

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION
FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE OROVILLE FACILITIES PROJECT
Docket No. P-2100-052

Section 2
Proposed Action and Alternatives
Pages 13 to 42
FEIS

2.0 PROPOSED ACTION AND ALTERNATIVES

This section describes each of the alternatives analyzed in detail in this EIS and summarizes the alternatives considered but eliminated from detailed study. The three alternatives analyzed in detail include DWR's Proposal as described in the Settlement Agreement (Proposed Action), DWR's Proposal with additional Staff-Recommended Measures (Staff Alternative), and the No-action Alternative, which is the baseline against which the other alternatives are compared.

In this section, we briefly describe the Proposed Action and the No-action Alternative. In section 3, we provide a detailed evaluation of the proposed measures for each resource. In section 4, we compare the costs of the measures, and in section 5, we explain our rationale for adopting our preferred alternative.

2.1 NO-ACTION ALTERNATIVE

The No-action Alternative includes existing project facilities, conditions of the existing license, environmental commitments such as those associated with DWR's water rights, recreation programs, and other agreements that affect current operations. Accordingly, the No-action Alternative also includes the following: (1) interim projects implemented by DWR during the relicensing effort, (2) measures continued under the 1983 Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish and Wildlife, and (3) measures identified during informal consultation with U.S. Fish and Wildlife Service (FWS) to resolve terrestrial listed species issues prior to the initiation of formal consultation to be conducted after license application filing. We use this alternative to establish baseline environmental conditions for comparison with other alternatives and to judge the benefits and costs of any measures that might be required under a new license. The effects of the No-action Alternative contribute to the character of existing environmental conditions, and we describe them in our discussion of the affected environment (see section 3).

2.1.1 Existing Project Facilities

The Oroville Facilities are located on the Feather River in the foothills of the Sierra Nevada and Sacramento Valley¹⁷ in Butte County, California. Oroville dam is located 5 miles east of the city of Oroville and about 130 miles northeast of San Francisco. The location of the project and the project features are shown on figure 2, a flow diagram for the Oroville Facilities is presented on figure 3, and the public land within the project boundary is shown on figure 19 (see section 3.3.6, *Recreational Resources*). For ease of reference and consistency, we use the terminology presented in table 1 throughout this EIS to discuss various locations relative to the project.

The Oroville Facilities were developed as part of the State Water Project, a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the State Water Project is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management, power generation, water quality improvement in the Sacramento-San Joaquin Delta (Delta), and recreation and fish and wildlife enhancement.

¹⁷ The Central Valley is a 400-mile-long and 40- to 60-mile-wide valley in California extending from Redding in the north to Bakersfield in the south. The portion of the valley north of Sacramento is known as the Sacramento Valley and the southern portion of the valley is known as the San Joaquin Valley.

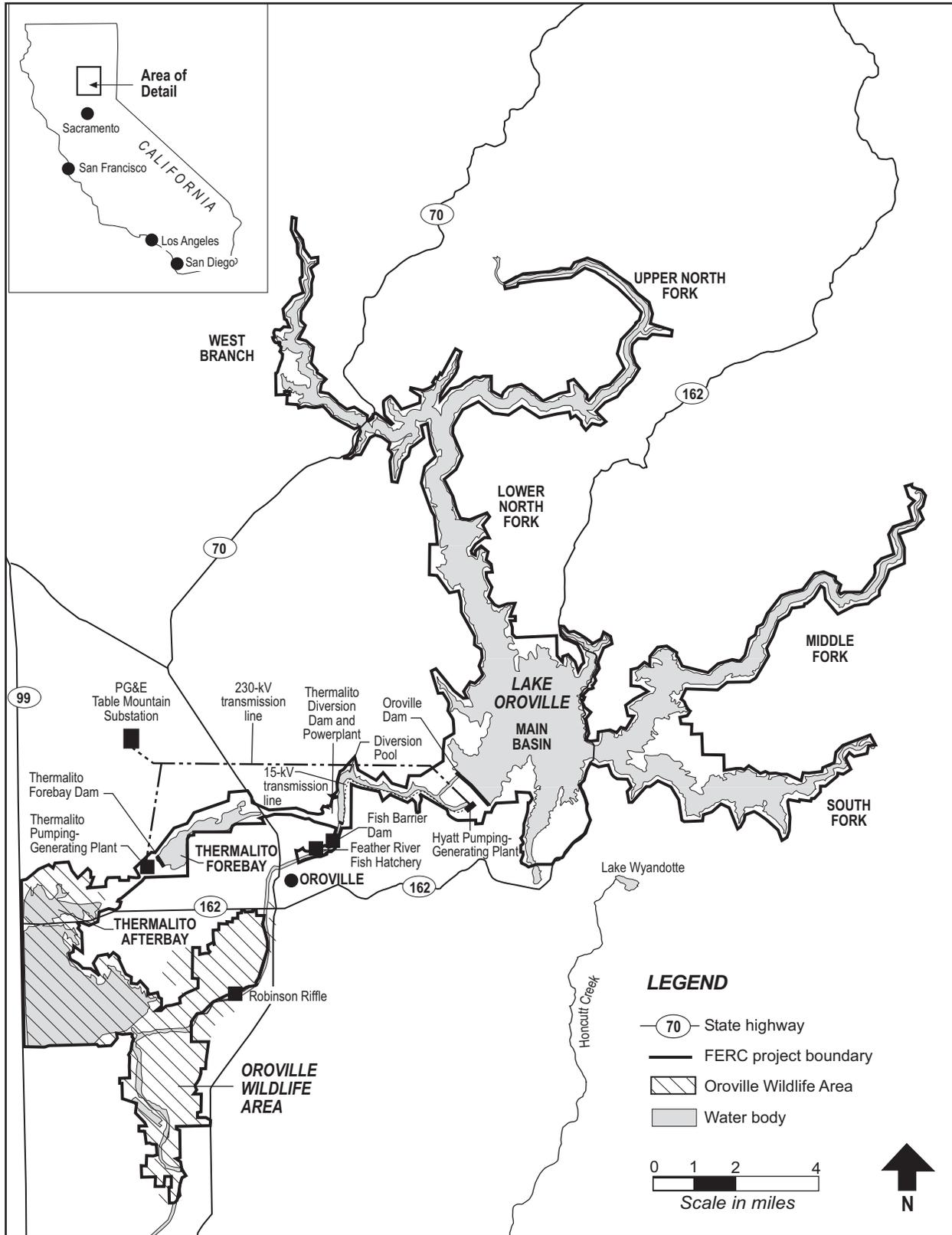


Figure 2. Oroville Facilities features. (Source: DWR, 2005a)

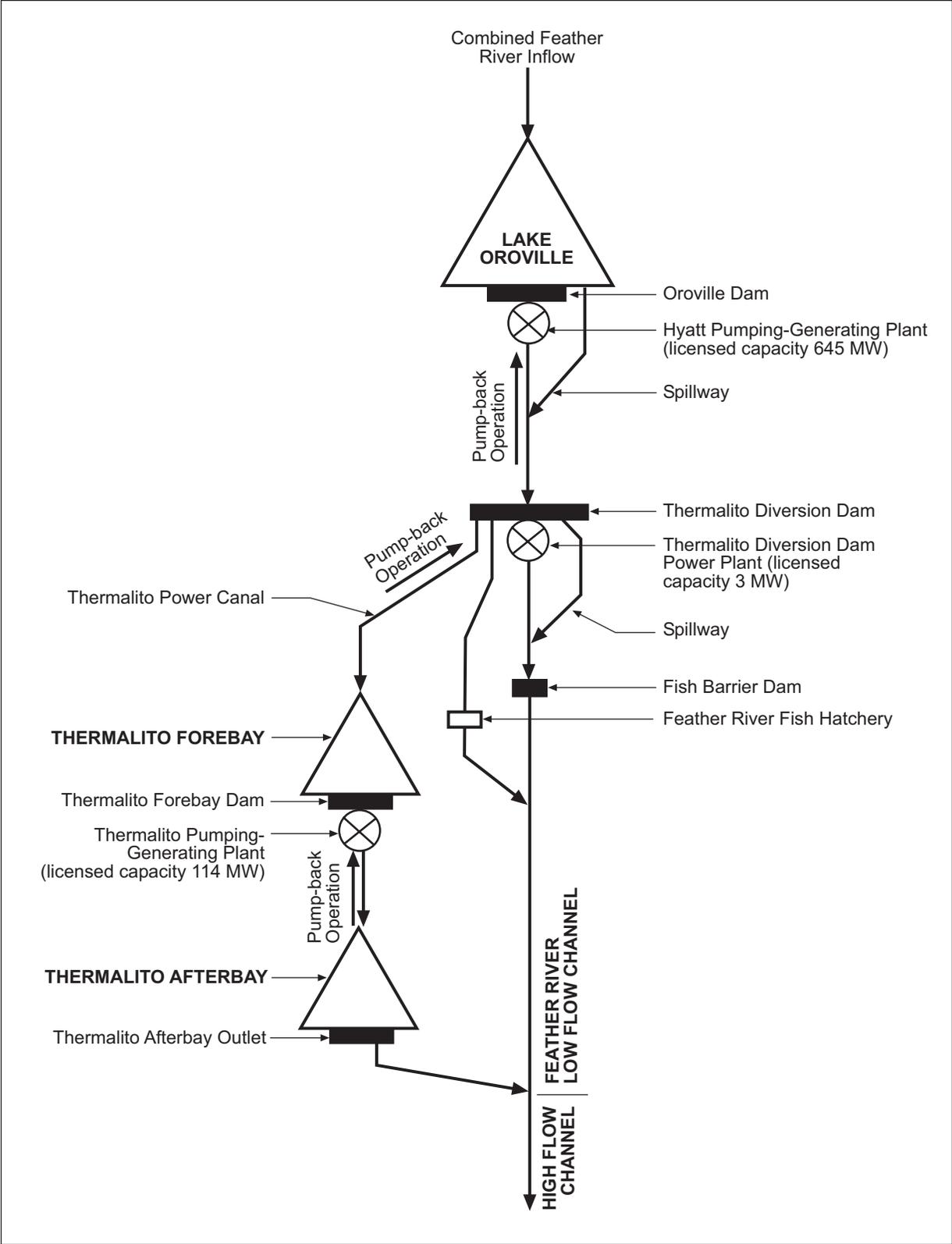


Figure 3. Oroville Facilities flow diagram. (Source: DWR, 2005b, exhibit B)

