9	Open year-round
Gregory Creek	Shoreline	18	Closes for winter
Hirz Bay	Individual	48	Open year-round
	Group	2 (120 and 80 person max)	Open year-round
Jones Valley (Upper & Lower)	Shoreline (at inlet)	21	Open year-round
Lakeshore East	Individual	24	Open year-round
	Yurt	2	Open year-round
Lower Salt Creek	Shoreline	–	Open year-round
Mariners Point	Shoreline	–	Closes for winter
McCloud Bridge	Individual	14	Closes for winter
Moore Creek	Individual	12	Closes for winter
	Group	1 (90 person max)	Closes for winter
Nelson Point	Individual	8	Closes for winter
	Group	1 (60 person max)	Closes for winter
Pine Point	Individual	14	Closes for winter
	Group	1 (100 person max)	Closes for winter
Ski Island	Boat-in	23	Open year-round

Sources: U.S. Forest Service 2014, 2023b.

Shasta Reservoir recreational areas also include day use activities such as picnicking, swimming, and other recreational opportunities, as summarized in Table S-12. Locations for shoreline day use activities are limited because of the steep and rocky shorelines around the lake. Use of these locations is less desirable when water elevations decline.

Table S-12. Shasta Lake Day Use Areas

Day Use Area	Recreational Activities	Details
Bailey Cove	Picnic	9 sites
	Trail	3.1 miles
Clikapudi	Trail	8 miles (with a 1-mile advanced mountain bike loop)
Dekkas Rock	Picnic	5 sites
Dry Fork Creek	Trail	4.7 miles
Fisherman's Point	Picnic	7 sites
	Trail	0.5 miles
Hirz Bay	Trail	1.6 miles
McCloud Bridge	Picnic	5 sites
Packers Bay	Trail	4 trails (0.4 to 2.8 miles each)
Potem Falls	Trail	0.3 miles
Samwel Cave Nature Trail	Interpretative trail	1 mile
Shasta Dam Visitors Center	Free tours of Shasta Dam; picnicking	Open Monday-Friday 8:30 a.m. to 4 p.m.
Sugarloaf	Trail	1 mile

Sources: U.S. Forest Service 2014, 2023c.

Fishing is popular at Shasta Reservoir, performed mostly by boat rather than from the shoreline. Anglers can catch warmwater and coldwater fish species year-round, owing to the summer stratification of the lake into a warm layer above a coldwater pool (Bureau of Reclamation 2014). Shasta Reservoir warmwater fishing opportunities include smallmouth bass, largemouth bass, spotted bass (*Micropterus punctulatus*), black crappie (*Pomoxis nigromaculatus*), bluegill, and channel catfish (*Ictalurus punctatus*) (U.S. Forest Service 2014). There are many bass tournaments at Shasta Reservoir 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 nine miles along the Sacramento River from Shasta Dam to Keswick Dam. The Bureau of Land Management (BLM), Shasta County, and USFS for the Bureau of Reclamation (Reclamation) administer recreational facilities and activities at Keswick Reservoir. The maximum water storage elevation at the top of the Keswick Dam spillway is 587 feet msl (Bureau of Reclamation 2023a). The water level fluctuates frequently, daily by one to three feet, and annually as much as eight to nine feet, 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 (Bureau of Land Management 2005).

There are several trails along Keswick Reservoir and areas for off-highway vehicles (OHVs) with camping allowed at one of the locations (Bureau of Land Management 2005, 2011). 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 FB 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 that would not be affected by water level fluctuations, 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 (Bureau of Reclamation 2014). 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 picnic sites and 27 campsites (Bureau of Land Management 2005). The Chappie-Shasta OHV staging area 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 picnicking.

Fishing opportunities are primarily for German brown trout and rainbow trout.

S.1.2.3 Whiskeytown Reservoir

Whiskeytown Reservoir is a CVP facility on Clear Creek that is located approximately eight miles west of Redding on the eastern slope of the Coast Range. Whiskeytown Reservoir is part of the Whiskeytown-Shasta-Trinity NRA. The National Park Service administers recreational facilities and activities. When water storage in the reservoir is at full capacity (water elevation is at 1,210 feet msl), Whiskeytown Reservoir has a surface area of 3,250 acres and 36 miles of shoreline (National Park Service 2020; Bureau of Reclamation 2023b). Average water elevations at Whiskeytown Reservoir do not vary significantly and range from approximately 580 to 586 feet msl.

Boating, waterskiing, sailing, kayaking, canoeing, swimming, and fishing occur at many locations at the reservoir. Boat ramps are available at Oak Bottom Marina, Brandy Creek Marina, and Whiskey Creek (National Park Service 2020), as summarized in Table S-13.

Table S-13. Whiskeytown Reservoir Boat Ramps

Boat Ramp	Access	Usable Elevations [a]
Brandy Creek Marina	Open year-round	1,210 to 1,190
Oak Bottom Marina	Open year-round	1,210 to 1,198
Whiskey Creek	Open year-round	1,210 to 1,195

Source: National Park Service 2020.
Boat ramps are closed when the water level is lower than the usable elevation (measured in feet mean sea level).

The reservoir level is relatively stable and does not affect the functionality of the boat ramps until late fall, when the Whiskey Creek boat ramp may become inaccessible.

The Whiskeytown Unit of the Whiskeytown-Shasta-Trinity NRA includes many campsites, including campgrounds for group camping opportunities (National Park Service 2020), as summarized in Table S-14.

Table S-14. Whiskeytown Reservoir Campgrounds

Campground	Campground Type	Number of Sites	Access
Brandy Creek	Recreational Vehicle	15	Open year-round
Brandy Creek	Primitive	2	Closes for winter
Coggins Park	Primitive	1	Open year-round
Crystal Creek	Primitive (near Crystal Creek)	2	Closes for winter
Dry Creek	Group	2 (50 person max each)	Closes for winter
Horse Camp	Primitive	2	Open year-round
Oak Bottom	Tent	94	Open year-round
	Recreational Vehicle	22	Open year-round
Peltier Bridge	Primitive (near Clear Creek)	9	Open year-round
Sheep Camp	Primitive	4	Closes for winter

Source: National Park Service 2023a.
Primitive campgrounds are typically tent-on-the-ground only campgrounds with no drinking water or electricity. Available facilities and amenities vary by campground.

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

Table S-15. Whiskeytown Reservoir Day Use Areas

Day Use Area	Recreational Activities	Details
Boulder Creek Falls	Trail (moderate)	1 mile
	Trail (advanced)	2.75 miles
Brandy Creek Beach and Falls	Picnicking, swimming	–
	Trail (moderate)	2.4 miles
	Trail (moderate)	1.5 miles
Buck Hollow	Trail (easy)	1 mile
Camden Water Ditch	Trail (easy)	1.2 miles
Clear Creek Canal and Vista	Picnicking	–
	Trail (moderate)	4.5 miles
Crystal Creek Water Ditch and Falls	Picnicking	–
	Trail (easy)	0.75 miles
	Trail (ADA-accessible)	0.4 miles
Davis Gulch	Trail (moderate)	3.3 miles
Guardian Rock	Trail (easy)	1 mile
	Trail (ADA-accessible)	0.25 miles
James K. Carr Trail	Trail (advanced)	1.7 miles
Kanaka Peak	Trail (advanced)	3.6 miles
Logging Camp	Trail (easy)	1 mile
Mill Creek	Trail (advanced)	6.1 miles
Mt. Shasta Mine Loop	Trail (moderate)	3.1 miles
Mule Mountain Pass	Trail (moderate)	5.5 miles
Oak Bottom Ditch	Trail (easy)	2.75 miles
Papoose Pass	Trail (advanced)	4.8 miles
Peltier	Trail (moderate)	1.75 miles
Princess Ditch	Trail (moderate) (mountain biking, horseback riding)	1.9 miles
Rich Gulch	Trail (advanced)	1.8 miles
Shasta Bally Road	Trail (advanced)	5.5 miles
Shasta Divide Nature Trail	Trail (moderate)	0.4 miles
South Fork Mountain Lookout Road	Trail (advanced)	7.0 miles
Upper Crystal Creek Road	Trail (advanced)	7.0 miles

Source: National Park Service 2023b.
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 Reservoir include brook trout (*Salvelinus fontinalis*), brown trout, rainbow trout, kokanee salmon, Chinook salmon, smallmouth bass, largemouth bass, spotted bass, sunfish (bluegill and crappie), brown bullhead, channel catfish, hardhead (*Mylopharodon conocephalus*), Sacramento sucker (*Catostomus occidentalis*), and Sacramento pikeminnow (National Park Service 2021).

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 West Sacramento).

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 (Bureau of 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 (Bureau of Reclamation 2014; Bureau of 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.

BLM owns and manages much of the land along the Sacramento River between Balls Ferry, California, and Red Bluff (Bureau of Reclamation 2014). Redding, Anderson, and BLM provide public access points. 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 Bonnyview 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 whitewater river reaches: (1) between Keswick Dam and the Anderson-Cottonwood Irrigation District Diversion Dam; and (2) 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 (Bureau of Reclamation 2014).

There are trails or trail access and picnicking facilities with access to the river in this reach of the Sacramento River (Bureau of Reclamation 2014). Trails include the 13-mile Sacramento River Trail, between Keswick Dam and Turtle Bay Park in Redding. Local municipalities, including Redding, Anderson, and Red Bluff, manage many of the picnicking locations. 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, sunfish, and striped bass (*Morone saxatilis*) (Bureau of Reclamation 2014). Fishing can occur from boats positioned along the Sacramento River and at four public fishing access points: Turtle Bay East, Kapusta Property, Deschutes Road, and Reading Island. Sites that provide fishing and trail access are Diestlehorst Pasture River Access, Jellys Ferry, and Sacramento River Island.

The California Department of Fish and Wildlife (CDFW) operates the Mouth of Cottonwood Creek Wildlife Area. This area provides viewing opportunities for Swainson's hawk (*Buteo swainsoni*), bald eagle, ringtail cat, river otter, and other birds and mammals (Bureau of Reclamation 2014). 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, mourning doves (*Zenaida macroura*), various species of ducks and geese, mule deer (*Odocoileus hemionus*), pig, turkey, and black bear (Bureau of Reclamation 2014).

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 (Bureau of Reclamation 2004). Water-dependent recreational activities along the middle reach include boating, swimming, and fishing (Bureau of Reclamation 2005a). Water-contact recreational activities are popular in this section of the river because of the relatively warm water. Public access points are provided along this reach by the California Department of Parks and Recreation (State Parks), and Tehama, Glenn, Colusa, and Sutter Counties (Bureau of 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 (California Department of Fish and Wildlife 2004; Bureau of Reclamation 2014). Public access for fishing, hunting, and wildlife viewing also is provided at the CDFW Fremont Weir Wildlife Area (California Department of Fish and Wildlife 2023a).

Fishing opportunities include Chinook salmon, steelhead, trout, American shad (*Alosa sapidissima*), sturgeon (*Acipenseridae spp.*), catfish, and striped bass (Bureau of Reclamation 2005a).

Seasonal game hunting opportunities include ring-necked pheasant (*Phasianus colchicus*), California quail, various species of ducks and geese, mourning doves, and mule deer (Bureau of Reclamation 2014).

Sacramento River confluence with the Delta (near West Sacramento)

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 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 2009); Sacramento County and Sacramento at Discovery Park and Miller Park, respectively (Sacramento County 2023a; Bureau of Reclamation 2005a); and by 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 (Bureau of Reclamation 2004, 2005a).

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 (Bureau of 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 (*Percina caprodes*), channel catfish, and common carp (*Cyprinus carpio*) (California Department of Fish and Wildlife 2023b).

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 these reaches are located within Shasta County and the easternmost reaches are within 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 (Bureau of Land Management 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 2023a). The Clear Creek Greenway includes 10 trails and eight picnic areas (Bureau of Land Management 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 (Sacramento River Watershed Project 2023b).

S.1.4 American River

Folsom Reservoir 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.1.4.1 Folsom Reservoir and Lake Natoma

Folsom Reservoir is a CVP facility on the American River. The El Dorado National Forest is in the upper American River watershed upstream of Folsom Reservoir. The State of California designated the North Fork American River, from its source to Iowa Hill Bridge, upstream of Folsom Reservoir, as part of the Wild and Scenic Rivers System (both national and California). Recreational facilities and activities in the Folsom Reservoir area are within the Folsom Reservoir SRA or the Folsom Powerhouse State Historic Park that are managed by California State Parks. Recreational activities upstream of Folsom Reservoir occur on or adjacent to lands owned by BLM, State Parks, and El Dorado County. When the water storage in Folsom Reservoir is at full capacity (water elevation is at 466 feet msl), the reservoir has a surface area of 11,500 acres and 75 miles of shoreline (California Department of Parks and Recreation and Bureau of Reclamation 2003, 2007; California Department of Parks and Recreation 2010). Average water elevation at Folsom Reservoir ranges from approximately 410 feet to 450 feet msl.

The upper extent of Lake Natoma is located about one mile downstream of Folsom Dam. Lake Natoma continues from the Rainbow Bridge to Nimbus Dam, about a four mile distance (California Department of Parks and Recreation and Bureau of Reclamation 2003, 2007). Recreational facilities and activities at Lake Natoma area are part of the Folsom Reservoir 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. The average water elevation of Lake Natoma is approximately 123 feet msl.

Water-related recreational activities at Folsom Reservoir include, but are not limited to, boating, jet skiing, waterskiing, windsurfing, rafting, sailing, canoeing, kayaking, swimming, and fishing (Bureau of Reclamation 2005b; California Department of Parks and Recreation and Bureau of Recreation 2003, 2007). The South Fork American River has 21 miles of whitewater boating that include stretches suitable for beginners 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 2022). 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 include paddling, rowing, and fishing because of a five mile per hour speed limit for motorized watercraft. California State University, Sacramento manages a Reclamation owned aquatic center at Lake Natoma (Bureau of Reclamation et al. 2006).

Folsom Reservoir Marina at Brown's Ravine is the only marina at Folsom Reservoir. There are six boat ramp facilities at Folsom Reservoir and three boat ramp facilities at Lake Natoma, as summarized in Table S-16.

Table S-16. Folsom Reservoir and Lake Natoma Boat Ramps

Location	Boat Ramp	Access	Usable Elevations [a]	Details
Folsom Reservoir	Beal's Point	Day use area	465 to 420	Informal boat ramp
	Brown's Ravine (Folsom Lake Marina)	Day use area	466 to 395	675 wet slips and 175 dry storage slips
	Folsom Point	Open year-round	466 to 406	–
	Granite Bay	Day use area	466 to 360	Largest boat ramp facility at Folsom Lake
	Hobie Cove	Open year-round	426 to 375	–
	Peninsula	Day use area	466 to 410	–
	Rattlesnake Bar	Open year-round	466 to 425	–
Lake Natoma	Black Miners Bar	Open year-round	121 to 115	–
	Nimbus Flat	Open year-round	128 to 115	Main boat ramp
		Open year-round	128 to 120	Informal boat ramp
	Willow Creek	Open year-round	125 to 115	Informal boat ramp

Sources: Bureau of Reclamation et al. 2006; California Department of Parks and Recreation and Bureau of Reclamation 2003, 2007.
[a] Boat ramps are closed when the water level is lower than the usable elevation (measured in feet mean sea level).

Campgrounds are located at Folsom Reservoir and Lake Natoma, as summarized in Table S-17. During seasons when water levels are lower, campsites are farther from the shoreline.

Table S-17. Folsom Reservoir and Lake Natoma Campgrounds

Location	Campground	Campground Type	Number of Sites	Access
Folsom Lake	Beal's Point	Individual	49	Open year-round
		Recreational Vehicle	20	Open year-round
	Peninsula	Boat-in	104	Remote; subject to winter and/or road closures
Lake Natoma	Black Miners Bar	Group	3	Open year-round

Sources: California Department of Parks and Recreation and Bureau of Reclamation 2003, 2007; California Department of Parks and Recreation 2022; Bureau of Reclamation et al. 2006.

Folsom Reservoir and Lake Natoma recreational areas also include day use areas for picnicking, swimming, and other recreational opportunities, as summarized in Table S-18. The locations for shoreline day use areas are limited because of the steep and rocky 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-18. Folsom Reservoir and Lake Natoma Day Use Areas

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

Location	Day Use Area	Recreational Activities	Details
Lake Natoma	Lake Natoma Trails	Trail	Several (1 to 10 miles)
	Lake Overlook	Trailhead (Lake Natoma Trail)	–
	Black Miners Bar	Picnicking (day use area)	32 sites
		Picnicking (campground)	17 sites
		Fishing	–
		Equestrian	–
		Trailhead (Lake Natoma Trail)	–
	Nimbus Fish Hatchery	Hatchery	–
	Nimbus Flat	Picnicking	37 sites
		Trailhead (Lake Natoma Trail)	–
		California State University, Sacramento Aquatic Center	–
	Willow Creek	Picnicking	4 sites
		Trailhead (Lake Natoma Trail)	–

Sources: Bureau of Reclamation et al. 2006; California Department of Parks and Recreation and Bureau of Reclamation 2003, 2007.
ADA = Americans with Disabilities Act.

Fishing is popular at Folsom Reservoir and Lake Natoma from boats and the shoreline. Anglers can catch warmwater and coldwater fish species owing to the summer stratification of the reservoir into a warm layer above a coldwater pool, especially in Folsom Reservoir (California Department of Parks and Recreation and Bureau of Reclamation 2007). Warmwater fishing opportunities include smallmouth bass, largemouth bass, spotted bass, and black and white crappie (Pomoxis annularis). The cooler water strata support fishing for rainbow trout, brown trout, and Chinook salmon.

S.1.4.2 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 California 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 Reservoir, along Folsom Reservoir and Lake Natoma, and along the lower American River through Discovery Park to its confluence with the Sacramento River (Bureau of 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 (Bureau of 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 (Sacramento County 2008). 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.1.4.3 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 (Bureau of Reclamation 2005b). The reservoir 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 a wide variety of migratory birds (Sacramento Municipal Utility District 2023).

S.1.5 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.1.5.1 New Melones Reservoir

New Melones Reservoir is a CVP facility on the Stanislaus River. Reclamation manages recreational activities and facilities at New Melones Reservoir. 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 (Recreation.gov 2023b).

Water-related recreational activities include boating, waterskiing, camping, picnicking, wildlife viewing, spelunking, rock climbing, gold panning, and fishing (Bureau of Reclamation 2010a). Float planes can land in 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 average water elevation varies between approximately 1,004 and 1,035 feet msl. In dry years when the reservoir water level is low (long-term average minimum levels can get down to 780 feet msl) 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 (long-term average maximum levels can get up to 1,087 feet msl), there is not enough flow to create whitewater conditions and whitewater rafting is not available.

Table S-19 summarizes the five boat ramps at New Melones Reservoir.

Table S-19. New Melones Reservoir Boat Ramps

Boat Ramp	Access	Usable Elevations [a]	Details
Angels Cove	Open year-round	1,088 to 975	One ramp
Glory Hole (New Melones Lake Marina)	Open year-round	1,088 to 860	4 ramps, 1 volunteer built ramp
Mark Twain	Open year-round	1,088 to 760	Unimproved ramp; hand launch only
Parrotts Ferry	Open year-round	1,088 to 900	One unimproved ramp
Tuttletown	Open year-round	1,088 to 900	Three boat ramps

Source: Bureau of Reclamation 2010a.
[a] Boat ramps are closed when the water level is lower than the usable elevation (measured in feet mean sea level).

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

Campgrounds are located at Glory Hole and Tuttletown, as summarized in Table S-20 (Bureau of Reclamation n.d.). Some of the campsites are located along the shoreline and the water can be difficult to access during seasons characterized by low water levels.

Table S-20. New Melones Reservoir Campgrounds

Campground	Campground Type	Number of Sites	Access
Glory Hole Recreation Area	Individual (2)	144 (total)	Open year-round
Tuttletown Recreation Area	Individual (3)	161 (total)	Open year-round
	Group	2 (Fiddleneck – 30-60 people; Oak Knoll – 20-50 people)	Open year-round

Source: Bureau of Reclamation n.d.

New Melones Reservoir recreational areas also include day use areas for picnicking, swimming, and other recreational opportunities, as summarized in Table S-21 (Bureau of Reclamation n.d.). Shoreline day use areas are less desirable when water elevations are low.

Table S-21. New Melones Reservoir Day Use Areas

Day Use Area	Recreational Activities	Details
Glory Hole Recreation Area (Buck Brush, Black Bart, Osprey Point)	Picnicking	61 sites
	Trails	Several (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 (1.5 to 4.0 miles)
New Melones Reservoir Visitor Center	Visitor Center and Museum	Open Saturday and Sunday, 10 a.m. to 4 p.m., Memorial weekend through Labor Day
Tuttletown Recreation Area (Heron Point, Eagle Point, Lupine)	Picnicking	52 sites
	Trail	Several (0.5 to 2.9 miles)
	Boat launch	Open year-round

Source: Bureau of Reclamation n.d.

S.1.5.2 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 2023; Tri-Dam Project 2015). Long-term average water elevations at Tulloch Reservoir are also the long-term average maximum water elevations and range from 500.5 feet to 508 feet msl.

Water-related recreational activities include boating, sailing, windsurfing, jet and waterskiing, and fishing. Camping and picnicking are 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 the South Shore Marina and Campground.

S.1.5.3 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 four miles to Knights Ferry (American Whitewater 2014). Downstream of Knights Ferry, there are seven parks, including Caswell Memorial State Park, a 258-acre park managed by State Parks (Stanislaus County 2015; California Department of Parks and Recreation 2018). Fishing opportunities on the lower Stanislaus River include bass, catfish, and crappie.

S.1.6 San Joaquin River

S.1.6.1 Millerton Reservoir

Millerton Reservoir is a CVP facility on the San Joaquin River. Millerton Millerton Reservoir is part of the Millerton SRA. State Parks administers recreational facilities and activities at Millerton Reservoir. When the water storage in Millerton Reservoir is at full capacity (water elevation is at 578 feet msl), it has a surface area of approximately 4,900 acres and 47 miles of shoreline (Bureau of Reclamation and California Department of Water Resources 2011). Average water elevations at Millerton Reservoir range from approximately 492 feet to 550 feet msl.

Recreational opportunities include boating, sailing, waterskiing, jet skiing, swimming, tournament and recreational fishing, camping, and picnicking (Bureau of Reclamation and California Department of Water Resources 2011; Bureau of Reclamation and California Department of Parks and Recreation 2010). Whitewater rafting opportunities for intermediate-level rafters occur upstream of Millerton Reservoir between August and November when low water levels in the lake increase the water flow (American Whitewater 2021). Table S-22 summarizes the public boat ramps on Millerton Reservoir.

Table S-22. Millerton Reservoir Boat Ramps

Boat Ramp	Location	Usable Elevations [a]
Crow's Nest (Ramp #1)	South side of dam at Crows Rest Picnic Area	580 to 487
South Bay (Ramps #2–5)	On South Shore near La Playa Picnic Area	580 to 500
North Shore (Ramp #6)	On North Shore in Meadows Campground and by Sunset Point Day Use Area	580 to 470

Sources: California's Greatest Lakes 2023; California Department of Parks and Recreation 2014.
[a] Boat ramps are closed when the water level is lower than the usable elevation (measured in feet mean sea level).

