

3.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the No-Action Alternative and two other alternatives analyzed in this PDEA. DWR participated with stakeholders in an open collaborative process allowed by FERC's Alternative Licensing Procedures (ALP) to identify interests, potential issues, and goals related to relicensing of the Oroville Facilities. Details on the collaborative process and stakeholders involved in the process are provided in Chapter 4.0. A brief description of the collaborative activities undertaken to assist in the development of the alternatives is provided below, followed by a description of the alternatives analyzed and those eliminated from further consideration.

3.0.1 Development and Completion of Technical Studies

The ALP collaborative Work Groups and Task Forces included representatives from federal, State, and local governments; resource agencies; federally and non-federally recognized Indian tribes; nongovernmental organizations; local special-interest groups; and local residents. These five Collaborative Work Groups (Cultural; Environmental; Recreation and Socioeconomics; Engineering and Operations; and Land Use, Land Management, and Aesthetics) used the resource issues, concerns, and comments gathered during the scoping process and issue statements they developed to cooperatively develop 71 Study Plans to provide supporting data and analysis for the PDEA. The results of these studies address issues identified during the formal scoping process and public meetings, and fulfill regulatory requirements associated with relicensing. In some cases, the Study Plans were designed to also address issues outside FERC's authority that may be included in a settlement agreement. The studies address issues related to five broad resource areas:

- Environmental (i.e., water quality, fisheries, terrestrial, geomorphology);
- Engineering and operations;
- Land use, land management, and aesthetics;
- Recreation and socioeconomics; and
- Cultural resources.

The Study Plans generated Study Plan Reports that were provided to the Collaborative and posted on the Oroville Facilities website when completed.

3.0.2 Development of Recommended PM&E Measures

Proposed protection, mitigation, and enhancement (PM&E) measures were developed primarily through the ALP. Although the term "PM&E" was used during this ALP, Collaborative stakeholders also referred to potential PM&E measures as resource actions (RAs). Throughout 2002, the Work Groups and associated Task Forces worked cooperatively to review and refine many issues. This refinement included the

identification of issues and questions, clarification of related resource interests, identification of existing and needed information to answer questions, agreement on the appropriate level of analysis required, regulatory standards, and other related issues. The stakeholders developed a common template to describe a proposed RA and provide basic information considered necessary to begin analysis of potential RAs related to the relicensing process and to identify the specific issue a potential RA was designed to address.

RAs were submitted by stakeholders to individual Work Groups or directly to DWR for distribution to the appropriate Work Group. In some cases, RAs were developed and refined by participants within the Work Groups themselves. Some RAs were transferred between Work Groups as stakeholders considered the most appropriate venue for discussion and further refinement.

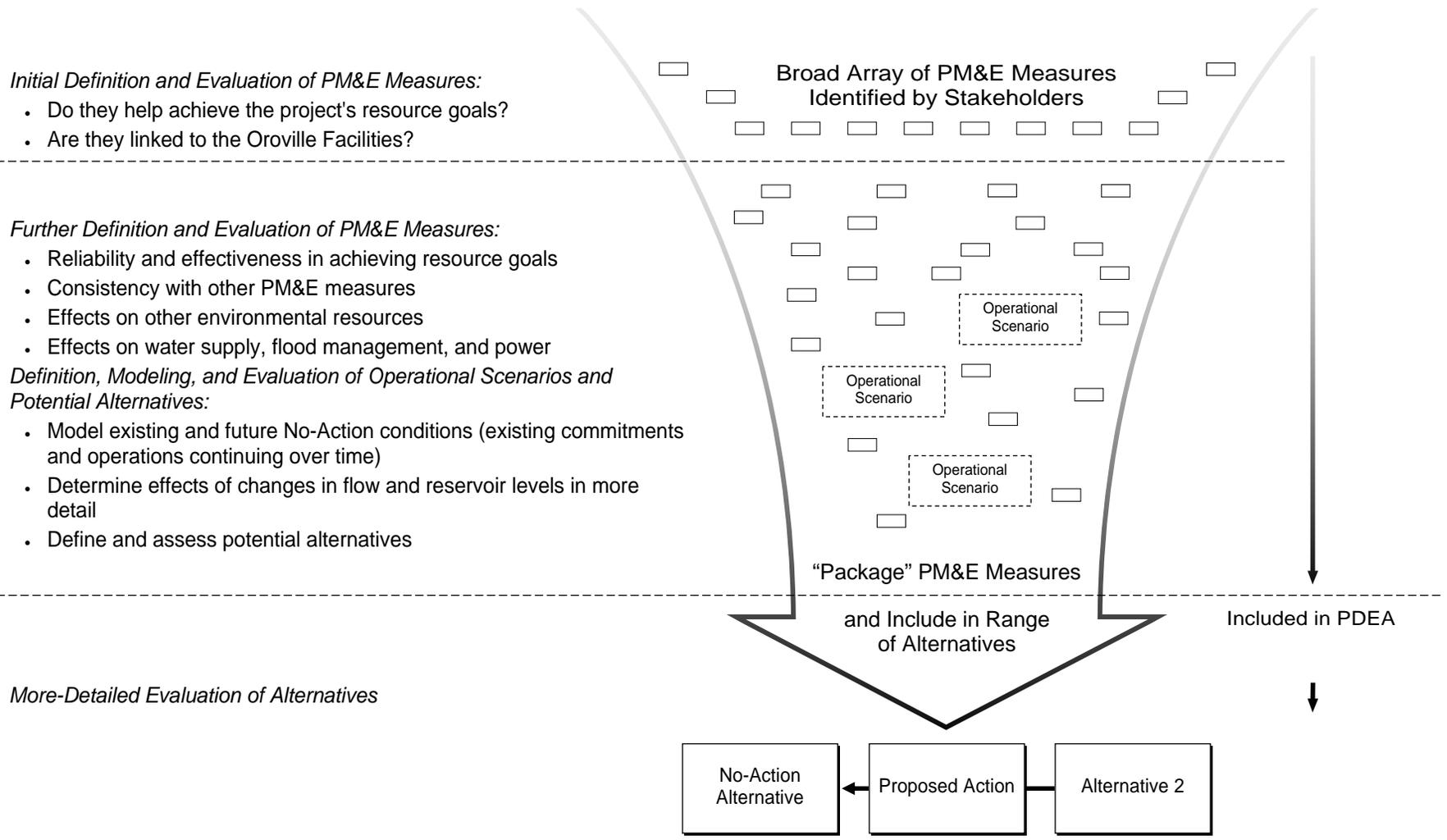
The Work Groups spent many months developing and reviewing potential RAs, identifying and eliminating redundancies, and consolidating similar or synergistic RAs as appropriate. Initial results from the numerous studies under way were used to inform the Work Groups and further refine potential RAs. Each Work Group then identified those RAs that could reasonably be expected to produce beneficial results and agreed by consensus to recommend the list of RAs to the PDEA development team for further analysis as potential PM&E measures for inclusion in an alternative. Supporting information for all PM&E measures that were received by DWR from the Work Groups and stakeholders and their disposition is described in Appendix D.

3.0.3 Evaluation of Proposed PM&E Measures

DWR evaluated the recommended PM&E measures as part of the alternatives development process (see Figure 3.0-1). As part of this process, each PM&E measure was evaluated for expected reliability and effectiveness. The evaluation process also analyzed whether the proposed PM&E measure would directly or indirectly conflict with other potential PM&E measures, cause direct or indirect effects on other environmental resources, or conflict with existing plans and policies. Recommended PM&E measures were also evaluated to determine potential effects on developmental aspects of the Oroville Facilities, including water supply, flood management, and power generation. Most PM&E measures would have direct or indirect effects on other resources, could affect water supply and result in power generation losses, or could involve other costs to implement.

3.0.4 Approach to Constructing the Alternatives

Figure 3.0-1 depicts the overall approach used to construct the alternatives. A broad array of potential PM&E measures was evaluated to determine project nexus and whether the PM&E measure would help achieve resource interests. PM&E measures that passed the initial level of analysis were carried forward into a more detailed definition and evaluation phase. Some PM&E measures were adjusted based on study



Source: Prepared by EDAW, Inc.

Figure 3.0-1. Developing the alternatives.

results, and some PM&E measures were created as necessary to address a project effect. At the same time, operational modeling, including “sensitivity analyses,” was conducted by DWR to help determine the feasibility of PM&E measures that would affect project operations. Reports generated from the collaboratively developed Study Plans were used in the evaluation of potential PM&E measures and assisted in the development of the alternatives.

In addition to power and other developmental purposes derived from the continued operation of the Oroville Facilities, FERC must give equal consideration in any license issued to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat); the protection, mitigation, and enhancement of recreational opportunities; protection of important cultural resources; and the preservation of other aspects of environmental quality. The alternatives were developed with an awareness of these considerations.

Plans and programs were considered by the Collaborative as a means to organize individual measures focused on specific activities into a more comprehensive approach to benefit the resource. Several plans and programs are included as specific components of the No-Action Alternative, the Proposed Action, or Alternative 2 and briefly described in this chapter. Descriptions of each plan or program included in this chapter are provided in Appendix H.

3.1 NO-ACTION ALTERNATIVE

The National Environmental Policy Act (NEPA) requires the evaluation of the No-Action Alternative, against which the effects of the alternatives can be compared. The purpose of describing and analyzing a No-Action Alternative is to allow decision-makers to better understand the environmental consequences of continuing to operate a project under the terms and conditions of its existing FERC license. Such consequences can then be compared to those associated with the alternatives, which are expected to include new PM&E measures.

Under the No-Action Alternative, the Oroville Facilities would continue to be operated as they are now under the terms and conditions in the existing FERC license, and no new PM&E measures would be implemented, other than those arising from existing legal obligations and agreements. These terms and conditions, along with other agreements and permits that DWR is committed to maintaining and implementing (including environmental programs), are also referred to as existing measures to be continued. In addition, DWR would continue existing maintenance practices needed to maintain the Oroville Facilities. This definition of No-Action conditions is consistent with the guidance contained in the following:

- Council on Environmental Quality (CEQ) NEPA guidance (see question 3 in the CEQ’s “Forty Most Asked Questions Concerning CEQ’s NEPA Regulations,” 46 Federal Register [FR] 18026, March 23, 1981, and as amended, 51 FR 15618, April 25, 1986); and
- *Preparing Environmental Assessments, Guidelines for Applicants, Contractors, and Staff* (FERC 2001).

The No-Action Alternative includes existing facilities, key conditions of the existing FERC license, environmental commitments such as those associated with DWR’s water rights, recreation programs, and other agreements that affect current Oroville Facilities operations. This includes interim projects implemented by DWR during the relicensing effort and further described in Section 3.1.2. These conditions and continuing measures would continue to affect operations in the future under the No-Action Alternative. Section 3.1.1 describes the existing Oroville Facilities while Section 3.1.2 outlines the existing operations.

DWR entered into informal consultation with the U.S. Fish and Wildlife Service (USFWS) to resolve terrestrial listed-species issues prior to the initiation of formal consultation to be conducted after license application filing. USFWS recommended several measures for early implementation (under the existing FERC license) to minimize or avoid take of a federally listed species related to ongoing project activities. These measures are described in a draft biological assessment (BA) (see Appendix E), covering terrestrial resources, and are included in the No-Action Alternative.

The assessment of effects for the No-Action Alternative used the CALSIM II, HYDROPS™, WQRRS, and other modeling and technical studies completed for the “benchmark” modeling scenarios to simulate existing and future hydrologic conditions. These scenarios and related modeling results were completed with input provided by stakeholders at the related and ongoing hydrology modeling workshops. Appendix C includes technical information on the operations modeling tools used for the assessment of effects and additional detail on existing project operations based on the models.

3.1.1 Existing Oroville Facilities

The Oroville Facilities (FERC Project No. 2100) were developed as part of the SWP, a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants, and generates electricity pursuant to a federal license issued by FERC on February 11, 1957. One of the two main purposes of the SWP 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 Central Coast, and Southern California. The Oroville Facilities are also operated for flood management, power generation, water quality improvement in the Sacramento–San Joaquin Delta (Delta), recreation, and fish and wildlife enhancement.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam, Lake Oroville, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, the OWA, Thermalito Forebay, Thermalito Forebay Dam, Thermalito Afterbay, Thermalito Afterbay Dam, and transmission lines, as well as a number of recreational facilities. Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-maf capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level. The hydroelectric units at the Oroville Facilities have a combined licensed generating capacity of approximately 762 MW. A detailed description of the facilities is provided in Appendix B.

3.1.1.1 Licensed Power Facilities

The Hyatt Pumping-Generating Plant is the largest of the three power plants within the Oroville Facilities, 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 into 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. Other generation facilities include the 3 MW Thermalito Diversion Dam Powerplant and the 114 MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, 4 miles downstream of 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 Powerplant is a 3 MW power plant located on the left abutment of Thermalito Diversion Dam. The power plant releases a maximum of 615 cfs of water into the river.

The Thermalito Power Canal is a 10,000-ft-long channel designed to convey generating flows up to 16,900 cfs to Thermalito Forebay and pumpback flows to the Hyatt Pumping-Generating Plant. Thermalito Forebay is an off-stream regulating reservoir for the Thermalito Pumping-Generating Plant.

The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pumpback flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into Thermalito Afterbay, which is contained by a 42,000-ft-long earth-fill 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 pumpback operations, and provides recreational opportunities. Several local irrigation districts receive water from Thermalito Afterbay.

3.1.1.2 Licensed Non-power Facilities

Feather River Fish Hatchery

The Feather River Fish Hatchery is an anadromous fish hatchery, built to compensate for the loss of spawning grounds and rearing areas for returning salmon and steelhead that resulted from construction of Oroville Dam. The hatchery complex consists of the Fish Barrier Dam and fish ladder, collection and holding tanks, enclosed spawning and early incubation facilities, grow-out ponds, and fish transport vehicles. The Thermalito Fish Hatchery Annex, a fish rearing facility on State Route (SR) 99 near Thermalito Afterbay, is used as a grow-out facility for some salmon and steelhead hatched at the Feather River Fish Hatchery.

The Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. Flow over the dam maintains fish habitat in the Low Flow Channel of the Feather River between the Fish Barrier Dam and the Thermalito Afterbay Outlet and provides attraction flow for the hatchery. The dam diverts fish into a fish ladder that leads to the hatchery. The Fish Barrier Pool formed behind the Fish Barrier Dam has a storage capacity of 560 af and covers 50 acres.

Each year, approximately 9,000 to 18,000 salmon and 2,000 steelhead are artificially spawned, a process that produces 18 to 20 million eggs. Salmon and steelhead are raised at the hatchery then transported in oxygenated, temperature-controlled tanks for release in the Feather and Sacramento Rivers, in Lake Oroville and other California reservoirs, and in San Pablo Bay near San Francisco Bay.

Oroville Wildlife Area

The OWA comprises approximately 11,000 acres west of Oroville that are managed for wildlife habitat and recreational activities. It includes Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000-acre area straddles 12 miles of the Feather River, which includes willow and cottonwood-bordered ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill Day Use Area, model aircraft grounds, three boat launches on Thermalito Afterbay and one on the river, and a primitive camping area. A DFG habitat enhancement program includes a wood duck/wildlife nest box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations. The OWA is within the project boundary for FERC Project No. 2100 and is described in more detail in Appendix B.

Recreation Facilities

The Oroville Facilities support a wide variety of recreational opportunities, including: boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking,

off-road bicycle riding, wildlife watching, and hunting. There are also visitor information sites with cultural and informational displays about the developed facilities and the natural environment. The majority of recreation facilities in the project area are within the Lake Oroville State Recreation Area (LOSRA), which has numerous facilities and sites offering diverse recreational opportunities. The LOSRA, managed by DPR, includes Lake Oroville and the surrounding lands and facilities within the project area as well as the land and waters in and around the Diversion Pool and Thermalito Forebay, downstream of Oroville Dam. Additional recreational facilities and opportunities exist within the project area but outside the LOSRA, specifically at Thermalito Afterbay, the OWA, and the Feather River Fish Hatchery.

Lake Oroville, with more than 15,000 surface acres at full pool, is one of the largest reservoirs in California. Major recreation facilities are located at Loafer Creek, Bidwell Canyon, the Spillway, and Lime Saddle. An overview of these and other existing recreation facilities that are maintained and operated under the current FERC license and included in the No-Action Alternative is presented below. More detailed information is provided in Appendix B.

Bidwell Canyon Campground, Boat Ramp, Day Use Area, and Marina

Bidwell Canyon Campground is located along the southern shore of Lake Oroville, east of Oroville Dam. This facility provides campsites for tents or recreational vehicles (RVs), the latter with full hookups. This site has flush toilets, piped water, showers, gray water sumps, and a picnic area with fire grills.

Bidwell Canyon Marina area, approximately 1 mile east of Oroville Dam on the southern shore of the reservoir, includes a fuel dock, pumping station for boat holding tanks, boat docks and storage, trailer facilities with RV hookups, and a multi-lane boat launch ramp. An exhibit describing the history of the Bidwell Bar Bridge is under development.

Loafer Creek Campground, Boat Ramp, Day Use Area, and Equestrian Campground

Loafer Creek Campground is the largest campground within the FERC project boundary and is located on the southern shore of Lake Oroville east of Oroville Dam. This facility has campsites for tents, RVs, and large groups. The multi-lane Loafer Creek boat ramp is located nearby. The campground is equipped with restrooms, showers, piped water, gray water sumps, picnic tables, and fire grills.

The Loafer Creek Equestrian Campground is equipped with shower stalls and feed troughs for horses. Restroom facilities and trailheads are located nearby. Recently, a paved access road, new feeder boxes, pipe corrals, and a 50-ft round pen were added at this location to provide enhanced equestrian recreational opportunities.

Saddle Dam Day Use Area

This primarily equestrian-use trailhead, located in the southeastern portion of the project area, was recently improved by regrading and adding gravel to the parking area; adding picnic tables, a vault-type, handicap-accessible toilet, a water trough, and hitching posts for horses.

Lime Saddle Campground, Day Use Area, and Marina

Built in 2001, Lime Saddle Campground is located on the western shoreline of the West Branch of the North Fork arm of Lake Oroville. This facility provides campsites for tents, RVs (some with hookups), and groups. The campground has restrooms, showers, and potable water; each site has a picnic table and fire grill.

Lime Saddle Marina includes boat docks and storage, fishing and boating supplies, gas, and oil. The marina is located on the West Branch of the Feather River near Lime Saddle Road. Close to the marina is the multi-lane Lime Saddle Boat Ramp and picnic facilities at the Day Use Area.

Spillway Recreation Area at Oroville Dam

The Spillway Recreation Area at Oroville Dam has the largest boat launching facility on Lake Oroville. A 12-lane ramp with more than 800 parking spaces, renovated in 2002, is used during high water; an 8-lane second-stage ramp is used during low water periods. This site also provides limited day use activities, en-route camping, and opportunities for picnicking and bike riding.

Enterprise Boat Ramp and Day Use Area

The Enterprise Boat Ramp and Day Use Area, located on the South Fork arm of Lake Oroville, provides boat launching and shoreline access. This site has a multi-lane boat ramp used during high water (>835 feet [ft] above mean sea level [msl]) and amenities limited to a recently installed vault-type, handicap-accessible toilet.

Car-Top Boat Ramps

These locations provide access to boaters launching canoes, small sailboats, and other small watercraft.

Nelson Bar. Nelson Bar Car-top Boat Ramp (BR) is located on the West Branch of the North Fork arm of Lake Oroville. The lower section of the boat ramp below the improved paved ramp is available for hand launching only. The site has a gravel parking lot, available at all but the highest water levels, and one vault toilet.

Vinton Gulch. Vinton Gulch Car-top BR is located on the West Branch of the North Fork arm of Lake Oroville. The single-lane boat ramp is used at high water. This site has no designated parking area and one vault toilet.

Dark Canyon. Dark Canyon Car-top BR is located on the West Branch of the North Fork arm of Lake Oroville. This single-lane boat ramp is available at most water levels. There is a paved parking lot but no restroom.

Foreman Creek. Foreman Creek Car-top BR is located on the north side of the main body of Lake Oroville. This multi-lane boat ramp provides access at most water levels but has no formally designated parking area and no restroom.

Stringtown. Stringtown Car-top BR is located on the South Fork arm of Lake Oroville. The boat ramp is available at most water levels. This site has a small parking area and one vault toilet.

Lake Oroville Visitors Center

Located east of Oroville Dam on Kelly Ridge, the 10,000-square-foot (sq ft) center features exhibits on the engineering and construction of the Oroville Facilities. Additionally, there are interpretive displays on the native culture and the natural resources of the area. The center has observation decks with picnic tables and an observation tower. Visitors to the Lake Oroville Visitors Center can also obtain specific information about recreational opportunities and activities in the area.

Boat-in Campgrounds

In addition to traditional campgrounds, Lake Oroville provides boat-in campgrounds (BICs) around the reservoir. These camps are accessible only by boat and service vehicles and are popular during periods of high water. There are a total of 84 individual/family boat-in campsites in the project area.

Bloomer Area. Bloomer Area BICs are located on the North Fork arm of Lake Oroville. Bloomer Area has four separate camp areas: Bloomer Cove, Bloomer Knoll, Bloomer Point, and Bloomer Group. Each has campsites equipped with tables and fire rings with cooking grills. The Bloomer Group is the only BIC in the Bloomer Area that offers a group site (one 75-person group site).

Goat Ranch. Goat Ranch BIC is located on the North Fork arm of Lake Oroville between the Bloomer campgrounds and where the West Branch splits from the North Fork arm. The campsites are equipped with tables and fire rings with cooking grills.

Foreman Creek. Foreman Creek BIC is located at the north side of Lake Oroville. This campground is equipped with potable water, gray water sump, tables, and fire rings with cooking grills.

Craig Saddle. Craig Saddle BIC is located between the Middle and South Fork arms of Lake Oroville. This area has 18 sites, each equipped with tables, potable water, and fire rings with cooking grills.

Floating Campsites and Restrooms

Lake Oroville has ten floating campsites that are anchored in different areas of the reservoir. Each is a two-story structure that provides a unique on-water camping experience and can accommodate up to 15 people, with living space and amenities such as cooking grill, table, sink, restroom, and sleeping area.

There are seven floating restrooms on Lake Oroville to preserve water quality and provide convenience for boaters. They are stationed around the reservoir, and each has two individual restrooms with vaults that are periodically pumped out.

Diversion Pool Day Use Area

The Diversion Pool Day Use Area is open for day use activities such as hiking, biking, trail access, and picnicking. Only non-motorized and electric boats are allowed on the Diversion Pool. The Diversion Pool Day Use Area has one vault toilet but few other amenities.

North Thermalito Forebay Recreation Area

The North Thermalito Forebay area offers picnicking, swimming, and en-route camping. Boating is restricted to non-motorized boats such as sailboats and canoes. The boat launch area has two multi-lane boat launch ramps. There are numerous picnic tables, group facilities and shade ramadas, and a popular sand beach.

South Thermalito Forebay Recreation Area

The South Thermalito Forebay Recreation Area provides outdoor recreational activities such as boating, picnicking, fishing, and swimming. The site has a multi-lane boat ramp with power boating limited to 330 acres of the 630-acre Thermalito Forebay. The site has several picnic tables with fire grills. A vault, handicap-accessible toilet was recently installed at this location.

Thermalito Afterbay Boat Ramps

Several boat ramps are available on Thermalito Afterbay at the following locations:

Wilbur Road. The Wilbur Road boat launch area consists of a multi-lane paved boat ramp, a parking lot with 14 car/trailer combination spaces, and a recently installed vault-type, handicap accessible toilet.

Larkin Road. The Larkin Road boat launch area has a graded and graveled car-top boat ramp. This site has a paved lot approximately 50 yards by 50 yards with a single-vault, handicap-accessible toilet.

Monument Hill. The boat ramp consists of a multi-lane paved boat launch ramp with a floating dock and is located on the eastern shoreline of Thermalito Afterbay. The paved and unpaved parking lots can accommodate about 75 car/trailer combinations.

Monument Hill Day Use Area

Monument Hill Day Use Area provides recreational activities such as boating, swimming, fishing, picnicking, and limited hunting. This site has several picnic tables, four flush toilets, a multi-lane boat launching ramp, and a fish cleaning station.

OWA Primitive Camping Area

Primitive camping is allowed in one designated area in the OWA. There are minimal amenities for users.

Equestrian, Bicycle, and Hiking Trails

Dan Beebe Trail. The Dan Beebe Trail is a 14.3-mile trail that is for equestrian and hiking use. The trail is commonly used by joggers and hikers and provides both difficult and easy terrain as it winds past the Diversion Pool and Lake Oroville. Restroom facilities and trailheads are dispersed along the route.

Brad Freeman Trail. The 41-mile Brad Freeman Trail circles Thermalito Forebay, Thermalito Afterbay, and the Diversion Pool, and crosses the crest of Oroville Dam. It was constructed in the mid-1990s as a mountain bicycle trail but became popular with equestrians and now has portions considered multipurpose. There are about a dozen popular or marked access points, many at other popular project recreation sites, from which trail users can stage. The mostly unpaved trail provides scenic off-road recreation, while some short sections are along paved roads and can be used by less-specialized bicycles. More than 30 miles of the trail are flat but include some rolling terrain; steep grades can be found on either side of Oroville Dam. The Brad Freeman Trail has been used for downhill and cross-country mountain-bicycle races.

DWR recently completed a group staging area at Thompson Flat that includes signage, a graveled driveway to Cherokee Road, graded parking, and a spur trail from the staging area to an existing trail.

Hiking Trails

Most of the hiking trails at Lake Oroville are located in the Bidwell Canyon and Loafer Creek areas; however, there is also a trail in the Spillway area. Informal trails offering shoreline access are found at Thermalito Afterbay, the Craig Saddle area, and the Foreman Creek Car-top BR area. Hiking trail locations and access points in the project area include Bidwell Canyon, Kelly Ridge, Loafer Creek, Potter's Ravine, Wyk Island, the Saddle Dam, Powerhouse Road, Lakeland Boulevard, East Hamilton Road, Toland Road, Tres Vias Road, and the Visitors Center Chaparral Interpretive Trail.

The Sewim Bo River Trail was recently developed along the southeast bank of the Feather River starting at the Feather River Nature Center and extending north to the Thermalito Diversion Dam. Amenities include picnic tables, shade ramadas, restrooms, and interpretive signage.

3.1.2 Existing Operations and Environmental Measures to be Continued

The licensed Oroville Facilities must operate within the constraints imposed by the much larger SWP, its complex operating rules, and existing environmental permits and commitments. The SWP was authorized by the voters in 1959 to “store runoff in Northern California and deliver to areas of need throughout the State.” The SWP is a multipurpose water project, providing water supply, flood management, power generation, recreation, and habitat enhancement for fish and wildlife.

Notwithstanding its multipurpose nature, the top priorities are water supply and flood management, and power generation is secondary. Water releases from various SWP reservoirs and diversion dams are dictated and controlled by essentially all authorized project purposes.

This section summarizes the operational elements of the Oroville Facilities that will continue in the future under the No-Action Alternative. These elements are presented in detail in Appendix B.