Table 1. Terminology used in the EIS to describe project-related geographic areas.
(Source: Staff)

Terminology Used in EIS	Description of Area Referenced by the Term
Lake Oroville	
Upper North Fork arm	North Fork of the Feather River from the project boundary in the vicinity of Big Bend dam (non-project) to the confluence with the West Branch of the North Fork of the Feather River
West Branch arm	West Branch of the North Fork of the Feather River from the project boundary in the vicinity of Concow Creek to the confluence with the Upper North Fork arm
Lower North Fork arm	North Fork of the Feather River downstream of the West Branch arm/Upper North Fork arm confluence to the Main Basin of Lake Oroville
Middle Fork arm	Middle Fork of the Feather River from the project boundary in the vicinity of Feather Falls to the Main Basin of Lake Oroville
South Fork arm	South Fork of the Feather River from the project boundary in the vicinity of Ponderosa dam (non-project) to the Main Basin of Lake Oroville
Main Basin	Central body of water formed at the confluence of the Lower North, Middle and South Fork arms
Waterbodies, Water Courses, and Watersheds	
North Fork	North Fork of the Feather River
West Branch	West Branch of the North Fork of the Feather River
Middle Fork	Middle Fork of the Feather River
South Fork	South Fork of the Feather River
Feather River	Feather River downstream of fish barrier dam
High flow channel	Feather River downstream of the Thermalito afterbay outlet to the project boundary
Low flow channel	Feather River between the fish barrier dam and the Thermalito afterbay outlet
North forebay	Portion of Thermalito forebay located north of Nelson Avenue
South forebay	Portion of Thermalito forebay located south of Nelson Avenue
Thermalito Complex	Project features and lands associated with the Thermalito forebay and Thermalito afterbay

The project encompasses 41,540 acres (figure 2) and includes Oroville dam and reservoir, Hyatt pumping-generating plant, Thermalito diversion dam power plant and the Thermalito pumping-generating plant. Other project features include the Thermalito diversion dam, the Feather River Fish Hatchery and fish barrier dam, Thermalito power canal, Oroville Wildlife Area (OWA), Thermalito forebay and forebay dam, Thermalito afterbay and afterbay dam, transmission lines, and a number of recreational facilities.

Oroville dam, along with two small saddle dams, impounds Lake Oroville, a 3.5 million acre-feet capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level (at

elevation 900 feet mean sea level [msl]).¹⁸ Oroville dam is 770 feet high from the base of the dam with a crest length of 6,920 feet. Bidwell Canyon Saddle dam is 47 feet high from the base of the dam with a crest length of 2,270 feet. Parish Camp Saddle dam is 27 feet high from the base of the dam with a crest length of 280 feet.

The Hyatt pumping-generating plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels to the Feather River just downstream of Oroville dam. The plant has a generating and pumping flow capacity of 16,950 cubic feet per second (cfs) and 5,610 cfs, respectively. The Thermalito diversion dam power plant and the Thermalito pumping-generating plant have generation capacities of 3 MW and 114 MW, respectively.

The Thermalito diversion dam, located 4 miles downstream of the Oroville dam, creates a tailwater pool for the Hyatt pumping-generating plant and is used to divert water to the Thermalito power canal. The Thermalito diversion dam is 143 feet high from the base of the dam with a crest length of 1,300 feet. The crest of the dam is at 233 feet msl. The diversion dam impounds the Thermalito diversion pool, which has storage capacity of 13,350 acre-feet with a maximum water surface area of 320 acres at the maximum water surface elevation of 225 feet msl. The Thermalito diversion dam power plant is a 3-MW power plant located below the left abutment of the diversion dam. The power plant releases a maximum of 615 cfs of water in the river through a single turbine.

The Thermalito power canal is a 10,000-foot-long channel designed to convey generating flows up to 16,900 cfs to the Thermalito forebay for use in the Thermalito pumping-generating plant. It also conveys pump-back flows of up to 9,000 cfs from the Thermalito forebay to the Thermalito diversion pool, which in turn acts as a forebay to provide flow to the Hyatt pumping-generating plant when it is operating in a pump mode. The Thermalito forebay is an off-stream regulating reservoir for the Thermalito pumping-generating plant. The Thermalito forebay dam is 91 feet high from the base of the dam with a crest length of 15,900 feet. The crest of the dam is at 231 feet msl. The dam impounds the Thermalito forebay, which has storage capacity of 11,768 acre-feet with a maximum water surface area of 630 acres at the maximum water surface elevation of 225 feet msl.

The Thermalito pumping-generating plant is designed to operate in tandem with the Hyatt pumping-generating plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in a generating mode, the Thermalito pumping-generating plant discharges into the Thermalito afterbay, which is impounded by a 42,000-foot-long earthfill dam. The Thermalito afterbay dam is 39 feet high from the base of the dam. Thermalito afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. The Thermalito afterbay has a storage capacity of 57,040 acre-feet with a maximum water surface elevation area of 4,300 acres at the maximum water surface elevation of 136.5 feet msl. Several local irrigation districts receive water from the Thermalito afterbay.

Major transmission lines include two separate transmission lines that meet the Commission's criteria for being primary transmission lines.¹⁹ Two sets of double circuit towers carrying three 230-

¹⁸ Although Lake Oroville has a nominal maximum surface elevation of 900 feet msl, DWR tries to hold the maximum elevation closer to 899 feet msl. The lake may exceed 900 feet msl during flood conditions. Note that our use of feet msl throughout this document is based on the National Geodetic Vertical Datum 1929.

¹⁹ DWR did not apply to modify the existing license with respect to transmission lines. Both transmission lines are required to get project power to market dependably and since the lines continued existence appears to depend on a Commission license, these transmission lines are properly classified as primary transmission lines.

kilovolt (kV) circuits within a 300-foot-wide corridor extend about 9 miles from the Hyatt pumping-generating plant’s switchyard to the Table Mountain switchyard. One set of double circuit towers extends about 2.3 miles within a 125-foot-wide corridor from the Thermalito pumping-generating plant switchyard to the Table Mountain switchyard. Two underground powerlines provide electricity to the Thermalito diversion dam and the Feather River Fish Hatchery. A 3.9-mile underground 15-kV powerline, also a primary transmission line, extends from the Hyatt pumping-generating switchyard to the Thermalito diversion dam power plant switchyard. A second underground 15-kV powerline, which is not a primary transmission line, connects the Thermalito diversion dam power plant with the Feather River Fish Hatchery.

The project boundary also includes the Feather River fish barrier dam, which is downstream of the Thermalito diversion dam and immediately upstream of the Feather River Fish Hatchery, an anadromous fish hatchery. The Feather River fish barrier dam is 91 feet high from the base of the dam with a crest length of 600 feet. The crest of the dam is at elevation 181 feet msl. The flow over the fish barrier dam maintains fish habitat in the Feather River between the dam and the Thermalito afterbay outlet and provides attraction flow for the hatchery. The Feather River Fish Hatchery receives returning salmon and steelhead and accommodates more than 20,000 adult fish and 15 million young, annually. The Thermalito fish rearing facility is located immediately adjacent to the dam on the west side of the Thermalito afterbay. This facility consists of a set of fish rearing ponds used to raise as many as 2.5 million fingerlings.

The following recreational facilities are located in the project boundary, unless otherwise noted:

Location/Type	Recreational Facility	
Lake Oroville	Nelson Bar boat launch	Craig Saddle boat-in campground
	Lime Saddle Complex (campground, group campground day-use area and boat launch)	Goat Ranch boat-in campground
	Bidwell Canyon campground, day-use area, boat launch)	10 floating campsites on Lake Oroville
	Bidwell Canyon day-use area and boat launch	Lake Oroville Visitor Center
	Loafer Creek campground	Feather River Fish Hatchery day-use area
	Loafer Creek group campground	Lake Oroville scenic overlook
	Loafer Creek equestrian campground	Dark Canyon boat launch
	Loafer Creek day-use area (swimming beach, boat launch)	Foreman Creek (campground and day-use area)
	Spillway day-use area (boat launch, swimming area)	Vinton Gulch boat launch
	Spillway RV campground	Enterprise boat launch
	Oroville dam overlook day-use area	Stringtown boat launch
	Bloomer boat-in campground	Feather River Nature Center ^a and day-use area
Thermalito Complex	North Thermalito forebay (day-use area, aquatic center, campground)	Monument Hill day-use area (boat launch, swimming area)

Location/Type	Recreational Facility	
	North Thermalito forebay day-use area (swimming area, aquatic center, boat launches)	Model aircraft flying facility
	North Thermalito forebay RV campground	Shoreline hunting blinds at Thermalito afterbay
	Thermalito diversion pool (day-use area)	Wilbur Road boat launch
	South Thermalito forebay day-use area (boat launch, swimming area)	Larkin Road boat launch
	Thermalito afterbay outlet camping area and informal boat launch	
Trailheads	East Hamilton Road Trailhead	Lakeland Boulevard Trailhead
	Toland Road Trailhead	Saddle Dam Trailhead
	Tres Vias Road Trailhead	
Trails	Bidwell Canyon Trail	Sewim Bo Trail
	Brad B. Freeman Trail ^b	OWA trails
	Dan Beebe Trail ^b	Potter's Ravine Trail ^b
	Loafer Creek Day-use /campground Trail	Roy Rogers Trail
	Loafer Creek Loop Trail	Wyk Island Trail

^a The Feather River Nature Center is owned by the City of Oroville and operated by the Feather River Recreation and Park District. The day-use facilities along the river are provided and maintained by DWR.

^b Portions of the trail are outside of the project boundary.

