Attachment 5

Revisions to Application Due to DWR's Responses (FERC Project No. 2100)

Some information provided in our responses to the items identified as Deficiencies, Clarifications, and Additional Information Requests resulted in several updates and revisions to our License Application filed with the Federal Energy Regulatory Commission on January 26, 2005. The listing below provides the parts of the application that were updated and revised.

Volume I: Exhibit D: Statement of Costs and Financing
Exhibit H: Information Required for New License

Volume III: Preliminary Draft Environmental Assessment (PDEA)
Chapter 6 Developmental and Economic Analysis
Chapter 7 Comprehensive Development Analysis and Recommendations

State of California
The Resources Agency
Department of Water Resources

REVISED EXHIBIT D
STATEMENT OF COSTS AND FINANCING

Oroville Facilities
FERC Project No. 2100

August 2005

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EXHIBIT D
STATEMENT OF COSTS AND FINANCING

The following information is provided in compliance with the requirements of CFR 18, Chapter 1, Subchapter B, §4.51(e).

1.0 GENERAL PROJECT DESCRIPTION

1.1 OVERVIEW

The Oroville Facilities (FERC Project No. 2100) were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose 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, and southern California. The Oroville Facilities are also operated for flood management, power generation, water quality improvement in the Delta, and recreation and fish and wildlife enhancement.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, 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, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure D.1.1-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5 million acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

1.2 EXISTING POWER FEATURES

The hydroelectric facilities have a combined license generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels 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.