The marina at Millerton Reservoir is located at Winchell Cove on the South Shore (Bureau of Reclamation and California Department of Parks and Recreation 2010). The marina includes 500 boat slips. There are also eight boat slips at Crow's Nest.

Campgrounds are located along the Millerton Reservoir North Shore, as summarized in Table S-23. 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-23. Millerton Reservoir Campgrounds

Campground	Campground Type	Number of Sites	Access
Dumna Strand	Shoreline; Individual	9	Open year-round
Fort Miller	Shoreline; individual	36	Open year-round
Group Campsites	Group	2 (45 and 75 person max)	Open year-round
	Amphitheater	1	Open year-round

Campground	Campground Type	Number of Sites	Access
Meadows	Shoreline; Individual; Launch Ramp	59	Open year-round
Mono	Shoreline; Individual	16	Open year-round
North Finegold	Boat-in	15	Open year-round
Rocky Point	Shoreline; Individual	20	Open year-round
Temperance Flat Boat	Boat-in	25	Open year-round
Valley Oak	Shoreline; Individual; Horse Area	6	Open year-round

Sources: California's Greatest Lakes 2023; Bureau of Reclamation and California Department of Parks and Recreation 2010.

Millerton Reservoir recreational areas also include day use areas for picnicking, swimming, and other recreational opportunities, as summarized in Table S-24 (Bureau of Reclamation and California Department of Parks and Recreation 2010). The locations for shoreline day use areas are less desirable when water elevations are low.

Table S-24. Millerton Reservoir Day Use Areas

Day Use Area	Recreational Activities	Details
Blue Oak	Picnicking	3 sites
	Trail (along South Shore)	4 miles
Buzzard's Roost Trail	Picnicking	2 sites
	Trail	0.5 miles
Crow's Nest	Picnicking	13 sites
Eagle's Nest	Picnicking	2 sites
	Trailhead	–
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	Picnicking	3 sites
	Historic site	–
North Shore Trail	Trail (Rocky Point Trail)	–
San Joaquin River Trail	Trail (along Millerton Lake shoreline)	14 miles
South Bay	Picnicking	9 sites
South Fine Gold	Picnicking	10 sites
	Trail	11 miles

Sources: Bureau of Reclamation and California Department of Parks and Recreation 2010; California Department of Parks and Recreation 2017a.

S.1.6.2 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. The parkway is managed by the San Joaquin River Parkway and Conservation Trust (Bureau of Reclamation and California Department of Water Resources 2011).

Water-related recreational activities include boating, canoeing, kayaking, whitewater rafting, and fishing (Bureau of Reclamation and California Department of Water Resources 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 and Skaggs Bridge Park at State Route 145 (American Whitewater 2023). 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 five-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 Firebaugh; and Las Palmas Fishing Access and Laird Park in Stanislaus County. Public access is provided at all these sites. A boat ramp is located upstream of Mendota Dam.

Most of these areas permit fishing. Fishing opportunities in the San Joaquin River include sunfish, crappie, bluegill, striped bass, largemouth bass, and catfish (Bureau of Reclamation and California Department of Water Resources 2011).

S.1.6.3 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 the Grasslands Resource Conservation District (Bureau of Reclamation 2012). Water-related activities include wildlife viewing and hunting. Hunting opportunities include waterfowl, shorebirds, and pheasants (Bureau of Reclamation and California Department of Water Resources 2011).

Several wildlife areas along the San Joaquin River rely on CVP operation of Millerton Lake to provide water (Bureau of Reclamation and California Department of Water Resources 2011). The West Hilmar Wildlife Area includes 340 acres of wildlife habitat accessible by boat. The San Joaquin River NWR includes 7,300 acres of riparian woodlands, wetlands, and grasslands for native wildlife, and the four-mile-long Pelican Nature Trail (U.S. Fish and Wildlife Service n.d.).

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

S.1.7 Bay-Delta Operations

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 environmental impact statement (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.1.7.1 Delta Recreational Opportunities

The primary recreational activities in the Delta are related to boating, wildlife viewing, hunting, and fishing. 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 U.S. Fish and Wildlife Service (USFWS) sites (Delta Protection Commission 2021).

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 2002; Delta Protection Commission 2021). 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. The latest update to the "Recreation and Tourism" chapter of the *Economic Sustainability Plan for the Sacramento-San Joaquin Delta* (Delta Protection Commission 2021) presented data on recreation-related facilities and services. There are 97 marinas and 48 camping/recreational vehicle facilities.

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

- **USFWS:** Stone Lakes NWR, Antioch Dunes NWR (U.S. Fish and Wildlife Service 2023; City of Antioch n.d.);
- **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 (California Department of Fish and Wildlife 2023a, 2023c, 2023d, 2023e);

- **State Parks:** Brannan Island-Franks Tract SRAs, Delta Meadows SRA;
- **California Department of Water Resources (DWR):** Clifton Court Forebay;
- **The Nature Conservancy/CDFW:** Cosumnes River Preserve;
- **Solano Land Trust:** Jepson Prairie Preserve (Solano Land Trust 2023);
- **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 (East Bay Regional Park District 2013); and
- **Municipal marinas, boat ramps, and fishing access facilities:** Antioch Marina and Municipal Boat Ramp; Pittsburg Riverview Park; Pittsburg Marina; Sacramento County Cliffhouse, Georgiana Slough Fishing Access, Hogback Island Access, and Sherman Island Public Access Facility; 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 Stockton; San Joaquin County Dos Reis Regional Park, Mossdale Crossing Regional Park, and Westgate Landing Regional Park; and Yolo County Clarksburg River Access (City of Antioch 2017, n.d.; City of Pittsburg 2023; Pittsburg Marina 2023; Sacramento County 2023b; City of Sacramento 2023; City of Stockton 2007; San Joaquin County Parks 2023; Yolo County 2009).

Several of these sites include launch sites for boats, canoes, and kayaks and trails (Delta Protection Commission 2012a; Delta Stewardship Council 2013; California Department of Fish and Wildlife 2023b, 2023a, 2023c; East Bay Regional Park District 2013; City of Antioch 2017, n.d.; City of Pittsburg 2023; Pittsburg Marina 2023; Sacramento County 2023b; City of Sacramento 2023; 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 (California Department of Water Resources 2013). 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 (California Department of Water Resources 2014).

Fishing opportunities in the Delta generally include striped bass, smallmouth bass, largemouth bass, spotted bass (*Micropterus punctulatus*), American shad, black crappie, Chinook salmon, steelhead, catfish, sunfish, tule perch (*Hysterocarpus traskii*), warmouth (*Lepomis gulosus*), and white sturgeon (*Acipenser transmontanus*) (Delta Protection Commission 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 (U.S. Fish and Wildlife Service 2023), and
- **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 (Delta Protection Commission 2012a).

S.1.7.2 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 (California Department of Fish and Wildlife 2023a): Activities include wildlife viewing, fishing, and hunting for pheasant, waterfowl, mourning dove, deer, valley quail, cottontail (*Sylvilagus* genus) and jackrabbits (*Lepus californicus*), and wild turkey.
- Sacramento Bypass Wildlife Area (California Department of Fish and Wildlife 2023c): Activities include wildlife viewing, and fishing for white catfish and black crappie in the Tule Canal, and largemouth bass, bluegill, and white catfish in the borrow pits.
- Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2023d): Activities include wildlife viewing, bird watching, and hunting; fishing for sturgeon, striped bass, black bass, and catfish. Hunting for waterfowl, American coot (*Fulica americana*), common moorhen (*Gallinula chloropus*), common snipe (*Gallinago gallinago*), pheasants, and mourning doves; educational and interpretative programs.
- Calhoun Cut Ecological Reserve (California Department of Fish and Wildlife 2023e): Activities include 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.1.7.3 Suisun Marsh

Suisun Marsh is 102,142 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 (Bureau of 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).

CDFW manages several areas within the Suisun Marsh for public access, including the areas in the subsequent list (Bureau of 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 a 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 (Bureau of Reclamation et al. 2011). Pier fishing opportunities are provided at the 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 (Bureau of Reclamation et al. 2011).

Fishing opportunities within Suisun Marsh include striped bass, white sturgeon, catfish, and carp (Bureau of 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. 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 the Grizzly Island Wildlife Area for hunting waterfowl, snipe, coots, moorhens, mourning doves, pheasants, rabbits, and tule elk (*Cervus canadensis nannodes*) (Bureau of Reclamation et al. 2011).

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.1.7.4 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 2021).

Contra Loma Reservoir

The Contra Loma Reservoir is a CVP facility in Contra Costa County that provides offstream storage along the Contra Costa Canal. EBRPD manages the recreation facilities. The 80-acre reservoir is part of the 775-acre Contra Loma Regional Park and Antioch Community Park (East Bay Regional Park District 2023a). 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 year-round. Fishing opportunities include catfish, striped bass, largemouth bass, bluegill, crappie, trout, and redear sunfish (*Lepomis microlophus*) (East Bay Regional Park District 2023a).

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 (*Dreissena polymorpha*). Previously, the San Benito County Water District managed the recreation facilities (Bureau of Reclamation 2015).

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 160 acres of surface area and six miles of shoreline. Recreational activities include boating, bicycling, sailing, picnicking, fishing, and windsurfing. There is one boat ramp at the reservoir (California Department of Parks and Recreation 2020). Fishing opportunities include striped bass, smallmouth bass, largemouth bass, spotted bass, white bass, catfish, crappie, and trout.

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 (. Recreational activities include boating, windsurfing, camping, swimming, and fishing (California Department of Water Resources 2023a). There is a boat ramp at the lake (California Department of Water Resources 2023a; East Bay Municipal Utility District 2023a). When the water surface elevation reaches 678 feet msl, boating hazards along the variable shoreline can be exposed. There are seven group campsites that can accommodate a total of 475 people and 145 family campsites (East Bay Regional Park District 2021). Fishing opportunities include rainbow trout, catfish, smallmouth bass, largemouth bass, striped bass, and other panfish (California Department of Water Resources 2023a).

Los Vaqueros Reservoir

Los Vaqueros Reservoir is a CCWD offstream storage facility in Contra Costa County. CCWD manages recreation facilities. Water-related activities include boating, using rented electrical boats, and fishing (Contra Costa Water District 2019). 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 (*Archoplites interruptus*) (Contra Costa Water District 2019).

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 (East Bay Municipal Utility District 2021). Recreation is not allowed within the waters of Upper San Leandro and Briones Reservoirs. The area offers visitors over 80 miles of trails, many of which provide reservoir views, within the watersheds of the reservoirs (East Bay Municipal Utility District 2023b).

EBMUD manages recreation facilities at San Pablo Reservoir. Recreational activities at San Pablo Reservoir include boating, picnicking, and fishing. There is a boat ramp at the reservoir. There are individual sites and four group picnic areas, of which three can accommodate up to 100 people at each site (East Bay Municipal Utility District 2023c). Fishing opportunities at San Pablo Reservoir include rainbow trout, catfish, black bass, bluegill, and crappie (East Bay Municipal Utility District 2023c).

EBMUD manages recreation facilities at Lafayette Reservoir. Recreational activities at Lafayette Reservoir include boating, picnicking, and fishing. 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 over ten miles of trails. Fishing opportunities at Lafayette Reservoir include rainbow trout, catfish, black bass, and sunfish (East Bay Municipal Utility District 2023d).

EBRPD manages recreation facilities at Lake Chabot as part of the Lake Chabot Regional Park. 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. Lake Chabot offers over 20 miles of trails for hiking that connect to an additional 70 miles of trails in Anthony Chabot Regional Park. Anthony Chabot Regional Park also has equestrian trails for riding (East Bay Regional Park District 2023b). Fishing opportunities at Lake Chabot include rainbow trout, catfish, black bass, crappie, bluegill, and carp (East Bay Regional Park District 2023c).

S.1.7.5 Recreational Fishing in San Pablo, Suisun, and San Francisco Bays

Recreational fishing for California halibut (*Paralichthys californicus*), 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 Estuary is related to striped bass and sturgeon fishing, especially in San Pablo and Suisun Bays (California Department of Fish and Wildlife 2023d).

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 (*Acipenser medirostris*) 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 Estuary during

periods specified by the National Marine Fisheries Service (California Department of Fish and Wildlife 2023f).

S.1.8 Nearshore Pacific Ocean on the 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 (*Oncorhynchus kisutch*), 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 three to 200 nautical miles offshore (Pacific Fishery Management Council 2023). Along the California coast, salmon fisheries are managed by CDFW from the shore to three nautical miles offshore with regulations that are generally similar to those applied by PFMC. 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.1.9 Central Valley Project and State Water Project 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 (Bureau of Reclamation 2007). Fishing opportunities include striped bass and catfish (Bureau of Reclamation 2007).

S.1.9.2 California Aqueduct/San Luis Canal

The California Aqueduct is an 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*) (Bureau of 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 (California Department of Parks and Recreation 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 (Bureau of Reclamation and California Department of Parks and Recreation 2013; California Department of Parks and Recreation 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 (Bureau of Reclamation and California Department of Parks and Recreation 2013; California Department of Parks and Recreation 2017b).

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

Picnicking, swimming, and hiking occur at the Basalt Area, Medeiros Area, and Los Banos Creek Area (California Department of Parks and Recreation 2017b; Bureau of Reclamation and California Department of Parks and Recreation 2013).

There are fishing opportunities in the San Luis Reservoir, O'Neill Forebay, and Los Banos Creek Reservoir. Largemouth bass, striped bass, crappie, American shad, perch, and occasionally salmon and sturgeon can be found at San Luis Reservoir and O'Neil Forebay. Los Banos Creek Reservoir offers crappie, bluegill, largemouth bass, catfish, and trout (California Department of Parks and Recreation 2017b). Hunting opportunities occur at San Luis Reservoir for waterfowl, deer, and wild pig (Bureau of Reclamation and California Department of Parks and Recreation 2013).

S.1.9.4 Cachuma Lake

Cachuma Lake and Bradbury Dam are located on the Santa Ynez River, approximately 25 miles northwest of Santa Barbara. Water supplied through the SWP Coastal Branch may be placed into storage at Cachuma Lake. A 1956 agreement transferred responsibility for operation, maintenance, and repairs of all Cachuma Project facilities (except for Bradbury Dam, which Reclamation operates) to the Cachuma Project Member Units: Santa Barbara, Goleta Water District, Montecito Water District, and Carpinteria Valley Water District (City of Santa Barbara 2023). Santa Barbara County Parks Department manages the recreation facilities. Water-related activities include boating and fishing within the lake and along the lake shoreline. 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 nine miles in length (Bureau of Reclamation 2010b). Fishing opportunities include rainbow trout, channel catfish, black crappie, white crappie, largemouth bass, smallmouth bass, redear sunfish, and bluegill (City of Santa Barbara 2023).

S.1.9.5 Lake Piru

Lake Piru is partially located within Los Padres National Forest on Piru Creek, a tributary of the Santa Clara River, in Ventura County. The United Water Conservation District owns the lake, and an independent concessions service operates the recreation area (United Water Conservation District 2018). The lake is used to store SWP water and winter runoff.

Recreational activities include boating, camping, and picnicking. On-shore recreational facilities include basketball courts, volleyball nets, horseshoe pits, a dog park, and a nine-hole disc golf course. The marina includes a boat ramp and 66 private boat slips. There are 238 campsites, which includes two group campsites (United Water Conservation District 2023).

S.1.9.6 Quail Lake

Quail Lake is a SWP facility located in the Tejon Rach area of the western Antelope Valley in Los Angeles County. The lake receives off-peak flows from the Oso Pumping Plant for storage. Recreation facilities are managed by DWR (California Department of Water Resources 2023b). Water-related activities include fishing within the lake and along the shoreline. Fishing opportunities include channel catfish, striped bass, blackfish, tule perch, threadfin shad (*Dorosoma petenense*), and hitch (*Lavinia exilicauda*).

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. 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. Los Alamos Campground offers 90 sites and three group sites. Fishing opportunities include largemouth bass, smallmouth bass, striped bass, catfish, bluegill, crappie, and trout. Daily reservoir elevations can vary substantially because the lake provides short-term storage for the downstream Castaic Powerplant (California Department of Water Resources 2023c).

S.1.9.8 Castaic Lake

Castaic Lake is the largest SWP reservoir in Southern California, located in Los Angeles County at the terminal end of the West Branch of the California Aqueduct. The Los Angeles County Department of Parks manages recreation facilities. There are over 11,200 total acres of parkland and open space at Castaic Lake (Friends of Castaic Lake 2023). Recreational activities include boating, waterskiing, jet skiing, wakeboarding, camping (52 sites), picnicking, swimming at the lagoon/afterbay, and fishing. Fishing opportunities include trout, largemouth bass, striped bass, catfish, and crappie (California Department of Water Resources 2023d).

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. State Parks manages the recreation facilities as part of the Silverwood Lake SRA (California Department of Parks and Recreation 2023b). 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 (California Department of Parks and Recreation 2016a).

S.1.9.10 Crafton Hills Reservoir

Crafton Hills Reservoir is a SWP facility located in Yucaipa within San Bernardino County. DWR manages the recreation facilities (California Department of Water Resources 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 reservoir can be viewed from many locations along these trails, but the reservoir itself is fenced.

S.1.9.11 Lake Arrowhead

Located in San Bernardino County, Lake Arrowhead is used by the Lake Arrowhead Community Services District to store SWP water (Lake Arrowhead Community Services District 2023). The Arrowhead Lake Association owns and operates the lake (Arrowhead Lake Association 2023a). The Arrowhead Lake Association manages the recreation facilities. Recreational activities include boating, camping, and fishing with opportunities to catch largemouth and smallmouth bass, rainbow trout, German brown trout, catfish, crappie, and bluegill (U.S. Forest Service 2023d; Arrowhead Lake Association 2023b).

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. State Parks manages the recreation facilities as part of the Lake Perris SRA. 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 (California Department of Parks and Recreation 2016b; California Department of Water Resources 2023e).

S.1.9.13 Diamond Valley Lake

The Metropolitan Water District of Southern California owns and operates Diamond Valley Lake, which is an offstream storage facility located in Riverside County. 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 (Metropolitan Water District of Southern California 2019). Fishing opportunities include black bass, bluegill, redear sunfish, rainbow trout, blue catfish, and channel catfish (Diamond Valley Marina 2023).

S.1.9.14 Lake Skinner

The Metropolitan Water District of Southern California owns and operates Lake Skinner, which is an offstream storage facility located in Riverside County. Riverside County Parks manages the recreation facilities. 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 (Riverside County 2023).

S.1.9.15 Dixon Lake

Dixon Lake is in the hills above Escondido in San Diego County (City of Escondido 2023a). Escondido owns and operates the lake. The lake is used to store SWP water.

Escondido manages the recreation facilities (City of Escondido 2023b). Recreational activities include camping, picnicking, and fishing. There are 45 campsites and 22 picnic sites (City of Escondido 2023c, 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 in San Diego County. San Diego owns and operates the reservoirs. The reservoirs are used to store SWP water (City of San Diego 2021).

San Diego manages the recreation facilities. Recreational activities at the reservoirs include boating, picnicking, hiking, and fishing (City of San Diego 2023a). 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* spp.) (City of San Diego 2023b). Recreational activities at San Vicente Reservoir include boating, picnicking, and fishing with opportunities to catch largemouth bass, sunfish, catfish, crappie, and carp (City of San Diego 2023c). Recreation activities at El Capitan Reservoir include boating, picnicking, and fishing, with opportunities to catch largemouth bass, bluegill, crappie, channel catfish, blue catfish, green sunfish, and carp (City of San Diego 2023d). 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 2023e). The reservoir is open for water recreation on Wednesdays, Saturdays and Sundays, from sunrise to sunset, February through October. The Coast to Crest trail, on the north side of the reservoir, is managed by the San Dieguito River Park and is open year-round for hiking. The boat launch ramp is currently unavailable for private boat launches (City of San Diego 2024). Murray Reservoir provides recreational opportunities for boating, floating, picnicking, and fishing for largemouth bass, bluegill, channel catfish, black crappie, and trout (City of San Diego 2023f).

S.1.9.17 Lake Jennings

Lake Jennings is in San Diego County (Lake Jennings 2023). Helix Water District owns and operates the lake. The lake is used to store SWP water.

Helix Water District manages the recreation facilities. Recreational activities include boating, camping, picnicking, and fishing. There are 97 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 (Lake Jennings 2023).

S.1.9.18 Sweetwater Reservoir

Sweetwater Authority owns and operates Sweetwater Reservoir in San Diego County (Sweetwater Authority 2023). The reservoir is used to store SWP water. Sweetwater Authority manages the recreation facilities, which include a playground, splash pad, and campground featuring 150 sites. Recreation activities include hiking, birdwatching, shoreline fishing (County of San Diego Parks and Recreation 2017).

S.2 Evaluation of Alternatives

This section describes the technical background for the evaluation of environmental impacts associated with the action 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. Alternative 2 consists of four phases that could be used under its implementation. All four phases are considered in the assessment of Alternative 2 to bracket the range of potential impacts.

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 identified as potential impacts to recreation. The modeled changes were also compared to boat ramp elevations to identify changes in the periods that ramps would be available for use. For waterbodies where average water elevations or flows were not modeled, changes were evaluated qualitatively.

Modeling efforts included climate change conditions projected for year 2040 and were applied consistently across the No Action Alternative and Alternatives 1 through 4. Conditions assumed for year 2040 include assumptions about 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.

S.2.2 No Action Alternative

Under the No Action Alternative, Reclamation would continue with current operation of the CVP, as described in the 2020 Record of Decision and subject to the 2019 Biological Opinions. The 2020 Record of Decision for the CVP and the 2020 Incidental Take Permit for the SWP represent current management direction or intensity pursuant to 43 CFR § 46.30.

The No Action Alternative is based on 2040 conditions. The changes to recreational resources that are assumed to occur by 2040 under the No Action Alternative conditions would be different than existing conditions because of the following factors:

- Climate change and sea-level rise
- General plan development throughout California, including increased water demands in portions of the Sacramento Valley

By the end of September, the surface water elevations at CVP reservoirs generally decline, and recreational activities diminish. It is anticipated that climate change would result in more short-duration high-rainfall events and less snowpack in the winter and early spring months. The reservoirs would be full more frequently by the end of April or May by 2040 than in recent historical conditions. However, as the water is released in the spring, there would be less snowpack to refill the reservoirs. This condition would reduce reservoir storage, thereby increasing the exposure of previously inundated reservoir shorelines during the spring and summer. This condition could benefit camping and day use, while adversely impacting fishing and boating.

Under the No Action Alternative, land uses in 2040 would occur in accordance with adopted general plans. Development under the general plans could affect recreational activities, depending on the type and location of development. Infill projects where areas are already developed could increase density but would be done in compliance with applicable zoning and general plan policies. Development in non-urbanized areas could convert natural or rural areas to developed areas, resulting in impacts to recreational activities.The No Action Alternative, thus, is expected to result in potential changes to recreational resources. These changes were described and considered in the 2020 Record of Decision.

The No Action Alternative would also rely upon increased use of Livingston-Stone National Fish Hatchery during droughts to increase production of winter-run Chinook salmon. However, this component requires no physical changes to the facility and would have beneficial effects on recreation.