In addition to the specific types of project operations discussed below, various routine operations and maintenance (O&M) activities are ongoing and would continue under the No-Action Alternative. These activities, which include routine repairs and maintenance, seismic monitoring, and tests and inspections, are intended to meet the following objectives:

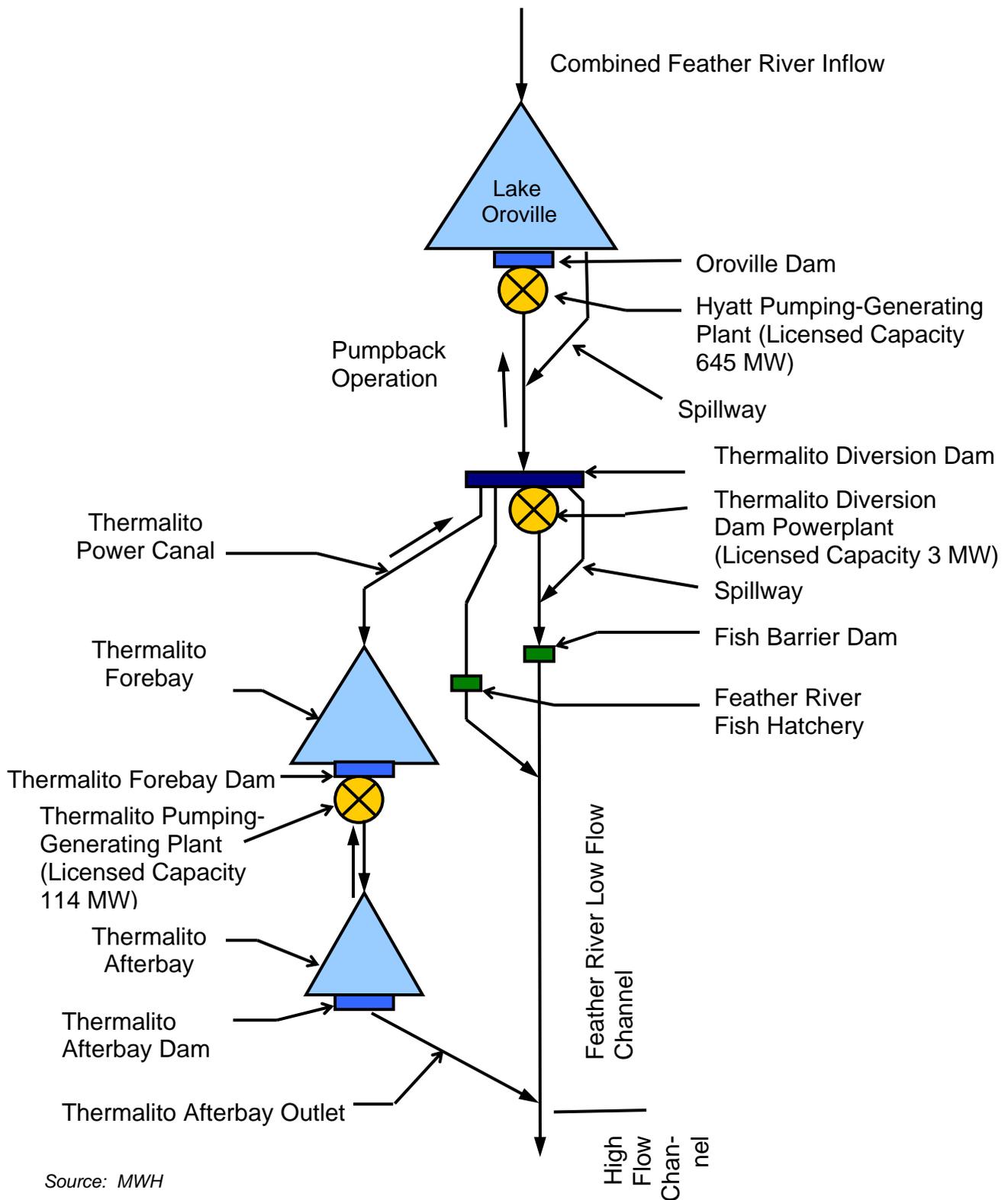
- Ensure safety, efficiency and reliability of operation;
- Meet U.S. Army Corps of Engineers (USACE) flood control criteria;
- Meet Feather River Service Area (FRSA) entitlements; and
- Implement water conservation practices.

Typical O&M practices conducted at the Oroville Facilities are included in tabular format in Appendix B.

3.1.2.1 Power Operations

Lake Oroville stores and releases water that flows into the reservoir from upstream reservoir releases and runoff within the watershed. Water is released from the Oroville Facilities to meet water supply, flood protection, water quality improvement, and fish and wildlife enhancement requirements. Typically, power is generated when water is released from Lake Oroville through the Oroville Facilities for these purposes. Power is also generated through pumpback operations. Figure 3.1-1 contains a flow diagram that illustrates the overall Oroville Facilities configuration and primary water storage and release points.

Planning and implementing SWP operations is highly dependent on constraints placed upon the Oroville Facilities. The Oroville Facilities’ operational planning is performed by the Operations Control Office (OCO).



Source: MWH

Figure 3.1-1. Oroville Facilities flow diagram.

The day-to-day operation of the Oroville Facilities is done through the Oroville Field Division. Decision-making for SWP operations begins with an overall long-range plan for the year. This long-range plan is used to establish general operational objectives and to assess the likelihood of achieving the operational objectives. Operations plans are developed on a weekly basis to meet the overall annual operational objectives. Daily schedules are subsequently developed to meet the weekly operational objectives and are adjusted in real-time as needed to respond to changes in conditions.

Reservoir Operation

DWR stores winter and spring runoff in Lake Oroville for release to the Feather River, as necessary, to meet downstream demands. Annual operations planning is conducted for multiyear carryover, in 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. Lake Oroville is targeted to fill to near a maximum annual level of 900 ft above msl. Typically maximum storage, which in drier years may be below 900 ft msl, is achieved in June. After the maximum storage is achieved in June, Lake Oroville will then 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 1991, 1992, and 1993 (1991 and 1992 were dry years), the minimum elevations were 651 ft, 702 ft, and 723 ft, respectively. USACE requires Lake Oroville to be operated to maintain up to 750,000 af of storage space to capture significant inflows for flood management. Historically, the maximum flood flows released from Lake Oroville were about 160,000 cfs in 1997. Figure 3.1-2 shows Lake Oroville elevations under various water year type conditions.

Annual Water Operations Planning

Operations planning requires coordination with other federal, State, and local agencies, and must consider a number of factors. The OCO develops an annual water operations plan that considers forecasted water supply, projected operations of the CVP, and regulatory (flood management, instream requirements, and water quality) and contractual obligations. This first official plan for the next year is completed in early December as part of the allocation process and is a significant component in determining the amount of forecasted deliveries by the SWP. This monthly time-step plan includes projected release to the Feather River, forecasts of Oroville inflow, Lake Oroville end-of-month storage levels, and local demands. The water operations plan is updated and reissued each month through April to reflect changes in hydrology and downstream operations. The Oroville Facilities power generation plants operate within the constraints established by the water operations plan.

Weekly Water Operations Planning

Each week, the OCO develops a general plan for reservoir releases. This plan considers how much water will be needed downstream for local water supply demands, Delta water quality and quantity requirements, instream flow and temperature requirements, SWP pumping requirements in the Delta, and minimum flood management storage space. The weekly plan is revised as needed to meet changing operational conditions both upstream and downstream.

Daily Water Operations Scheduling

Hourly water releases through the power plants are scheduled daily. The hourly operation of the power plants is planned to maximize the amount of energy that may be produced during periods when electrical demand is highest. Additionally, ancillary services are bid into the California Independent System Operator (ISO) market on a day-ahead and an hour-ahead basis. These ancillary services include regulation up and down, spinning reserves, non-spinning reserves, and supplemental energy. Oroville Facilities operations are scheduled to maximize power benefits as long as the operations fit within the constraints of the overall daily Feather River release objective downstream of Thermalito Afterbay.

Releases

Releases from Lake Oroville are scheduled on a weekly basis to accommodate water supply, water quality requirements in the Delta; instream flow requirements in the Feather River; and minimum flood management space requirements. Weekly operational plans are updated as needed to respond to changing conditions. The Diversion Pool, Thermalito Forebay, and Thermalito Afterbay are too small for seasonal storage, so they are used only in weekly and daily operations planning. Releases through the Hyatt and Thermalito Pumping-Generating Plants are scheduled on an hourly basis 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 be scheduled at off-peak times, hourly operational decisions are affected by the following considerations:

- Electrical energy prices and ancillary service requirements such as spinning reserve;
- Supplemental energy market activities; and
- Voltage regulation requirements.

Storage in Thermalito Forebay and Thermalito Afterbay is used to generate power and maintain uniform flows in the Feather River downstream of the Oroville Facilities. Thermalito Afterbay also provides storage for pumpback operations. The pumpback operations are designed to use water that is in excess of what is required for downstream flow requirements for pumping back into 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. Generation provided by this pumpback activity contributes on average only about 6 or 7 percent to the total annual Oroville Facilities generation. Because the two main power plants are operated to take advantage of weekday generation when power values are highest, there is usually higher storage in Thermalito Afterbay by the end of the week. During the weekend, water from the afterbay continues to be released to the Feather River, generation at the Hyatt and Thermalito Pumping-Generating Plants is decreased, and pumpback operations into Lake Oroville may occur. By the end of the weekend, the elevation of Thermalito Afterbay is lowered to prepare for a similar operation the following week.

Feather River Service Area Water Supply Entitlements

DWR has contractual obligations to nine local agencies¹ in the FRSA that are collectively referred to as the FRSA water users. They receive water according to the terms of settlement in various agreements stemming from the original construction of the project. These settlements recognized the senior water rights of those agencies and determined that DWR would provide them certain quantities of water from storage in Lake Oroville in accordance with those senior water rights. The amount of water that DWR is committed to provide these agencies is approximately 994,000 af annually, subject to provisions for reduction in supply under certain specific low-inflow conditions.² The actual amount delivered varies from year to year, and can exceed the above amount. Water needed to meet these FRSA entitlements is delivered at two locations in Lake Oroville, two locations in the Thermalito Power Canal, four locations in Thermalito Afterbay, and four locations on the Feather River below Thermalito Afterbay.

DWR has also executed a number of small contracts with riparian landowners along the Feather River downstream of Oroville Dam. Riparian owners are entitled to divert unimpaired flow for use on riparian land, but are not entitled to augmented flow made available as a result of project storage. Although the quantities of water are relatively small and do not ordinarily influence SWP operations, in certain years riparian diversions can affect Oroville releases.

Water Supply Requirements of the State Water Contractors

As a component of the SWP, the Oroville Facilities are operated to provide downstream water supply for municipal, industrial, and irrigation purposes, and water is exported to meet the requests of the water contractors. To illustrate how water releases from the Oroville Facilities are distributed for multiple downstream uses,

¹ The FRSA agencies are the Last Chance Creek Water District; the Thermalito Irrigation District; the South Feather Water and Power Agency (formerly Oroville-Wyandotte Irrigation District); the Western Canal Water District; the Joint Water District Board (comprising the Richvale Irrigation District, the Biggs-West Gridley Water District, the Butte Water District, and the Sutter Extension Water District); the Tudor Mutual Water Company; the Oswald Water District; the Garden Highway Water Company; and the Plumas Mutual Water Company. The settlement of water rights for these entities is typically expressed in terms of af of annual entitlement, although some settlement agreements also stipulate specific rates of flow in cfs.

² Individual contracts with these agencies determine the terms of flow reduction. Of the total entitlement, 187,245 af is not subject to reduction.

Table 3.1-1 shows DWR records from 2001 and 2002 indicating actual releases for various uses. As a practical matter, water supply exports are met with whatever water is available after Delta requirements are met. In other words, some of the water released for instream and Delta requirements in the table below may be available for export by the SWP once the Delta standards have been met.

Table 3.1-1. Downstream use of water from the Oroville Facilities (2001 and 2002).

Downstream Use	2001		2002	
	Amount Used (taf)	Percentage of Release	Amount Used (taf)	Percentage of Release
Feather River Service Area	1,024	46	925	34
Support of Exports	93	4	773	28
Instream and Delta Requirements	1,099	50	1,043	38
Flood Management	0	0	0	0
Total	2,216	100	2,741	100

Note: taf = thousand acre-feet

Source: DWR SWP Operations Control Office

Flood Management

The Oroville Facilities are an integral component of the Sacramento River Flood Control Project, the flood management system for the areas along the Feather and Sacramento Rivers downstream of Oroville Dam. From September to June, the Oroville Facilities are operated under flood control requirements specified by USACE. Under these requirements, Lake Oroville is operated to maintain up to 750,000 af of storage space to allow for the capture of significant inflows. Flood control releases are based on the release schedule in the flood control diagram or the emergency spillway release diagram prepared by USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with USACE.

The flood control requirements are consistent with multipurpose use of reservoir storage. During times when flood management space is not required to accomplish flood management objectives, the reservoir space can be used for storing water. From October through March, the maximum allowable storage limit (point at which specific flood release would have to be made) varies from about 2.8 to 3.2 maf to ensure adequate space in Lake Oroville to handle floodflows. The actual flood storage requirements are partially based on a wetness index, computed from accumulated basin precipitation. This allows higher levels in the reservoir when the prevailing hydrology is dry while maintaining adequate flood protection. When the wetness index is high in the basin (i.e., high potential runoff from the watershed above Lake Oroville), the flood management space required is at its greatest amount to provide the necessary flood protection. From April through June, the maximum allowable storage limit is increased as the flooding potential decreases, which allows capture of the higher spring flows for use later in the year. During September, the maximum allowable storage decreases again to prepare for the next flood season.

During flood events, and in consultation with USACE, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

Power Transactions

Overall, the SWP uses more energy than it produces. To balance SWP loads with available resources, DWR relies on a suite of options that includes purchases from the day-ahead and hour-ahead markets; capacity exchanges; and energy contracts (both short and long-term). Two such contracts with Southern California Edison Company (SCE) have allowed DWR to exchange on-peak capacity and energy for off-peak energy that may be used elsewhere within the SWP system. Specifically, under the terms of the 1979 Power Contract and the 1981 Capacity Exchange Agreement, DWR provided SCE with up to 350 MW of capacity and approximately 40 percent of the energy from the Oroville Facilities. In return, DWR received off-peak energy from SCE equal to the amount of energy provided to SCE from the Oroville Facilities, plus an additional amount of energy as payment for the on-peak capacity. The amount of additional energy was determined annually based on the Capacity-Energy Exchange Formula defined in the 1979 Power Contract.