2.1.2 Project Boundary

At Lake Oroville, the project boundary generally follows an elevational contour about 200 to 600 feet from the maximum pool level (900 feet msl) and includes the entire reservoir. In the vicinity of Oroville dam, Bloomer Hill, Foreman Creek, Loafer Creek, and Bidwell Canyon, the project boundary extends upslope as much as 4,900 feet to include lands where there are project features and recreation facilities; the project boundary at these locations does not follow an elevational contour. At the Thermalito diversion pool and power canal, the project boundary generally follows an elevational contour about 200 to 500 feet from the maximum pool level (225 feet msl) except near the Thermalito diversion dam where it extends upslope up to 2,000 feet to include land where the powerhouse and the facilities to operate the dam are located. The project boundary also extends downstream of the Thermalito dam on the Feather River to include the fish barrier dam, fish hatchery, and its components. The project boundary in this area includes both sides of the river, generally following an elevational contour about 100 to 500 feet from the river shoreline from the dam to just downstream of the fish hatchery. At the Thermalito forebay and afterbay, the project boundary generally follows the shoreline of the reservoirs extending upslope about 200 to 3,000 feet to include project features and recreation facilities. South of the Thermalito afterbay, the project boundary generally follows the boundary of the OWA, which was the site excavated for material to build the Oroville dam. In this area, the project boundary is between 300 and 8,000 feet from the Feather River and includes the Thermalito afterbay outlet. The project boundary includes two separate transmission lines which are 9 and 2.3 miles in length with corridor widths of about 300 and 125 feet, respectively. The project boundary encompasses about 11,200 acres of the 12,000-acre OWA.

The project boundary includes two separate transmission lines which are 9 and 2.3 miles in length with corridor widths of about 300 and 125 feet, respectively. We describe these two lines in section 2.1.1, *Existing Project Facilities*. DWR did not apply to modify the existing license with respect to transmission lines and both of these lines meet the Commission’s criteria for primary transmission line. This is because these transmission lines are required to dependably deliver project power to market and the lines continued existence appears to depend on a Commission license. There are also two 15 kV powerlines within the project boundary. The 3.9-mile underground 15-kV powerline between the Hyatt pumping-generating switchyard and Thermalito diversion dam power plant switchyard also appears to meet the definition of primary transmission line. A second underground 15-kV powerline connecting the Thermalito diversion dam power plant with the Feather River Fish Hatchery does not appear to be a primary transmission line; nonetheless, it is a project transmission facility.

2.1.3 Existing Project Operations

2.1.3.1 Overall Project Operations

Winter and spring runoff is stored in Lake Oroville for release to the Feather River, as necessary, to meet downstream water demands and minimum instream flow requirements. Annual planning for operations is conducted for multi-year carryover, during which half the Lake Oroville storage above the minimum pool is assumed available for subsequent years. The operations plan is updated regularly to reflect changes in hydrology and downstream operations. Water can also be stored in Lake Oroville and the other project impoundments over a shorter time-frame (over days or hours) to meet power objectives as described below.

As shown in figure 3, the project offers flexibility with respect to energy generation and flow release. Specific technical information about the various flow, storage, and generating capacity is provided for each project facility in the following sections. Conceptually, water can be released from Lake Oroville through the Hyatt pumping-generating plant during peak hours. That water can either be (1) temporarily stored in the Thermalito diversion pool for pumping back to Lake Oroville during off-peak hours, (2) released through the Thermalito diversion dam power plant to produce electricity and provide instream flow to the low flow channel; or (3) passed down the Thermalito power canal to the Thermalito forebay. Water passed through the Thermalito power canal can be stored in the Thermalito forebay or passed through Thermalito pumping-generating plant to produce electricity and then either stored in the Thermalito afterbay or passed through the Thermalito afterbay outlet to the high flow channel. Water stored in the Thermalito afterbay can also be temporarily stored and later pumped upstream during off-peak hours to the Thermalito forebay. Once back in the Thermalito forebay, water can be sent in either direction, provided the hydraulics would permit open channel flow²⁰ back to the Thermalito diversion pool.

2.1.3.2 Lake Oroville

Typically under normal and wetter conditions, Lake Oroville is filled to its normal maximum annual level of elevation 900 feet msl in June and then can be lowered as necessary to meet downstream requirements to its minimum level in December or January. During and following dry years, the reservoir may be drawn down more and may not fill to desired levels the following spring. During wetter hydrologic conditions, Lake Oroville is managed to control downstream flooding. The U.S. Army Corps of Engineers (Corps) requires Lake Oroville to be operated to maintain up to 750 thousand acre-feet of

²⁰ Open channel flow is characterized as having the top surface exposed to the atmosphere unlike closed conduit flow which operates under pressure. The elevation in the Thermalito afterbay must be higher than the elevation of the water in the Thermalito diversion pool in order for water to flow in that direction.

storage space to capture significant inflows for flood control. In general, operations usually result in the following: (1) lower reservoir levels in the late winter and early spring for flood control purposes, (2) higher levels in the late spring and early summer when higher flows may be captured without affecting flood protection, and (3) declining reservoir levels in the late summer and fall as the stored water is used. Lake Oroville daily water surface elevations for various hydrologic conditions are summarized on figure 4.

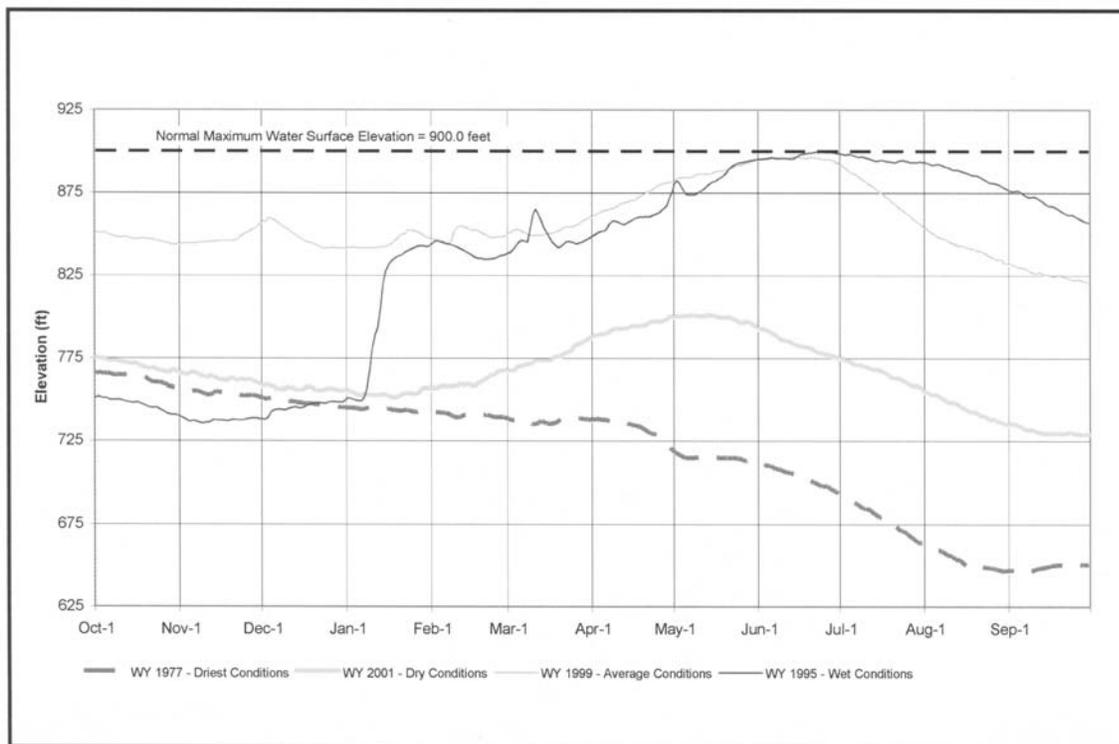


Figure 4. Lake Oroville daily elevations under various water conditions. (Source: DWR, 2005b)

The project is also designed to use water that is in excess of the downstream flow requirement for pumping water back into the Thermalito forebay and then into Lake Oroville during off-peak hours. This water is then released again during on-peak hours when power values increase. The project operates in a pump-back mode year-round, and this operation can cause Lake Oroville to fluctuate 1 to 2 feet on a daily basis. Weekly fluctuations range from 2 to 6 feet and may be as great as 9 to 11 feet over a several week period (DWR, 2005c).

Since storage at the project began in 1967, the minimum elevation of Lake Oroville occurred on September 7, 1977, when the reservoir was at 645.11 feet msl corresponding to a reservoir content of 882,395 acre-feet. The maximum reservoir elevation occurred on June 4, 1973, when the reservoir was at 899.88 feet msl corresponding to a reservoir content of 3,536,000 acre-feet. Start-of-month elevations for Lake Oroville are summarized in figure 5. Looking at start-of-month elevations since water year 1971, the October 1 (beginning of the water year) Lake Oroville levels ranged from elevation 648 feet msl to 850 feet msl and averaged 793 feet msl.

2.1.3.3 Thermalito Forebay, Diversion Pool, and Power Canal

Because the Thermalito forebay and diversion pool and the power canal are all designed to share the same operating water level and are essentially the same hydraulic system, the water levels in each of

these facilities rise and subside in unison. The system does not fluctuate much on a daily basis. During the summer, it is generally cycled down 2 to 4 feet during the middle of the week and then refilled by the weekend. During the winter, it may fluctuate more.