S.2.3 Alternative 1

S.2.3.1 Potential Changes to Recreational Opportunities

Trinity River

Under Alternative 1, average water elevation at Trinity Reservoir could be slightly higher, by approximately one foot, compared to the No Action Alternative. Seasonal fluctuations in water levels would remain approximately the same as the No Action Alternative (Figure S-1). There would be no impacts on boating because the number of days with access to boat ramps would not change.

Camping and day use facilities are located along Trinity Reservoir. 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 under Alternative 1 would effectively remain the same as the No Action Alternative (Figure S-1); therefore, Alternative 1

could have negligible impacts on camping, day use opportunities at the campgrounds surrounding Trinity Reservoir, and 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 because access and population health and abundance would not change.

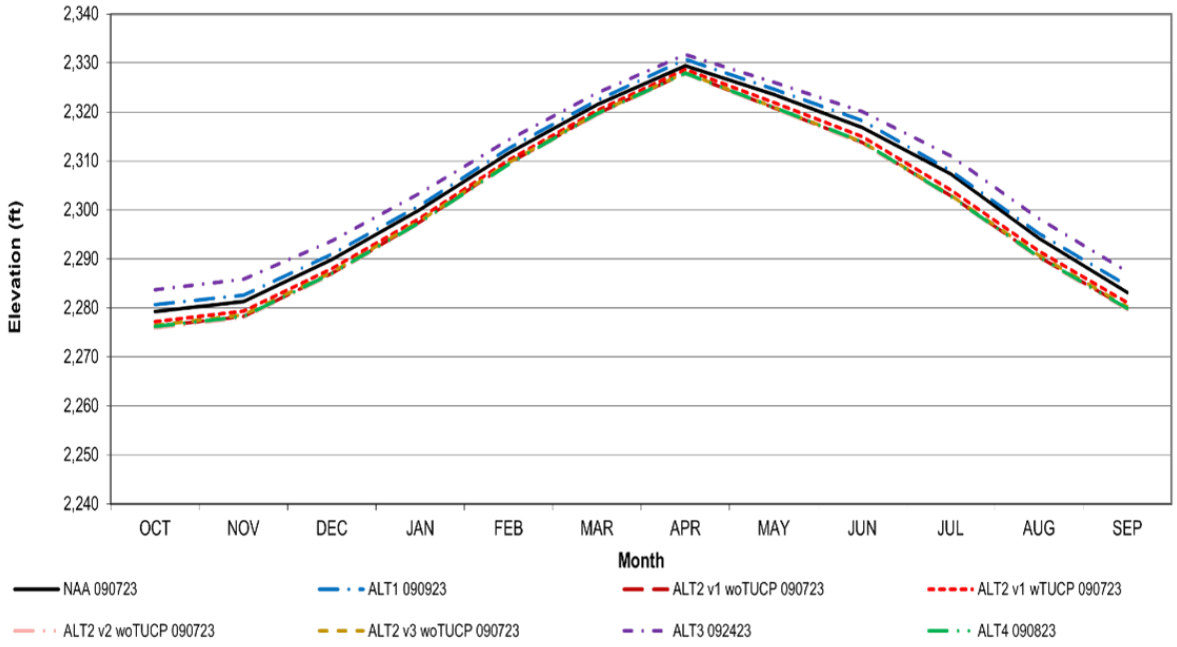

Figure S-1. Trinity Reservoir Long-Term Average Water Level Elevation

Sacramento River

Under Alternative 1, the average water elevation of Shasta Reservoir would increase minimally (up to approximately three feet) compared to the No Action Alternative from August to April and would remain very similar to the No Action Alternative from May through July year, as shown in Figure S-2. The average water elevation would be highest in the spring and lowest in the fall, similar to the No Action Alternative. Likewise, water elevations under Alternative 1 would still be within the elevation range for most boat ramps on Shasta Reservoir to be usable during the late spring and early summer months. Because average water elevations would not be likely to substantially change during the spring and summer months, there would be no impact on camping, day use activities, or recreational fishing on Shasta Reservoir during those seasons. The approximately three-foot elevation increase compared to the No Action Alternative from September to December on Shasta Reservoir could have negligible impacts on camping and day use, as well as activities such as hiking or wildlife viewing, and recreational fishing access.

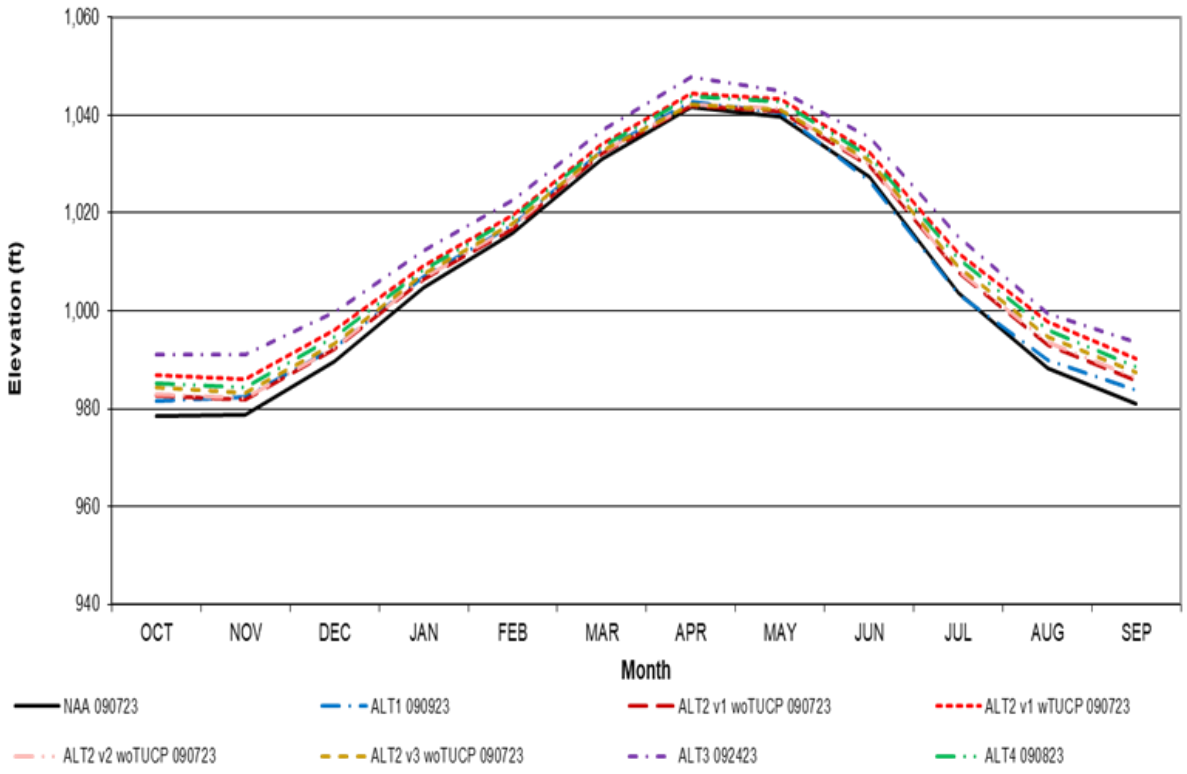

Figure S-2. Shasta Reservoir Long-Term Average Water Level Elevation

Average water elevations and seasonal fluctuations at Keswick Reservoir are not expected to substantially change under Alternative 1 compared to the No Action Alternative. The largest monthly change is fewer than three feet in August. 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 or recreational fishing opportunities.

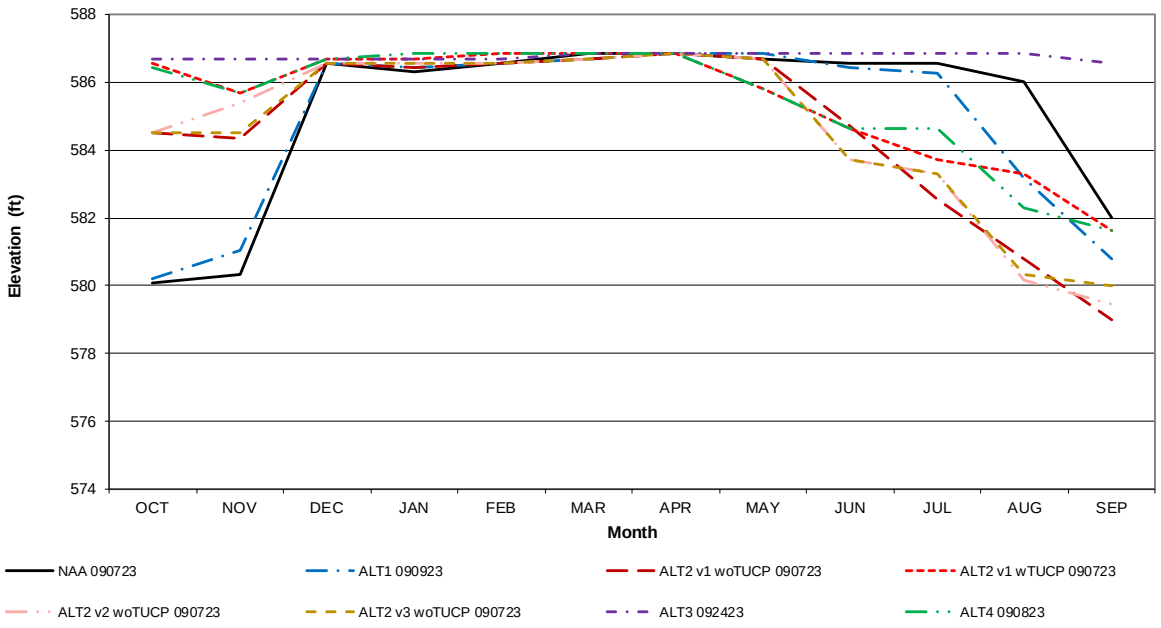

Figure S-3. Keswick Reservoir Long-Term Average Water Level Elevation

Average water elevations and seasonal fluctuations at Whiskeytown Reservoir are not expected to change under Alternative 1 compared to the No Action Alternative; therefore, no impacts on boating activities or access on Whiskeytown Reservoir, camping or day use activities near the reservoir, or recreational fishing opportunities on the reservoir 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 below Keswick Dam under Alternative 1 compared to the No Action Alternative would increase from December through June by up to 800 cubic feet per second (cfs) and decrease in July through November by up to 280 cfs, as shown in Figure S-4. Average flows on the Sacramento River below Keswick Dam under Alternative 1 compared to the No Action Alternative would remain the same most of the year, except for an increase of approximately 530 cfs in June and a decrease of approximately 570 cfs in September, as shown in Figure S-5. 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, which 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 the rest of the year could improve access to the shoreline.

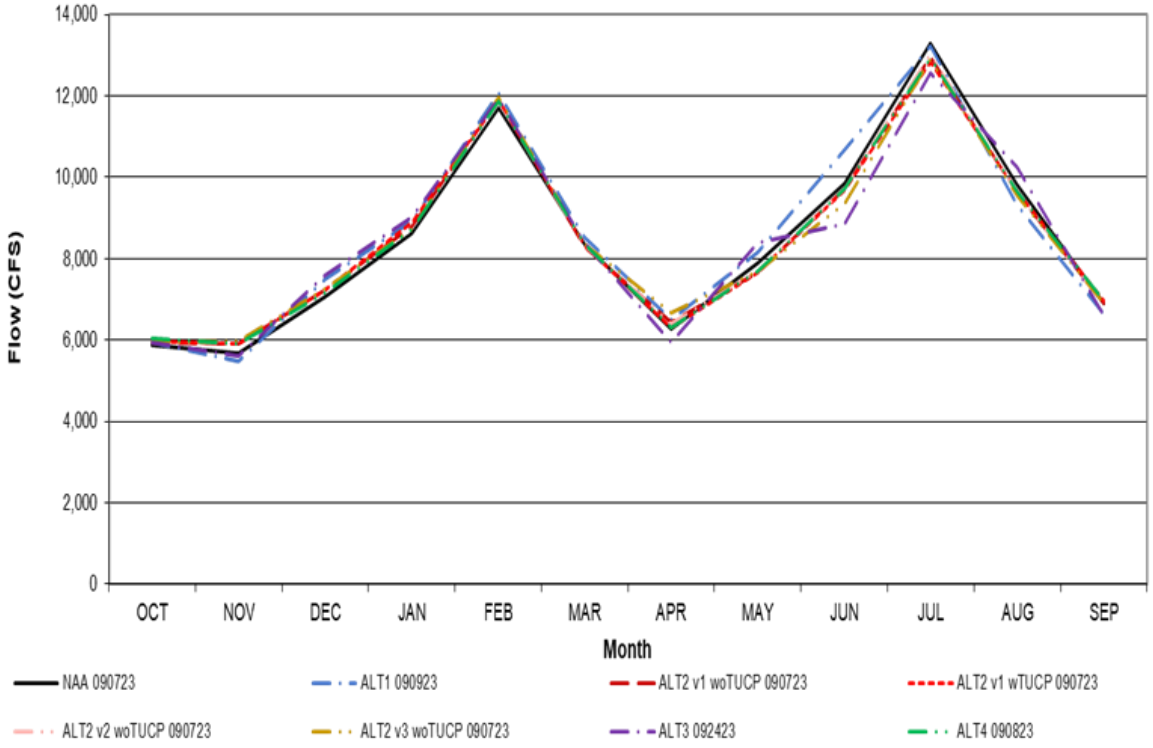

Figure S-4. Sacramento River Long-Term Average Flow Downstream of Keswick Reservoir

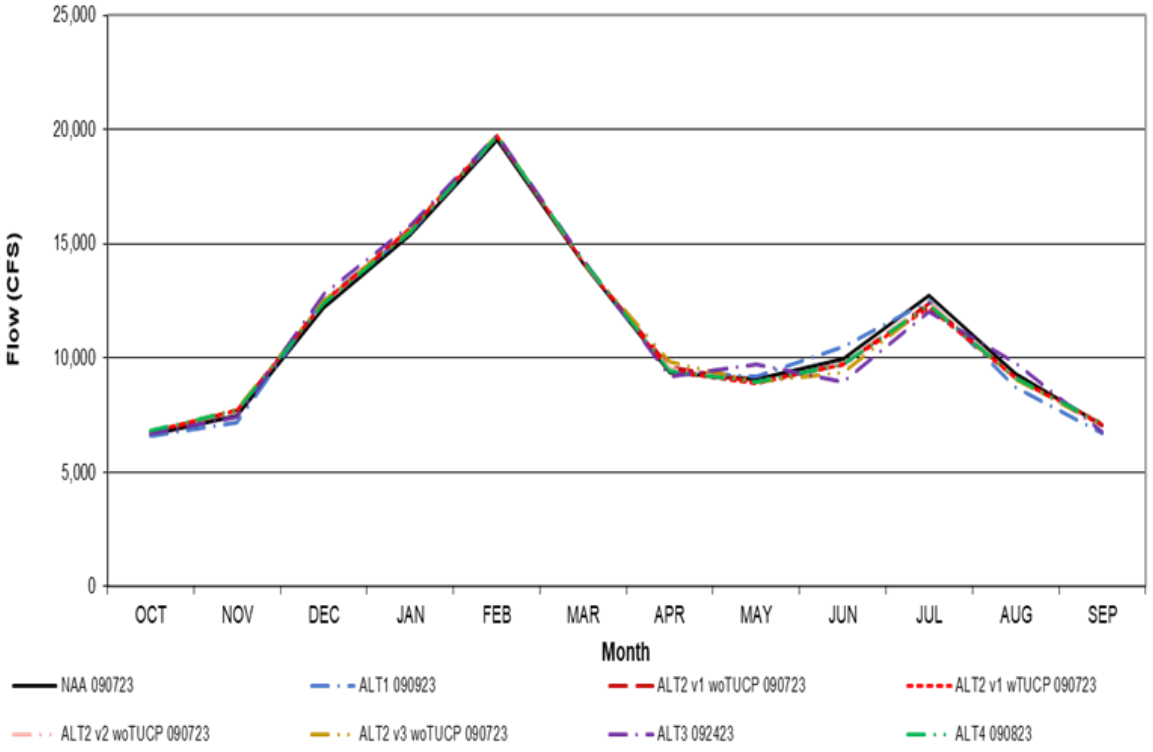

Figure S-5. Sacramento River Long-Term Average Flow Below Red Bluff Diversion Dam

Clear Creek

The average flows and seasonal fluctuations at Clear Creek below Whiskeytown Dam would vary under Alternative 1 throughout the year, as shown in Figure S-6, because of minimum instream flow releases and no pulse flows compared to the No Action Alternative. The average flow would vary between 50 and 95 cfs between October through March and then remain steady at approximately 50 cfs from April through September. Recreational activities such as hiking, picnicking, kayaking, swimming, fishing, and gold panning could all be adversely affected under Alternative 1. There are no camping opportunities at Clear Creek, so Alternative 1 would have no impacts on camping.

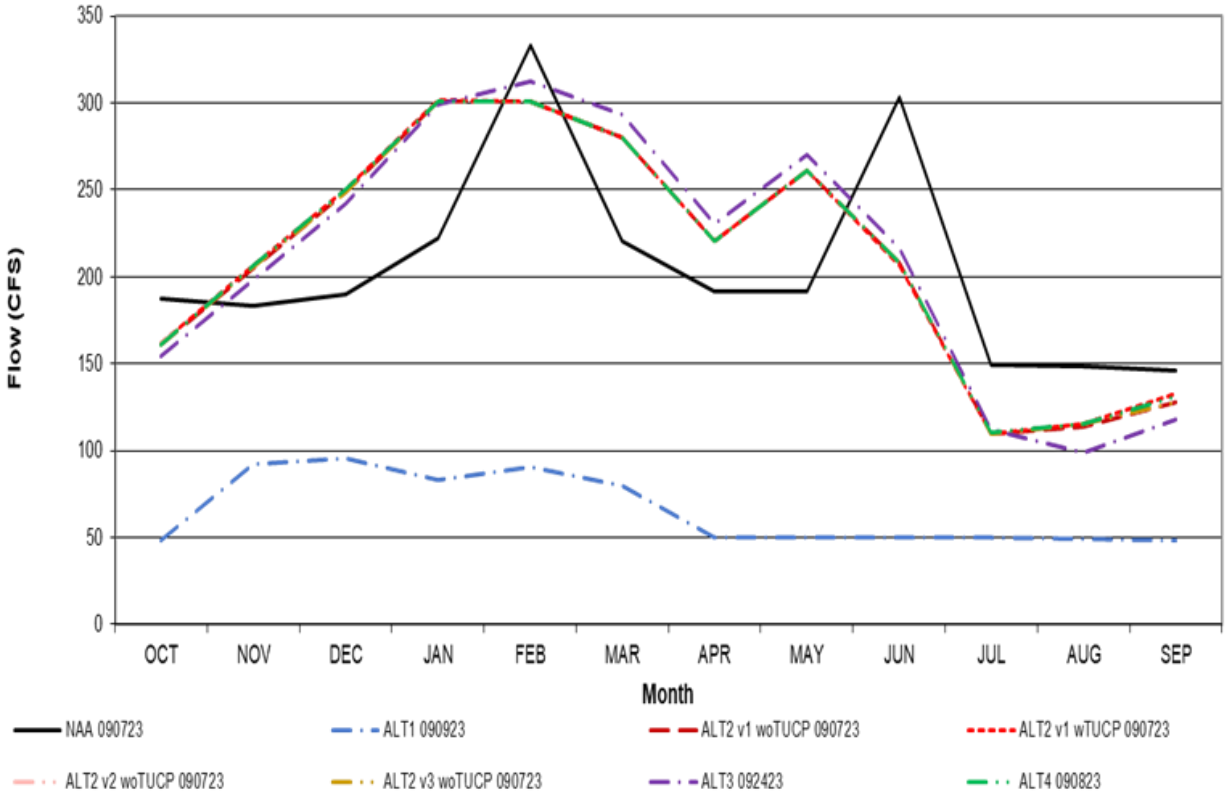

Figure S-6. Clear Creek Flow below Whiskeytown Dam Long-Term Average Flow

American River

A variety of boating activities, including jet skiing, waterskiing, windsurfing, rafting, sailing canoeing, and kayaking, occur on Folsom Reservoir. Additionally, whitewater rafting occurs along the South Fork American River upstream of Folsom Reservoir, and at Skunk Hollow and Salmon Falls. Under Alternative 1, average Folsom Reservoir water elevations would remain the same or increase throughout the year compared to the No Action Alternative, as shown in Figure S-7. The largest increase from the No Action Alternative, approximately seven feet, would occur in November. Thus, under Alternative 1, the reservoir would experience similar seasonal fluctuations as 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 to camping and day use activities near Folsom Reservoir 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 substantially shrink the beach. Water levels upstream of Folsom Reservoir are not expected to change under Alternative 1, so whitewater rafting would not change.

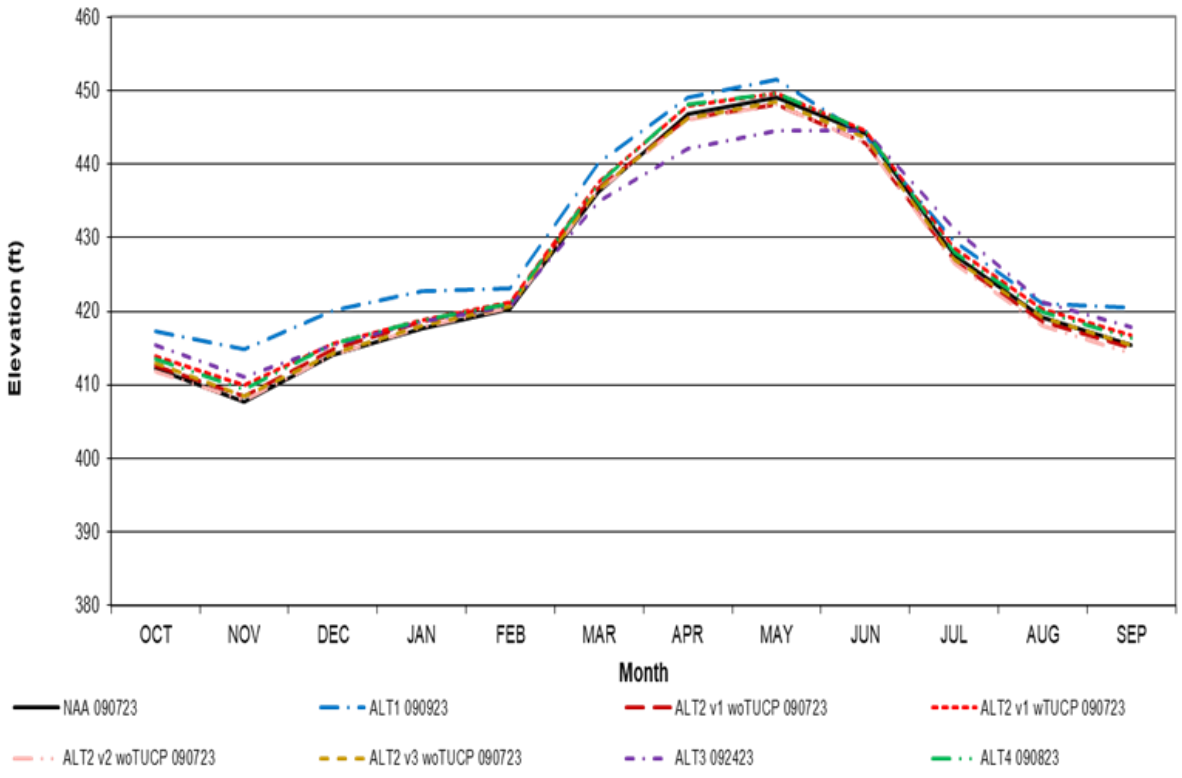

Figure S-7. Folsom Reservoir Long-Term Average Water Level Elevation

Under Alternative 1, average water elevation levels and seasonal fluctuations in Lake Natoma would have only minor variations (less than 1 foot) compared to the No Action Alternative, as shown in Figure S-8. The average water elevation level would remain basically constant at approximately 123 feet year-round, so boating, camping, day use activities, and recreational fishing could have negligible impacts.