Several power purchases and sales agreements, the largest of which are the SCE power and capacity exchange contracts, expired on December 31, 2004; a different portfolio of generation resources will be made available to meet SWP energy and capacity requirements starting January 1, 2005. DWR is involved in solicitation and confidential negotiation efforts with a variety of providers of generation capacity and energy. The results of solicitation and negotiations were not available at the time this document was prepared. In any event, all new power contracts will abide by applicable environmental and regulatory conditions. Implementation of these contracts will not alter the environmental analysis presented herein.

Load Management

DWR controls the timing of SWP pumping load through an extensive computerized network. This control system allows DWR to minimize the cost of power it purchases by maximizing pumping during off-peak periods when power costs are lower—usually at night—and by selling power to other utilities during on-peak periods when power values are high. By taking advantage of this flexibility in scheduling SWP pumping load and generation, DWR reduces the net cost for SWP water deliveries.

When generation from the Oroville Facilities exceeds SWP load requirements, DWR sells the excess power on the market. Currently, DWR contracts with utilities and marketers for short-term purchase, sale, or exchange of power. In addition to selling firm power, DWR may sell power on a day-to-day or hour-to-hour basis according to the terms of its interchange agreements and the Western System Power Pool agreement. These agreements provide the basis for making energy transactions, short-term capacity and energy sales or exchanges, unit commitments, and transmission service purchases.

3.1.2.2 Licensed Non-power Facility Operations

Feather River Fish Hatchery Operations

DWR constructed the Feather River Fish Hatchery in 1967 to compensate for habitat lost to spawning salmon as a result of the construction of Oroville Dam. The hatchery artificially spawns thousands of returning salmon and steelhead each year. DFG operates the hatchery under contract to DWR, and DWR pays for most hatchery-associated expenses. Water is released from the Oroville Facilities storage reservoirs to support fish hatchery operations downstream of the Fish Barrier Dam. Fish hatchery temperature objectives are listed in Table 3.1-2. The design of the Oroville Facilities provides for flexibility to enable water temperature control. Flow release measures available to control water temperature are detailed in Appendix B.

It should be noted, however, that an estimated \$12.1 million in capital for outlet modification costs to meet Feather River and Feather River Fish Hatchery temperature requirements under the modeled No-Action Alternative is included to achieve hatchery temperature criteria under the future 2020 modeled No-Action conditions. For temperature modeling, DWR used the Howell-Bunger river outlet valve from Oroville Dam in roughly one-third of the years to achieve temperature requirements for the Feather River Fish Hatchery through 2020. This valve was not designed for such use and cannot be used reliably to achieve current hatchery temperature requirements under 2020 hydrologic supply and demand conditions.

Table 3.1-2. Feather River Fish Hatchery water temperature objectives.

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

Source: Initial Information Package (DWR 2001)

The Fish Barrier Dam diverts fish into a ladder leading to the hatchery. All fish are stopped at the dam. The fish ladder gates are opened on or about September 1 to allow adult spring-run Chinook salmon to enter the hatchery. The early entries are ready for spawning in October. Fish entering the hatchery after September 15 are considered fall-run. When the gates are open, upstream migrating fish can move into the 0.5-mile-long ladder leading to the hatchery. All salmon adults entering the hatchery are retained for egg taking or fertilization. The entire process of egg/milt collection, fertilization, incubation, rearing, and holding of fry, fingerlings, and yearlings is conducted within the facilities. As fish reach the end of the ladder, they

swim into the gathering tank, and a mechanical sweep moves the fish into the spawning building. Salmon and steelhead that are not ready to be artificially spawned are moved to one of four circular holding tanks. The main hatchery building houses the spawning operation and incubators.

Unlike Chinook salmon, not all adult steelhead die after spawning; therefore, adult steelhead spawned at the hatchery are released. The fish ladder gate is open continuously through the fall and winter, as long as fish with viable eggs ascend the hatchery ladder. Hatchery steelhead are reared to the yearling stage and released in the Feather River. All steelhead fish produced in the Feather River Fish Hatchery are marked with an adipose fin clip. The external fin clip allows anglers to determine quickly whether the fish is of hatchery origin and can be kept. The hatchery also marks a percentage (currently about 10 percent) of its steelhead and spring- and fall-run Chinook salmon using coded wire tags.

An Inland Reservoir Program was implemented on and off for 30 years and involved a small expansion at the Feather River Fish Hatchery. However, because of continuing disease problems, this program was stopped and the expanded hatchery area was temporarily shut down. The expanded area is now used for the current Lake Oroville Stocking Program. This program consists of obtaining coho salmon eggs from a salmon farming operation in the Pacific Northwest and rearing them first for 5–6 months at the Feather River Fish Hatchery, then (if recommended by pathology results) transferring them to the Thermalito Fish Hatchery Annex where they are reared until they are of appropriate size for release into Lake Oroville.

Sport Fishery Management

DWR manages a cold and warmwater sport fishery in Lake Oroville. DWR funds a full-time fishery biologist and a salmonid stocking program and prepares 90-day and quarterly reports to FERC. Habitat improvements for warmwater game fish include brush shelter construction, planting of willows and/or buttonbush slips and annual grasses, and installation and O&M for irrigation systems and channel catfish spawning structures.

Oroville Wildlife Area

As described in Section 3.1.1, the OWA is an 11,000-acre area that is managed for wildlife habitat and recreational activities. Limited gravel mining also occurs within the OWA. As a result of interagency agreements negotiated between DWR and DFG, DFG manages Thermalito Afterbay and other OWA locations. The first significant management agreement was executed in 1968, when DWR transferred to DFG "control and possession" of the borrow area and adjacent property along the Feather River. This agreement set forth DFG responsibility for establishing, operating, and maintaining a public fish and wildlife management area and providing for recreation on that property. In addition, DFG agreed to be responsible for all costs associated with operation and maintenance. The California Fish and Game

Commission formally established this State Wildlife Area in coordination with that agreement.

The second significant management agreement was negotiated between DWR and DFG in 1986. This agreement transferred an easement to DFG for management of the Thermalito Afterbay water surface and adjoining lands for use as a State Wildlife Area and associated recreation. DWR did not transfer possession of the property but established an easement to allow DFG access and management responsibilities. DFG became responsible for all costs associated with operation and maintenance of this property as a subunit of the OWA, although some Thermalito Afterbay recreation facilities have subsequently been constructed and are maintained by DWR.

DFG is responsible for providing staff to manage and operate the OWA³ and sets guidelines for public use of this area. DFG allows public use 1 hour before sunrise to 1 hour after sunset; a designated area for overnight camping allows for a maximum stay of 14 nights in any calendar year. However, it is not always possible to enforce these hours or stay limits. DFG has also periodically conducted controlled burning to reduce fuel loading in various locations, primarily around Thermalito Afterbay. In addition, DFG and DWR have constructed and maintained fuel breaks in several locations to reduce the potential for spread of wildfire.

DFG has conducted a regular habitat enhancement program in the OWA that included the planting of upland nesting cover and foraging vegetation for waterfowl, along with thinning/removal of vegetation around the Thermalito Afterbay brood ponds and dredging ponds in the preserve. The thinning/removal activities are conducted to provide improved access for waterfowl. Approximately 200 acres of land are tilled and planted each year and remain as suitable nesting/foraging habitat for approximately 5 years before beginning to revert to the existing grasses. In addition, DFG thins and removes vegetation in and around ponds and rock piles to provide recreational access to the various habitats.

Recreational Facilities Operations and Maintenance and Facilities Usage **Monitoring**

Operations and maintenance activities will continue at existing recreation facilities in the project area, most of which are within the LOSRA. LOSRA, managed by DPR, includes Lake Oroville and the surrounding lands and facilities within the project area, as well as the land and waters in and around the Diversion Pool and Thermalito Forebay, downstream of Oroville Dam. Additional recreational facilities and opportunities exist within the project area but outside LOSRA, specifically at Thermalito Afterbay, the OWA, and the Feather River Fish Hatchery. Each of these areas is managed by DFG. The recreational facilities described in Section 3.1.1 are maintained and operated under the current FERC license.

³ This area had full-time on-site staff assigned until March 1, 2004. DFG management elected to reassign staff to other State Wildlife Areas in response to State budget cuts.

Recreation monitoring for usage, attendance, and capacity levels will continue to be collected. This information will be compiled and provided on FERC Form 80 once every 6 years to document current public recreation use within the project area.

Interim Projects

Early in the ALP, DWR agreed to consider implementing some actions prior to receiving a new license provided no license amendment was needed, environmental review requirements were limited, and there was agreement to include the actions in the new license application when filed. A Task Force was initiated through the Recreation and Socioeconomics Work Group to evaluate potential actions that could be taken in advance of license renewal. The Task Force eventually recommended two dozen actions for consideration. DWR identified those actions that were feasible to accomplish before license renewal and began implementation. The completed interim projects are listed and described below.

- *Restroom Upgrades.* Vault type, handicap accessible restrooms were installed at Wilbur Road Boat Ramp, Model Aircraft Flying Facility at Thermalito Afterbay, Enterprise Boat Ramp, South Thermalito Forebay, and Saddle Dam.
- *Loafer Creek Equestrian Campground Improvements.* A paved access road, new feeder boxes, pipe corrals, and a 50-ft round pen were added near Loafer Creek Campground to enhance equestrian recreational opportunities.
- *Group Staging Area.* DWR secured the Thompson Flat property, graded parking, installed signage, graveled the drive from Cherokee Road, and developed a spur trail from the staging area to an existing bicycle trail.
- *Bidwell Exhibit.* DWR is coordinating with DPR to develop an exhibit of the history of Bidwell Bar Bridge.
- *Saddle Dam Improvements.* The existing Saddle Dam equestrian parking area was improved by regrading and adding gravel to the parking area; adding picnic tables, a water trough, and hitching posts for horses; and planting native shade trees.
- *Lake Oroville Overlook Improvements.* The Lake Oroville overlook located off the Oro-Quincy Highway (SR 162) was improved by removing the previous cyclone fencing, installing a new California Department of Transportation (Caltrans) specification fence and automobile safety barrier, and adding interpretive signs.
- *Reseed Oroville Dam.* DWR reseeded the face of Oroville Dam with California poppies.
- *Model Aircraft Flying Facility Improvements.* At the Model Aircraft Flying Facility, DWR paved the crossing runways, graded and graveled the parking

lot, installed aircraft staging tables, constructed picnic facilities with shade ramadas, and added fencing.

- *Promote Existing Recreation Facilities.* DWR provided funding to the Oroville Chamber of Commerce for billboards along SR 99 and Pentz Road to direct people to LOSRA facilities.
- *Boating Safety Training.* DWR is continuing to work cooperatively with DPR, the Butte Sailing Club, and the Feather River Recreation and Park District (FRRPD) to fund improved boat storage facilities, boating safety equipment, and instructional programs. The latter include a recurring “Aquatic Adventure Camp” that targets local disadvantaged youths.
- *Sewim Bo River Path.* A walking trail was developed along the southeastern bank of the Feather River starting at the Old Bath House (now the Nature Center and Native Plant Garden) and extending north to the Thermalito Diversion Dam. Improvements along the river trail include picnic tables, shade ramadas, restrooms, interpretive signs, and parking, including Americans with Disabilities Act (ADA) access.
- *Feather River Fish Hatchery Landscaping Improvements.* These include new shade trees, assorted native plants and grasses, and picnic facilities.

Environmental Measures to be Continued

An August 1983 agreement between DWR and DFG entitled *Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife* sets criteria and objectives for flow and temperatures in the Low Flow Channel and the reach of the Feather River between Thermalito Afterbay and Verona. This agreement:

- Establishes minimum flows between the Thermalito Afterbay Outlet and Verona, which vary by water year type;
- Requires flow changes under 2,500 cfs to be reduced by no more than 200 cfs during any 24-hour period, except for flood management operations;
- Requires flow stability during the peak of the fall-run Chinook spawning season;
- Sets an objective of suitable temperature conditions during the fall months for salmon and during the later spring/summer for shad and striped bass; and
- Establishes a process whereby DFG will recommend each year, by June 1, a spawning gravel maintenance program to be implemented during that calendar year.

Additionally, a 1984 FERC order states that upon completion of construction of the Thermalito Diversion Dam Powerplant, DWR shall operate the Oroville Facilities in such a manner as to maintain a minimum flow of 600 cfs within the Feather River downstream of Thermalito Diversion Dam. Downstream of the Thermalito Afterbay Outlet, the license requires a minimum release so that flows in the Feather River are 1,000 cfs from April through September, and 1,700 cfs from October through March when the April–July unimpaired runoff in the Feather River is greater than 55 percent of normal. When the April–July unimpaired runoff is less than 55 percent of normal, the license requires minimum flows of 1,000 cfs from March to September and 1,200 cfs from October to February. This requirement is to protect any spawning that could occur in overbank areas during the higher flow rate by maintaining flow levels high enough to keep the overbank areas submerged. In practice, flows are maintained below 2,500 cfs from October 15 to November 30 to prevent spawning in the overbank areas. According to the 1983 agreement, if, during the period of October 15 to November 30, the average highest 1-hour flow of combined releases exceeds 2,500 cfs, except for flood management, accidents, or maintenance, then the minimum flow shall not be less than 500 cfs less than that flow. The 1983 agreement also states that if the April 1 runoff forecast in a given year indicates that the reservoir level will be drawn to 733 ft, water releases for fish may be reduced, but not by more than 25 percent.