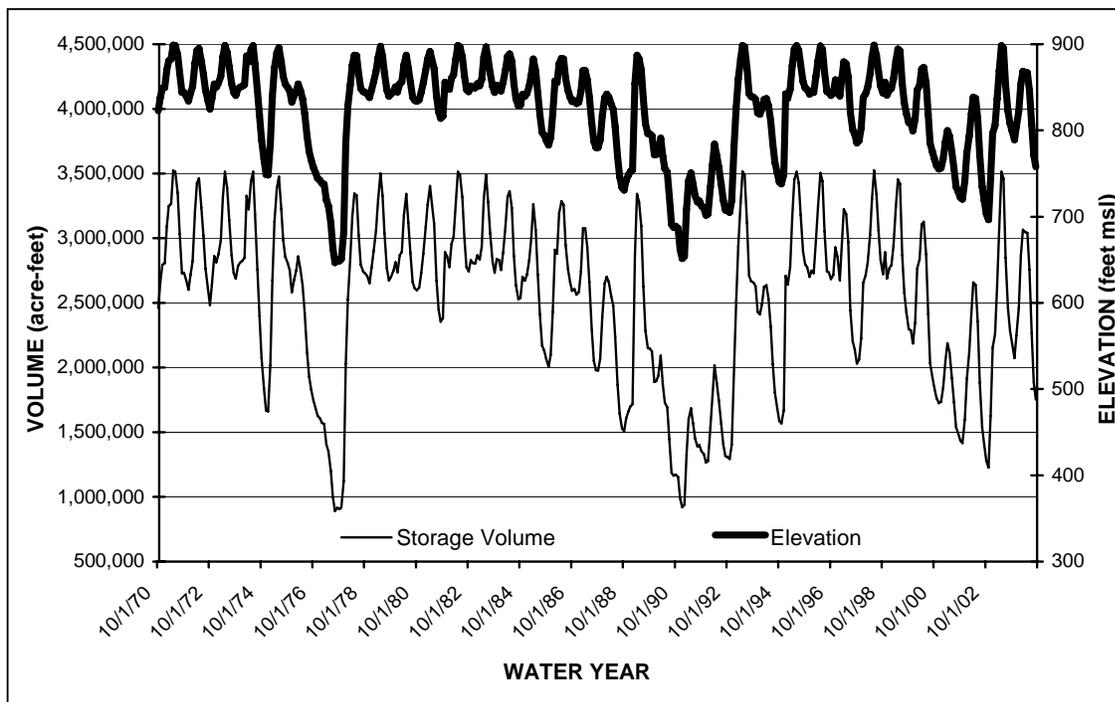


Figure 5. Lake Oroville historic storage volume and water surface elevations, water year 1971–2004. (Source: DWR, 2005d)

2.1.3.4 Thermalito Afterbay

Thermalito afterbay is operated to meet multiple requirements, including regulating inflow from the Thermalito pumping-generating plant, providing water for withdrawal during pump-back operation, and releasing water through the Thermalito afterbay outlet to the Feather River. Thermalito afterbay is also the location where diversions are made to meet the Feather River service area irrigation entitlements. To successfully meet each requirement, operational flexibility is required at Thermalito afterbay.

Natural hydrologic conditions do not affect the Thermalito afterbay operation; it is primarily affected by operational requirements. Generally, the Thermalito afterbay does not have seasonal differences in the operation, and the water surface elevation varies from about 124 to 136 feet msl throughout the year. DWR schedules hourly releases through the Edward Hyatt and Thermalito pumping generating plants to maximize the amount of energy produced when power values are highest. Because the downstream water supply is not dependent on hourly releases, and pumping of SWP water can occur at off-peak times; energy prices primarily dictate hourly operations for the power generation facilities. Storage in Thermalito forebay and afterbay helps to maximize the value of Project energy and maintain uniform flows in the Feather River downstream from the Oroville facilities. The Thermalito afterbay also provides storage for pump-back operations, which are designed to maximize profit from the power generation facilities. DWR releases water from Lake Oroville when power prices are high, then pumps water not needed to meet downstream requirements back into Lake Oroville from Thermalito forebay and afterbay when power prices are low. Because DWR operates the power plants to maximize weekday generation when power prices are highest, storage is usually higher in the afterbay at the end of each

week than at the beginning. Downstream releases during the weekend or pumpback to Lake Oroville (to prepare for the following week's operation) lower the water in the afterbay (DWR, 2003).

A common refill pattern is that Thermalito afterbay is at its low point on Monday and builds storage over the week to reach a maximum elevation on Saturday. After a maximum is reached on Saturday, Thermalito afterbay is often decreased through the first part of Monday and the cycle frequently starts over. The weekly fluctuations usually range from 2 to 6 feet, although there are times during the year when the elevation is allowed to be higher or lower as a response to systemwide operations or energy prices. Fluctuations of about 9 to 11 feet sometimes occur during a several week period and are most likely to occur in the winter. This type of operation is illustrated in figure 6. As can be seen from figure 6, pump-back operations occur on a year-round basis.

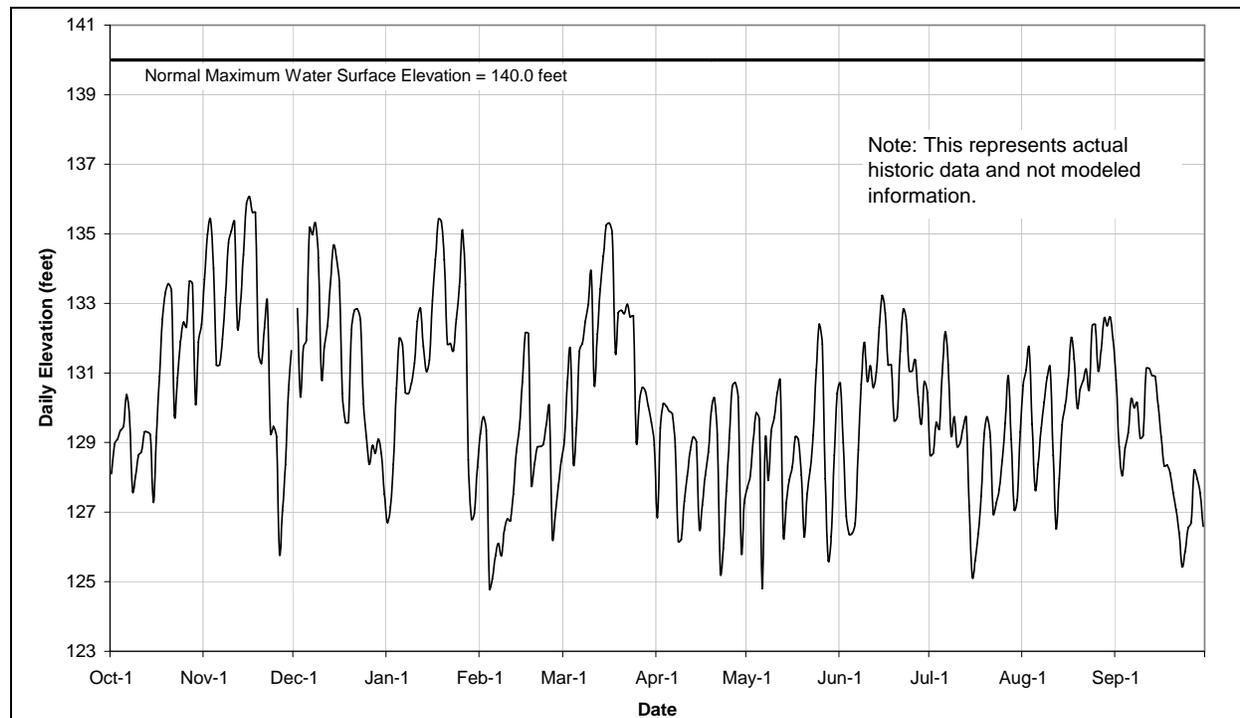


Figure 6. Thermalito afterbay historical water surface elevations, water year 2001. (Source: DWR, 2005e)

2.1.3.5 Minimum Instream Flows and Water Temperature

Minimum Instream Flows

Minimum flows in the Feather River originally were set by an agreement between DWR and the California Department of Fish and Game (DFG) (DWR, 1983). The agreement, titled *Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish and Wildlife*, established criteria for flow and water temperature in the low flow channel and the reach of the Feather River downstream of the Thermalito afterbay outlet to the confluence with the Sacramento River to preserve salmon spawning and rearing habitat. The agreement specifies a minimum release of 600 cfs into the Feather River from the Thermalito diversion dam for fisheries purposes when surface elevations of Lake Oroville are below 733 feet msl. (This is the total volume of flows from the diversion dam outlet, the diversion dam power plant, and the Feather River Fish Hatchery outlet.) For a Lake Oroville surface elevation greater than 733 feet, the minimum instream flow requirements on the Feather River

downstream of the Thermalito afterbay outlet are listed in table 2 (DWR, 1983). These flows are requirements in the existing project license.

Table 2. Minimum instream flow requirements on the Feather River at Lake Oroville surface elevation greater than 733 feet msl. (Source: DWR, 2005a)

Normal Runoff (%) ^a	October–February (cfs)	March (cfs)	April–September (cfs)
>55	1,700	1,700	1,000
<55	1,200	1,000	1,000

^a Normal runoff is defined as 1,942,000 acre-feet, which is the mean (1911 to 1960) April through July unimpaired runoff near Oroville. If the April 1, runoff forecast in a given water year indicates that, under normal operation of the project, Oroville reservoir will be drawn to elevation 733 feet (approximately 1,500,000 acre-feet), minimum flows in the high flow channel may be diminished on a monthly average basis, in the same proportion as the respective monthly deficiencies imposed upon deliveries for agricultural use from the project; however, in no case shall the minimum flow releases be reduced by more than 25 percent.

Under the agreement, if the hourly flow were to exceed 2,500 cfs anytime between October 15 and November 30, DWR must maintain a flow equal to that hourly flow amount less 500 cfs until the following March unless the high flow was a result of flood management operations or mechanical problems.²¹ This requirement ensures flow levels are high enough to keep the overbank areas submerged to protect any fish spawning that could occur. In practice, the flows are maintained below 2,500 cfs from October 15 to November 30 to prevent fish from spawning in the overbank areas.

Ramping Rates

The 2002 biological opinion (NMFS, 2002) specifies down-ramping rates for releases into the low flow channel (table 3). The ramping rates were slightly modified in 2004. Because instream flows and ramping rates primarily affect aquatic resources, these topics are further discussed in section 3.3.3, *Aquatic Resources*. These down-ramping rates are not required by the existing project license.

Table 3. National Marine Fisheries Service 2002 biological opinion required ramping rates. (Source: NMFS, 2004)

Feather River Low Flow Channel Releases (cfs)	Rate of Decrease (cfs)
5,000 to 3,501	1,000 per 24 hours
3,500 to 2,501	500 per 24 hours
2,500 to 600	200 per 24 hours ^a

^a DWR (2005a, appendix B1, table B1-1) indicates this value is 300 cfs per 24 hours. We assumed the biological opinion is correct.