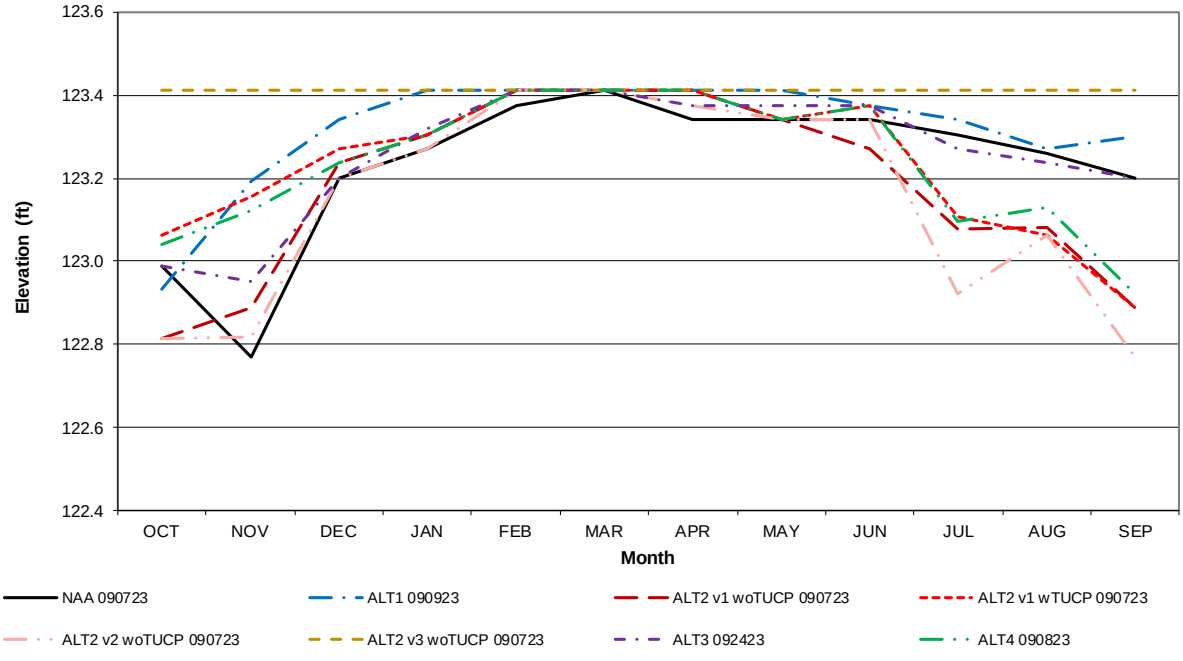

Figure S-8. Lake Natoma Long-Term Average Water Level Elevation

Under Alternative 1, the average flow and seasonal fluctuations of the American River below Nimbus Dam, which is the beginning of the American River Parkway, would remain similar to the No Action Alternative, as shown in Figure S-9. Alternative 1 shows an increase in flow of approximately 260 cfs in February and approximately 420 cfs in June compared to the No Action Alternative. Recreational opportunities at the American River Parkway, including boating, rafting, kayaking, canoeing, swimming, and fishing could all have small beneficial effects. There is no camping along the American River Parkway, so no effects on camping would occur.

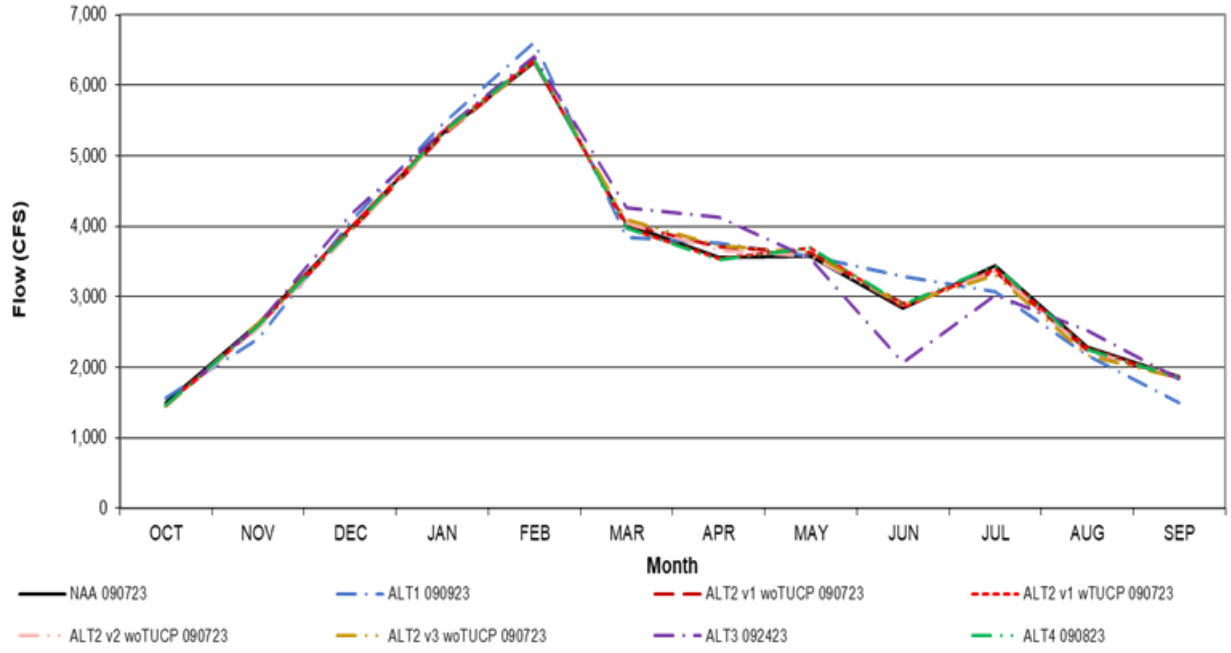

Figure S-9. American River Average Flow below Nimbus Dam

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.

Stanislaus River

The average reservoir elevations of New Melones Reservoir for Alternative 1 would remain similar to the No Action Alternative from October through March, as shown in Figure S-10. From April through September, the average water elevations of New Melones Reservoir would decrease slightly, by no more than two feet, compared to the No Action Alternative. Water elevations under Alternative 1 would remain within the usable elevation for boat ramps on the reservoir. Alternative 1 could have negligible effects on boating, recreational fishing access, campgrounds, and day use facilities at New Melones Reservoir.

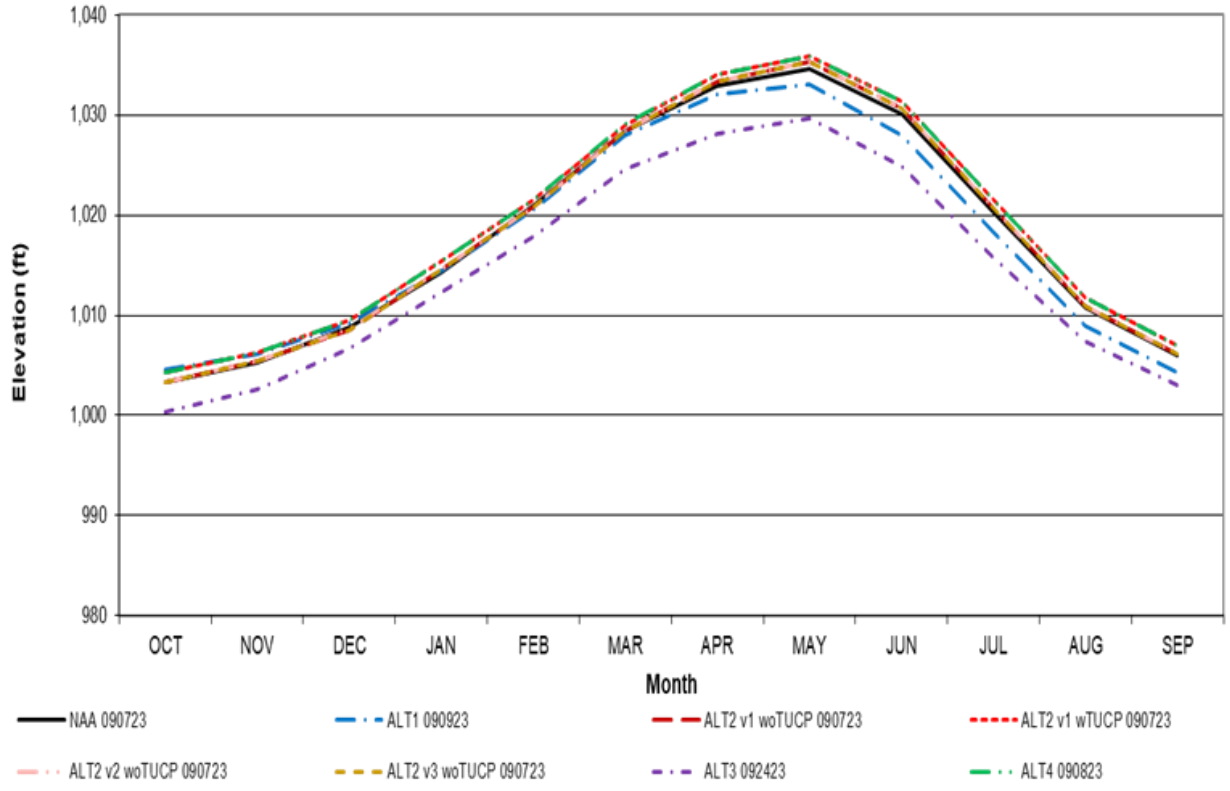

Figure S-10. New Melones Reservoir Long-Term Average Water Level Elevation

There would be no change to average reservoir elevations for Tulloch Reservoir compared to the No Action Alternative; therefore, there would be no effects on boating, camping, day use activities, or recreational fishing access.

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 increase slightly from November to February and again in April through July compared to the No Action Alternative, as presented in Figure S-11. Alternative 1 generally sees the same seasonal fluctuations as the No Action Alternative. Increased flows in the spring could improve recreational fishing by improving fishing access.

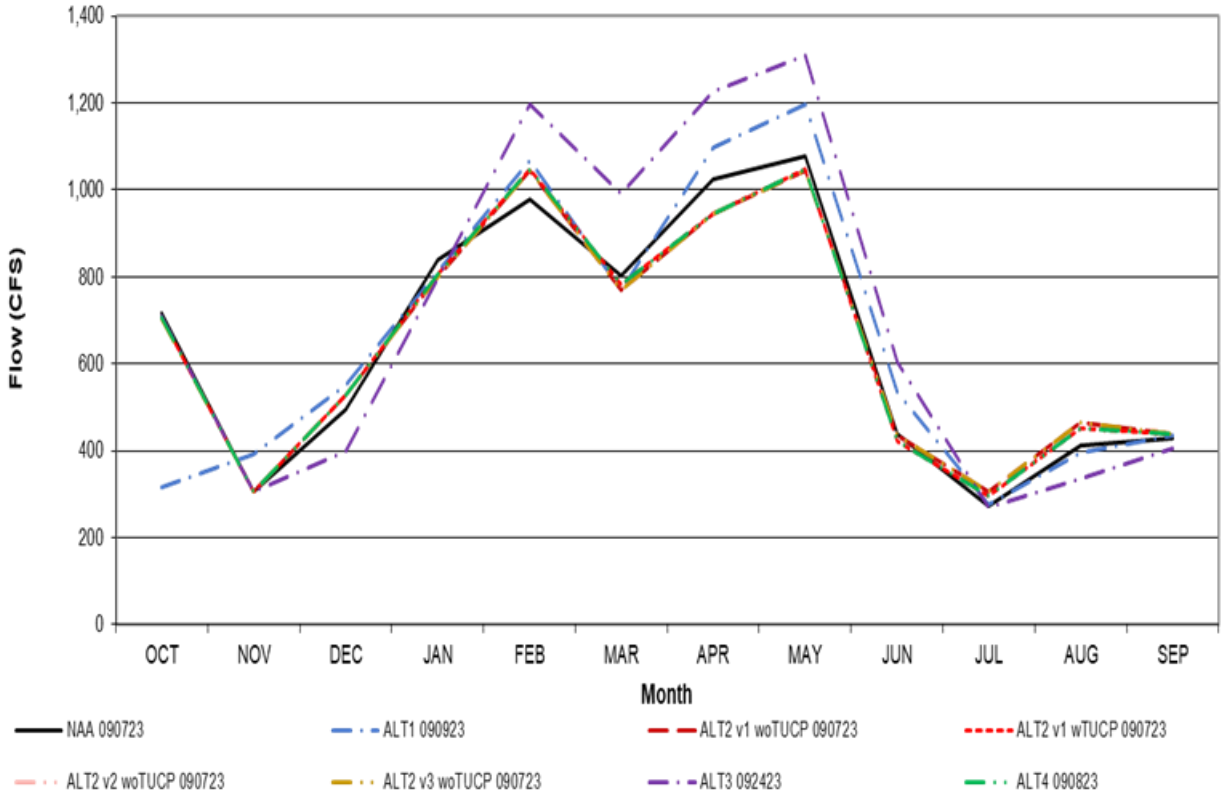

Figure S-11. Stanislaus River Flow below Goodwin Long-Term Average Flow

San Joaquin River

A variety of boating activities occur on Millerton Reservoir and there are whitewater rafting opportunities upstream of Millerton Reservoir. As shown in Figure S-12, 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 Reservoir 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 Reservoir, on the San Joaquin River, or at the San Joaquin River National Wildlife Refuge, there would also be no impacts on camping, day use activities, or fishing.

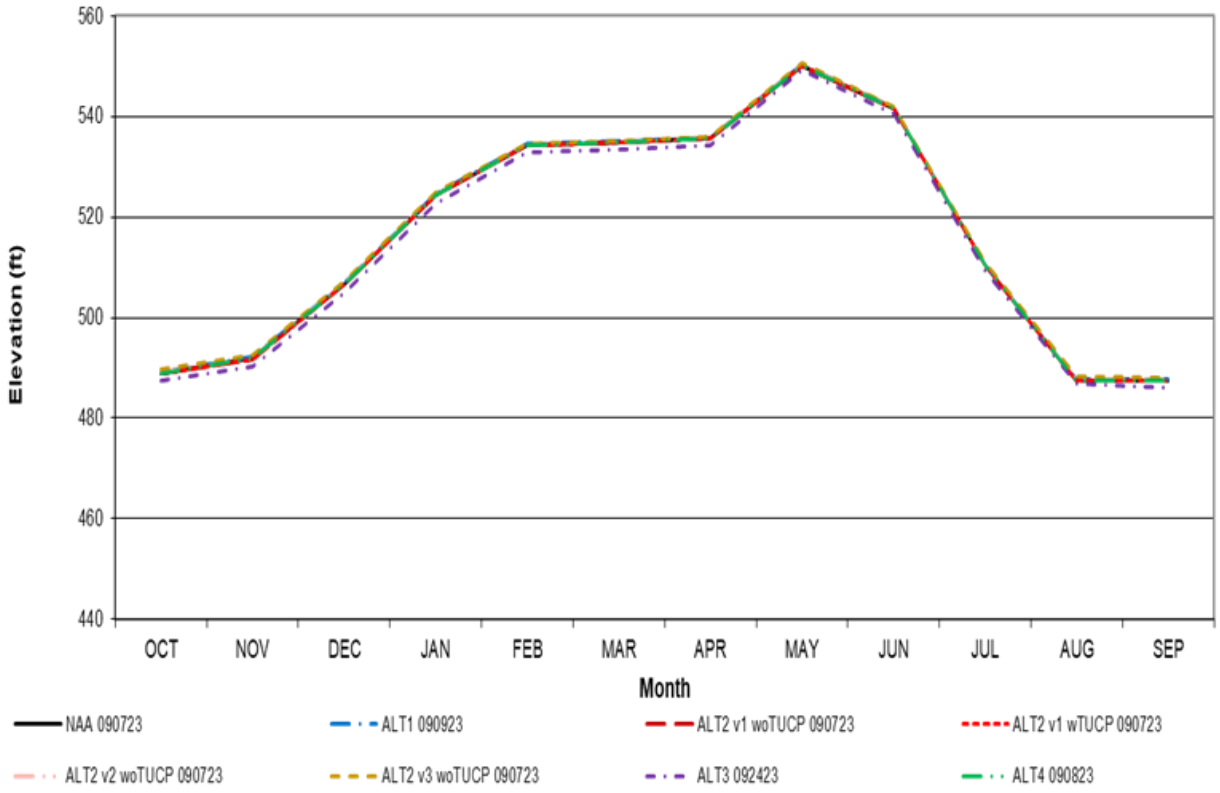

Figure S-12. Millerton Reservoir Long-Term Average Water Level Elevation

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. Long-term average flows on the San Joaquin River are not anticipated to substantially change under Alternative 1 compared to the No Action Alternative. Therefore, no effects 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 River National Wildlife Refuge, so no effects would occur. Day use activities would not be affected as flows would not substantially change.

Bay-Delta Operations

It is anticipated that there would be slight changes in Delta outflow under Alternative 1 throughout the year, as shown in Figure S-13, but these changes would not substantially affect boating, camping, day use activities, or fishing on the Delta. Seasonal fluctuations would remain the same as the No Action Alternative.

Although flows would change, there would be only small changes in average elevations in the Bay-Delta system under Alternative 1 compared to the No Action Alternative. Average water elevations would be slightly higher in January through August and slightly lower in September through December. Boating hazards at Lake Del Valle would be exposed in November when the water surface elevation drops to approximately 676 feet msl. No impacts on recreation are

anticipated at the Yolo Bypass and Cache Slough, or in the other San Francisco Bay reservoirs, including Contra Loma Reservoir, Bethany Reservoir, 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.

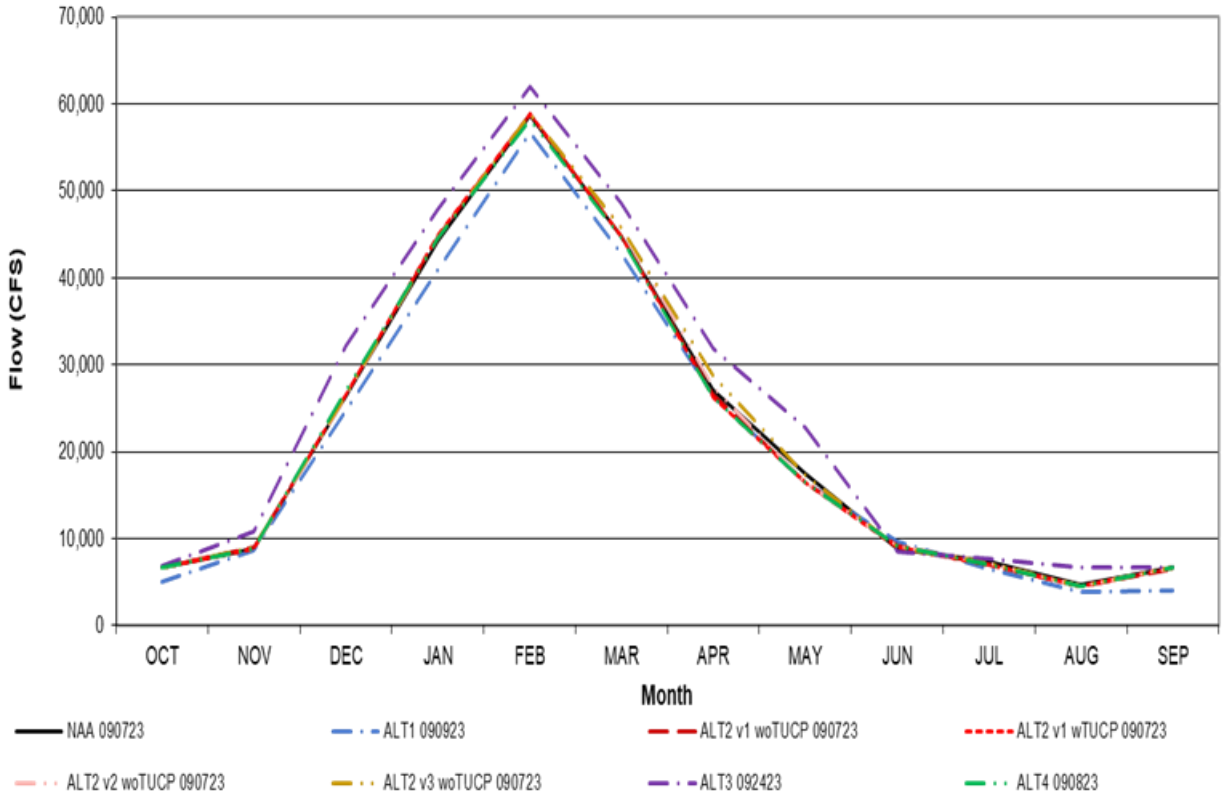

Figure S-13. Bay-Delta Long-Term Average Outflow

Nearshore Pacific Ocean on the California Coast

Changes in water operations under Alternative 1 could have the potential to affect Chinook salmon. Alternative 1 is predicted to result in an annual abundance of approximately 102 more Chinook salmon (or 1,532 pounds biomass) in the ocean compared to the No Action Alternative. Alternative 1 may provide a slight benefit to recreational fisheries in the Nearshore Pacific Ocean on the California Coast, but the difference is likely negligible.

Central Valley Project and State Water Project 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 would increase at San Luis Reservoir throughout the year, except in November, with the largest increase being approximately 34 feet in May, as shown in Figure S-14. These elevation increases follow the existing seasonal fluctuations at San Luis Reservoir. Boat ramps, which are open year-round, would still be usable with the anticipated 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.