Instream Flow Requirements

The Oroville Facilities are operated to meet minimum flows in the Low Flow Channel as established by the 1983 agreement (see above). The agreement specifies that the Oroville Facilities release a minimum of 600 cfs into the Feather River from the Thermalito Diversion Dam for fisheries purposes. This is the total volume of flows from the Thermalito Diversion Dam Powerplant and the Feather River Fish Hatchery pipeline.

The Thermalito Afterbay Outlet is operated to meet minimum instream flow requirements as well as to meet demands for SWP delivery and Delta environmental protection. Flow releases through the Thermalito Afterbay Outlet do not normally vary on an hourly or even daily basis, but instead are scheduled on a weekly basis.

Feather River Temperature Requirements

There are several temperature objectives for the Feather River downstream of the Thermalito Afterbay Outlet. During the fall months, after September 15, the temperatures must be suitable for fall-run Chinook. From May through August, they must be suitable for shad, striped bass, and other warmwater fish.

The National Oceanic and Atmospheric Administration (NOAA) Fisheries has also established an explicit criterion for steelhead trout and spring-run Chinook salmon. DWR is required to control water temperature at Feather River mile 61.6 (Robinson Riffle in the Low Flow Channel) from June 1 through September 30 pursuant to a biological opinion (BO) on the effects of the CVP and SWP on Central Valley spring-

run Chinook and steelhead. This measure requires water temperatures less than or equal to 65°F on a daily average.

1995 Delta Water Quality Control Plan

Flows through the Delta are maintained to meet Bay-Delta water quality standards arising from DWR's water rights permits. These standards are designed to meet several water quality objectives such as salinity, Delta outflow, river flows, and export limits. The purpose of these objectives is to attain the highest water quality, which is reasonable, considering all demands being made on Bay-Delta waters. In particular, they protect a wide range of fish and wildlife including Chinook salmon, delta smelt, striped bass, and the habitat of estuarine-dependent species.

Water Quality Monitoring

SWP water quality monitoring by the Division of Operation and Maintenance for various inorganic, organic, and biological parameters has occurred regularly since 1968. Current water quality parameters monitored in Lake Oroville, Thermalito Forebay, and Thermalito Afterbay would continue under the new license for all alternatives. Nutrients are monitored twice a year, in April and November, at Oroville Dam. Aluminum, barium, cadmium, mercury, silver, chlorinated organics, organo-phosphorus pesticides, herbicides, carbamates, and other pesticides are monitored quarterly at Thermalito Forebay. At Thermalito Afterbay, nutrients are monitored twice a year while aluminum, barium, cadmium, mercury, and silver are monitored monthly and bromide and suspended solids are monitored quarterly.

Mosquito Abatement

DFG does not directly conduct mosquito abatement programs within the OWA. However, the annual operating budget includes up to \$40,000 per year (including up to \$20,000 that is contributed by DWR) that is paid to the local mosquito abatement district. This program consists of spraying pesticides in amounts and locations determined appropriate by abatement program staff.

Draft Biological Assessment Measures

DWR entered into informal consultation with USFWS to resolve terrestrial listed-species issues prior to the initiation of formal consultation to be conducted after license application filing. Measures are described in a terrestrial draft BA that has been submitted to USFWS by DWR. Several of the measures have been identified for early implementation (under the existing FERC license) to minimize or avoid take of federally listed species related to ongoing project activities. These measures are included in the No-Action Alternative and detailed in Appendix E.

Wood Duck Box Volunteer Program

DFG maintains wood duck/wildlife nest boxes each year with the help of public volunteers in the OWA. Although these nest boxes are intended for wood ducks,

many other types of wildlife also use them. The work associated with the nest box program includes cleaning as well as replacing those that are in disrepair.

3.2 PROPOSED ACTION

This section describes how the Oroville Facilities and project operations would be modified under the Proposed Action. The Proposed Action includes PM&E measures designed to address ongoing effects of project operations. These measures include those developed by the ALP Collaborative and USFWS during informal consultation. The Proposed Action also includes measures recommended by the results of the Recreation Needs Analysis (DWR 2004). Measures included in the Proposed Action are shown on Figure 3.2-1. The Proposed Action includes the existing measures as described in the No-Action Alternative, unless otherwise indicated.

3.2.1 Licensed Power Facilities

No new licensed power facilities or modifications of existing licensed power facilities are proposed under the Proposed Action.

3.2.2 Licensed Non-power Facilities

3.2.2.1 Feather River Fish Hatchery Facilities

No facilities modifications to the Feather River Fish Hatchery are included in the Proposed Action. A proposed Hatchery Adaptive Management Program (HAMP) would provide a framework for ongoing evaluation and improvements to the operations of the hatchery and would be designed to respond to changing regulatory, biological, and hydrologic conditions while fulfilling the original purpose of the hatchery. The Interpretation and Education (I&E) Program developed under the Proposed Action may include educational measures at the Feather River Fish Hatchery.

3.2.2.2 Oroville Wildlife Area

Under the Proposed Action, the OWA would continue to be managed for wildlife habitat, recreation, and limited gravel extraction. Environmental measures proposed for the OWA in the Proposed Action are described in Section 3.2.2.6, while recreation measures proposed are described in Section 3.2.2.3. The OWA is managed pursuant to the Oroville Wildlife Area Management Plan prepared in 1978. Management of the OWA by DFG as described in the No-Action Alternative would continue under the Proposed Action, and no new facilities in the OWA associated with the continued hydroelectric power generation of the project are proposed.

3.2.2.3 Recreation Facilities

Recreation Facilities—General

Under the Proposed Action, recreation facilities in the project area would be upgraded and modernized over the term of the new license to address current needs identified in the Recreation Needs Analysis and future needs based on monitoring as described in the Recreation Management Plan (RMP) (DWR 2005). In general, recreation facility changes would improve accessibility; provide additional and improved day use and trail facilities (parking areas, group day use shelters, picnic tables, sanitation facilities); and provide for campground expansion and/or improvements at Bidwell Canyon, Loafer Creek, the Thermalito Afterbay Outlet, and the floating campsites. The Proposed Action would also enhance boating facilities (including increased access during times of low reservoir level) and develop two ADA accessible bank-fishing piers (South Thermalito Forebay and Diversion Pool).

Recreation Facilities—Programmatic Elements

Recreation Management Plan

The Proposed Action includes the preparation and implementation of an RMP (draft RMP included as Appendix I) based on findings of the Recreation Needs Analysis (SP-R17). The RMP clarifies the role of DPR, DFG, the California Department of Boating and Waterways (DBW), and other entities to carry out DWR's responsibility for managing, maintaining, and developing recreational resources within the FERC project boundary. The RMP includes measures to address continued O&M and monitoring at existing and new recreation sites, periodic recreation monitoring through the term of the new license, identification of additional measures to be undertaken should use triggers be met, and compliance with ADA requirements and other applicable regulations. The RMP also includes the development and implementation of a comprehensive non-motorized trails program.

Law Enforcement. The RMP included in the Proposed Action clarifies the roles of the various entities with enforcement responsibilities for facilities within the FERC project boundary and clearly defines the enforcement responsibilities and expected protocols to ensure the safety of recreation users and protection of environmental resources in the FERC project boundary.

Recreation Monitoring Program. Monitoring activities are described in a Recreation Monitoring Program included in the RMP that details process, data collection methodology, indicators, and standards that trigger when proposed capital measures and O&M related measures would be implemented over the course of the license.

Interpretation and Education Program. The Proposed Action proposes development of a project-wide I&E Program as described in the RMP to include measures such as the installation of additional interpretive and educational signage at various locations within the FERC project boundary and the provision of timely information to boaters regarding changing access conditions and alternative boating facility availability.

Another element of the proposed I&E Program is the provision of new directional signs at various locations within the FERC project boundary. Specific funding to promote the project recreation facilities would be eliminated in the Proposed Action; however, the website would remain and DWR would continue to promote the recreation facilities consistent with other SWP facilities.

Operations and Maintenance Activities. Project-wide operations and maintenance activities proposed in the Proposed Action include increased debris removal at boat ramps and adjacent recreation facilities and more frequent adjustment of floating docks. In addition, a FERC License Coordination Unit located at the Oroville Field Division would facilitate license compliance activities. Other operations and maintenance activities are described in Section 3.2.3.2.

Recreation Facilities—Lake Oroville

Bidwell Canyon Campground, Day Use Area, Boat Ramp and Marina

The Proposed Action includes measures at Bidwell Canyon designed to expand parking opportunities, maximize boat-launching capacity, and enhance ADA accessibility to the marina. Measures include the creation of 190 additional parking spaces at Bidwell Marina and widening of the Bidwell Canyon Campground loop road to accommodate current and anticipated future user needs. Expansion of Bidwell Marina parking facilities would necessitate the construction of a new replacement campground loop adjacent to the remaining "Gold Flat" loop to compensate for the loss of campground space. If insufficient space is available to replace the 38 campsites currently at the site, up to 15 sites would be added at Loafer Creek Campground.

The Proposed Action proposes construction of a new, low-water-access boat ramp at Bidwell Canyon. Bidwell Canyon presents the most feasible location on Lake Oroville for construction of a low-water ramp due to topography, security, and access issues. The additional boating dock planned for Bidwell Marina would improve boat launching/retrieval efficiency. The low-water-access ramp would start at about elevation 750 and extend to elevation 640 (reservoir conditions allowing), providing for continued use of Lake Oroville by boaters even during low water conditions.

Loafer Creek Campground, Day Use Area, Boat Ramp, and Equestrian Campground

The Proposed Action includes measures to improve boat launch capacity at Loafer Creek through the addition of additional boarding docks. It includes the construction of a new camp loop for the two new group RV campsites with utilities, enhancement of ADA accessibility at the Loafer Creek Group and Equestrian Campgrounds, and improvement for shoreline access and ADA accessibility to the day use area, swimming beach, and cove. The swim beach constructed as part of the original facilities is often inaccessible during a significant portion of the high-use summer season as water levels drop below the beach elevation. A feasibility study would be conducted to evaluate the possibility of providing improved swimming opportunities at

either Loafer Creek or Lime Saddle during the primary 4-month recreation season, and recommendations from that study may be implemented under the Proposed Action.

Lime Saddle Campground, Day Use Area, Boat Ramp, and Marina

Under the Proposed Action, the existing marina would be updated for enhanced ADA accessibility. The licensee would also encourage and support DPR and the concessionaire in restoration of the storm-damaged marina structures, and add boarding dock(s) if feasible and advantageous to maximize launching capability. The Proposed Action also proposes to conduct a feasibility study of costs, benefits, and options to provide new swimming opportunities in the future at Lime Saddle during the primary 4-month recreation season.

Spillway Boat Ramp/Day Use Area

No additional measures are included at this location in the Proposed Action. The need for additional launching capabilities during low-water conditions is met through the construction of a new low-water ramp at Bidwell Marina. The Spillway location was eliminated from consideration for a new low-water ramp due to increased security concerns with the proximity of this location to critical structural components of the project.

Enterprise Boat Ramp and Day Use Area

The Proposed Action includes the development of a low-water boat ramp and boarding dock at Enterprise to meet user demand during a wider range of water level conditions. The new ramp would begin at or near the foot of the existing ramp and extend to approximately 750 ft elevation with gravel parking near the toe of the ramp extension if topography permits. Exact alignment would depend on cultural resource surveys and engineering studies. DWR would also construct ten picnic sites at this location.

Nelson Bar Car-top Boat Ramp

No additional facilities are included in the Proposed Action for this location. The site would be monitored for use and effects consistent with the RMP.

Vinton Gulch Car-top Boat Ramp

No additional facilities are included in the Proposed Action for this location. Improved directional signage at this location is included in the Proposed Action as a component of the proposed I&E Program. The site would be monitored for use and effects consistent with the RMP.

Dark Canyon Car-top Boat Ramp

The Proposed Action includes the construction of the defunct toilet building at this location. Improved directional signage at this location is included in the Proposed Action as a component of the proposed I&E Program. The site would be monitored for use and effects consistent with the RMP.

Stringtown Car-top Boat Ramp

This boat ramp uses a remnant of a pre-project road that is now largely inundated by Lake Oroville. This car-top ramp and its concrete surface will continue to be maintained above elevation 866 ft msl. The asphalt portion below that elevation affords access to Lake Oroville during lower reservoir levels, but will continue to degrade as a result of seasonal saturation associated with fluctuating reservoir elevations. Under the Proposed Action, a sign would be installed indicating that users of the boat ramp do so at their own risk. Improved directional signage from the main access road is included in the Proposed Action as a component of the proposed I&E Program.

Foreman Creek Area

Due to the large number of archaeological sites in the Foreman Creek area, the Historic Properties Management Plan (HPMP) developed for the project area would be needed to assist in both improving and redirecting recreational usage to specific areas of Foreman Creek to prevent future damage to historic properties and culturally sensitive areas. The Proposed Action includes redirection of recreational use as recommended in the HPMP and installation of a vault toilet, trash receptacle, and picnic tables. Educational measures designed to provide information regarding the protection and preservation of cultural and other sensitive resources at Foreman Creek and other areas within the FERC project boundary are included in the Proposed Action as a component of the proposed I&E Program.

Lake Oroville Visitors Center

No additional measures are included in the Proposed Action at this location.

Saddle Dam Trailhead

The Proposed Action includes the development of a short trail to provide shoreline access at this site.

Boat-in Campgrounds

No additional measures are included at the BICs in the Proposed Action.

Oroville Dam Overlook Day Use Area

No additional measures are included in the Proposed Action at this location.

Floating Campsites

The Proposed Action would relocate three of the existing floating campsites on Lake Oroville to the Lime Saddle area. The three campsites would be identified in consultation with DPR.

Recreation Facilities—Diversions Pool

Diversions Pool Day Use Area (Northwest Side of Diversions Pool)

The Proposed Action would provide additional day use facilities, including 10 new picnic sites with pole grills along the Diversions Pool. The Proposed Action also includes construction of an ADA accessible fishing pier or platform at a suitable Diversions Pool location.