Additionally, ramping criteria for changing the flows in the Feather River (table 4) have been established. These ramping criteria are flow rate dependent to protect the fishery habitat from rapid dewatering and to protect the river channel from erosion and scour resulting from high flow fluctuation. For increasing flow, the hourly limit is 5,000 cfs regardless of flow during the previous hour. This

²¹ For example, if the hourly flow reached 3,500 cfs on October 20, DWR would be obligated to maintain a minimum flow of 3,000 cfs until the following March.

ramping criterion for increasing flow is suspended when the storage of Lake Oroville is above 2,780,000 acre-feet (i.e., flooding conditions).²²

Table 4. Feather River ramping criteria for reducing flow. (Source: DWR, 2006)

Feather River Low Flow Channel Releases (cfs)	Rate of Decrease (cfs reduction per 24 hours)
Less than 2,500	200
2,500 to 3,500	500
3,500 to 6,500	1,000
Greater than 6,500	2,000

Temperature

The project is operated to meet water temperature objectives at the Feather River Fish Hatchery. The existing maximum temperature objectives are listed in table 5. These temperature objectives are not required by the existing project license.

Table 5. Existing temperature objectives at the Feather River Fish Hatchery.

Period	Temperature (+/- 4°F)	Period	Temperature (+/- 4°F)	Period	Temperature (+/- 4°F)
April 1–May 15	51°	June 16–August 15	60°	October 1–November 30	51°
May 16–May 31	55°	August 16–31	58°	December 1–March 31	No greater than 55°
June 1–June 15	56°	September 1–30	52°		

2.1.4 Existing Environmental Measures

Currently, DWR provides facilities and programs related to fisheries, wildlife, and recreation at the project. See sections 3.3.3.1, *Aquatic Resources*, 3.3.4.1, *Terrestrial Resources*, and 3.3.6.1, *Recreational Resources*, respectively, for discussion of these facilities and programs.

2.1.5 Project Safety

The project has been operating for more than 37 years under the existing license, and during this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. As part of the relicensing process, Commission staff would evaluate the continued adequacy of the proposed project facilities under a new license. Special articles would be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the new license term to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

²² Although the agreement that outlined this ramping criteria was superseded by the 1983 Agreement, and the 1983 Agreement only specifies criteria for low flow channel releases less than 2,500 cfs, DWR still maintains this criteria in its operations procedures.

2.2 DWR’S PROPOSAL (PROPOSED ACTION)

Under the Proposed Action, the project would continue to be operated for the purposes described in section 2.1. Measures included in the Settlement Agreement would modify flow releases and provide various other environmental protection, mitigation, and enhancement measures.

2.2.1 Proposed Project Facilities

DWR does not propose to construct any additional project facilities; however, under Proposed Article A108, *Flow/Temperature to Support Anadromous Fish*, DWR would conduct studies to investigate the potential for making facility modifications to improve temperature conditions for anadromous fish in the low flow and high flow channels. If implemented, modifications would be completed within 10 years of license issuance.

2.2.2 Proposed Project Operations

DWR proposes to operate the project similar to its current operation with the following changes (DWR, 2006a):

- **Low flow channel—instream flow:** The minimum instream flow requirement in the low flow channel would be 700 cfs except between September 9 and March 31 when it would be 800 cfs (Proposed Article A108, *Flow/temperature to Support Anadromous Fish*). Minimum instream flow requirements in the high flow channel would be the same as the existing minimum instream flow requirements (see section 2.1.2).
- **Fish hatchery—temperature:** Prior to implementing any facility modifications, DWR would attempt to meet the following temperature objectives at the Feather River Fish Hatchery by modifying at least 3 specific operations²³ listed in Proposed Article A107.2, *Feather River Fish Hatchery Improvement Program*.

Period	Minimum Temperature Requirement (°F)	Proposed Maximum Temperature Objective ^a (°F)	Not-to-Exceed Temperature (°F)
April 1–May 15	51	55	55
May 16–May 31	51	55	59
June 1–June 15	None	60	60
June 16–August 15	None	60	64
August 16–August 31	None	60	62
September 1–September 30	None	56	56
October 1–November 30	None	55	55
December 1–March 31	None	55	55

²³ The proposed article states, “The licensee shall seek to not exceed these maximum mean daily temperatures through operational changes including but not limited to: (1) curtailing pump-back operation; (2) removing shutters on Hyatt intake; and (3) after river valve refurbishment, DWR will consider the use of the river valve up to a maximum of 1,500 cfs; provided however these flows need not exceed the actual flows in the high flow channel, but in no event would the high flow channel flows be less than 2,500 cfs as specified in A108.2.”

^a The temperature objective would be a target between the time the license is issued and either facility modifications are completed or 10 years, whichever occurs first, after which meeting the objectives would be a license requirement. The temperature objectives also would be subject to conference year and uncontrollable forces provisions, as defined in Proposed Article 108.6 and 108.7. Under Proposed Article A107.2, *Feather River Fish Hatchery Improvement Program*, new temperature objectives at least as protective as the proposed objectives could be developed for Commission approval after facility modifications are completed.

- **Low flow and high flow channels—temperature:** Prior to implementing any facility modifications, DWR would attempt to meet the following temperatures in the low flow channel by modifying up to three specific operations listed in Proposed Article 108, *Flow/temperature to Support Anadromous Fish*. After implementing any facility modifications, the temperature objectives in the low flow channel would become requirements, and temperature objectives in the high flow channel would be evaluated and modified.

Maximum Temperature for the Low Flow Channel		Maximum Temperature for the High Flow Channel	
Period	Temperature (°F)	Period	Temperature (°F)
January–March	56	January–March	56
April	56	April	61
May 1–15	56–63 ^a	May 1–15	64
May 16–31	63	May 16–31	64
June–August	63	June–August	64
September 1–8	63–58 ^a	September 1–8	61
September 9–30	58	September 9–30	61
October	56	October	60
November–December	56	November–December	56

^a Indicates a period of transition from the first temperature to the second temperature.

2.2.3 Proposed Environmental Measures

Table 6 lists DWR’s proposed measures, which are included in appendix A of the Settlement Agreement, to protect and enhance environmental resources that may be affected by the project.²⁴ These measures are listed in table 6.

²⁴ The precise wording of this summarization of the Settlement Agreement measures may differ from the specific language of the Settlement Agreement. Individual articles include programmatic elements for scheduling and developing plans, monitoring, evaluation and reporting that are not listed in this table. Characterizations of these measures are primarily the result of our attempt to provide a concise summary of the measures for this draft EIS and are not intended to modify any of the terms of the Settlement Agreement.

Table 6. Proposed articles included in appendix A of the Settlement Agreement. (Source: DWR, 2006a, as modified by staff)

Article	Measure	Elements
Aquatic Resources		
A102	Gravel Supplementation and Improvement Program	Conduct physical assessment of spawning riffles between RM 54.2–67.2 and supplement spawning gravels in low flow channel or high flow channel.
A103	Channel Improvement Program	Implement and maintain modifications to Moe’s Ditch and Hatchery Ditch and five additional side channel improvements (totaling 2,460 feet) to support spawning and rearing.
A104	Structural Habitat Supplementation and Improvement Program Plan	Map existing and potential large woody debris (LWD) sources and riparian habitat between the fish barrier dam to the downstream limit of the project boundary in the Feather River. Plan, install, maintain and replace habitat structures using LWD and boulders in the Feather River
A105	Fish Weir Program	Develop Phase 1 Plan within 1 year to schedule, install, and operate a monitoring fish weir upstream of Thermalito afterbay for implementation within 3 years. Develop Phase 2 plan within 8 years to schedule, install, and operate a segregation fish weir upstream of Thermalito afterbay for implementation within 12 years. Evaluate and potentially install an egg-taking station for fall-run Chinook to transport to Feather River Fish Hatchery.
A107	Feather River Fish Hatchery Improvement Program	Operate Feather River Fish Hatchery in cooperation with DFG to produce salmonids. Operate to achieve temperature objectives for the intake with contingencies for modifying them upon completing facility modifications. Develop and file within 2 years a multi-faceted hatchery management plan that outlines hatchery practices that would respond to changing conditions. In addition to facility management, the plan would also address genetics, operational protocols, tagging, and disease management. Install water disinfection system for Feather River Fish Hatchery, if fish are passed upstream of hatchery. Conduct facility assessment of the Feather River Fish Hatchery with DFG and report findings within 2 years. Conduct assessment and report again every 5 years for term of license.
A108	Flow/Temperature to Support Anadromous Fish	Minimum flows in low flow channel: <ul style="list-style-type: none"> • April 1 to September 8—700 cfs • September 9 to March 31—800 cfs unless otherwise notified by NMFS, FWS, and DFG that lower flows substantially meet needs of anadromous fish. Operate to achieve temperature objectives for the low flow channel (Robinson Riffle) with contingencies for modifying them upon completing facility modifications.