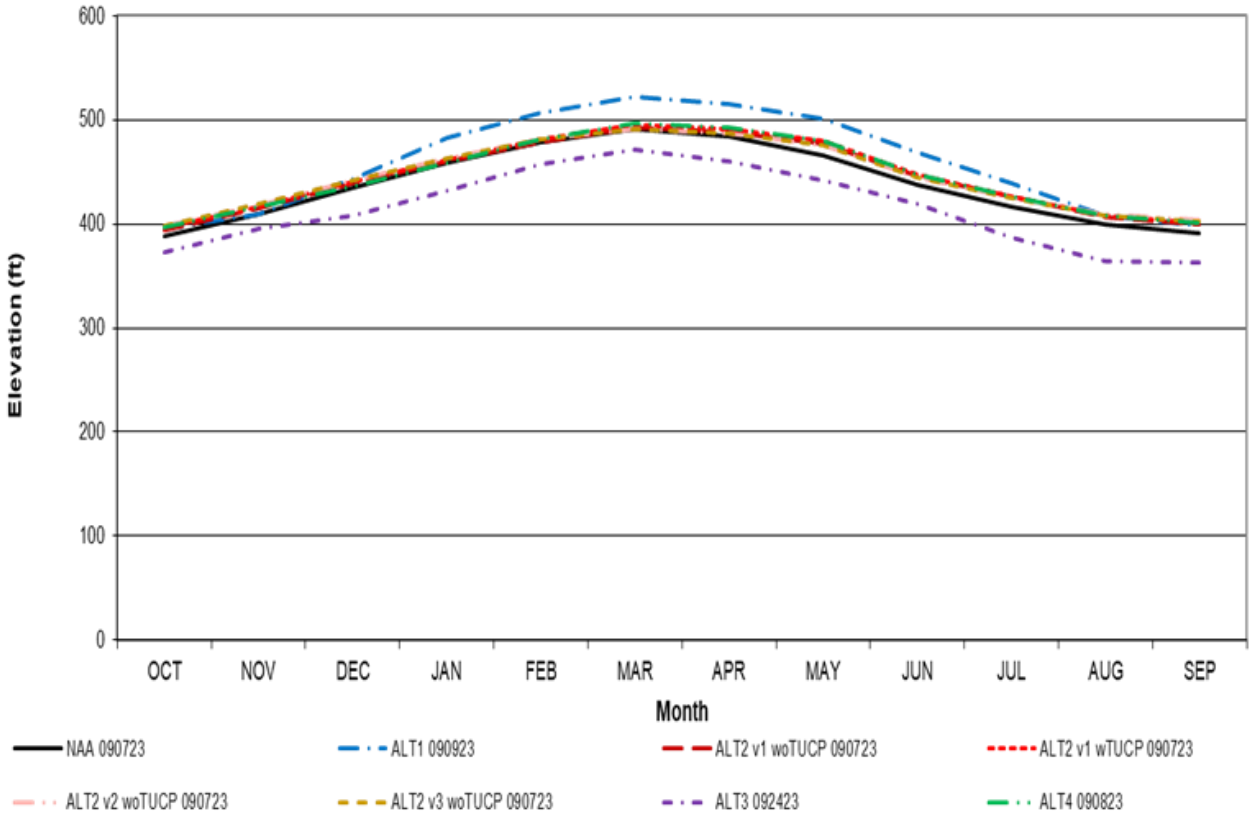

Figure S-14. San Luis Reservoir Long-Term Average Water Level Elevation

S.2.4 Alternative 2

Alternative 2, Multi-Agency Consensus, provides for governance decisions that would be made at certain junctures over time, which are described as four different "phases". The four “phases” were all evaluated to present the maximum possible effects (adverse and beneficial) resulting from operations under any singular phase. The modeling results of each phase are compared to the No Action Alternative to evaluate changes in water level elevation and flow. The effect on water level elevation and flow of each phase would differ.

Implementation of Alternative 2 may include the Alternative 2 Without Temporary Urgency Change Petition (TUCP) Delta Voluntary Agreements (VA) phase, Alternative 2 Without TUCP and Without VA phase, Alternative 2 Without TUCP Systemwide VA phase, or Alternative 2 With TUCP Without VA phase. The Alternative 2 With TUCP Without VA phase would only be implemented as a backstop during drought.

Tables and figures can present all four phases of Alternative 2. Table S-25 shows naming conventions:

Table S-25. Alternative 2 Phases

Name in Figures	Narrative Name
Alt2 v1 wTUCP	Alternative 2 With TUCP Without VA
Alt2 v1 woTUCP	Alternative 2 Without TUCP Without VA
Alt2 v2 woTUCP	Alternative 2 Without TUCP Delta VA
Alt2 v3 woTUCP	Alternative 2 Without TUCP Systemwide VA

S.2.4.1 Potential Changes to Recreational Opportunities

Trinity River

Under all phases of Alternative 2, the average elevation of Trinity Reservoir would be lower compared to the No Action Alternative by up to five feet, as shown in Figure S-15. Seasonal fluctuations in water levels would also remain the same throughout the year.

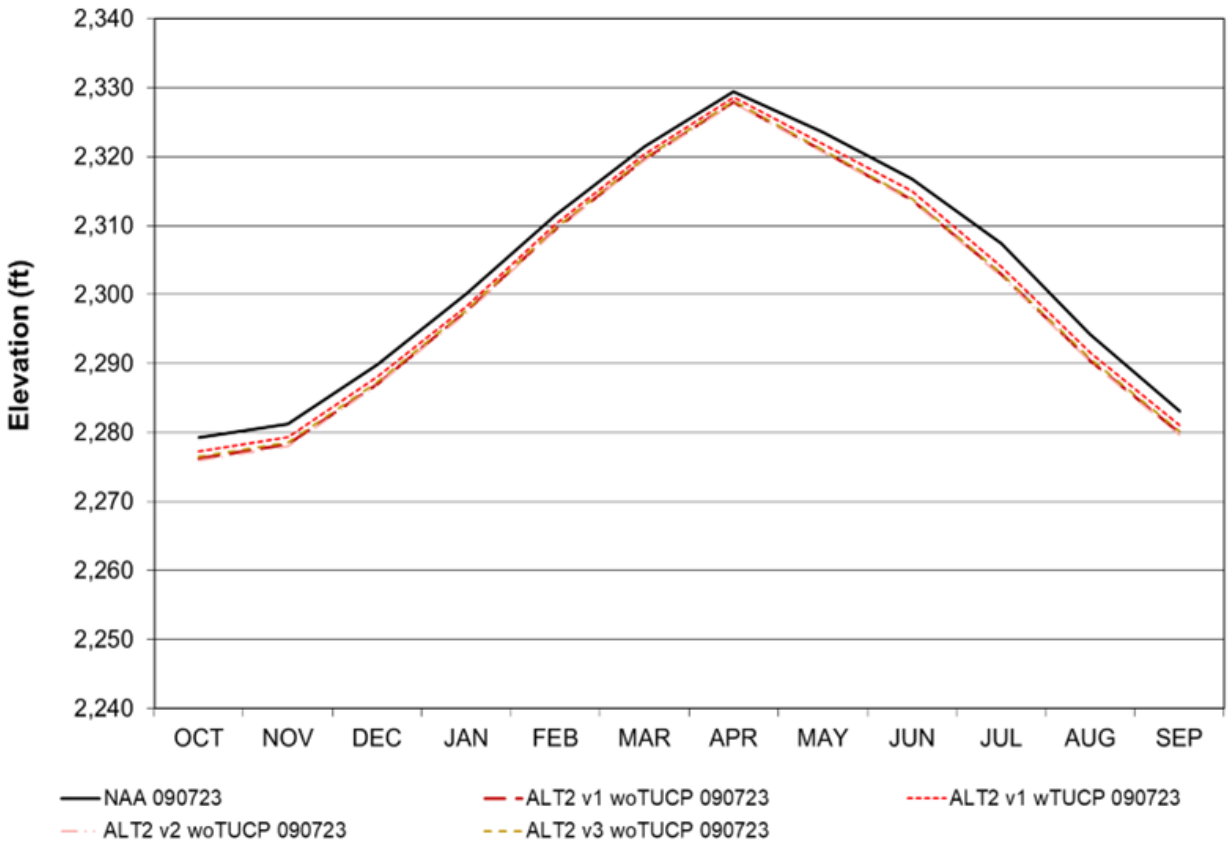

Figure S-15. Trinity Reservoir Alternative 2 Long-Term Average Water Level Elevation

The long-term average minimum elevations of Trinity Reservoir, under all phases of Alternative 2, would remain the same as the No Action Alternative from January through March, as shown in Figure S-16. From April through October, all phases of Alternative 2 would have a higher long-term average minimum elevation compared to the No Action Alternative (up to 4.6 feet higher), except for Alternative 2 Without TUCP Delta VA, which would have lower long-term average minimum elevations than the No Action Alternative by up to five feet. In December, all phases of Alternative 2 would have lower long-term average minimum elevations compared to the No Action Alternative (up to 25 feet lower), except for Alternative 2 With TUCP Without VA, which would have a higher long-term average minimum elevation than the No Action Alternative by up to 7.5 feet in December.

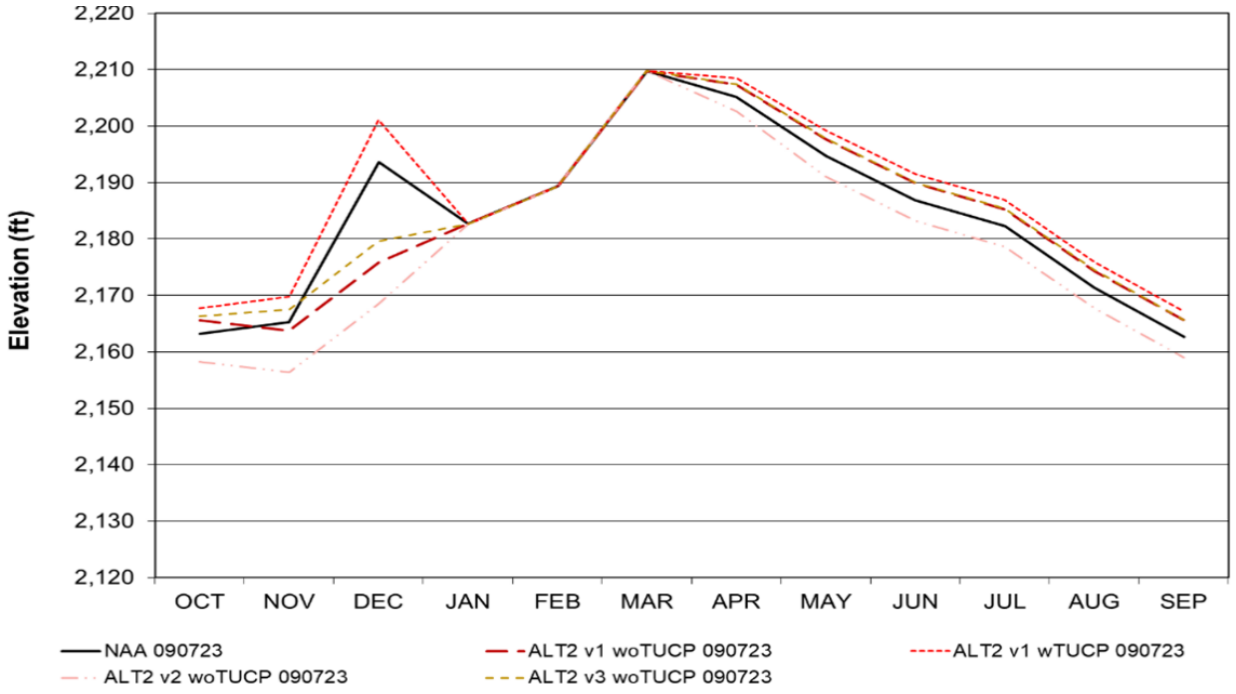

Figure S-16. Trinity Reservoir Alternative 2 Long-Term Average Minimum Water Level Elevation

The long-term average maximum elevations under all phases of Alternative 2 would remain the same as the No Action Alternative throughout the year, as shown in Figure S-17.

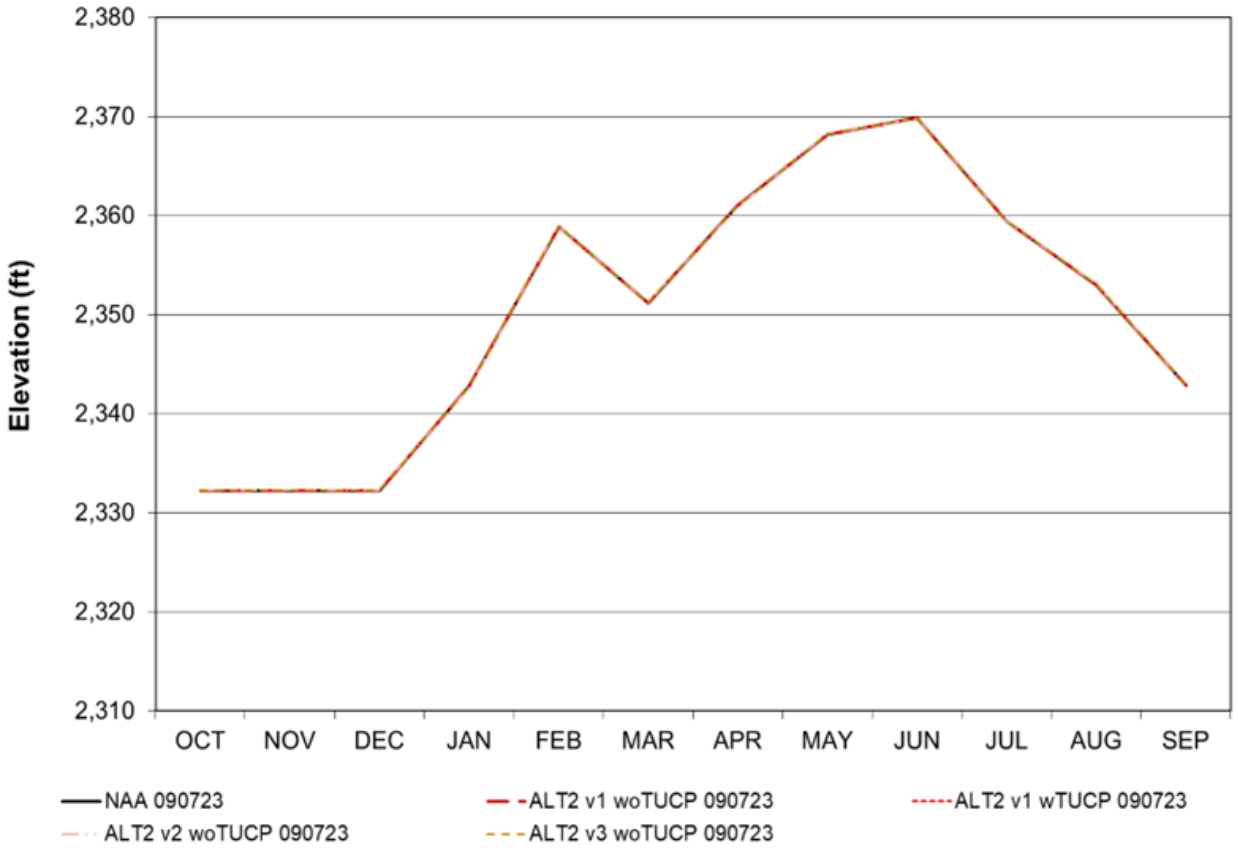

Figure S-17. Trinity Reservoir Alternative 2 Long-Term Average Maximum Water Level Elevation

Under Alternative 2 Without TUCP Delta VA, the long-term average minimum December water elevation in Trinity Reservoir may be less than 2,170 feet, making the Minersville boat ramp unusable. Similar to the No Action Alternative, under all other phases of Alternative 2, the Minersville boat ramp would remain useable in December. Under all phases of Alternative 2, except for Alternative 2 Without TUCP Delta VA, at the long-term average minimum water level elevations shown in Figure S-16, the Minersville boat ramp would be usable from December through August, thus providing a minor beneficial impact on boating. At the long-term average minimum water elevations shown in Figure S-16, all other Trinity Reservoir boat ramps would not be usable. There would be no substantial effect on camping, day use activities, and fishing at and near Trinity Reservoir.

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 all phases of Alternative 2, the average elevation of Shasta Reservoir would be greater compared to the No Action Alternative by approximately three to eight feet (maximum is Alternative 2 With TUCP Without VA), as shown in Figure S-18. Seasonal fluctuations in average water levels would also remain the same throughout the year.

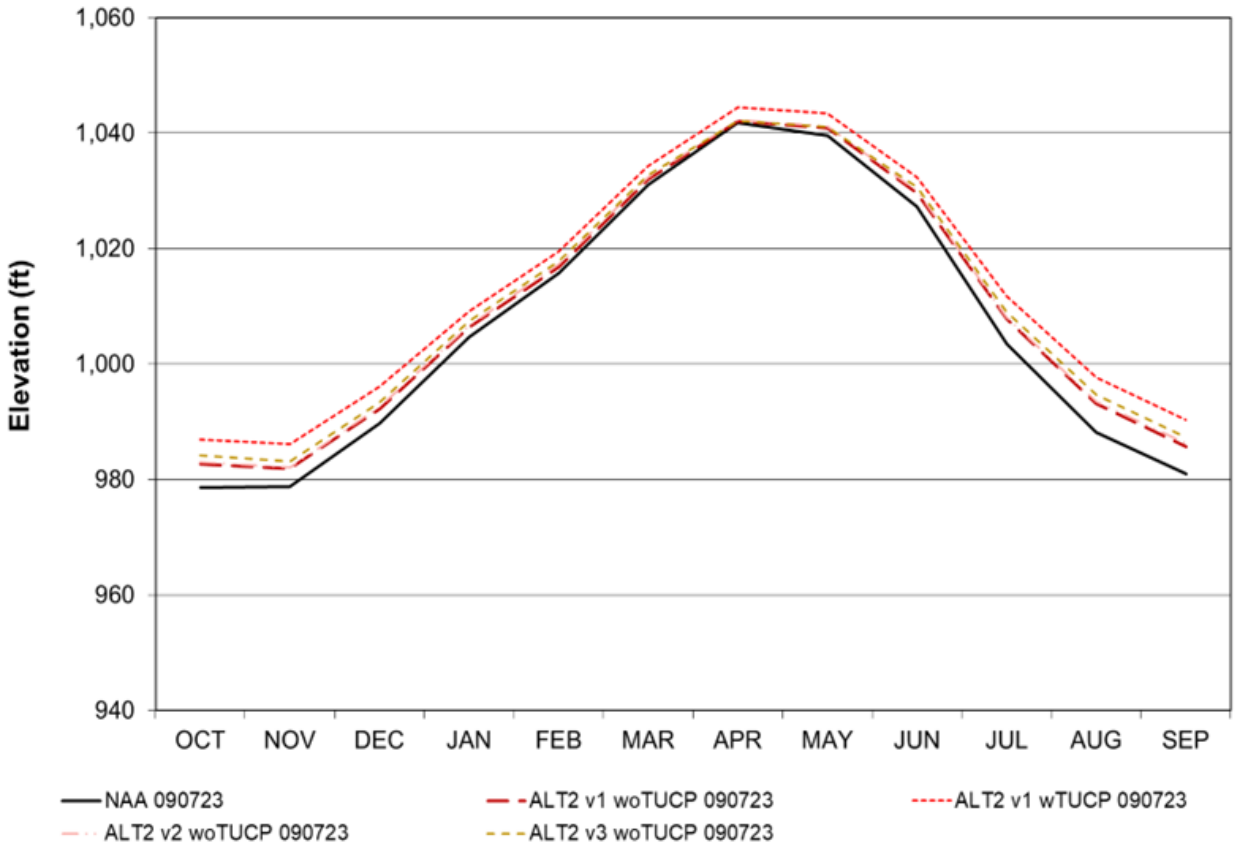

Figure S-18. Shasta Reservoir Alternative 2 Long-Term Average Water Level Elevation

Except for Alternative 2 With TUCP Without VA, the seasonal fluctuations of long-term average minimum Shasta Reservoir elevations under all phases of Alternative 2 are similar to the No Action Alternative throughout most of the year (Figure S-19). These long-term average minimum elevations range from approximately ten feet greater than (Alternative 2 Without TUCP Without VA) to approximately seven feet less than (Alternative 2 Without TUCP Delta VA) the No Action Alternative. In November, all phases of Alternative 2 would have the same long-term average minimum elevation. Throughout the rest of the year, the long-term average minimum elevations for Alternative 2 With TUCP Without VA would be greater than the No Action Alternative by approximately 56 feet (January) to approximately 15 feet (December).

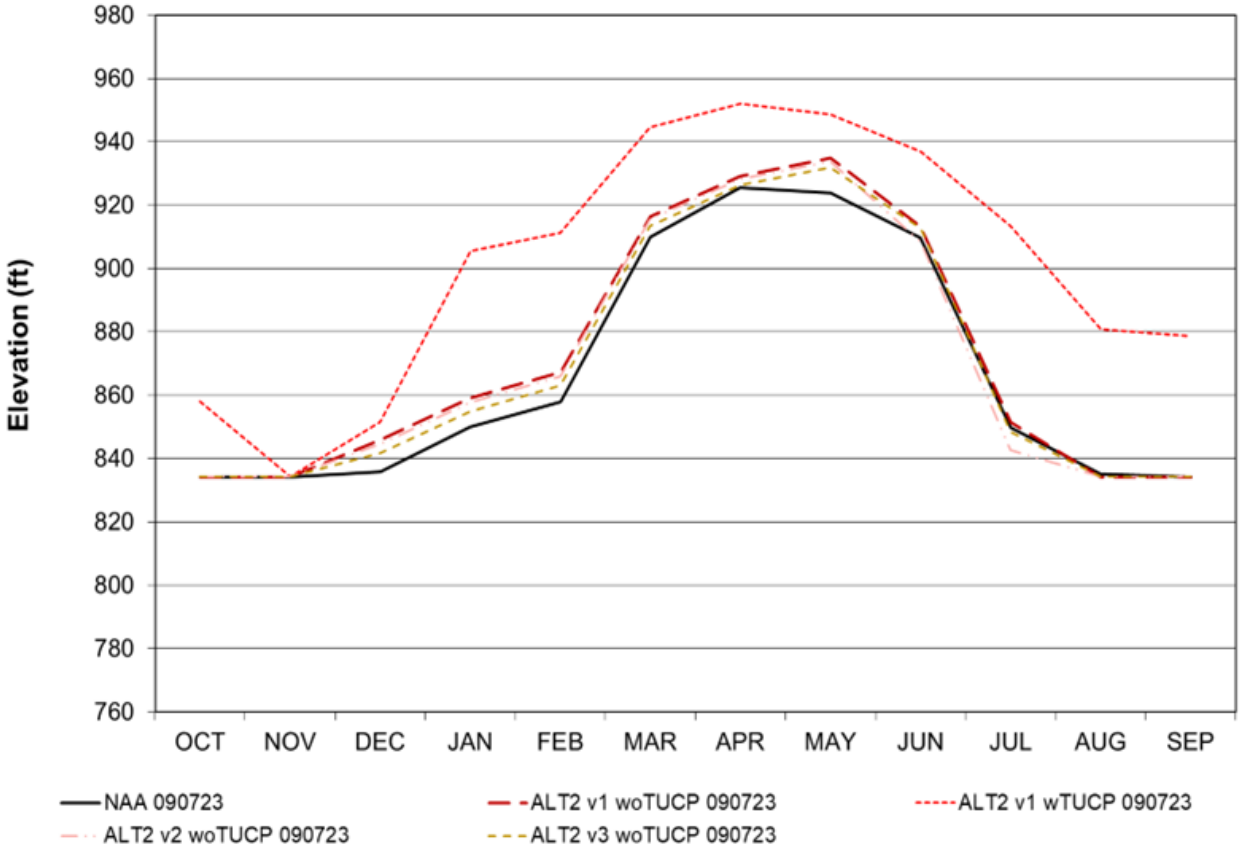

Figure S-19. Shasta Reservoir Alternative 2 Long-Term Average Minimum Water Level Elevation

The long-term average maximum water level elevations at Shasta Reservoir under all phases of Alternative 2 would remain the same as the No Action Alternative throughout the year (Figure S-20), except for a minor variation in March where they would be one foot less than the No Action Alternative.