Lakeland Boulevard Trailhead (Southeast Side of Diversions Pool)

Vehicle access, day use facilities, and parking would be added near the trailhead at Lakeland Boulevard. This includes a car-top boat ramp that would create new access on the south side of the Diversions Pool. Limited day use facilities would include a gravel parking area, restroom, picnic tables, pole stoves, and access to water for hikers. Fencing would be installed as appropriate to separate the access road and proposed day use facilities from the railroad tracks.

Recreation Facilities—Low Flow Channel/Feather River

Sewim Bo River Trail

No additional measures are included in the Proposed Action at this location.

Recreation Facilities—North Thermalito Forebay

North Thermalito Forebay Boat Ramp/Day Use Area/Aquatic Center/En-Route Campground

The Proposed Action would evaluate options to warm the water for enhanced swimming opportunities while protecting water quality in the swim areas. It would also provide new non-motorized trail opportunities in Thermalito Forebay as a component of the proposed trails program included in the RMP. The Proposed Action would provide additional limited shoreline access consistent with federal and State Endangered Species Act (ESA) species protection, as well as provide basic facility improvements to the Aquatic Center.

South Thermalito Forebay Boat Ramp/Day Use Area

The Proposed Action includes the installation of an ADA accessible fishing pier and additional day use and swimming facilities, such as a sandy swim beach, additional landscaping and shade trees, five to ten additional picnic tables with pole grills, and

paved parking areas. The Proposed Action also includes the provision of new trail opportunities in the area as recommended in the proposed Trails Program included in the RMP.

Recreation Facilities—Thermalito Afterbay

The Proposed Action proposes to protect wildlife values in Thermalito Afterbay by reducing boat speeds north of SR 162.

Wilbur Road Boat Ramp

Improved directional signage at this location is included in the Proposed Action as a component of the proposed I&E Program.

Larkin Road Car-top Boat Ramp

The Proposed Action includes installation of ten family picnic tables with shade structures, a swim beach area, and restroom improvements. Directional signs would be posted at key locations along the route to Larkin Road Car-top BR as a component of the proposed I&E Program.

Monument Hill Boat Ramp and Day Use Area

No additional measures are included in the Proposed Action at this location.

Model Aircraft Flying Facility

No additional measures are included in the Proposed Action at this location.

Recreation Facilities—Oroville Wildlife Area

Oroville Wildlife Area Afterbay Outlet Boat Ramp/Day Use Area/Campground

The Proposed Action would resolve existing conflicts between wildlife management objectives and recreational activities in the OWA in coordination with DPR, DFG, and other appropriate agencies by developing a comprehensive description of recreation and wildlife management priorities and responsibilities, including specific recommendations within the RMP. The Proposed Action also would evaluate options to provide additional revenue for new services or facilities within the OWA.

The Proposed Action includes construction of an organized camping facility at the Thermalito Afterbay Outlet to discourage unauthorized camping. Day use facilities, including picnic tables and pole grills, would be added near the river but at some distance from the camping facilities. Increased visitor management and enforcement would be implemented to enforce fishing regulations and other use restrictions within the OWA. A Wildland Fire Evacuation Plan would be developed and implemented for the OWA.

Directional signs would also be posted at key locations along the route to the Thermalito Afterbay Outlet BR and Campground as a component of the proposed I&E Program.

Oroville Wildlife Area Dispersed River and Pond Access Sites

To improve the aesthetic appearance of the area, the Proposed Action would provide additional trash receptacles and trash pick-up at locations where trash accumulation is an issue. Regulatory and educational signage detailing illegal fishing and consequences would be posted at the Feather River. These measures would be coupled with increased enforcement of regulations within the OWA and would include the use of vehicle barriers to limit access to selected areas within the OWA. The dispersed sites would be monitored for use and effects consistent with the RMP.

Two ADA accessible Watchable Wildlife sites would be constructed and operated within the OWA to increase wildlife viewing opportunities.

Dispersed Use Sites Outside the Oroville Wildlife Area

This PM&E measure would include periodic monitoring for new dispersed use sites within the project area. New sites would be identified with the goal of managing the sites before degradation or damage occurs.

3.2.2.4 Cultural Resources

Under the Proposed Action, measures for the protection of, or compensation for the ongoing project effects on, cultural resources are proposed including the development of the HPMP. These measures were developed in compliance with the requirements of Section 106 of the National Historic Properties Act (NHPA). These measures include developing a programmatic plan to determine when the stabilization of historic properties is appropriate, conducting data recovery of historic properties subject to imminent loss, restricting public access at specific BICs, and limiting travel outside of designated areas by motorized wheeled vehicles. The Proposed Action also includes measures to expand the existing Site Stewardship Program, to identify and set aside areas for planting and/or harvesting traditionally used plants, to develop and implement an interpretive and educational signage program, and to establish a curation facility for housing archaeological collections associated with the Oroville Facilities. These measures will be documented more fully in the HPMP prepared in accordance with the guidelines for HPMPs issued by FERC and the Advisory Council on Historic Preservation (FERC and ACHP 2002).

3.2.2.5 Land Use, Management, and Aesthetics

In addition to the continuation of measures described in the No-Action Alternative, the Proposed Action includes a measure to screen the material storage area located north of the Oroville Dam emergency spillway to improve the aesthetic appearance of the area, as well as the development and implementation of a debris management

strategy to continue to collect and remove debris at McCabe Creek while protecting sensitive cultural resources.

3.2.2.6 Environmental Measures

Environmental measures included in the Proposed Action are designed to address ongoing effects of project operations over the term of the new license. In general, the Proposed Action includes environmental measures that improve fish spawning and rearing habitat to complement ESA species recovery programs, provide additional habitat for waterfowl, protect bald eagle and vernal pool habitat, and include provisions for other terrestrial ESA species protection. To protect the wildlife values of the Thermalito Afterbay as a subunit of the OWA, a speed limit of 5 mph would be enforced on Thermalito Afterbay north of SR 162.

Natural Salmonid Spawning and Rearing Habitat

The Proposed Action includes improvements to approximately 800 linear feet of salmonid spawning and rearing habitat at Moe's Ditch and Hatchery Ditch. The measure would include a monitoring program to evaluate success of the habitat improvement activities.

A Large Woody Debris Supplementation and Improvement Program would be developed and implemented under the Proposed Action. The program would increase habitat and create additional cover, edge, and channel complexity using large woody debris and boulder placement. This measure is designed to address the incremental loss of large woody debris resulting from the continued blockage of large woody debris recruitment to the lower Feather River from upstream of Oroville Dam. Likewise, a Gravel Supplementation and Improvement Program included in the Proposed Action would address the continued blockage of gravel from upstream sources.

The Gravel Supplementation and Improvement Program would be developed and implemented to increase the quantity and improve the quality of spawning habitat for spring-run Chinook salmon and steelhead in the Low Flow Channel, from the Fish Barrier Dam downstream to the Thermalito Afterbay Outlet, and the High Flow Channel downstream of the Thermalito Afterbay Outlet. This program includes gravel placement in the vicinity of the Fish Barrier Dam and directly placed and spread at targeted spawning riffles. The program includes active management through ripping and raking at appropriate areas within the Low Flow Channel.

Salmonid Genetics

To assist in ESA species recovery, the Proposed Action includes the construction and operation of fish barrier weirs and a salmon egg-taking station for fall-run Chinook salmon downstream of the Fish Barrier Dam in the Low Flow Channel. This measure would not require any changes in flow conditions and would provide an opportunity to segregate the spring and fall runs of Chinook salmon in the Feather

River while also addressing concerns about high salmonid spawning densities in the Low Flow Channel.

Feather River Fish Hatchery

DWR would continue to operate the hatchery the same as under the No-Action Alternative, but with the development of a HAMP. The basic objective of this program is to adaptively manage hatchery practices to respond to changing conditions. DFG, in coordination with DWR, would use adaptive management to operate the Feather River Fish Hatchery to maintain production goals, broaden release strategies, evaluate current marking program effectiveness, and continue to minimize diseases potentially propagated by the hatchery.

The hatchery temperature targets and the salmonid marking program as described in the No-Action Alternative are planned to continue under the Proposed Action.

Lower Feather River Fishery—Sturgeon Passage

No measures are included in the Proposed Action for this activity.

Sport Fishery Management

No additional measures are included in the Proposed Action for this activity.

Terrestrial Habitat in Thermalito Afterbay

Four measures are recommended as part of the Proposed Action to increase waterfowl habitat, food sources, and nest cover in the project area. Four additional brood ponds would be constructed adjacent to Thermalito Afterbay. The additional brood ponds would provide potential habitat suitable for migratory birds, giant garter snake, bald eagles, red-legged frogs, and other species listed under the California Endangered Species Act (CESA) and the Federal Endangered Species Act (FESA).

To ensure that waterfowl brood ponds retain sufficient water to remain functional throughout the primary waterfowl brooding season, the Proposed Action proposes to recharge the brood ponds at 3-week intervals for the brooding period from approximately April 15 to June 31.

The Proposed Action includes the development of approximately 60 acres of upland food enhancement to augment wintering nesting waterfowl and upland game bird food sources in the vicinity of Thermalito Afterbay. The Proposed Action also includes the development of upland waterfowl nest cover. This involves annual maintenance and development of approximately 240 acres of waterfowl nesting cover within the Thermalito Afterbay portion of the OWA on a rotational basis.

Terrestrial Habitat in the Oroville Wildlife Area

The Proposed Action proposes to install and maintain additional wildlife nesting boxes in the OWA to enhance nesting use and wood duck production within portions of the project area. This measure is designed to supplement an ongoing DFG habitat improvement practice.

Vegetation and Wildlife Management

The Proposed Action proposes development and implementation of an Invasive Species Management Plan to reduce noxious non-native plant species populations and replace them with appropriate native plants, targeting the Thermalito Complex, the OWA, and selected lands around Lake Oroville. Management methods would include a combination of mechanical, manual, and chemical efforts to remove noxious species. Most species would need multiple-year treatments and monitoring.

Draft Biological Assessment Measures

The Proposed Action includes draft BA measures recommended by USFWS during informal consultation associated with the relicensing effort. In addition to those measures described in the No-Action Alternative, the Proposed Action includes measures recommended by USFWS to address giant garter snake habitat, bald eagle habitat, vernal pool related species, California red-legged frog, and valley elderberry longhorn beetle. These measures are described in detail in the draft BA covering terrestrial resources, a copy of which is included in Appendix E1 of this PDEA.

3.2.3 Project Operations

No modifications to project operations related to minimum flows, ramping rates, water supply, flood protection, or temperature criteria and targets (as described in the No-Action Alternative) are included in the Proposed Action. Operational changes that are being proposed for environmental reasons are described under Section 3.2.2.6, Environmental Measures.

3.2.3.1 Water Quality

In addition to continuing measures described in the No-Action Alternative designed to meet water quality standards, the Proposed Action includes monitoring of bacteria levels at swim areas and a companion educational component designed to inform the public about potential sources of bacteria in the water. The Proposed Action also includes a component designed to educate the public regarding potential health issues related to the consumption of contaminated fish from project waters. These measures are designed to protect public health, improve water quality at specific designated or developed recreation/swim areas, and develop appropriate public notification of health issues.

3.2.3.2 Operations and Maintenance

In addition to O&M activities included in the RMP, the Proposed Action proposes specific O&M measures to be approached programmatically including managing off-highway vehicle (OHV) use effects, managing litter accumulation and dumping, managing user-defined trails, and managing dispersed site pioneering and creep.

Generally, increased debris removal would be provided at boat ramps and adjacent facilities at Bidwell Canyon, Lime Saddle, Loafer Creek, and Spillway. The removal of floating woody debris that accumulates at the boat ramps during periods of high water, as well as the removal of sand and mud deposits from the ramps as the water level decreases, should enhance recreational access, experience, and safety.

As needed, more frequent adjustment of the boarding dock(s) at the boat ramps would also be provided at Bidwell Canyon, Loafer Creek, Spillway, and Lime Saddle during times of reservoir drawdown.

The Proposed Action would require enforcement of reduced boat speeds on Thermalito Afterbay north of SR 162 and increased visitor management and enforcement of regulations within the OWA. The Proposed Action also includes additional trash pick-up along the Feather River at access points within the OWA where trash accumulation is a problem.

The Proposed Action includes continued annual O&M and periodic use and effect monitoring consistent with the RMP at all campgrounds (including boat-in and floating campsites), boat ramps, trailhead access points, day use areas, the Visitors Center, and the Feather River Fish Hatchery.

3.3 ALTERNATIVE 2

This section describes how the project facilities and project operations would be modified under Alternative 2. Alternative 2 includes all measures described in the Proposed Action (including the No-Action Alternative measures included in the Proposed Action) unless otherwise indicated. Alternative 2 includes PM&E measures to address the same ongoing effects and direct effects of project operations as with the Proposed Action. However, the additional measures included in Alternative 2 are not preferred by the licensee because they may adversely affect operational flexibility, may not have an apparent project nexus, may not represent the best balance of project resources, and in many cases are not well supported by the study results. Some measures included in Alternative 2 are additional measures that were suggested in the Collaborative by resource agencies. Others are recreational enhancement measures that were supported in the Collaborative by some local stakeholder groups to meet their interpretation of what is an appropriate level of recreation development. Measures included in Alternative 2 are shown in Figure 3.3-1.

3.3.1 Licensed Power Facilities

No new licensed power facilities or modifications of existing licensed power facilities are proposed under Alternative 2.

3.3.2 Licensed Non-power Facilities

3.3.2.1 Feather River Fish Hatchery

Facility modifications to the Feather River Fish Hatchery are included in Alternative 2. The proposed Hatchery Adaptive Management Program described in the Proposed Action would be included in Alternative 2 and supplemented with a water sterilization element for upstream fish stocking disease control. The sterilization apparatus would need a power source and some construction is expected at the Feather River Fish Hatchery to house the equipment and make the necessary connections although no designs are available. The Interpretive and Education Program developed under the Proposed Action, which may include educational measures at the hatchery, would also be included in Alternative 2.