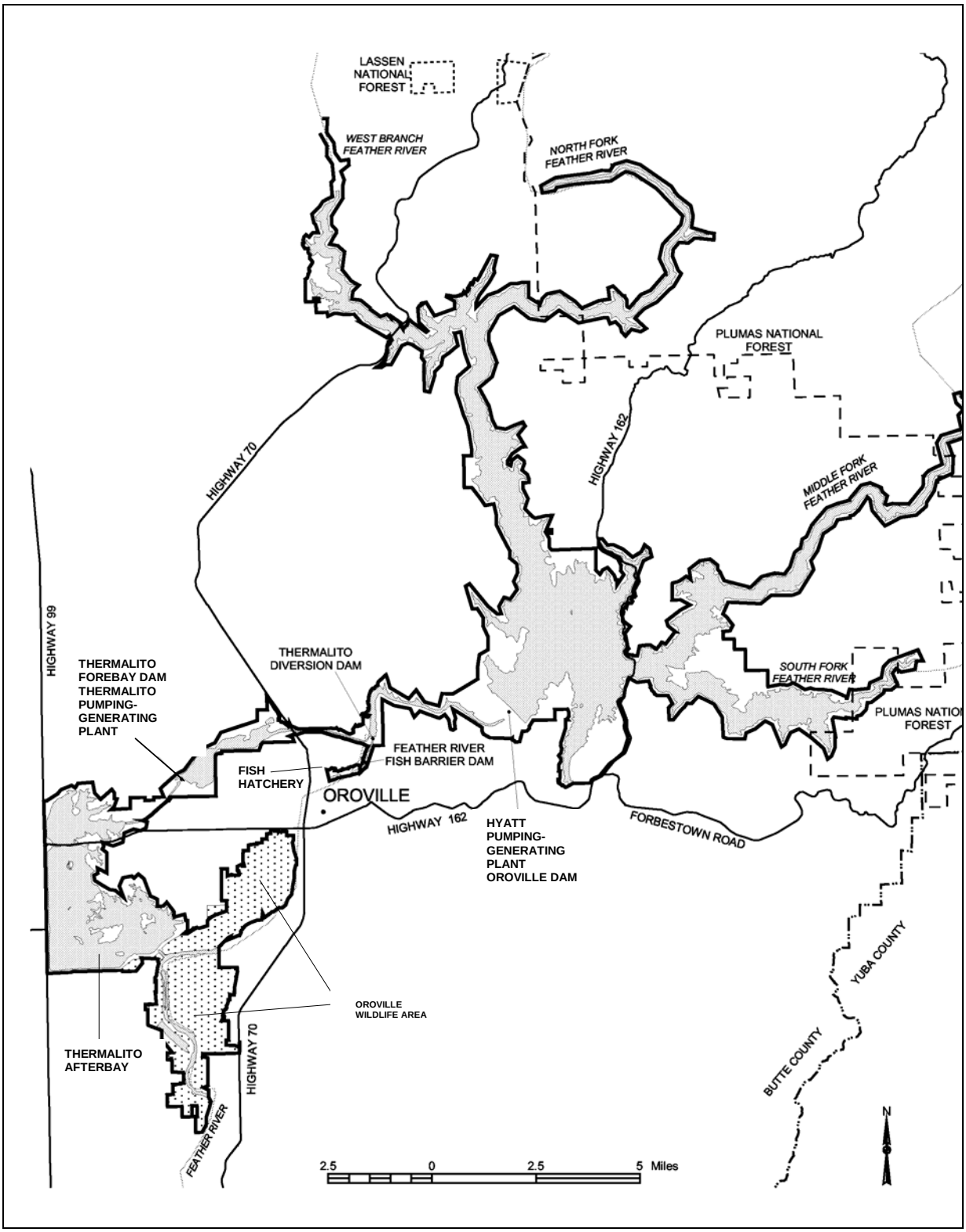

Figure D.1.1-1. Oroville Facilities features location map.

Thermalito Diversion Dam, four miles downstream of the Oroville Dam creates a tail water 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 the Diversion Dam. The power plant releases a maximum of 615 cfs of water into the river.

The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The 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 pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-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 pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from Thermalito Afterbay.

1.3 EXISTING ENVIRONMENTAL AND RECREATION COMMITMENTS

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Thermalito Afterbay Outlet and provides attraction flow for the hatchery. The Feather River Fish Hatchery, an anadromous fish hatchery, was built to compensate for the loss of spawning grounds and rearing areas for returning salmon and steelhead trout and their offspring; the spawning grounds and rearing areas were lost due to construction of Oroville Dam. The hatchery has recently accommodated more than 20,000 adult fish and 15 million young fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. These opportunities include: 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. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, North and South Thermalito Forebay, and Lime Saddle. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitor Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the 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 airplane grounds, three boat launches on Thermalito Afterbay and two on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

2.0 PROJECT DEVELOPMENT COSTS

2.1 ORIGINAL PROJECT COSTS

This application is not an application for an initial license, and therefore a tabulated statement providing the actual or approximate original cost is not required under CFR 18, §4.51(e).

2.2 VALUE OF PROJECT AT LICENSE EXPIRATION

The Department of Water Resources, an agency of the State of California, operates the Oroville Facilities as a municipality as that term is defined in § 796 (7) of the Federal Power Act (USCS §§791 a), and therefore, the valuation requested under Section 4.51(e)(2) of FERC's regulations is not applicable to the Oroville Facilities.

3.0 ESTIMATED COST OF PROPOSED CONSTRUCTION

3.1 PROPOSED NEW DEVELOPMENT

No operational changes, new facilities, or facility upgrades are proposed by the applicant to improve power generating potential of the Oroville Facilities.

3.2 PROPOSED PROTECTION, MITIGATION AND ENHANCEMENTS

Operational changes or additional facilities to accommodate environmental, fishery, and recreation enhancement measures are being determined through a negotiated settlement agreement process. Costs for any facilities currently under consideration can be found in Section 6.2 of the Preliminary Draft Environmental Assessment (PDEA) document.

4.0 AVERAGE ANNUAL COST OF THE OROVILLE FACILITIES

4.1 COST OF CAPITAL

DWR does not have shareholders and therefore does not finance projects with equity capital. Original, as well as new construction, is financed through the issuance of Revenue Bonds.

In 1994, DWR completed repayment of the original 1964 Oroville Facilities Revenue Bonds, and therefore carries no debt related to the original construction.

Costs of borrowings for new construction that has taken place since the original facilities were completed are reported in Bulletin 132, an annual publication produced by DWR and available on the following web site:

http://www.swpao.water.ca.gov

4.2 LOCAL, STATE, AND FEDERAL TAXES

As a State Agency in California, DWR is not subject to payment of any state, local, or federal taxes associated with the Oroville Facilities.

4.3 DEPRECIATION OR AMORTIZATION

Annual debt service payments on outstanding bonds used for State Water Project facilities, including the expansion and improvement of Oroville Facilities are maintained by DWR State Water Project Analysis Office (SWPAO). Levelized bond costs are based on a residual of $401,462,526 outstanding as of 2005. DWR's economic model used a discount rate of 6% and a 30-year amortization period.

4.4 ANNUAL OPERATIONS AND MAINTENANCE COSTS

Average annual operation and maintenance costs for the Oroville Facilities is $30,958,000. This figure includes operation, maintenance, and station power. Annual renewals and replacements, major infrastructure repairs/improvements and capital components of the power and water facilities are estimated at approximately $4,527,000 per year.