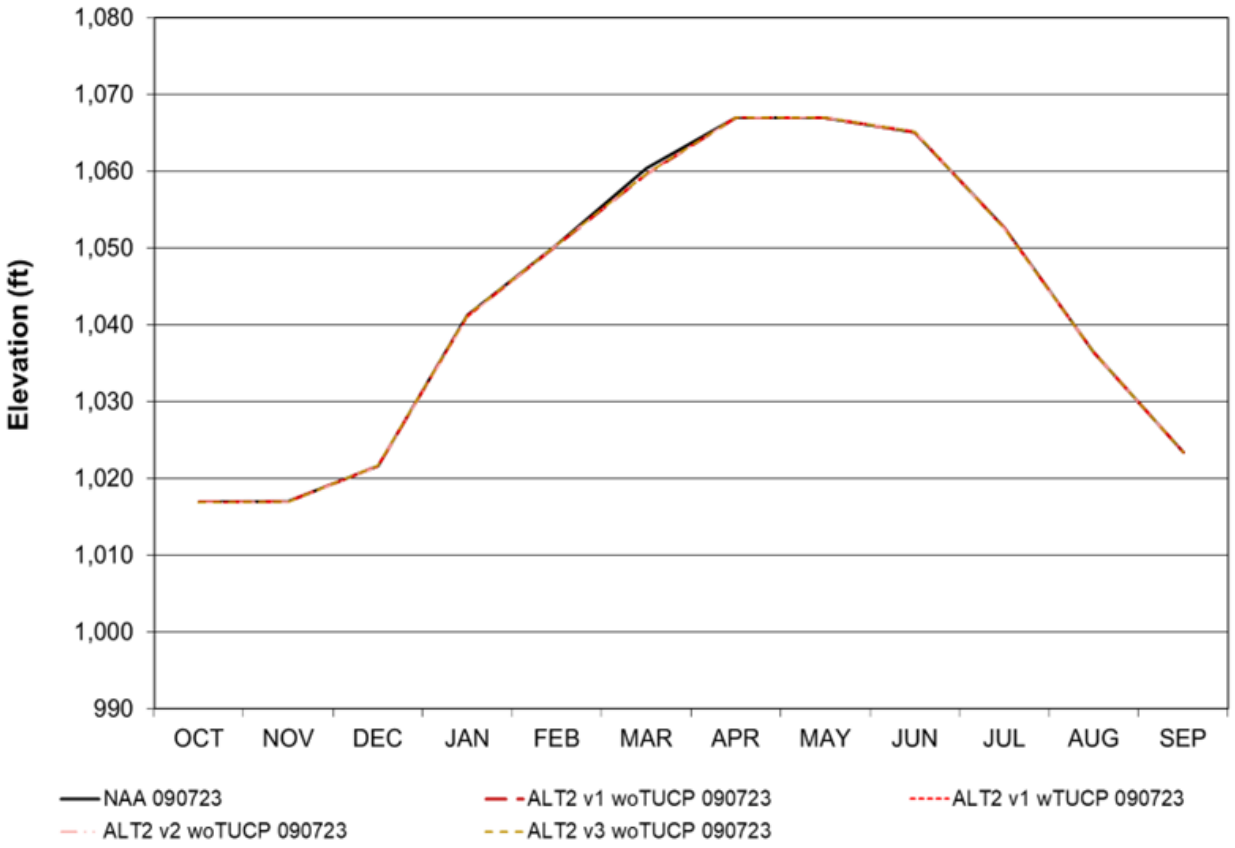

Figure S-20. Shasta Reservoir Alternative 2 Long-Term Average Maximum Water Level Elevation

Under Alternative 2, the long-term average minimum water elevations of all four phases would be greater than the No Action Alternative, and all boat ramps at Shasta Reservoir would remain accessible from March through June. However, under Alternative 2 With TUCP Without VA, the long-term average minimum water elevations at Shasta Reservoir would be greater than the No Action Alternative year-round, and the Centimudi and Jones Valley boat ramps would be accessible from January through October, providing a beneficial impact. All phases of Alternative 2 would have long-term average minimum water elevations at Shasta Reservoir higher than the No Action Alternative through most of the year. Camping, picnicking, swimming, and fishing at Shasta Reservoir would not be affected by any phases of Alternative 2.

Clear Creek

Under all phases of Alternative 2, the average flow at Clear Creek below Whiskeytown would be greater than the No Action Alternative from November through May, except for February when it would be less by approximately 32 cfs, as shown in Figure S-6. From June through October, all phases of Alternative 2 would be less than the No Action Alternative by approximately 26 to 96 cfs. There are no camping opportunities at Clear Creek, so Alternative 2 would have no effects on camping. The decrease in flows could adversely affect day use activities, such as wildlife viewing, kayaking, and recreational fishing due to less habitat.

American River

Under all phases of Alternative 2, the average elevation of Folsom Reservoir would be similar to the No Action Alternative within approximately one to two feet, as shown in Figure S-21. Seasonal fluctuations in water levels would also remain the same throughout the year.

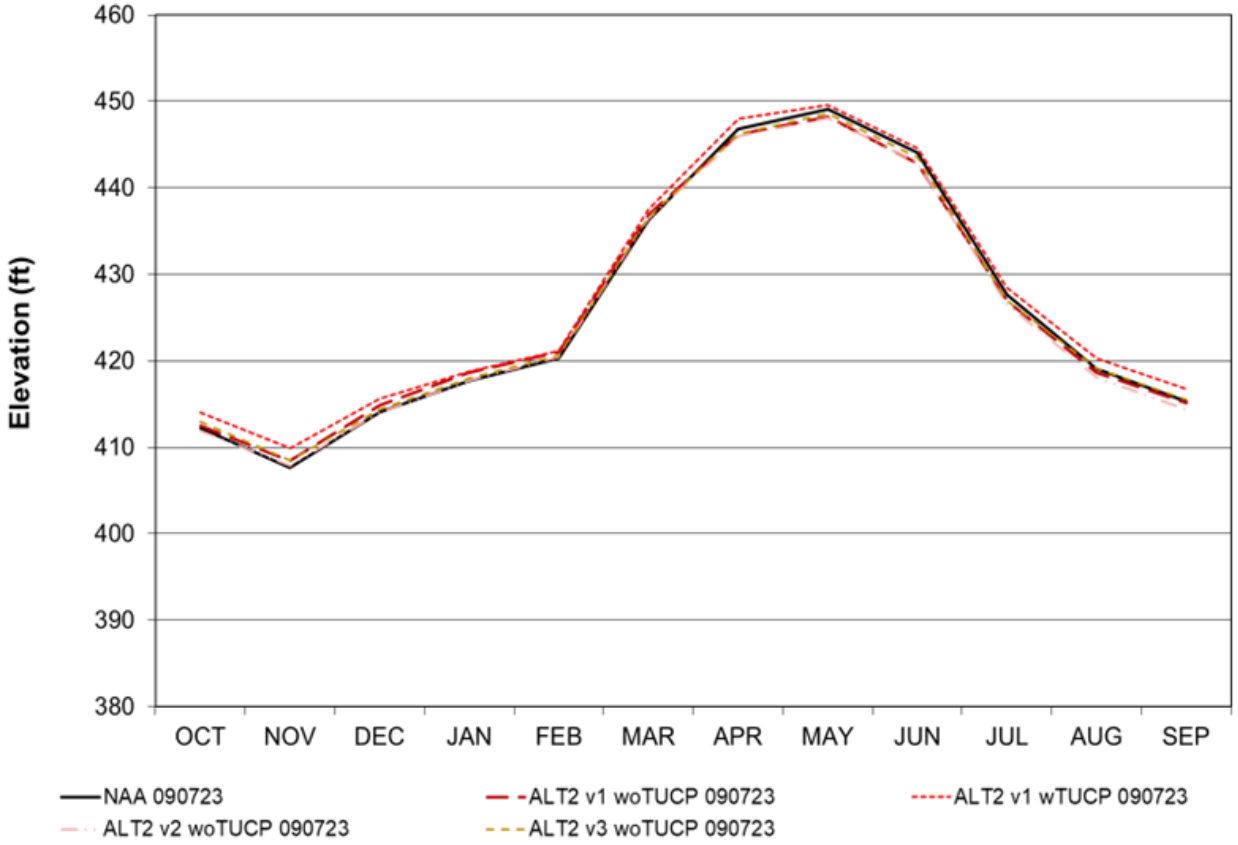

Figure S-21. Folsom Reservoir Alternative 2 Long-Term Average Water Level Elevation

Throughout most of the year, the long-term average minimum water elevations of all phases of Alternative 2 would remain greater than the No Action Alternative, as shown in Figure S-22. Alternative 2 Without TUCP Delta VA and Alternative 2 Without TUCP Systemwide VA could see long-term average minimum water elevations occasionally less than the No Action Alternative by one to three feet. Alternative 2 With TUCP Without VA long-term average minimum water elevations would be equal to or greater than the No Action Alternative by a maximum of approximately 62 feet.

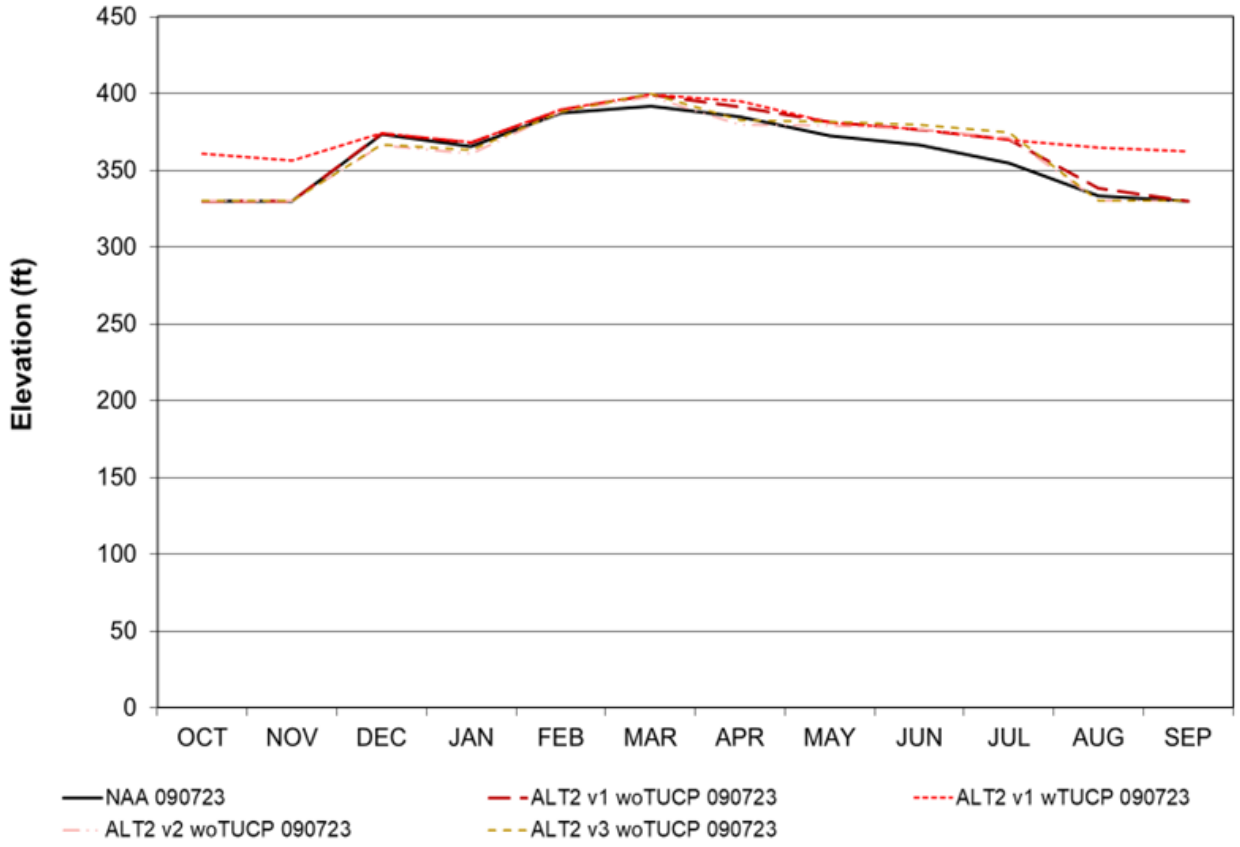

Figure S-22. Folsom Reservoir Alternative 2 Long-Term Average Minimum Water Level Elevation

The long-term average maximum elevations under all phases of Alternative 2 would remain within one foot of the No Action Alternative throughout the year, as shown in Figure S-23.

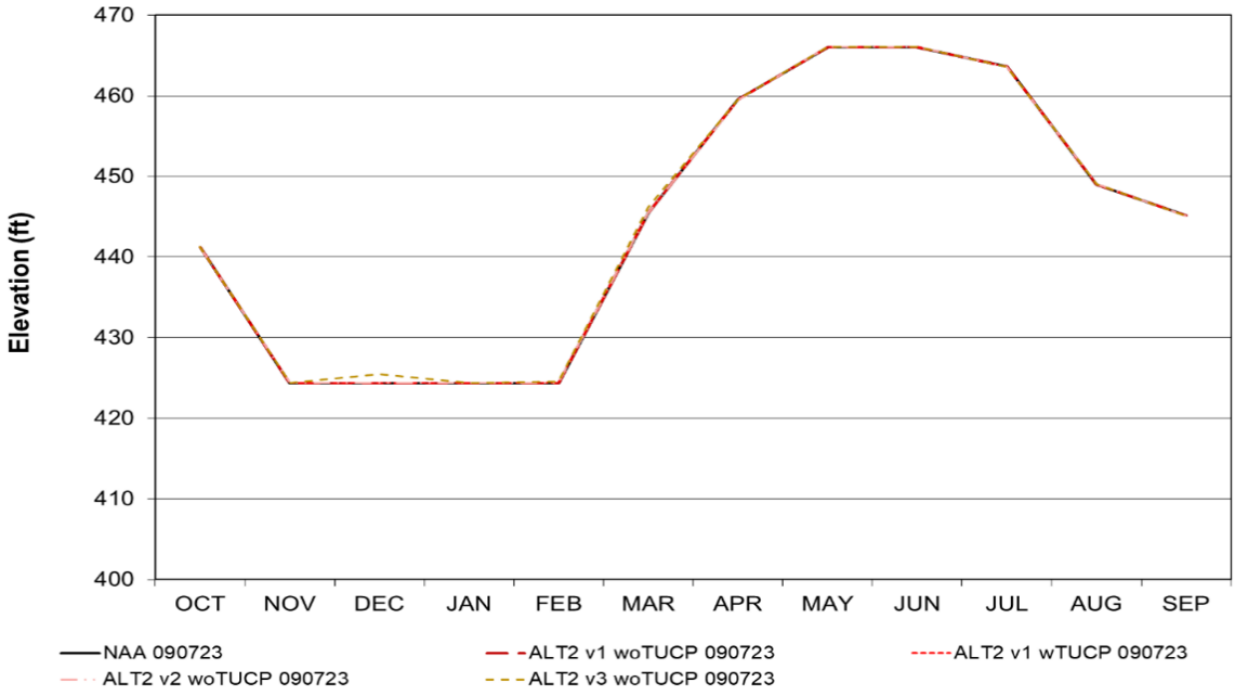

Figure S-23. Folsom Reservoir Alternative 2 Long-Term Average Maximum Water Level Elevation

The slight elevation increases under Alternative 2 compared to the No Action Alternative would not be great enough to have substantial impacts on boating access, camping, day use, or recreational fishing access at Folsom Reservoir. Additionally, water levels upstream of Folsom Reservoir are not expected to change under Alternative 2, so whitewater rafting would not be affected. Under Alternative 2 With TUCP Without VA, the long-term average minimum water elevations could be up to 632 feet greater than the No Action Alternative during the summer and fall.

The long-term average and maximum water elevations at Lake Natoma would remain at 123 feet msl, with no change from the No Action Alternative. The long-term average minimum water elevation at Lake Natoma under Alternative 2 Without TUCP Systemwide VA would remain at 123 feet, slightly higher than the No Action Alternative during the spring, and up to 21 feet higher in October and November, as show in Figure S-24. The long-term average minimum water elevations under Alternative 2 Without TUCP Without VA and Without TUCP Delta VA would remain the same as the No Action Alternative, with Alternative 2 With TUCP Without VA varying between the No Action Alternative and Alternative 2 Without TUCP Systemwide VA throughout the year.

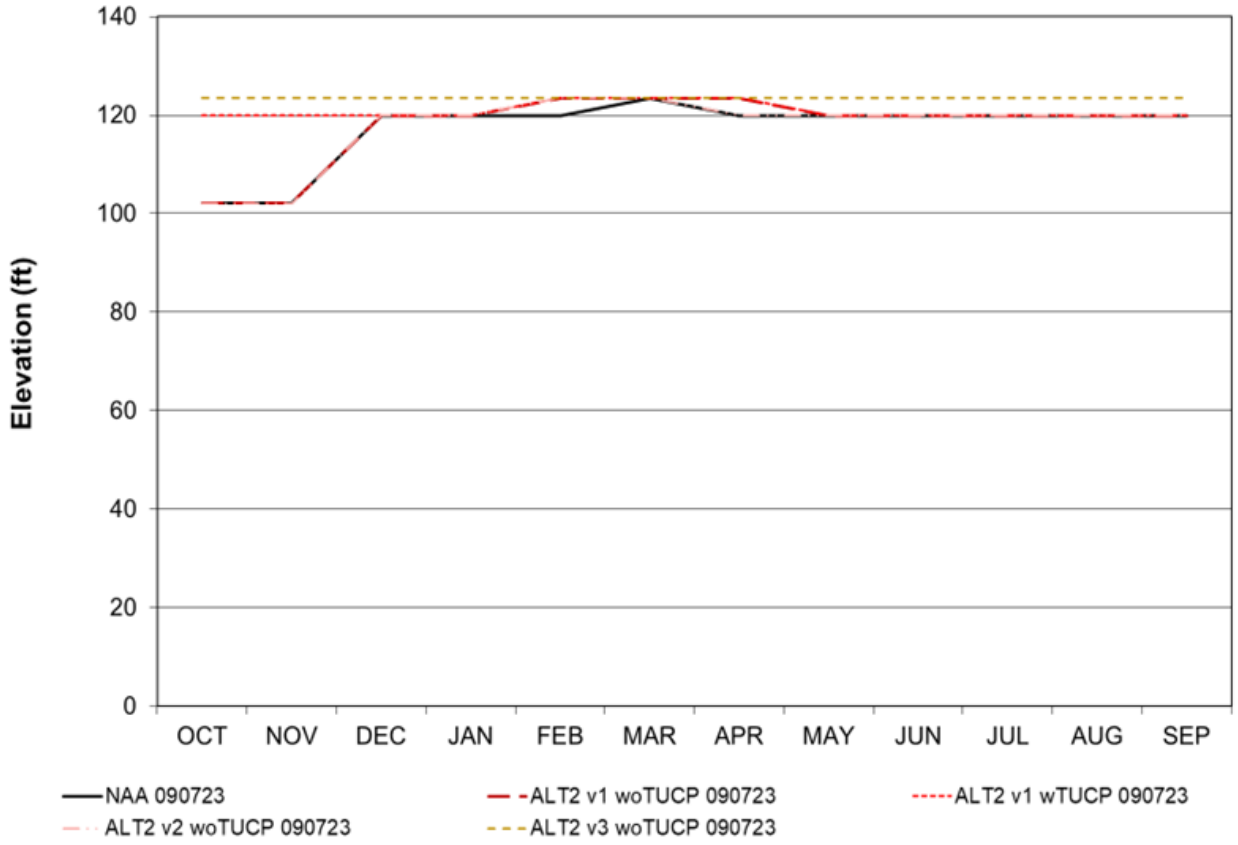

Figure S-24. Lake Natoma Alternative 2 Long-Term Average Minimum Water Level Elevation

Average long-term flows and seasonal fluctuations of the American River below Nimbus Dam (the beginning of the American River Parkway) would remain similar to the No Action Alternative. No impacts on water recreation activities, 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 effect on camping.

Stanislaus River

The average elevations at New Melones Reservoir under Alternative 2 would be the same or greater by one foot compared to the No Action Alternative, as shown in Figure S-25. All phases would see the same seasonal fluctuations.

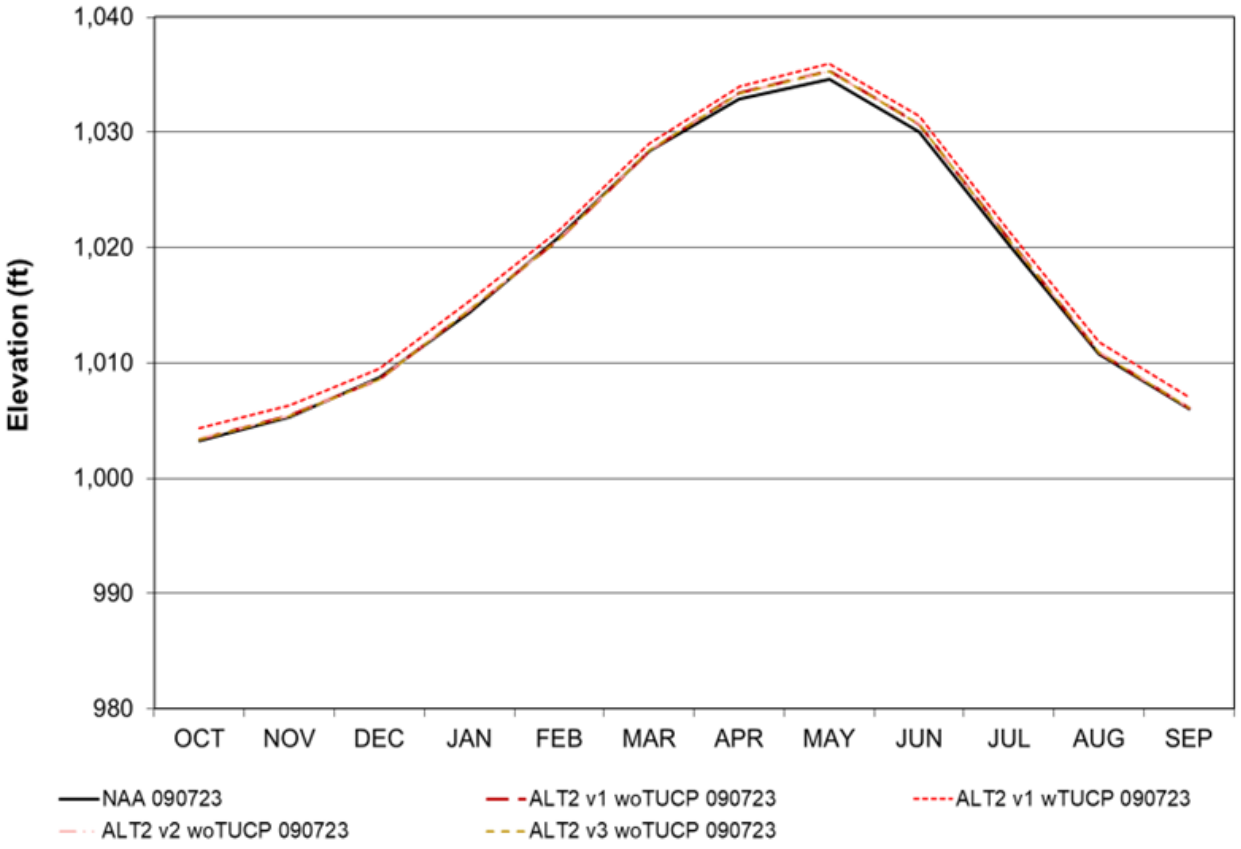

Figure S-25. New Melones Reservoir Alternative 2 Long-Term Average Water Level Elevation

The long-term average minimum water elevation at New Melones Reservoir for all phases of Alternative 2 would see the same seasonal fluctuations as the No Action Alternative and would be higher by approximately five to eight feet over the course of the year, as shown in Figure S-26.