Article	Measure	Elements
		<p>Minimum flows in high flow channel: Provide minimum instream flows in the high flow channel, based on preceding April to July unimpaired runoff > or = 55%:</p> <ul style="list-style-type: none"> • October 1 to March 31—1,700 cfs • April 1 to September 30—1,000 cfs <p>preceding April to July unimpaired runoff < 55%:</p> <ul style="list-style-type: none"> • October 1 to February 28/29—1,200 cfs • March 1 to September 30—1,000 cfs <p>Reduce monthly average minimum instream flows in the high flow channel by not more than 25% if forecast indicates that Lake Oroville will be drawn down to 733 feet.</p> <p>Operate to maintain minimum instream flows within 500 cfs of inflows exceeding 2,500 cfs between October 15 and November 30 unless flows result from flood flows, inadvertent equipment failure or malfunction.</p> <p>Facility Modifications: Study and possibly implement options for facility modifications to improve temperature conditions for anadromous fish in the high and low flow channels and the Feather River Fish Hatchery.</p> <p>Implement approved facility modification(s) and test for 5 years.</p>
A109	Reservation of Section 18 Authority	NMFS and Interior reserve authority to prescribe fish passage at Lake Oroville as provided in draft Habitat Expansion Agreement
A110	Lake Oroville Warm Water Fishery Habitat Improvement Program	<p>Plan and implement projects to benefit warmwater fishery spawning and rearing habitat in 7-year cycles.</p> <p>Provide \$40,000 per year for constructing 15 habitat units (i.e., a habitat unit is defined in the settlement agreement as a project constructed with \$2,000 of labor and materials).</p>
A111	Lake Oroville Cold Water Fishery Habitat Improvement Program	Develop and implement a coldwater fishery habitat improvement plan to stock 170,000 yearling salmon or equivalents per year (+/- 10%) in Lake Oroville and provide funding for stocking not to exceed \$75,000 per year.
Geology and Soil Resources		
A106	Riparian and Floodplain Improvement Program	<p>Identify and implement riparian/floodplain improvement projects and identify areas where gravel extraction may take place in anticipation of improving terrestrial and aquatic habitat.</p> <p>Analyze and select recommended alternatives for riparian/floodplain improvement in two phases. Implement Phase 1 within 15 years and implement Phase 3 improvements within 25 years.</p> <p>Provide funding not to exceed \$5 million (excluding profits from gravel sales) for this program.</p>

Article	Measure	Elements
Water Quality		
A112	Comprehensive Water Quality Monitoring Program	Develop and implement a comprehensive water quality monitoring program that includes sampling of and reporting on water chemistry; fish tissue bioaccumulation; pathogens, petroleum product concentrations, and erosion at recreation sites; water temperature; bioassays; and aquatic macro invertebrates.
A113	Monitor Bacteria Levels and Provide Public Education and Notification	<p>Monitor bacterial levels from June 1 to September 30 at eight swim areas.</p> <p>Provide public information about potential sources of bacteria in the water.</p> <p>Provide funding for monitoring not to exceed \$124,000 in first 5 years and \$23,500 annually, thereafter.</p>
A114	Public Education Regarding Risks of Fish Consumption	<p>Provide public information about potential health issues related to contaminated fish consumption.</p> <p>Provide funding to Office of Environmental Health Hazard Assessment to publish public information.</p> <p>Provide funding for this program not to exceed \$20,800 in first 5 years and \$1,800 annually, thereafter.</p>
Terrestrial Resources		
A115	OWA Management Plan	<p>Develop and file plan within 2 years that includes wildlife, recreation, and fuel management; implementation schedule; agency management funding; monitoring and reporting requirements.</p> <p>Provide funding not to exceed \$200,000 to develop the initial plan.</p>
A116		Provide reasonable public access to OWA for hunting and fishing.
A117	Protection of Vernal Pools	<p>Implement and, if necessary, modify conservation measures in FWS biological opinion to protect vernal pool invertebrate habitat.</p> <p>Maintain the same amount and quality, including hydrologic connectivity, of existing vernal pool habitat as established in DWR's 2004 baseline habitat maps (253 individual vernal pools or swales totaling about 18.3 acres).</p> <p>Conduct earth-moving activities so as not to alter the hydrology related to the 253 vernal pools and swales.</p> <p>Inspect fences around/at vernal pools at least monthly to ensure fences are intact and monitor for adverse uses. Make any necessary repairs or replacements within 30 days.</p> <p>Encourage California Department of Parks and Recreation (DPR) and DFG patrols and enforcement of restrictions at vernal pools.</p> <p>Apply gravel coverings to all seepage-pump access roads located along the south and west edges of the Thermalito afterbay by 2008.</p> <p>Prohibit disking within 100 feet of vernal pool edges.</p>

Article	Measure	Elements
A118	Minimization of Disturbances to Nesting Bald Eagles	<p data-bbox="643 247 1419 331">Avoid, to the extent possible, herbicide use within 200 feet of vernal pools. If needed, use glyphosate-based rather than acetolactate synthase-inhibiting herbicides; limit use of surfactants.</p> <p data-bbox="643 352 1419 415">Evaluate and report on effectiveness of measures annually through 2010 and every other year after 2010.</p> <p data-bbox="643 436 1419 611">Implement and, if necessary, modify bald eagle nesting territory management plans for existing nesting territories, conduct mid-winter bald eagle counts at least every 2 years, report and develop draft site-specific management plans for new territories in consultation with DFG and FWS, and install at least one fishery structure/cover element annually in Lake Oroville near foraging areas.</p> <p data-bbox="643 632 1419 684">Develop additional management plans or amend current plans if new nest territories are identified.</p>
A119	Protection of Giant Garter Snake	<p data-bbox="643 709 1419 741">Evaluate and report on effectiveness of measures annually.</p> <p data-bbox="643 762 1419 873">Implement and, if necessary, modify conservation measures in FWS biological opinion to maintain the same amount and quality, including connectivity, of existing giant garter snake wetlands habitat as established in DWR's 2004 baseline habitat maps.</p> <p data-bbox="643 894 1419 947">Consult with FWS prior to initiating any activities in area D of the OWA.</p> <p data-bbox="643 968 1419 1052">Minimize activities (e.g., construction or maintenance of trails, roads, or other permanent recreational features) in upland habitat within 200 feet of giant garter snake wetland habitat.</p> <p data-bbox="643 1073 1419 1157">Prohibit rodent control activities in designated giant garter snake wetlands habitat or within 200 feet of the habitat, except as necessary for maintaining structural integrity of project features.</p> <p data-bbox="643 1178 1419 1262">Remove non-native vegetation or noxious weeds at Thermalito forebay and afterbay and the OWA only by hand, using hand tools or through individual plant treatment with appropriate herbicides.</p> <p data-bbox="643 1283 1419 1409">Provide that the structural components of giant garter snake habitat (e.g., LWD) that accrue or move through natural processes would not be removed or otherwise altered, unless necessary for project operations or public safety.</p> <p data-bbox="643 1430 1419 1482">Develop and implement a public education program to prevent giant garter snakes from being intentionally harmed or killed.</p> <p data-bbox="643 1503 1419 1535">Restrict dog-training field exercises in the Thermalito afterbay areas.</p> <p data-bbox="643 1556 1419 1608">Maintain and manage giant garter snake habitat around the Thermalito afterbay margins occurring in the waterfowl brood ponds.</p> <p data-bbox="643 1629 1419 1713">Restrict burning and disking wetland margins of the Thermalito afterbay drawdown zone to the inactive period of the year, November through March.</p> <p data-bbox="643 1734 1419 1793">Encourage gravel-mining lessees operating within the project boundary to implement habitat improvements.</p>

Article	Measure	Elements
		Encourage agencies that maintain roads and structures along and under Highway 99 to avoid altering or degrading these structures. Promote improving, if possible, these structures to improve connectivity of giant garter snake habitat.
A120	Protection of Valley Elderberry Beetle	<p>Implement and, if necessary, modify conservation measures in the FWS biological opinion to maintain the same amount and quality, including connectivity, of existing valley elderberry longhorn beetle habitat as established in DWR's 2004 baseline habitat maps.</p> <p>Avoid, to the extent possible, direct and indirect effects on existing elderberry shrubs.</p> <p>Meet compensation requirements for valley elderberry longhorn beetle, if necessary, using a conservation banking process.</p> <p>Implement best management practices and other measures as necessary to ensure elderberry plants are not inadvertently harmed.</p>
A121	Protection of Red-Legged Frogs	<p>Implement and, if necessary, modify conservation measures in the FWS biological opinion to protect red-legged frog habitat. The measures for red-legged frogs are the same as described for the giant garter snake in Proposed Article A119, <i>Protection of Giant Garter Snake</i>.</p> <p>Conduct protocol level surveys for the California red-legged frog and, if necessary, consult with the FWS before initiating any formal planning of actions within the project boundary.</p>
A122	Construction and Recharge of Brood Ponds	<p>Construct 4 ponds within 20 years with a specified schedule for maintaining their water surface elevation and monitoring.</p> <p>Provide funding not to exceed \$920,000 to construct 4 brood ponds.</p>
A123	Provision of Upland Food for Nesting Waterfowl	<p>Prepare and plant 60–70 acres of upland cover/forage crops annually.</p> <p>Provide funding not to exceed \$9,000 annually to implement.</p>
A124	Provision of Nest Cover for Upland Waterfowl	<p>Manage 240 acres to provide nest cover for upland waterfowl.</p> <p>Provide funding not to exceed \$15,000 annually to implement.</p>
A125	Installation of Wildlife Nesting Boxes	Install and maintain 100 nesting boxes in the OWA.
A126	Invasive Plant Management	<p>Specify treatment areas and methods, best management practices, and monitoring, and address purple loosestrife, giant reed, tree of heaven, scarlet wisteria, parrot feather, Himalayan blackberry, aquatic primrose, yellow star thistle, Spanish broom, French broom, scotch broom, and skeleton weed specific species.</p> <p>Coordinate plan and ongoing actions with applicable agency.</p> <p>Provide funding not to exceed \$450,000 to develop and implement plan in the first 5 years and \$35,000 annually thereafter.</p>