3.3.2.2 Oroville Wildlife Area

Under Alternative 2, the OWA would be managed in the same manner as described in the Proposed Action.

3.3.2.3 Recreation Facilities

Recreation Facilities—General

In addition to the measures described in the Proposed Action, Alternative 2 includes a Trails Program that (contingent upon FERC approval) would convert most trails into multi-use trails, except for trails not recommended by DPR for multi-use due to safety considerations; additional campground facility enhancements at Bidwell Marina, Loafer Creek, and Lime Saddle campgrounds; facilities to support special events; and creation of a whitewater park.

Recreation Facilities—Programmatic Elements

Recreation Management Plan

Alternative 2 includes an RMP with a Safety and Law Enforcement component, a Recreation Monitoring Program, I&E Program, and O&M activities as described in the Proposed Action.

Recreation—Lake Oroville

Bidwell Canyon Boat Ramp/Campground/Day Use Area/Marina

Alternative 2 would provide an additional parking lot for periods of high pool levels, would modify an existing group meeting room into a new campground activities center, and would add a camp store shell (1,000 sq ft building) for operation by a concessionaire to support expansion of the campground facilities. Under Alternative 2, a temporary event grandstand space for use by event organizers or concessionaires during fishing tournaments would be created in the parking area.

Loafer Creek Boat Ramp/Day Use Area/Campground/Group Campground/Equestrian Campground

Alternative 2 would include construction of a new campground activity center and a swimming facility either at Loafer Creek or at Lime Saddle, depending on results of a feasibility study, and opening a gravel access road for use as a car-top boat launch to reservoir elevation 750 ft above msl.

Lime Saddle Boat Ramp/Day Use Area/Campground/Marina

Alternative 2 would include provision of a new day use area at Parish Cove with a courtesy dock linked by trail access to Lime Saddle Campground. It would also include a trail linking the marina directly to the campground, as well as upgrading existing picnic tables and shade structures. Alternative 2 proposes providing a new low-water boat ramp at Lime Saddle.

Alternative 2 would include the construction of 25–50 new RV/tent campsites and a new group RV campsite if monitoring results demonstrated such a need. Alternative 2 would also include construction of approximately 50–60 new parking spaces, possibly using the adjacent PG&E parcel (which would require purchasing from PG&E) to relocate the existing maintenance yard to make room for the parking lot.

Spillway Boat Ramp/Day Use Area

Alternative 2 would include extending the boat ramp at the Spillway location to permit boat launching during low reservoir level (below 695 ft) periods. This alternative would also evaluate the RV “en-route” camping currently allowed at the Spillway and modify facilities and/or operations as necessary.

Enterprise Boat Ramp and Nelson Bar, Vinton Gulch, and Dark Canyon Car-top Boat Ramps

There are no additional measures under Alternative 2 for any of these boat launch facilities.

Foreman Creek Car-top Boat Ramp

The measures for Alternative 2 are the same as those under the Proposed Action.

Stringtown Car-top Boat Ramp

Alternative 2 would add picnic tables and upgrade the vault restroom at this location. A larger parking and turnaround area would also be provided.

Lake Oroville Visitors Center

No additional measures are included in Alternative 2 for this location. The Lake Oroville Visitors Center would be operated as currently operated for project visitors and educational programs.

Saddle Dam Trailhead

No additional measures are included in Alternative 2 for this location.

Oroville Dam Overlook Day Use Area

Alternative 2 would include construction of approximately 30–50 additional parking spaces at this location.

Floating Campsites

Alternative 2 would include construction of three additional floating campsites on Lake Oroville.

Upper North Fork Arm Below Poe Powerhouse

Alternative 2 would provide services for whitewater boaters in the upper North Fork, including consideration of a potential future boater take-out or a potential non-motorized watercraft tow service for whitewater boaters who run the North Fork Feather River, as well as real-time river flow data and Lake Oroville reservoir pool level data accessible to the public via the Internet, flow phone, or other means.

Recreation—Diversion Pool

Diversion Pool DUA (Northwest Side of Diversion Pool)

Alternative 2 includes the development of additional day use and boat launch sites for trail users and boaters along both the north and south shores of the Diversion Pool to include picnic tables, pole stoves, and trash receptacles. This measure would also provide shoreline access to the north side of the Diversion Pool.

Alternative 2 would also involve creation of a competition-style public artificial channel for whitewater boating activities on the right bank below the Diversion Pool with support facilities including parking, stairs, restrooms, and grandstands. The

whitewater channel would require periodically diverting 400 to 1,000 cfs from the river through the channel and back to the river downstream.

Alternative 2 also includes the construction of a flexible event center on DWR property next to the Diversion Dam to include arena fencing, utilities, grandstand seating, small concession office building, parking, and restrooms.

Recreation—Low Flow Channel/Feather River

Feather River Fish Hatchery

Alternative 2 would include construction of spawning riffle access near the Feather River Fish Hatchery where natural salmonid spawning activity could be observed.

Recreation—North Thermalito Forebay

North Thermalito Forebay Boat Ramp/Day Use Area/Aquatic Center/ En-Route Campground

No additional measures are included in Alternative 2 for this location.

Recreation—South Thermalito Forebay

No additional measures are included in Alternative 2 for this location.

Recreation—Thermalito Afterbay

Alternative 2 would reduce maximum boat speeds to 5 mph north of Highway 162 in the Thermalito Afterbay for wildlife concerns.

Thermalito Afterbay—Wilbur Road Boat Ramp, Larkin Road Car-top Boat Ramp, and Monument Hill Boat Ramp/Day Use Area

No additional measures are included in Alternative 2 for these locations.

Recreation—Oroville Wildlife Area

Oroville Wildlife Area Afterbay Outlet Boat Ramp/Day Use Area/Campground

No additional measures are included in Alternative 2 for these locations.

Oroville Wildlife Area Dispersed River and Pond Access Sites, and Dispersed Use Sites

No additional measures are included in Alternative 2 for these locations.

3.3.2.4 Cultural Resources

In addition to the measures described in the Proposed Action, Alternative 2 would include the relocation of highly visible mortar cupules from the riprap embankment near the fish hatchery to a setting where they can be protected and appreciated. Alternative 2 also includes additional funding support for the Site Stewardship Program described in the Proposed Action.

3.3.2.5 Land Use, Management, and Aesthetics

Alternative 2 includes the development, in coordination with other responsible entities, of a Fuel Load Management Plan and cost-sharing strategy to reduce fuels along the urban/wildland interface. Alternative 2 also calls for the transfer of U.S. Bureau of Land Management (BLM) lands currently contained within the FERC boundary to the licensee.

3.3.2.6 Environmental Measures

Alternative 2 includes all measures described in the Proposed Action (including the No-Action Alternative measures included in the Proposed Action) unless otherwise indicated. In addition to most of the measures included in the Proposed Action, Alternative 2 provides for increased spawning habitat downstream of Oroville Dam, and structural changes to assist sturgeon passage in the lower Feather River.

Natural Salmonid Spawning and Rearing Habitat

In addition to the Large Woody Debris and Gravel Supplementation and Improvement Programs described under the Proposed Action, Alternative 2 would create additional gravel spawning habitat.

Salmonid Genetics

No additional measures are included in Alternative 2 related to salmonid genetics.

Feather River Fish Hatchery

In addition to the Hatchery Adaptive Management Program described under the Proposed Action, Alternative 2 includes a water sterilization component to assist in disease management within the upstream stocking program and a marking program that would mark all hatchery-reared steelhead and spring-run Chinook salmon.

Lower Feather River Fishery—Sturgeon Passage

Alternative 2 would make structural modifications as necessary at Shanghai Bench and the Sunset Pumps diversion to allow passage for sturgeon.

Sport Fishery Management

No additional measures are included in Alternative 2 related to sport fishery management.

Terrestrial Habitat at Thermalito Afterbay

No additional measures are included in Alternative 2 related to terrestrial habitat at Thermalito Afterbay.

Terrestrial Habitat at Oroville Wildlife Area

No additional measures are included in Alternative 2 related to terrestrial habitat at the OWA.

Vegetation and Wildlife Management

No additional measures are included in Alternative 2 related to vegetation and wildlife management measures.

Draft Biological Assessment Measures

Alternative 2 includes draft BA measures recommended by USFWS during informal consultation associated with the relicensing effort, as described under the No-Action Alternative and the Proposed Action.

3.3.3 Project Operations

No modifications to project operations related to ramping rates, water supply, or flood protection are included in Alternative 2, except for the flow-increase in the Low Flow Channel and the adjustment of temperature criteria at Robinson Riffle.

3.3.3.1 Minimum Flows

Alternative 2 includes a proposal to increase minimum releases to the Low Flow Channel to 800 cfs. Minimum flows would be maintained within the Feather River downstream from the Thermalito Diversion Dam and the Feather River Fish Hatchery, except when total release to the Feather River is less than 800 cfs. If the total flow in the High Flow Channel is less than 800 cfs, then the flow in the Low Flow Channel would be reduced to that amount. All other minimum flow measures (as described under the Proposed Action) would continue under Alternative 2.

3.3.3.2 Temperature Criteria/Targets

Alternative 2 sets new temperature criteria/targets for the Feather River at Robinson Riffle (see Table 3.3-1). In general, the temperatures are lower during summer months to protect coldwater species in the lower Feather River. Alternative 2 includes a proposal to increase the minimum flow in the Low Flow Channel to 1,200

cfs from May 1 to June 15, except when total release to the Feather River is less than 1,200 cfs. If the total flow in the High Flow Channel is less than 1,200 cfs, then the flow in the Low Flow Channel would be reduced to that amount. This action would increase the residence time for water in Thermalito Afterbay, thereby potentially increasing the temperature of irrigation water released during critical growing periods for rice.

Table 3.3-1. Alternative 2 water temperature objectives for Robinson Riffle.

Dates	Temperature Objective (°F)
January 1 - April 30	54
May 1 – May 31	60
June 1-15	63
June 16 - August 31	64
September 1 – October 15	58
October 16 – November 30	56
December 1 - 31	54

3.3.3.3 Operations and Maintenance

No additional measures are included in Alternative 2 related to operations and maintenance activities.

3.3.3.4 Water Quality

No additional measures related to water quality are included in Alternative 2.

3.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The following identifies several alternatives that are not evaluated in detail within the PDEA. In one form or another, these alternatives involve either transferring the operation and maintenance of the Oroville Facilities to another governmental entity or discontinuing power generation. None of these potential scenarios is considered reasonable or even remotely likely. Briefly discussed below are non-power license, decommissioning, Oroville Dam removal and decommissioning, and federal takeover.

3.4.1 Federal Takeover

A federal department or agency may file a recommendation that the United States exercise its right to take over a hydroelectric power project with a license that is subject to Sections 14 and 15 of the Federal Power Act (FPA). The recommendation must be filed no earlier than 5 years before the license expires and no later than the end of the comment period specified by FERC. Federal takeover and operation of the Oroville Facilities would require Congressional approval as provided under Section 14 of the FPA. Furthermore, should a takeover occur, DWR must follow procedures relating to takeover and relicensing as outlined in 18 Code of Federal Regulations (CFR) Part 16.

Although these facts alone would not preclude further consideration of this alternative, there is no evidence showing that a federal takeover should be recommended to Congress. No party has suggested that federal takeover would be appropriate, and no federal agency has expressed interest in operating the Oroville Facilities. Therefore, federal takeover of the Oroville Facilities is not considered further in this PDEA.

3.4.2 Nonpower License

The alternative in which FERC would issue a nonpower license is not evaluated in detail in the PDEA for several reasons. A nonpower license is a temporary license that FERC would terminate whenever it determines that another governmental agency will assume regulatory authority over and supervision of the lands and facilities covered by the nonpower license. FERC, under the authority of the FPA, allows licensees to apply for nonpower licenses, which permit the licensees to cease operation of their power generation facilities. When a licensee proposes to cease operation of these facilities, FERC regulations require that the licensee prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS) in accordance with NEPA, CEQ guidelines, and other applicable laws.

Furthermore, the licensee must provide information required under 18 CFR 16.11 including but not limited to: (1) a proposal that shows the manner in which the licensee plans to remove or otherwise dispose of the project's power facilities; (2) a proposal to repair or rehabilitate any nonpower facilities; and (3) a statement of the costs associated with removing the project's power facilities and with any necessary restoration and rehabilitation work.

Under this alternative, the nonpower license would continue to cover and address all of the Oroville Facilities, which include Lake Oroville, Oroville Dam, the Hyatt Pumping-Generating Plant, Thermalito Pumping-Generating Powerplant, Thermalito Diversion Dam Powerplant, Thermalito Forebay, Thermalito Afterbay, and associated recreational and fish and wildlife preservation and enhancement facilities. DWR could be required to maintain the recreational facilities, Feather River Fish Hatchery, and the OWA.

Under a nonpower license, the three Oroville power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating Plant) would remain in place, continue to operate for a limited amount of time, and eventually become inoperable. The dams and the powerhouse intakes would remain operable. The facilities could no longer be used to generate power, but they would retain their role in flood management, recreation, environmental purposes (fisheries and wildlife habitat enhancement), and water delivery (irrigation, salinity control, conditions in the Delta, etc.).

A termination of facility operations, temporary or otherwise, would have significant effect on power supply for the State's power grid by eliminating 762 MW, or roughly 2 percent, of the State's peak supply. Additionally, ancillary system benefits,

including spinning reserves, non-spinning reserves, peaking capacity, and grid stability, would be lost, and the cost of developing replacement power would be considerable.