DWR performs routine annual maintenance work on the Oroville Facilities and makes capital improvements to ensure efficient operation of the facilities.

4.5 ANNUAL COSTS OF EXISTING OROVILLE FACILITIES

Table D.4.5-1 shows the current annual costs of the Oroville Facilities.

Table D.4.5-1. Annual costs of Oroville Facilities.

Annual Cost Item	Amount
Levelized Bond Cost (1)	$16,845,000
Operations and Maintenance (2)	$ 26,431,000
Existing Environmental/Recreation Measures (3)	$10,016,000
Capital Improvements/Additions (4	$4,527,000
Amortized FERC Relicensing Costs (5)	$4,722,000
FERC Annual Charges (6)	(included in O&M – see below)
Transmission Wheeling	N/A
Total	**$62,541,000**

(1) Levelized Bond Cost is based on a residual of $401,462,526 in outstanding revenue bond repayment obligations, which is the Oroville Facilities' share of the Burns-Porter General Obligation Bonds, the Small Hydro Bonds, the WSRB "Water System" Bonds, and the WSRB Surcharge. The bond obligations extend from 2005 through 2029.
(2) O&M costs include operation, maintenance, administrative and management overhead/general expenses, FERC Administrative fees, but exclude pumpback energy costs.
(3) Refer to Table D.4.7-1 below for the cost basis for existing environmental and recreation measures and programs; this annual figure includes the additional capital costs associated with ongoing recreation and environmental measures under the No-Action Alternative.
(4) Estimated levelized annual value of major equipment renewals and replacements and infrastructure repairs/improvements to water and power related facilities.
(5) Based on a total of $65 million in relicensing program expenditures through January 2005. SWP Analysis Office relicensing program costs and subcontracted services are included in this line item.
(6) Annual administrative charges DWR has paid to FERC for the period beginning 1996 through 2002 are:

1996	$374,600	2000	$147,400
1997	$307,300	2001	$38,300
1998	$383,200	2002	$53,200
1999	$274,700		

4.6 PROJECTED TOTAL ANNUAL COST OF OROVILLE FACILITIES

DWR, State and Federal resource agencies, Indian Tribes, and other stakeholder groups participating in the Oroville Facilities relicensing process are currently negotiating the PM&E measures that will help DWR to continue operating the facilities in a cost efficient manner over the term of the new FERC license. The PDEA defines the preferred alternative. See Chapter 6.0 Developmental Analysis of the PDEA for further discussion of the annual costs and benefits of the Oroville Facilities, when PM&E measures anticipated under the new FERC license are considered.

4.7 CAPITAL AND ANNUAL COST OF PROPOSED ENVIRONMENTAL MEASURES

4.7.1 Generation

Certain measures proposed or recommended by stakeholders during the relicensing effort would affect project economics by adding to the energy production cost (i.e., requiring new capital expenditures or additional annual costs for operation and maintenance). Other measures considered under the Alternatives as described in Chapter 3.0 of the PDEA would reduce future power production from the Oroville Facilities, thereby reducing annual power benefits. Table D.9.1-1 in Section 9 of this Exhibit illustrates how proposed operational changes considered under the various alternatives would affect future power generation by the Oroville Facilities.

4.7.2 Environmental Measures

The cost of each PM&E measure is an annualized cost represented over the 30-year period of analysis. Tables D.4.7-1, through D.4.7-3 show the capital, annual operating and aggregate annualized cost for the three Alternatives estimated in the PDEA.