Article	Measure	Elements
Recreational and Aesthetic Resources		
A127	Recreation Management Plan	<p>Implement the Recreation Management Plan filed with the Settlement Agreement which consists of 6 programs which provide: new and upgraded recreation facilities; operation and maintenance for project recreation facilities; monitoring recreation use at the project; interpretation and education program and; an administrative framework.</p> <p>Nelson Bar Boat Launch: Install a sign, barrier and/or gate at terminus of the boat launch for public safety during lowered reservoir elevations.</p> <p>Lime Saddle: Provide 10 additional recreational vehicle (RV) campsites at the Lime Saddle campground and a new RV group site (50 people at one time) at the Lime Saddle group campground. At the Lime Saddle day-use area, replace 13 tables and 7 shade structures and install pole stoves. Construct 60-space parking area adjacent to existing parking area. Provide Americans with Disabilities Act (ADA) accessibility at marina, boat ramp, and day-use picnic sites. Add an additional boarding dock to improve launching capacity. Conduct a feasibility study to determine if improved swimming opportunities can be provided at either Loafer Creek or Lime Saddle during the recreation season.</p> <p>Dark Canyon Boat Launch: Install a vault restroom and provide directional signs along the roadside to the site.</p> <p>Foreman Creek Boat Launch: Redirect recreational use to avoid effects on historic properties and culturally sensitive areas. Install vault restroom, trash receptacle, and 5 to 10 picnic tables with shade ramadas.</p> <p>Enterprise Boat Launch and Day-Use Area: Construct 10 day-use sites and extend the existing boat ramp to about 750 feet msl to provide boating access at low water elevations. Construct a gravel parking area near the end of the ramp if topography permits. Provide 1 new boarding dock.</p> <p>Stringtown Boat Launch: Maintain the ramp surface above 866 feet msl and install a sign, barrier, or gate for safety purposes at the unmaintained road in the inundation zone. Provide directional signs along the roadside to the site.</p> <p>Lake Oroville Scenic Overlook: Provide trash receptacles and minor trail enhancements at the overlook along State Route 162.</p> <p>Saddle Dam Trailhead: Provide 10 picnic tables, a stock watering trough, and sink. Construct a short, non-motorized trail to provide shoreline access.</p> <p>Loafer Creek: Construct two new group campsites with RV hook-ups and an associated shower building at the Loafer Creek group campground. Provide ADA accessibility at the Loafer Creek group and equestrian campgrounds. Provide a fish cleaning station near the boat ramp and install a vault restroom at Brooks Orchard. Improve an existing service road in the day-use area to provide an alternative launch when the Loafer Creek ramp is dewatered. Provide one additional or enlarge the existing boarding dock to improve launching capacity. Improve shoreline access and ADA accessibility to the day-use area, swimming beach, and cove. Conduct a feasibility study to determine if improved swimming opportunities can be provided at either Loafer Creek or Lime Saddle during the recreation season.</p>

Article	Measure	Elements
		<p>Bidwell Canyon: Construct a new campground loop with 30 to 38 campsites adjacent to the remaining loop at the Bidwell Canyon campground. At the Bidwell Canyon day-use area, create 215 additional parking spaces: 90 at Bidwell Marina (using a current campground loop), 80 at Bidwell boat ramp 2, and 45 at new Bidwell boat ramp 3. Extend three launch lanes from about 750 to 640 feet msl to provide boating access at low water elevations. Provide 1 or 2 floating docks. Implement ADA upgrades to improve accessibility within the complex.</p> <p>Lake Oroville Visitor Center: Provide a visitor information and education program and enhance the existing facilities.</p> <p>Lake Oroville Spillway: Determine the optimum boarding dock system configuration at the Spillway day-use area boat launch and provide an additional boarding dock, if feasible, to improve launching capacity.</p> <p>Oroville Dam Overlook Day-Use Area: Provide additional 100-space parking area, additional 4 to 5 tables with shade ramadas, and interpretive panels, modify existing parking spaces and restroom to make ADA accessible, and improve the surface of the walkway from the parking lot to the crest of the dam at the Oroville dam overlook day-use area.</p> <p>Lake Oroville: Install 3 additional floating campsites.</p> <p>Lake Oroville Area: Modify or construct seven trails in this area, including extending the Potter’s Ravine North Fork Shoreline Trail, opening an access road near the Loafer Creek equestrian campground to bicycles, providing one or two short access trails at the Saddle Dam Trailhead access, relocating a segment of the Bidwell Canyon Trail, rerouting a segment of the Brad B. Freeman Trail near the Hyatt power plant switchyard for security purposes, and opening most of the Dan Beebe Trail to bicycles.</p> <p>Thermalito Diversion Pool: On the northwest shoreline of the Thermalito diversion pool (Burma Road), construct 10 concrete picnic tables with pole grills, improve existing graveled area used for launching, and possibly provide an ADA accessible fishing pier at the Diversion Pool day-use area.</p> <p>Thermalito Diversion Pool: On the southeast shoreline of the Thermalito diversion pool (Lakeland Boulevard), construct access road to railroad bridge crossing at the Thermalito diversion pool. Construct a new day-use area including a car-top boat launch, graveled parking area, vault restroom, picnic tables, pole grills, and foot trail access to the shoreline; install fencing to separate facilities from the railroad tracks. Install non-potable water trough.</p> <p>Thermalito Diversion Pool: Modify or construct four trails along the Thermalito diversion pool, including opening the Burma Road and adjacent portions of the Brad B. Freeman Trail to equestrian use, opening most of the Dan Beebe Trail to bicycle use, constructing a paved trail from the Feather River Fish Hatchery downstream to the project boundary, and evaluating the feasibility of both providing a trail crossing the diversion pool and a demonstration mountain bicycle trail originating from the Lakeland Boulevard Trailhead access.</p>

Article	Measure	Elements
		<p>Feather River Fish Hatchery: Improve a launch site for non-motorized boats and provide additional interpretive displays and paths.</p> <p>North Thermalito Forebay Day-Use Area: Provide a fish cleaning station and evaluate warmer water swimming options.</p> <p>South Thermalito Forebay: Install ADA-accessible fishing pier, 5 to 10 day-use sites, and paved parking areas. Provide sandy swimming beach with safety buoys, landscaping, and shade trees.</p> <p>Thermalito Forebay: Provide new non-motorized trails including short shoreline access trails and forebay area loop trails consistent with protecting federal and state endangered species.</p> <p>Wilbur Road Boat Launch: Provide directional signs along the roadside to the Wilbur Road boat launch.</p> <p>Larkin Road Boat Launch: Provide 5 to 10 family picnic tables with pole stoves and shade structures, a sandy swimming beach with safety buoys and directional signs along the roadside to the Larkin Road boat launch.</p> <p>Thermalito Afterbay Outlet: Construct 20 campsites at the 40-acre parcel area north of the Thermalito afterbay outlet and designate 5 to 10 day-use sites with picnic tables south of the Thermalito afterbay outlet. Regravel existing access roads, revegetate disturbed areas, and provide one to two additional vault restrooms, if needed. Upgrade the boat ramp surfacing with concrete and pave the associated parking area and access road.</p> <p>Oroville Wildlife Area: Provide two ADA-accessible watchable wildlife sites, with additional trash receptacles and vehicle barriers, and implement site hardening and closure measures. Enhance 2 non-motorized boat launch sites/take-outs at the OWA and designate as access sites for the proposed River trail.</p> <p>Oroville Wildlife Area: Maintain and enhance public access for hunting and fishing.</p> <p>Programmatic: Provide for O&M at new and existing project recreation facilities.</p> <p>Programmatic: Establish a License Coordination Unit of appropriate DWR staff in Oroville to manage the terms and conditions of the new license.</p> <p>Programmatic: Establish Recreation Advisory Committee with specified membership criteria to advise on plan implementation, review monitoring data, and recommend modifications to the plan.</p> <p>Oroville Wildlife Area: Implement measures to resolve conflicts between wildlife management objectives and recreational use, including reducing boating speeds on Thermalito afterbay north of State Route 162.</p> <p>Lake Oroville: Provide annual funding for planning July 4th fireworks display.</p>

Article	Measure	Elements
A132	Screening of Material Storage Area	<p>Programmatic: Coordinate with Pacific Gas and Electric Company to provide daily flow release information from the upstream Poe Project via a web link and/or flow phone link.</p> <p>Programmatic: Prepare a Recreation Implementation Plan, in consultation with Recreation Advisory Committee, for first 12 years for FERC approval.</p> <p>Plant vegetation to screen material storage area within 1 year.</p>
Cultural Resources		
A128	Historic Properties Management Plan	<p>Implement the Historic Properties Management Plan (HPMP) that includes the following elements:</p> <ul style="list-style-type: none"> • Data recovery and stabilization of historic properties subject to imminent loss. • Restricted public access at Goat Ranch and Bloomer boat-in campgrounds. • Eliminate motorized wheeled vehicles use in the Lake Oroville fluctuation zone. • Expand the existing Site Stewardship Program. • Identify and set aside areas for planting and harvesting traditionally used plants. • Develop and implement an interpretive and educational signage program. • Establish a curation facility for housing archaeological collections associated with the Oroville Facilities. • Develop and implement a plan to protect cultural resources at Foreman Creek through recreation management actions.
A129	Improve and Redirect Recreation Usage to Specific Areas at Foreman Creek	<p>Develop plan to protect cultural resources at Foreman Creek while continuing to provide for recreation activity.</p> <p>Develop plan in consultation with four federally recognized Native American Tribes located in Butte County and Recreation Advisory Committee.</p> <p>Restrict existing car-top boat ramp use and develop facilities to encourage recreational use in designated areas.</p> <p>Review plan annually with tribes and Recreation Advisory Committee over first 5 years and as necessary thereafter to ensure plan is achieving stated goals.</p>
General		
A100	Ecological Committee	<p>Establish and convene an Ecological Committee to provide consultation and advice to DWR relative to the various resource management license articles.</p> <p>Include specific membership criteria.</p>

Article	Measure	Elements
A101	Lower Feather River Habitat Improvement Plan	Develop comprehensive implementation and monitoring program and adaptive management summary report as required by other articles.
A130	Flood Control	Operate project as prescribed by Secretary of Army.
A131	Early Warning System	Develop an Early Warning Plan that outlines communication protocols emergency procedures to be implemented when there are greater than normal releases from Lake Oroville and during flood emergency events.
A133	Project Boundary Modifications	Revise exhibit G within 2 years to include all project features, recreational and environmental measures, access roads, transmission lines, and other necessary lands.
A134	Expenditures	Acknowledge that FERC reserves right to require measures regardless of expenditure limitations outlined in license articles.
A135	Procedural Requirements	Comply with procedural requirements provided in the Settlement Agreement (dispute resolution, reopener, license amendment). Direct that FERC not consider motions to reopen/amend the license by those who have not signed the Settlement Agreement or complied with procedural requirements specified in the Settlement Agreement for Dispute Resolution, Reopener and Amendment of New Project License.

2.3 MODIFICATIONS TO DWR'S PROPOSAL

2.3.1 Water Quality Certification

Section 401 of the Clean Water Act (33 U.S.C. §1341) requires that a license applicant obtain from the state a certification that project discharges will comply with applicable effluent limitations, or waiver of certification. Without a 401 certificate, the project cannot be licensed. On October 26, 2005, DWR applied to the State Water Resources Control Board (Water Board) for water quality certification for the Oroville Facilities as required by Section 401 of the Clean Water Act.²⁵ On October 16, 2006, DWR withdrew and re-applied for Water Quality Certification. The Water Board is required to take action within 1 year of the application filing date, which would be October 16, 2007.