At this point, no agency has suggested a willingness or ability to assume regulatory authority and supervision over the lands and facilities covered by the nonpower license. No party has sought a nonpower license, and there is no basis for concluding that the Oroville Facilities should no longer be used to produce power. Additionally, a nonpower license would not support the purpose and needs of the Oroville Facilities that relate to producing electric power to provide pumping energy needed for the SWP. Given this and the other factors outlined above, a nonpower license for the Oroville Facilities is not considered further in this PDEA.

3.4.3 Project Retirement/Decommissioning

Project retirement could result from:

- DWR notifying FERC that it sought to surrender its license;
- DWR failing to file its license application; or
- An order of termination issued by FERC based on an implied surrender.

None of the foregoing conditions are reasonably foreseeable; nonetheless, to fulfill the intent of the ALP, the PDEA includes the following discussion of project retirement.

The regulations pertaining to nonpower licenses under FERC, the FPA, NEPA, and the CFR as outlined above would also apply to retirement or decommissioning without dam removal. Under the alternative of decommissioning without dam removal, the three Oroville power plants would be removed, the equipment salvaged or disposed of, and the powerhouse sites graded and restored. The dams and powerhouse intakes would remain operable. Similar to the arrangement under the nonpower alternative, the facilities could no longer be used to generate power, but they would retain their role in water supply, flood management, recreation, and environmental purposes. This alternative differs from the nonpower alternative described above in that the generation plants would be removed or become permanently inoperable.

Under 18 CFR 6.2, the licensee may surrender its license if it has satisfied all conditions imposed by FERC to protect the public interest, including those related to disposition of constructed facilities. The licensee is also required to file a schedule for the submittal of a surrender of license; file a surrender application according to the approved schedule; and provide for disposition of all project facilities. Where project facilities have been constructed on federal lands, the licensee must restore the project lands to a satisfactory condition and continue paying annual charges until the effective date of the order accepting surrender. Once decommissioning has been

completed and the area has been restored to a satisfactory condition, FERC would no longer be involved with the Oroville Facilities.

The purpose of this action would be to decommission while maintaining the impoundment and the critical nonpower related roles performed by the Oroville Facilities. If the dams were not removed, they would have to be maintained to prevent dam failures and the attendant threat to public safety. Additionally, the dams would need to be maintained to allow the Oroville Facilities to continue their role in flood management, recreation, environmental purposes, and water delivery.

Decommissioning would have a significant, long-term effect on power supply to the State's power grid (see Chapter 2.0). Additionally, decommissioning would not support the primary purpose and needs of the Oroville Facilities that relate to providing electric power. Therefore, decommissioning of the Oroville Facilities has been eliminated from further consideration.

Under the dam removal and decommissioning alternative, Oroville Dam would be removed and the Hyatt Pumping-Generating Plant would be decommissioned. The Thermalito Diversion Dam Powerplant and Thermalito Pumping-Generating Plant could remain in place for power generation with unregulated flows from the Feather River. Because Lake Oroville would no longer exist in its current configuration to provide adequate water storage and release, the remaining generating plants, if left in place, could operate similar to run-of-river plants, losing much of their capability to provide reliable energy and ancillary services such as spinning reserves, peaking capacity, and grid stability. Thermalito Diversion Dam would likely remain in place, continuing to divert water to Thermalito Forebay and Thermalito Afterbay, allowing these facilities to continue their role in recreation, environmental purposes, and water delivery for local irrigation. These roles would also continue for the Fish Barrier Dam and the Thermalito Afterbay Dam, which would remain in place.

The primary purpose of this action would be to restore much of the Lake Oroville area to its original natural habitat. This alternative, however, would have significant negative effects. The facilities could still play vital roles in recreation, environmental purposes, and water supply; however, these functions would be diminished significantly with the removal of Oroville Dam and the loss of its capability to store and release 3.5 maf of storage capacity currently available at Lake Oroville. Few, if any, water supply benefits would remain, and flood protection would virtually disappear. Because roughly 85 percent of the power generation would be decommissioned, and pumped-storage peaking operations would be eliminated, this action would have a significant, long-term effect on power supply for the State's power grid. Dam removal activities would result in short-term increases in downstream turbidity and sedimentation and in short-term increases in noise, dust, exhaust emissions, and traffic in the vicinity of the Oroville Facilities. There could be significant effects on recreation and property values around the existing Lake Oroville. A lower reservoir level would be established, potentially destroying existing shoreline wetlands and other habitat. A lower reservoir level would expose currently inundated archeological sites to damage from vandalism and illicit collecting.

Restoration activities such as revegetation and slope stabilization may be necessary to restore the land previously inundated by approximately 16,000 surface acres of water, comprising Lake Oroville. DWR would also need to decommission the water-related recreation facilities at Lake Oroville, which include boat launches and floating and boat-in camps. Reduced recreational use of these facilities would lead to reduced economic benefits from recreational activities and project spending. Recreation facilities (campgrounds, picnic areas, boat launches, beaches, etc.) would no longer be maintained at Loafer Creek, Bidwell Canyon, the Spillway, and Lime Saddle; however, the Lake Oroville Visitors Center, the OWA, Thermalito Afterbay, and Thermalito Forebay would remain.

Removal of the dam could increase riverine habitat for several dozen miles, benefiting fish, wildlife, and riparian habitats. Recreational opportunities associated with riverine conditions (rafting, kayaking, and fishing) could increase, with related economic benefits to local communities. Fish passage would not be improved, as the Fish Barrier Dam and Thermalito Diversion Dam would remain in place. The Feather River Fish Hatchery would likely continue operations to compensate for fisheries effects. Short-term adverse visual effects during removal activities would give way over the long term to visual benefits from removal of project structures.

The cost to remove the dam and power plant would be significant. Additionally, this alternative would not support the primary purpose and needs of the Oroville Facilities that relate to electric power, water supply, flood management, recreation, and environmental purposes. Removal of all dams associated with the Oroville Facilities would not meet the project purpose and needs, and would generate effects similar to those described for removal of the main dam. Given these considerations, decommissioning facilities and removal of the dams included in the Oroville Facilities is not evaluated further in this PDEA.

3.4.4 New Generation Capacity

DWR does not propose any modifications to the Oroville Facilities that would either add new generation equipment or increase the generating capability of the existing three power plants. However, DWR does propose continuing to operate and maintain the Oroville Facilities for electric power generation with new environmental and recreational enhancements under the Proposed Action. These enhancements could be either structural and/or operational improvements that would affect future project costs and/or the amount of annual generation.

3.4.5 Protection, Mitigation, and Enhancement Measures Considered but Not Included in Alternatives

3.4.5.1 PM&E Evaluation Process

More than 500 separate PM&E measures were suggested during the course of the Oroville Facilities ALP. After discussion and consideration, some of these measures were eliminated by the Work Groups while others were recommended to DWR for

further consideration during development of the PDEA. This section describes DWR's evaluation process used to identify which PM&E measures were to be included in the alternatives.

The PM&E measures were first sorted, evaluated, and considered by the Collaborative. Then DWR compared the PM&E measures to determine any potential cross resource and system effects. During the 2 years that the Collaborative discussed and developed PM&E measures, many measures were expanded, some were combined and others eliminated by the Work Groups. The PM&E Evaluation Matrix, provided as Appendix D, includes the disposition of each individual PM&E measure considered.

As described in Section 3.0.3, PM&E measures were reviewed for project nexus and the expected reliability and effectiveness in addressing project interests.

A PM&E measure has a project nexus if either of the following situations is applicable:

- It addresses an ongoing effect of the project (i.e., effects of the existing Oroville Facilities, not effects of new actions under consideration). Consistent with FERC's March 2001 PDEA guidance document, "ongoing effects" are those effects of a project that would continue under the No-Action Alternative if some new action that influences these effects does not take place.
- It affects those resources (mostly land-based resources) that are geographically located within the official FERC project boundary. Examples include some of the recreation facility-, fuel load management-, and invasive species-related PM&E measures. The fuel load and invasive species PM&E measures are examples of land management measures designed to better manage project lands and nearby land outside of the project.

Effectiveness generally refers to the degree to which the PM&E measure achieves the purpose/goal, and reliability generally refers to its durability and effectiveness over time.

The PM&E measures that passed this initial threshold entered a more detailed definition and evaluation phase in which they were investigated for their potential to affect resources or conflict with other PM&E measures.

In this stage it was evaluated whether the proposed PM&E measure would cause direct or indirect effects on other environmental resources (especially species protected by CESA and/or FESA and sensitive cultural resources), directly or indirectly conflict with other potential PM&E measures, or conflict with existing plans and policies. As an important factor in this relicensing effort, the PM&E measures were also evaluated to determine potential effects on the project operations, namely power generation, water supply, and flood management. The effects of a PM&E measure on the environmental resources could also be positive, for example, if enhancing resources and supporting the purpose of the project. Those PM&E

measures usually were included, unless other measures addressed the ongoing effects more effectively.

Accordingly, many of the approximately 500 considered PM&E measures were not included in the alternatives as they were eliminated by the Work Groups, failed to demonstrate a project nexus or the ability to address project issues, or failed to enhance environmental resources. A further factor that kept PM&E measures from being included in the alternatives was that many PM&E measures addressed the same issue, so that the solutions that were easily feasible and had the least effects often prevailed. The disposition and rationale concerning each PM&E measure is captured in the PM&E Evaluation Matrix in Appendix D.

Fish Passage Evaluation Process

A variety of PM&E measures were considered and discussed with the Collaborative pertaining to potential future fish passage study programs and/or facility construction that may be desirable for the upper Feather River system. Ultimately, two alternative trap-and-haul programs were identified for further analysis as part of the PDEA preparation as described in Appendix D, Table D-2.

Under the first program (Scenario 1), immigrating anadromous salmonids would be transported to tributary streams above Lake Oroville and below the next impassable fish barrier (i.e., essentially within the licensed FERC boundary for Project No. 2100). Under the second program (Scenario 2), immigrating anadromous salmonids would be transported to tributaries further upstream of Lake Oroville, above the impassable barriers, thereby providing access to additional spawning habitat.

Implementation of a fish passage program may contribute to reducing competition for spawning habitat and the associated effects on anadromous salmonids in the lower Feather River (below Oroville Dam) and provide access to upstream tributaries and additional spawning grounds; however, continued unnaturally high spawning densities would be expected to persist downstream from Oroville Dam. Furthermore, a fish passage program would provide a redundant measure for the spatial segregation of spring-run and fall-run Chinook salmon spawning populations compared to the lower risk and lower cost fish barrier weir program that is included in both the Proposed Action and Alternative 2. Both programs have the same objective of reducing the opportunity for genetic introgression between the runs. The fish passage program would have the additional benefits of providing access to additional quantities of habitat and exposure to habitat conditions more closely approximating historical salmonid spawning and rearing conditions. Potential adverse effects of a fish passage program would include:

- Genetic introgression between transported steelhead and resident rainbow trout populations;
- Removal of resident juvenile rainbow trout from the upstream tributaries during steelhead juvenile capture;

- Disease transmission;
- Potential reduction in overall salmonid production due to unavoidable losses occurring in the fish passage program that do not currently occur in wild production in the lower Feather River;
- Potential predation effects on other ESA-listed species; and
- Potential cross resource effects involved in the implementation of a fish passage program including increased traffic, potential changes to fishing regulations, and effects due to the introduction of ESA-listed fish species to upstream tributaries.

The Scenario 1 fish passage program was evaluated in detail in the SP-F15 Report entitled *Upstream Fish Passage*, summarized in Section G-AQUA1.9 of Appendix G-AQUA1. Task 1 of the report summarized the anadromous fish species habitat and life stage requirements related to fish passage and the results are equally applicable to both Scenario 1 and 2 fish passage programs. Task 2 of the report evaluated the suitability of the available habitat in the upstream tributaries to support a fish passage program for Scenario 1. It determined that although potentially suitable habitat was available for all life stages of the salmonid species potentially included in the passage program, water temperatures occur in the upstream tributaries that are reported to have potentially significant adverse effects on anadromous salmonids. Task 2 does not directly apply to the Scenario 2 fish passage program habitat and geographic scope, but water temperatures in the upstream tributaries tend to be generally cooler in the critical summer months.

Task 3 summarized all of the alternative methods and devices and identified their characteristic performance and site requirements for the fish passage program. The general concepts of the Task 3 report are applicable to both the Scenario 1 and 2 fish passage programs. Task 4 is a fish passage model to estimate the resulting fish production from selected combinations of alternative fish passage program elements and goals. The model is equally applicable to both Scenario 1 and 2 fish passage programs because the model does not include population productivity effects from adverse water temperatures present in the Scenario 1 fish passage program that are less of a potential feasibility factor in the Scenario 2 fish passage program.

The model includes many factors that, in combination, estimate the production efficiency of the program. The model determined that, given the combination of factors that produce the highest production efficiency, the fish passage program was not expected to produce a biologically sustainable level of performance. The fish passage program would need to perform more than 75 percent better than expected to achieve a biologically sustainable fish passage program.

Because the above described study results are equally applicable to both Scenario 1 and 2 fish passage programs, neither program was included as a component of the

final set of alternatives created for analysis in the PDEA, and implementation of a fish passage program was eliminated from further consideration.

As part of the ALP and subsequent alternatives development, enhancement of existing and/or creation of new side-channel habitat was evaluated to provide additional and more appropriate spawning and rearing habitat for salmonids downstream of Oroville Dam as an alternative to the development of a trap-and-haul fish passage program. Side-channel enhancements downstream of Oroville Dam were evaluated as an alternative to moving salmonids to upstream (above Oroville Dam to the next migratory barrier) habitat, which is critically limited for salmonids due to unsuitable water temperatures. Therefore, the Proposed Action includes enhancement of Moe's Ditch and Hatchery Ditch to provide 800 linear feet of spawning and rearing habitat that would be accessible to salmonids below Oroville Dam. Alternative 2 includes the creation of additional side-channel habitat to further assist in ESA species recovery.

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