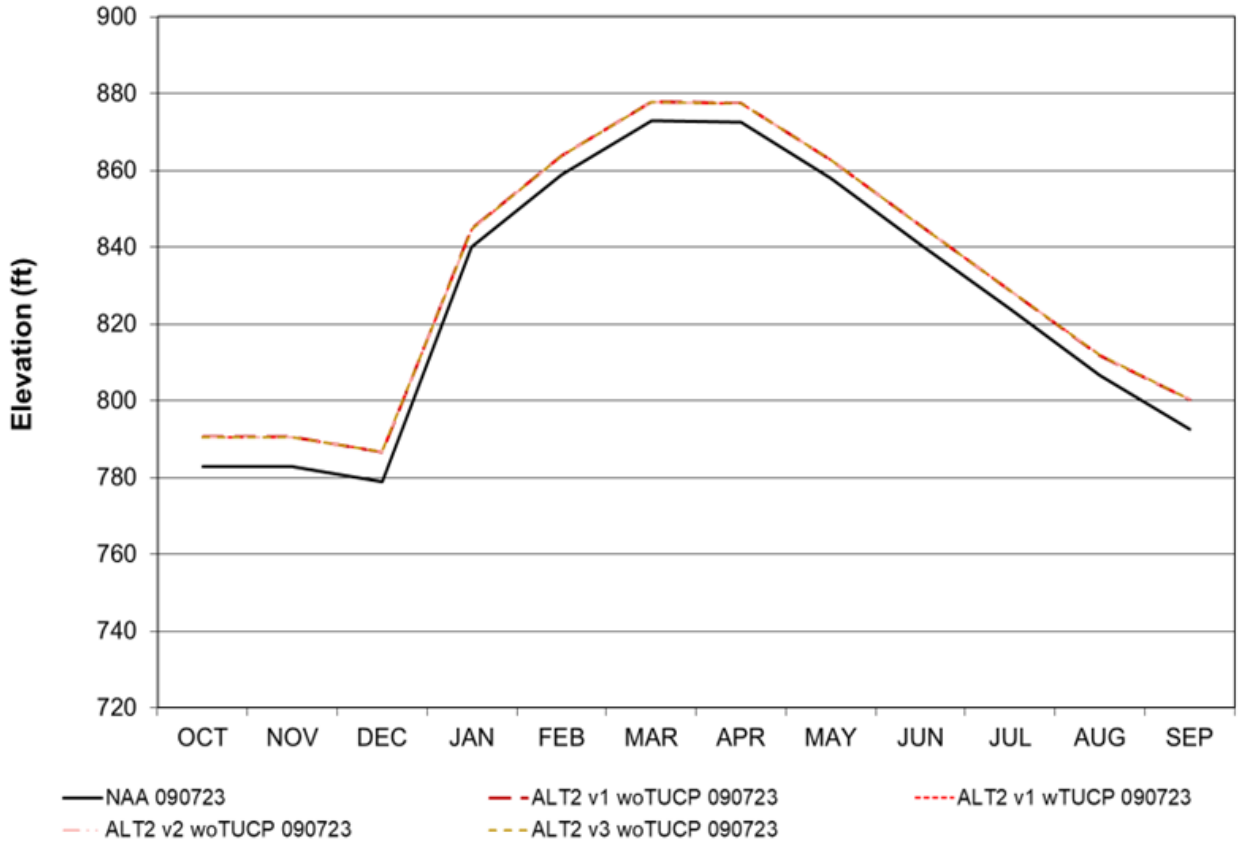

Figure S-26. New Melones Reservoir Alternative 2 Long-Term Average Minimum Water Level Elevation

Long-term average maximum water elevations at New Melones Reservoir would remain the same as the No Action Alternative under all phases, as shown in Figure S-27.

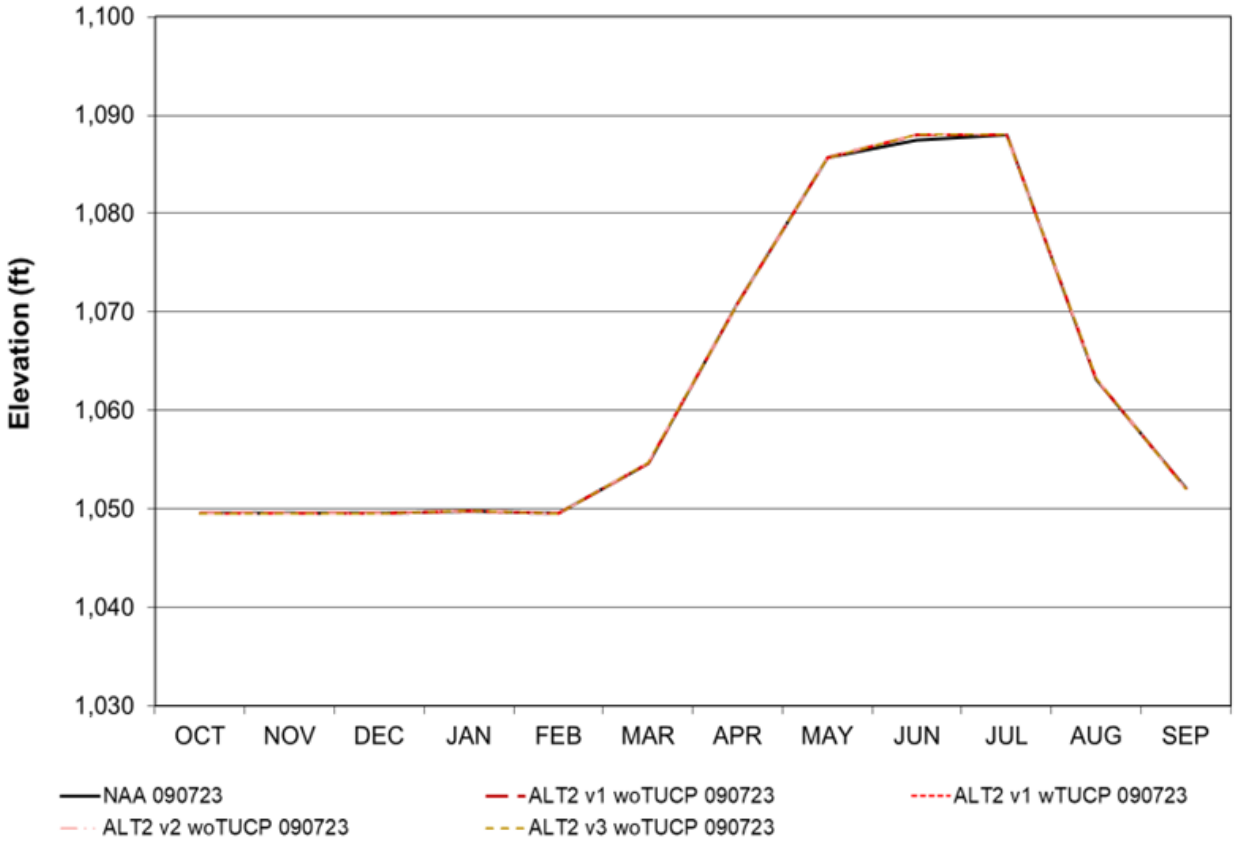

Figure S-27. New Melones Reservoir Alternative 2 Long-Term Average Maximum Water Level Elevation

Recreational activities at New Melones Reservoir would not be affected under Alternative 2.

Water elevations and seasonal fluctuations in Tulloch Reservoir under Alternative 2 would be the same as the No Action Alternative; 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 all phases of Alternative 2, average flows on the Stanislaus River below Goodwin would be higher than the No Action Alternative in February, July, and August, with the highest increase in flows occurring February (approximately 70 cfs). Average flows would decrease compared to the No Action Alternative in March through May, with the largest decreases occurring in April (approximately 80 cfs), as shown in Figure S-11. Reduced flows could have minor effects on rafting and recreational fishing access. The highest flows occur in February when recreation is less popular. Long-term average minimum flows for all phases of Alternative 2 would remain the same as the No Action Alternative, except in February where there would be an increase of approximately 80 cfs. Long-term average maximum flows for all phases of Alternative 2 would remain the same as the No Action Alternative, except in February when there would be lower flows (by approximately 2,100 cfs) and in December and July when there would be higher flows (by 1,200 – 1,300 cfs).

San Joaquin River

Under Alternative 2, there would be no changes to recreation on Millerton Reservoir, as average and long-term average minimum water elevations and seasonal fluctuations would not change compared to the No Action Alternative. Under Alternative 2 Without TUCP Systemwide VA, the March long-term average maximum water elevation would be approximately 2 feet greater than the No Action Alternative and all other phases of Alternative 2. This slight change would not affect recreation at the lake.

Average San Joaquin River flows are not likely to be substantially different under Alternative 2 compared to the No Action Alternative.

There would be no changes to day use activities at the San Joaquin River National Wildlife Refuge under Alternative 2 compared to the No Action Alternative.

Bay-Delta Operations

Long-term average and maximum San Joaquin River Delta outflows under Alternative 2 would be the same as the No Action Alternative (Figure S-13). Under the No Action Alternative average Delta outflows range from approximately 4,540 cfs in August to approximately 58,240 cfs in February. There would be no effects on recreation associated with the Delta.

Long-term average minimum Delta outflows under all phases of Alternative 2 would be the same as the No Action Alternative for August through November, as shown in Figure S-28. In December, long-term average minimum Delta outflows under Alternative 2 With TUCP Without VA and Without TUCP Without VA would be higher than the No Action Alternative by approximately 725 cfs. Long-term average minimum Delta outflow under all phases of Alternative 2 would be lower than the No Action Alternative in January and February, by up to 1,400 cfs (January). Long-term average minimum Delta outflow under all phases of Alternative 2, except Alternative 2 With TUCP Without VA, would be higher than the No Action Alternative March through June, with a maximum increase of approximately 3,080 cfs in April. This could extend the accessibility of water-related recreation activities out into late spring, as compared to the No Action Alternative.

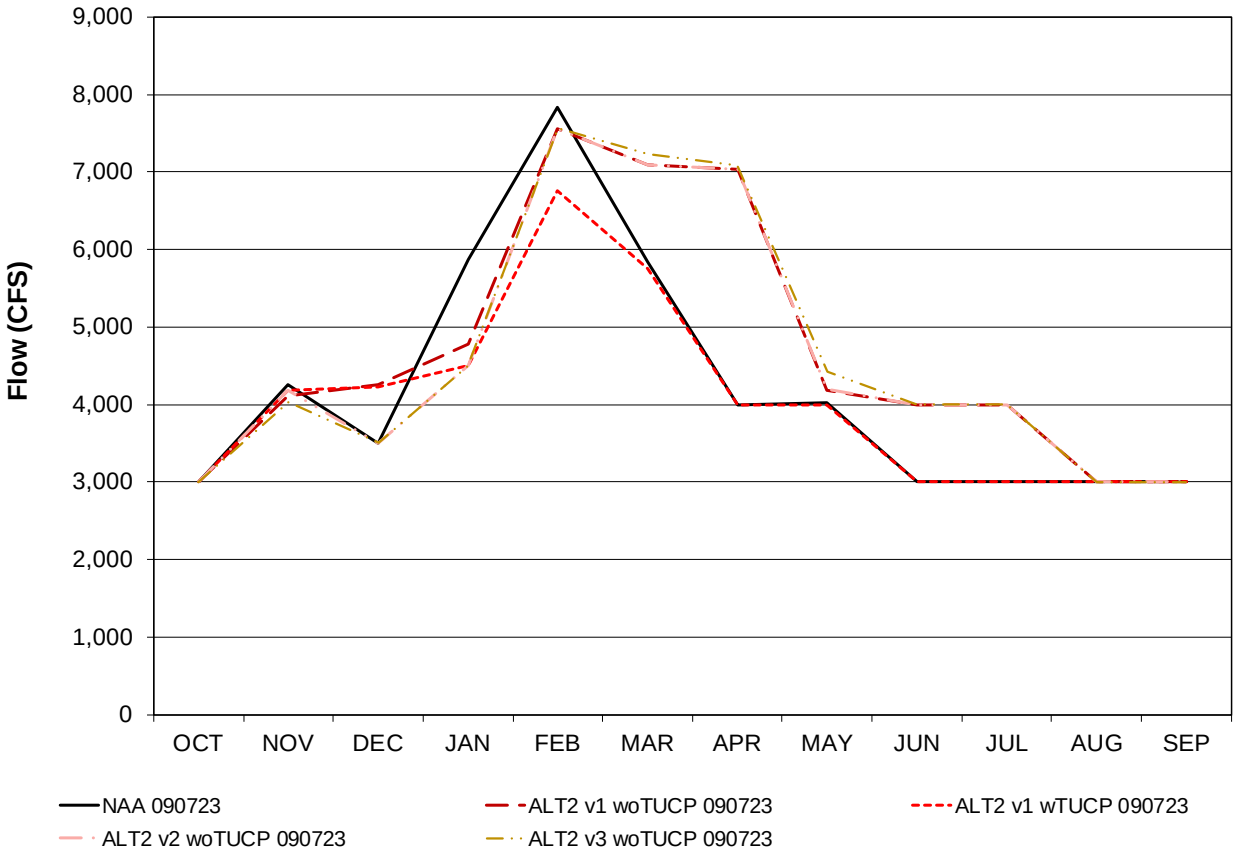

Figure S-28. Bay-Delta Alternative 2 Long-Term Average Minimum Outflow

Average Lake Del Valle water elevations under all phases of Alternative 2 would be similar to the No Action Alternative. October (approximately 637 feet msl) through May (approximately 703 feet), long-term average minimum water elevations would be similar to the No Action Alternative, except for Alternative 2 Without TUCP Delta VA, which would see an increase of up to 27 feet in October and November (to approximately 656 and 664 feet msl, respectfully). From June through September, long-term average minimum water elevations under all phases would be approximately one to 14 feet greater in elevation than the No Action Alternative, while Alternative 2 Without TUCP Delta VA would remain similar to the No Action Alternative. The long-term average maximum water elevations for all phases would remain similar to the No Action Alternative. No effects to boating and recreation are anticipated at the Yolo Bypass and Cache Slough, or in the San Francisco Bay reservoirs, as discussed in Alternative 1.

Nearshore Pacific Ocean on the California Coast

Changes in water operations under the Alternative 2 phases could have the potential to affect Chinook Salmon. Alternative 2 without TUCP without VAs could result in approximately 16 fewer Chinook salmon (or 250 pounds biomass) in the ocean compared to the No Action Alternative. This is likely a negligible difference in Chinook salmon for recreational fisheries between the No Action Alternative and Alternative 2 without TUCP without VAs.

Alternative 2 with TUCP without VAs could result in an annual abundance of approximately 12 fewer Fall-Run Chinook salmon (or 190 pounds biomass) in the ocean compared to the No Action Alternative. This is likely a negligible difference in Chinook salmon for recreational fisheries between the No Action Alternative and Alternative 2 with TUCP without VAs.

Alternative 2 without TUCP with Delta VAs could result in an annual abundance of approximately 33 fewer Chinook salmon (or 506 pounds of biomass) in the ocean compared to the No Action Alternative. This is likely a negligible difference in Chinook salmon for recreational fisheries between the No Action Alternative and Alternative 2 without TUCP with Delta VAs.

Alternative 2 without TUCP with Systemwide VAs could result in an annual abundance of approximately 180 more Chinook salmon (or 2,693 pounds biomass) in the ocean compared to the No Action Alternative. This is likely a negligible difference in Chinook salmon for recreational fisheries between the No Action Alternative and Alternative 2 without TUCP with Systemwide VAs.

None of the Alternative 2 phases differ greatly from the No Action Alternative but the Alternative 2 without TUCP with systemwide VAs is the only alternative that is modeled to increase Chinook salmon, potentially benefiting recreational fisheries, of all the Alternative 2 phases. The other three phases decrease salmon abundance available relative to the No Action Alternative, but the decrease is likely negligible.

Central Valley Project and State Water Project Service Areas

San Luis Reservoir

Similar to Alternative 1, average water levels under all phases of Alternative 2 would increase at San Luis Reservoir, and the seasonal fluctuation would remain similar to existing conditions (Figure S-29). Long-term average water levels would be approximately one to 13 feet higher year-round compared to the No Action Alternative, with the greatest increases in water elevation anticipated between May and September.

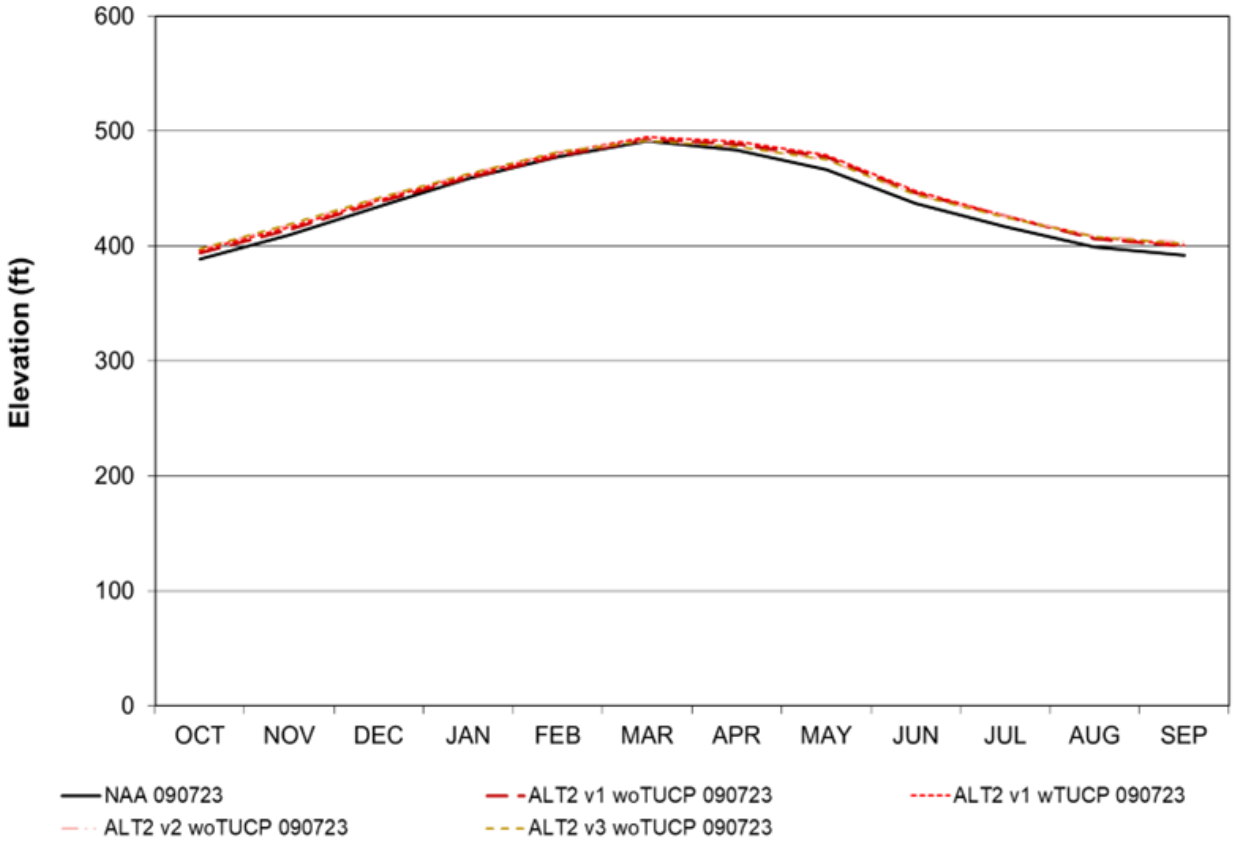

Figure S-29. San Luis Reservoir Alternative 2 Long-Term Average Water Level Elevation

Long-term average minimum water levels in the San Luis Reservoir for all phases of Alternative 2 would remain similar to the No Action Alternative for July through January, except for November when Alternative 2 With TUCP Without VA would be about five feet greater and Alternative 2 Without TUCP Delta VA would be approximately 30 feet less than the No Action Alternative (Figure S-30). A decrease in long-term average minimum water elevations could adversely impact boating, swimming, and fishing. Between January and June, all phases would be greater than the No Action Alternative, varying between eight and 44 feet greater, rendering the boat ramps operational for more months out of the year.

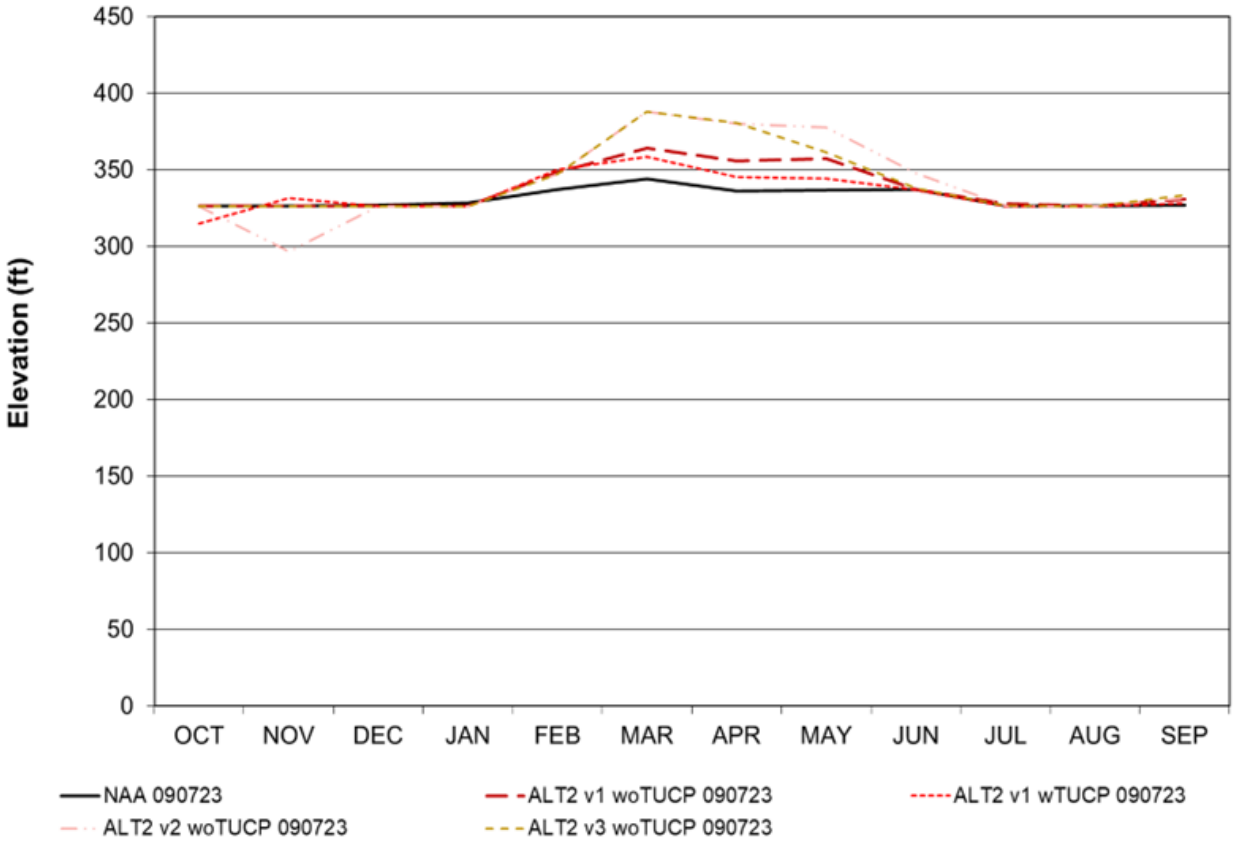

Figure S-30. San Luis Reservoir Alternative 2 Long-Term Average Minimum Water Level Elevation

Long-term average maximum water elevations at the San Luis Reservoir during all phases of Alternative 2 follow the same seasonal fluctuations as the No Action Alternative, while remaining approximately 12 to 18 feet greater, as shown in Figure S-31.