2.3.2 Section 18 Fishway Prescriptions

Section 18 of the Federal Power Act (FPA) states that the Commission shall require the construction, maintenance, and operation by a licensee of such fishways as the Secretaries of the U.S. Departments of Commerce (through the National Marine Fisheries Service [NMFS]) and Interior (through FWS) may prescribe. NMFS, by letter dated March 28, 2006, and Interior, by letter dated March 29, 2006, reserved this authority, and they state that their preliminary terms and conditions under section 18 of the FPA are consistent with the relevant provisions of the Settlement Agreement. NMFS filed modified fishway prescriptions on February 17, 2007, that are also consistent with the Settlement Agreement. NMFS considers that the Settlement Agreement, including an agreement-in-principle on a Habitat Expansion Agreement, would provide better protection for fish resources than a prescription of fish passage at this time. However, if the Habitat Expansion Agreement is not completed or implemented as anticipated through the Settlement Agreement, NMFS continues to reserve its fishway prescription authority under section 18 to implement fish passage.

²⁵ For more information, refer to eLibrary filing titled *Filing of Application for Water Quality Certification of California Department of Water Resources for P-2100*, dated November 3, 2005, accession no. 20051103-5076.

2.3.3 Section 4(e) Federal Land Management Conditions

Section 4(e) of the FPA states that the Commission may issue a license for a project on a federal reservation only if it finds that the project license will not interfere or be inconsistent with the purpose for which the reservation was created or acquired. Section 4(e) of the FPA requires that a Commission license for a project located on a reservation include the conditions that the Secretary of the department under whose supervision the reservation falls deems necessary for the adequate protection and use of such reservation.

By letter dated March 29, 2006, the Forest Service filed, under section 4(e) of the FPA, preliminary terms and conditions that are consistent with the relevant provisions of the Settlement Agreement.²⁶ The Forest Service filed 19 preliminary conditions for the project. Conditions numbered 1 through 15 are standardized conditions included by the agency to meet applicable laws and regulations germane to the project. Because these conditions are administrative in nature, they are not discussed further in the EIS. The remaining conditions numbered 16 through 19 include:

- Condition no. 16, *Heritage Resources*—Prepare and file a Historic Properties Management Plan (HPMP) for protecting and interpreting heritage resources located on National Forest System lands. This preliminary 4(e) condition is identical to Proposed Article A128, *Historic Properties Management Plan*.
- Condition no. 17, *Protection of Forest Service Special Status Species*—Prepare a biological evaluation before taking actions to construct new project features on National Forest System lands;
- Condition no. 18, *Invasive Weed Management*—Prepare a plan to reduce invasive plant species on or affecting National Forest System lands. This preliminary 4(e) condition is identical to Proposed Article A126, *Invasive Plant Management*.
- Condition no. 19, *Development of a Fuel Management Plan*—Prepare a plan to identify and prioritize fuel management issues and recommend actions to address these issues on National Forest System lands.

In its transmittal letter, the Forest Service stated that it will issue final terms and conditions and supporting information within 60 days of the end of the comment period for the draft EIS, if the Forest Service determines that the draft EIS provides an adequate record to support the section 4(e) conditions. If the Forest Service determines that the record is incomplete at the draft EIS stage, the Forest Service will file final section 4(e) conditions within 60 days of publication of the final EIS.

2.3.4 Section 10(j) Recommendations

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project.

Section 10(j) also states that, whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purpose and the requirements of the FPA or other applicable laws, the Commission and agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibility of the agency. We do not recommend the DFG 10(j) recommendation that corresponds to Proposed Article A116, because this

²⁶ The filing identified portions of the Settlement Agreement measures as section 10(a) recommendations where the text is not directly applicable to or affecting National Forest System lands.

recommendation is not a specific measure to protect fish and wildlife resources and therefore is not within the scope of section 10(j).

In response to the Commission's Ready for Environmental Analysis (REA) notice dated September 12, 2005, NMFS, Interior (on behalf of FWS), and DFG filed letters of comment that included section 10(j) recommendations that are consistent with the Settlement Agreement.²⁷ These agencies are also parties to the Settlement Agreement. In their letters, the agencies recommend adoption of the provisions of the Settlement Agreement and all the provisions thereof.

2.3.5 Staff Alternative

After evaluating the Proposed Action, including mandatory conditions filed pursuant to section 4(e) and 18 of the FPA, and other recommendations from resource agencies and interested entities under sections 10(a) and 10(j) of the FPA, we considered what, if any, additional measures would be necessary or appropriate for continued operation of the project. The measures under the Proposed Action are described in section 2.2, *DWR's Proposal (Proposed Action)*.

In addition to the measures under the Proposed Action, the Staff Alternative includes the following measures:

- Supplement gravel in the Feather River to increase suitable spawning habitat for Chinook salmon and steelhead. Monitor at least 10 of the 15 riffles every 5 years on a rotating basis or after a high flow event. Develop a common definition of median size ranges of gravels to benefit Chinook salmon and steelhead (revision to Proposed Article A102).
- Identify potential actions and implement a phased program to enhance the riparian corridor and connect the Feather River to its floodplain, including how flood/pulse flows may contribute to floodplain values and benefit fish and wildlife species. DWR's evaluation of potential actions should include the potential for flood/pulse flows to increase risk of Infectious Hematopoietic Necrosis (IHN) transmission. Delineate specific on-the-ground actions, or provide a quantified benchmark by which success and compliance of measures can be assessed (revision to Proposed Article A106).
- Obtain Commission approval prior to implementing any modification to the minimum instream flow regime or water temperature objectives (revision to Proposed Article A108, *Flow/Temperature to Support Anadromous Fish*).
- Develop a plan to install the proposed vault restroom, 5 to 10 picnic tables with shade armadas, and interpretive signs, and possibly install pole stoves at the Foreman Creek boat launch (revision to Proposed Action 127, *Recreation Management Plan*).
- Include in the Recreation Management Plan a provision to develop site plans and reconstruct the boat-in campgrounds at Bloomer, Goat Ranch, and Craig Saddle within the first 10 years after license issuance (revision to Proposed Action 127, *Recreation Management Plan*).
- Establish standards for maintaining developed recreation facilities, including trails, and incorporate these into the Recreation Management Plan (revision to Proposed Article 127, *Recreation Management Plan*).
- Include in the Recreation Management Plan a provision to conduct baseline inventory of trail conditions using established standards (see previous bullet) developed for project trails prior to proposing any changes to trail use designation (revision to Proposed Article 127, *Recreation Management Plan*).

²⁷ Interior letter dated March 28, 2006, and NMFS and DFG letters dated March 29, 2006.

- Include in the Recreation Management Plan a provision to monitor and report on trail conditions throughout the term of any license issued (revision to Proposed Article 127, *Recreation Management Plan*).
- Include in the Recreation Management Plan a provision to expand the recreation monitoring program to include non-trail users to detect latent demand and unmet user needs related to trails (revision to Proposed Article 127, *Recreation Management Plan*).
- Revise the non-motorized trail program of the Recreation Management Plan based on the trail condition inventory, analysis of the survey and trail use data, and results of the feasibility studies for new trails. Include recommendations, if appropriate, for changing trail use designations and a proposed implementation schedule.
- Revise and resubmit the HPMP for Commission approval.
- Close the Foreman Creek boat launch to recreational use and develop a plan for protecting cultural resources that considers a spectrum of possible actions including installing recreational facilities to redirect recreational use away from cultural resources and discontinuing recreational use at the site. Prepare the plan within 6 months of license issuance in consultation with local Native American Tribes (revision to Proposed Article 129, *Improve and Redirect Recreation Usage to Specific Areas at Foreman Creek*).
- Prepare a fuel management plan for National Forest System lands within the project boundary.
- Develop a plan to continue reseeded, as necessary, the downstream face of Oroville dam.
- Prepare a biological evaluation of the effects of any proposed project construction activities on Forest Service special status species or their habitat.
- Develop a threatened and endangered species implementation plan that would describe how DWR would comply with its proposed conservation measures and the terms and conditions contained in the FWS's biological opinion.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.4.1 Federal Government Takeover of the Project

We do not consider federal takeover to be a reasonable alternative. Federal takeover and operation of the project would require Congressional approval. Although that fact alone would not preclude further consideration of this alternative, there is no evidence to indicate that federal takeover should be recommended to Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

2.4.2 Issuing a Non-power License

A non-power license is a temporary license that the Commission terminates when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a non-power license, and we have no basis for concluding that the project should no longer be used to produce power. Thus, we do not consider a non-power license a realistic alternative to relicensing in this circumstance.

2.4.3 Retiring the Project

Project retirement could be accomplished with or without dam removal. Either alternative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions and cessation of power generation at the project, resulting in the following effects:

- Energy currently generated by the project would be lost. The project is estimated to produce an annual average of 2.4 million MWh of electrical power, providing about one-third of the electricity needed each year to operate the pumps that move water through the State Water Project.
- There would be significant costs involved in retiring the powerhouse and appurtenant facilities.
- The environmental enhancements currently proposed by DWR would be foregone.
- If the dam and control structures were removed and the original riverine shoreline re-established, existing recreational, residential, and commercial facilities operated by DWR, the California Department of Parks and Recreation (DPR), and commercial interests would be compromised.
- The potential for environmental effects such as release of sediments accumulated behind the dam to the river downstream and loss of lacustrine habitats and wetlands could occur.

However, removal of the dam and control structures would restore a free-flowing river and riverine habitat, eliminate any fish entrainment mortality that may be occurring, provide unobstructed fish passage past the site, provide unobstructed recreational riverine boating, and provide the potential for the Tribe to re-establish some of its traditional uses of the river prior to impoundment.

Despite these potential benefits, we do not regard this alternative as reasonable in view of the many more potential losses.

The second project retirement alternative would involve retaining the dam and control structures and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated this alternative. We have no basis for recommending this action. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we do not consider removal of the electric generating equipment to be a reasonable alternative.

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