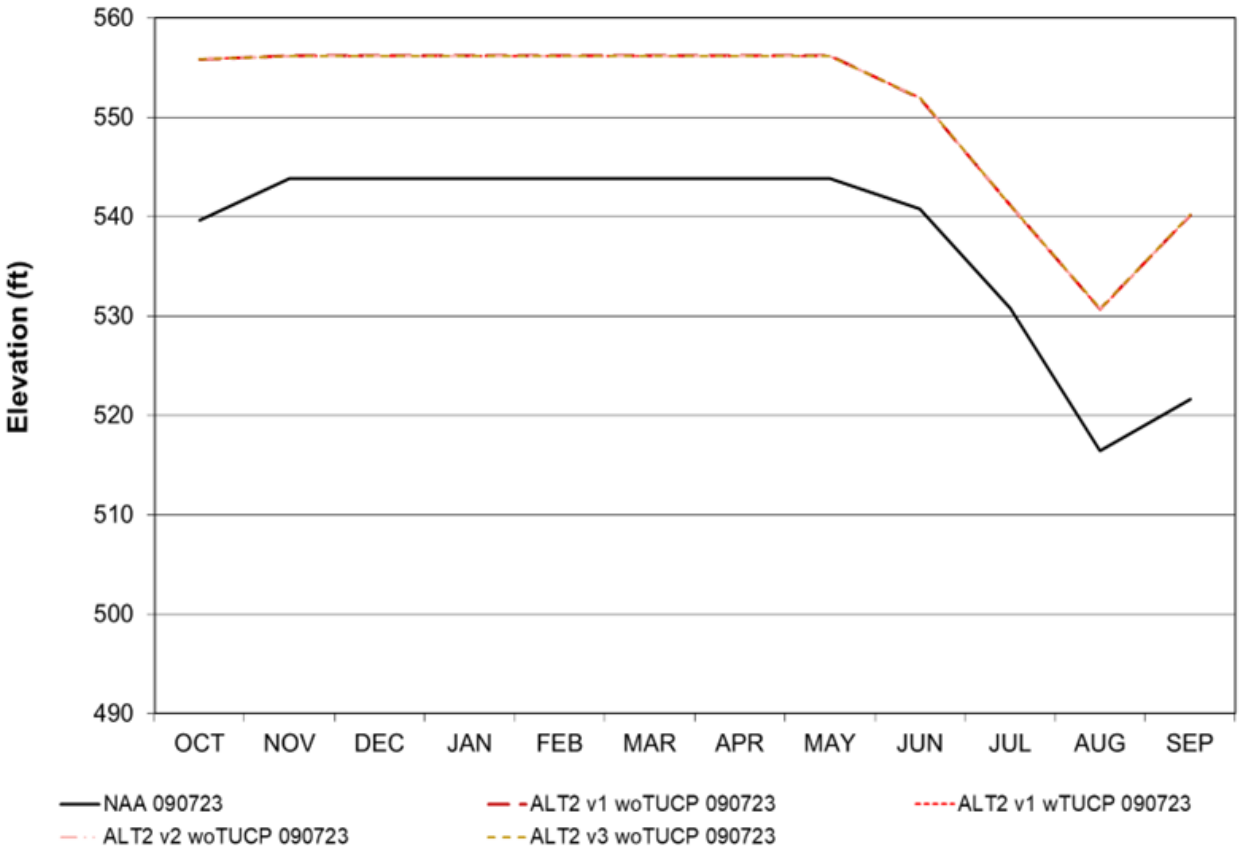

Figure S-31. San Luis Reservoir Alternative 2 Long-Term Average Maximum Water Level Elevation

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.

S.2.5 Alternative 3

S.2.5.1 Potential Changes to Recreational Opportunities

Trinity River

Under Alternative 3, average monthly water elevation at Trinity Reservoir would be slightly higher, by approximately two to four feet, compared to the No Action Alternative; seasonal fluctuations in water levels would remain approximately the same under Alternative 3 (Figure S-1). Therefore, Alternative 3 could have negligible impacts 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 3, so elevation levels would remain stable and there would be no effect on recreational opportunities.

Sacramento River

Under Alternative 3, the average monthly water elevation of Shasta Reservoir would increase throughout the year, by six feet up to a maximum of approximately 13 feet (in September), compared to the No Action Alternative, as shown in Figure S-2. Thus, benefits to boating, camping, fishing, and day use could occur. The locations for shoreline day use activities are limited because of the steep and rocky shorelines. The locations developed for shoreline day use activities could become more desirable if water elevations rise.

The maximum water storage elevation at the top of the Keswick Dam spillway is 587 feet. Under Alternative 3, water elevations at Keswick Reservoir would remain stable throughout the year at approximately 587 feet, with very minor fluctuations. This would be an increase over water elevation under the No Action Alternative in August through November. No impacts to recreation are anticipated. Water elevations at Whiskeytown Reservoir would have minor variations of no more than one foot compared to the No Action Alternative; therefore, 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 below Keswick Reservoir and below Red Bluff Diversion Dam would increase slightly in December, January, May, and August, and decrease slightly in April, June, and July relative to the No Action Alternative (Figure S-4 and Figure S-5). The highest decrease in monthly average flows is expected to occur in June (974 cfs). Seasonal fluctuations in flows would not change compared to the No Action Alternative. A decrease in flows in June and July could have a minor negative impact on boating, whitewater rafting, camping, day use activities, and recreational fishing throughout the summer as aesthetics and access to the river may change.

Clear Creek

Under Alternative 3, the average flow and seasonal fluctuations of Clear Creek below Whiskeytown Dam would be similar to those discussed in Alternative 2. However, Alternative 3 would have a slightly lower flow from August through December (by approximately five to 16 cfs), as shown in Figure S-6. February through June, the average flow would be slightly greater than Alternative 2 (by approximately nine to 11 cfs, or 4%). In June through October, under Alternative 3, the average flow would be approximately 66-82% lower than the No Action Alternative. Therefore, the impacts on recreation would be the same as the impacts discussed under Alternative 2.

American River

Similar changes in average water elevation and seasonal fluctuations for Folsom Reservoir and Lake Natoma as described in Alternative 2 would occur under Alternative 3; however, Folsom Lake elevations would be approximately two to five feet lower during the spring under Alternative 3. Seasonal fluctuations in the average American River flow below Nimbus Dam would remain similar to the No Action Alternative, as well as Alternative 2 (Figure S-9). However, Alternative 3 flows would be slightly higher in March and April (by approximately 300 to 600 cfs, or 82-96% of the No Action Alternative), and lower in June and July (by approximately 410 to 800 cfs, or only 72-88% of the No Action Alternative). Thus, water-related

recreation at Folsom Reservoir, Lake Natoma, and the American River Parkway could be adversely affected in June and July.

Stanislaus River

Under Alternative 3, average water elevation at New Melones Reservoir would be slightly lower, by approximately four to six feet, compared to the No Action Alternative; seasonal fluctuations in water levels would remain approximately the same as the No Action Alternative, as shown in Figure S-10. There would be no change to average reservoir elevations for Tulloch Reservoir compared to the No Action Alternative; therefore, there would be no effects on boating, camping, day use activities, or recreational fishing access.

Under Alternative 3, the seasonal fluctuations would be similar to the No Action Alternative. However, in comparison to the No Action Alternative, Alternative 3 would see greater increases in flow from February through June (approximately 190 to 230 cfs), greater decreases in flow in August, September, and December (approximately 30 to 100 cfs), and the same flows in October and November. Therefore, compared to the No Action Alternative, increased flows in the spring under Alternative 3 could improve recreational fishing by improving fishing access.

San Joaquin River

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

Bay-Delta Operations

Average flows in Delta outflow would see seasonal fluctuations similar to the No Action Alternative, with average flows greater than the No Action Alternative from November through May, and August, with the greatest increase of approximately 5,200 cfs seen in May. Average flows through the Yolo Bypass would increase December through February as compared to the No Action Alternative, by up to 1,000 cfs. The increased average flows in the Delta could positively affect water-related recreational activities such as boating, sailing, waterskiing, canoeing, kayaking, and fishing.

Slight changes in average elevations (approximately three to four feet from October through February) at Lake Del Valle would be expected under Alternative 3 as compared to the No Action Alternative. Therefore, there would be no impacts on recreation in the San Francisco Bay reservoirs as compared to the No Action Alternative.

Nearshore Pacific Ocean on the California Coast

Changes in water operations under Alternative 3 could have the potential to affect Chinook Salmon relative to the No Action Alternative. Alternative 3 could result in an annual abundance of approximately 659 more Chinook salmon (or 9,886 pounds biomass) in the ocean compared to the No Action Alternative. Thus, Alternative 3 would benefit recreational fisheries relative to the No Action Alternative.

Central Valley Project and State Water Project Service Areas

San Luis Reservoir

Under Alternative 3, the average water elevation at San Luis Reservoir would decrease throughout the year as compared to the No Action Alternative (Figure S-14). Decreases would be largest between July and September (approximately 30 to 44 feet), but smaller decreases in water levels would be anticipated throughout the rest of the year (approximately 20 to 24 feet). Seasonal fluctuations in average water levels would not change when compared to the No Action Alternative.

Within the San Luis Reservoir SRA, recreational activities include boating, camping, picnicking, wildlife and scenic viewing, fishing, and hunting. The boat ramp available at Dinosaur Point in San Luis Reservoir is operational to 360 feet msl, and water levels could get close to that in August and September. The boat ramp available at the Basalt Area is operational to 340 feet msl, thus the lake would still be accessible throughout the summer months. Other recreational activities would not be affected.

S.2.6 Alternative 4

S.2.6.1 Potential Changes to Recreational Opportunities

Trinity River

Under Alternative 4, average monthly water elevation at Trinity Reservoir would be slightly lower, by up to five feet, than under the No Action Alternative; seasonal fluctuations in water levels would remain approximately the same under Alternative 4 as the No Action Alternative (Figure S-1).

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 there would be no effect on recreational opportunities.

Sacramento River

Compared to the No Action Alternative, the average monthly water elevation of Shasta Reservoir under Alternative 4 would increase slightly (approximately two feet) from February to May, with a larger increase (approximately 7 feet) from June to January, as shown in Figure S-2. Thus, benefits to boating, camping, fishing, and day use could occur as discussed in Alternative 2.

Water elevations at Keswick Reservoir would begin to decline earlier in the year (April) than under the No Action Alternative and would remain lower than under the No Action Alternative through September, as shown in Figure S-3. Water elevations would be higher than the No Action Alternative in October and November, by up to six feet. These changes in the water elevations at Keswick Reservoir should not have impacts on the other recreational activities here, such as hiking, boating, fishing, and other water sports. No camping occurs at Keswick Reservoir, so there would be no impacts on camping at this location.

Water elevations at Whiskeytown Reservoir would have minor variations of no more than one foot compared to the No Action Alternative; therefore, no impacts on boating, day use activities, or recreational fishing would occur.

Average flows on the Sacramento River below Keswick Reservoir and below Red Bluff Diversion Dam would be similar to flows under the No Action Alternative. No impacts on recreational activities would occur.

Clear Creek

Alternative 4 flows and seasonal fluctuations along Clear Creek below Whiskeytown Dam would be greater than the No Action Alternative from November through May, except for February when it would be less by approximately 32 cfs, as shown in Figure S-6. From June through October, Alternative 4 would be less than the No Action Alternative by approximately 26 to 96 cfs. Therefore, compared to the No Action Alternative, the decrease in flows could adversely affect day use activities, such as wildlife viewing, kayaking, and recreational fishing due to less habitat.

American River

Under Alternative 4, average water elevations at Folsom Reservoir and Lake Natoma would be the same as under the No Action Alternative and would see the same seasonal fluctuations (Figure S-7 and Figure S-8). Thus, there could be negligible effects on boating, recreational fishing access, camping, and day use activities.

Under Alternative 4, flow and seasonal fluctuations of the American River below Nimbus Dam would be similar to the No Action Alternative, as shown in Figure S-9. The highest monthly flows are expected to occur in February and the lowest in September and October. Day use activities (e.g., boating, fishing, biking, walking, picnicking, etc.) along the river would not be affected by this alternative.

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 would be the same or greater by one foot compared to the No Action Alternative (Figure S-10). Long-term average flows in the Stanislaus River below Goodwin (Figure S-11) would be higher than the No Action Alternative in February, July, and August, with the highest increase in flows occurring February (approximately 70 cfs). Average flows would decrease compared to the No Action Alternative in March through May, with the largest decreases occurring in April (approximately 80 cfs), as shown in Figure S-11. Compared to the No Action Alternative, reduced flows could have minor effects on rafting and recreational fishing access on the Stanislaus River. Recreational activities at New Melones Reservoir would not be affected under Alternative 4, compared to the No Action Alternative.

There would be no change to average reservoir elevations for Tulloch Reservoir compared to the No Action Alternative; therefore, there would be no effects on boating, camping, day use activities, or recreational fishing access.

San Joaquin River

Under Alternative 4, there would be no substantial changes to average water elevations, flows, or seasonal fluctuations in Millerton Reservoir, the San Joaquin River, or the San Joaquin River National Wildlife Refuge compared to the No Action Alternative.

Bay-Delta Operations

Long-term average Delta outflows (Figure S-13) and flows in the Yolo Bypass under Alternative 4 are not anticipated to change compared to the No Action Alternative. Therefore, recreation associated with the Delta would not be affected. No changes in average elevations are expected in the Bay-Delta system under Alternative 4 as compared to the No Action Alternative; therefore, there would be no effects on recreation in the San Francisco Bay reservoirs.

Nearshore Pacific Ocean on the California Coast

Changes in water operations under Alternative 4 could have the potential to affect Chinook Salmon relative to the No Action Alternative. Alternative 4 could result in an annual median abundance of approximately 18 fewer Chinook salmon (or 269 pounds biomass) in the ocean compared to the No Action Alternative. This is likely a negligible difference for recreational fisheries compared to the No Action Alternative.

Central Valley Project and State Water Project Service Areas

San Luis Reservoir

Under Alternative 4, seasonal fluctuations at San Luis Reservoir would be similar to the No Action Alternative (Figure S-14), while the average water elevation would be approximately five to 16 feet higher from March through November. An increase in average water elevations could benefit boating, camping, hiking, swimming, fishing, and picnicking.

S.2.7 Mitigation Measures

Following is a description of mitigation measures identified for recreation resources per alternative. These mitigation measures include avoidance and minimization measures that are part of each alternative and, where appropriate, additional mitigation to lessen impacts of the alternatives.

S.2.7.1 Avoidance and Minimization Measures

No avoidance and minimization measures have been identified.

S.2.7.2 Additional Mitigation Measures

Mitigation Measure REC-1: Update Public Information on Changing Recreation Conditions

Reclamation will facilitate updates to widely available information (websites or other sources) to inform the public when adverse changes in average water elevation, river flows, or seasonal fluctuations occur to recreation resources, depending on different factors such as the type of recreation and intensity of the activity (e.g., advanced whitewater rafting versus less-advanced rafting).

S.2.8 Summary of Impacts

Table S-26 includes a summary of impacts, the magnitude and direction of those impacts, and potential mitigation measures for consideration.

Table S-26. Impact Summary

Impact	Alternative	Magnitude and Direction of Impacts [a]	Potential Mitigation Measures
Potential Changes to Recreational Opportunities	No Action Alternative	Current conditions would continue unchanged. Seasonal fluctuations would continue to impact recreational activities, including boating, camping, day use, and/or fishing. [b]	–
	Alternative1	Potential benefits on boating, camping, day use, and/or fishing could occur at Sacramento River (in the spring and summer), Folsom Reservoir (summer through winter), the American River Parkway (in the spring and summer, particularly for water activities), Stanislaus River (spring), and the San Luis Reservoir (year-round).	–
		Potential minor adverse impacts on boating, camping, day use, and/or fishing could occur at the Sacramento River (in the fall), Clear Creek (year-round), and Lake Del Valle (November).	MM REC-1
		No changes would occur to recreational resources at Trinity Reservoir, Lewiston Reservoir, Shasta Reservoir, Keswick Reservoir, Whiskeytown Reservoir, Lake Natoma, Rancho Seco Park and Lake, New Melones Reservoir, Tulloch Reservoir, Millerton Reservoir, the San Joaquin River region, the Bay-Delta Area, the CVP and SWP Service Areas, or the Nearshore Pacific.	–
	Alternative 2	Potential minor benefits to boating, camping, day use, and/or fishing would occur at Shasta Reservoir (year-round), Clear Creek (winter through spring), Lake Natoma (fall), the Bay-Delta Area (spring), and San Luis Reservoir (late spring to early fall) under long-term average conditions.	–
		Potential minor, adverse impacts boating, camping, day use, and/or fishing would occur at Clear Creek (spring through fall), and the lower Stanislaus River (spring) under long-term average conditions.	MM REC-1
		No changes would occur to recreational resources at Trinity Reservoir, Lewiston Reservoir, Keswick Dam, Whiskeytown Reservoir, Folsom Reservoir, the American River Parkway, Rancho Seco Park and Lake, New Melones Reservoir, Tulloch Reservoir, Millerton Reservoir, the San Joaquin River region, or the CVP and SWP Service Areas under long-term average	–

Impact	Alternative	Magnitude and Direction of Impacts [a]	Potential Mitigation Measures
		conditions. Alternative 2 without TUCP with systemwide VAs would increase Chinook salmon, potentially benefiting recreational fisheries. The other three phases would have negligible decreases in salmon abundance.	
	Alternative 3	Potential minor benefits to boating, camping, day use, and/or fishing would occur at Shasta Reservoir (year-round), Clear Creek (winter through spring), American River (spring), the Bay-Delta Area (winter through spring), and the Nearshore Pacific (annual).	–
		Potential minor, adverse impacts to boating, camping, day use, and/or fishing would occur at Sacramento River; Clear Creek (summer through fall); Folsom Reservoir (summer), Lake Natoma (summer), and the American River Parkway (summer); and San Luis Reservoir (summer).	MM REC-1
		No changes would occur to recreational resources at Trinity Reservoir, Lewiston Reservoir, Keswick Dam, Whiskeytown Reservoir, Lake Rancho Seco Park and Lake, New Melones Reservoir, Tulloch Reservoir, the Stanislaus River, Millerton Lake, the San Joaquin River region, San Francisco Bay reservoirs, or the CVP and SWP Service Areas.	–
	Alternative 4	Potential minor benefits to boating, camping, day use, and/or fishing would occur at Shasta Reservoir (summer through winter), Clear Creek (winter through spring), and San Luis Reservoir (spring through fall).	–
		Potential minor adverse effects on boating, camping, day use, and/or fishing would occur at Clear Creek (summer through fall), and Lower Stanislaus River (spring).	MM REC-1
		No changes are expected on the Trinity River, Lewiston Reservoir, Keswick Reservoir, Whiskeytown Reservoir, Sacramento River, Folsom Reservoir, Lake Natoma, American River Parkway, Rancho Seco Park, New Melones Reservoir, Tulloch Reservoir, Millerton Reservoir, San Joaquin River, San Joaquin Valley Refuges, the Bay-Delta area, the San Francisco Bay reservoirs, and the Nearshore Pacific.	–

[a] For the evaluation of alternatives, operation of the action alternatives is compared to the No Action Alternative.
[b] Under the No Action Alternative, Reclamation would operate the CVP consistent with the 2020 Record of Decision implementing the Proposed Action consulted upon for the 2019 Biological Opinions and the reasonable and prudent measures in the incidental take statements. DWR would operate the SWP consistent with the 2020 Record of Decision and the 2020 Incidental Take Permit for the SWP. Reclamation and DWR would operate consistent with authorizing legislation, water rights, contracts, and agreements as described by common components. The evaluation under the No Action Alternative is compared to existing conditions.

S.2.9 Cumulative Impacts

Past, present, and reasonably foreseeable projects, described in Appendix Y, *Cumulative Impact Technical Appendix*, may have cumulative impacts on recreation, to the extent that they impact flow and water elevation.

Past and present actions contribute to the existing condition of the affected environment in the project area while reasonably foreseeable actions are those that are likely to occur in the future that are not speculative. Past, present, and reasonably foreseeable projects include actions to develop water storage capacity, water conveyance infrastructure, water recycling capacity, the reoperation of existing water supply infrastructure, including surface water reservoirs and conveyance infrastructure, and habitat restoration actions. The projects identified in Appendix Y that have the most potential to contribute to cumulative impact on recreation are:

- B.F. Sisk Dam Raise and Reservoir Expansion Project
- Sites Reservoir Project

The No Action Alternative would continue with the current operation of the CVP and may result in changes to recreation in the Central Valley Project and State Water Project. These changes may potentially contribute to cumulative impacts and were described and considered in the 2020 Record of Decision.

Most of the projects listed in Appendix Y lists past, present, and reasonably foreseeable projects that have or may potentially result in cumulative impacts to recreation. Resource management plans and programs are being implemented by communities throughout the action area. These plans, such as California EcoRestore, the Suisun Marsh Habitat Management, Preservation, and Restoration Plan, the San Joaquin River Restoration Program, the San Francisco Bay Delta Action Plan, and the Shasta Management Plan 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, projects that decrease water temperatures and increase water quality, such as the South Delta Temporary Barriers Project and the Prospect Island Tidal Habitat Restoration Project, could create beneficial changes in habitat for fish populations.

In the short-term, the implementation of resource management plans and restoration measures could have cumulative impacts resulting from the construction activities 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. 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 negative impacts on recreation from changes to average river flows, reservoir elevations, and seasonal fluctuations (see Table S-26). Therefore, effects from all action alternatives could have minor contributions to beneficial and/or negative cumulative impacts on recreation. However, the contribution of the action alternatives to cumulative impacts would be anticipated to be minimal because only minor changes to recreation would occur and the changes would be dispersed throughout the project area.

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