Table D.4.7-1. Estimated costs for PM&E measures—No-Action Alternative ($1,000).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Temperature Criteria/Targets	$12,130	$80
Natural Salmonid Spawning and Rearing Habitat	$0	$556
Salmonid Genetics	$0	$0
Feather River Fish Hatchery	$0	$1,625
Lower Feather River Fishery	$0	$985
Fishery Management	$0	$234
Thermalito Afterbay Terrestrial Habitat	$8	$73
OWA Terrestrial	$0	$10
Vegetation and Wildlife Management	$12	$27
Water Quality	$0	$50
Recreation— P2100 (general, incl. trails, restrooms, wildfire evac. plan, law enforcement, final RMP, and monitoring)	$244	$210
Bidwell Canyon BR/Campground/DUA/Marina	$0	$550
Loafer Creek BR/DUA/Campground/Group Campground/Equestrian Campground	$10	$675
Lime Saddle BR/DUA/Campground/Marina	$0	$425
Spillway BR/DUA	$164	$575
Enterprise BR	$0	$125
Vinton Gulch Car-top BR	$0	$30
Dark Canyon Car-top BR	$0	$40
Foreman Creek Car-top BR	$0	$170
Stringtown Car-top BR	$0	$50
Lake Oroville Visitors Center	$0	$340
Saddle Dam Equestrian Facilities and Trailhead Access	$38	$25
Bloomer Area BICs	$0	$40
Goat Ranch BIC	$0	$40
Foreman Creek BIC	$0	$40
Craig Saddle BIC	$0	$40
Oroville Dam Overlook DUA	$0	$25
Floating Campsites and Floating Restrooms	$0	$385
Upper North Fork Arm and Poe Powerhouse	$0	$0
Diversion Pool DUA (Northwest side)	$0	$25
Lakeland Boulevard	$71	$10
Recreation – Low Flow Channel/Feather River Fish Hatchery	$30	$25
North Thermalito Forebay	$0	$475
South Thermalito Forebay	$0	$80
Thermalito Afterbay—Wilbur Road BR	$7	$25
Thermalito Afterbay—Larkin Road Car-top BR	$0	$25
Thermalito Afterbay—Monument Hill BR/DUA	$0	$100
Model Aircraft Flying Area	$27	$25

Table D.4.7-1. Estimated costs for PM&E measures—No-Action Alternative ($1,000).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
OWA—Thermalito Afterbay Outlet BR/DUA/Campground	$0	$25
OWA Dispersed River and Pond Access Sites	$0	$10
Dispersed Use Sites	$0	$0
Cultural Resources	$0	$0
Land Use, Management, and Aesthetics	$0	$40
Annual Estimate of Future Recreation Capital Improvements and Replacements	$0	$800
TOTAL CAPITAL AND ANNUAL COST	**$12,741**	**$9,090**
LEVELIZED ANNUAL COST	**$10,016**	

Notes: BIC = Boat-in Camp; BR = Boat Ramp; DUA = Day-Use Area
Source: developed by MWH

Table D.4.7-2. Estimated costs for PM&E measures—Proposed Action ($1,000).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Temperature Criteria/Targets	$12,130	$80
Natural Salmonid Spawning and Rearing Habitat	$4,020	$731
Salmonid Genetics	$4,100	$215
Feather River Fish Hatchery	$0	$1,750
Lower Feather River Fishery	$0	$1,055
Lake Oroville Fishery Management	$0	$234
Thermalito Afterbay Terrestrial Habitat	$965	$107
OWA Terrestrial Habitat	$8	$100
Vegetation and Wildlife Management	$500	$112
Water Quality	$25	$75
Recreation— P2100 (general, incl. trails, restrooms, wildfire evac. plan, law enforcement, final RMP, and monitoring)	$994	$616
Bidwell Canyon BR/Parking/Campground/DUA/Marina	$9,268	$775
Loafer Creek BR/DUA/Campground/Group Campground/Equestrian Campground	$4,420	$1,050
Lime Saddle BR/DUA/Campground/Marina	$400	$500
Spillway BR/DUA	$50	$625
Enterprise BR	$3,500	$200

Table D.4.7-2. Estimated costs for PM&E measures—Proposed Action ($1,000).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Vinton Gulch Car-top BR	$33	$40
Dark Canyon Car-top BR	$33	$50
Foreman Creek Car-top BR	$2,863	$250
Stringtown Car-top BR	$34	$60
Lake Oroville Visitors Center	$200	$425
Saddle Dam Trailhead	$113	$50
Bloomer Area BICs	$0	$50
Goat Ranch BIC	$0	$50
Foreman Creek BIC	$0	$50
Craig Saddle BIC	$0	$50
Oroville Dam Overlook DUA	$0	$25
Floating Campsites and Floating Restrooms	$50	$435
Upper North Fork Arm and Poe Powerhouse	$0	$0
Diversion Pool DUA (West side)	$200	$50
Lakeland Boulevard Equestrian Staging, DUA and Trail Access	$1,950	$150
Recreation – Low Flow Channel/Feather River Fish Hatchery	$30	$50
North Thermalito Forebay	$470	$550
South Thermalito Forebay	$200	$115
Thermalito Afterbay—Wilbur Road BR	$10	$25
Thermalito Afterbay—Larkin Road Car-top BR	$250	$50
Thermalito Afterbay—Monument Hill BR/DUA	$0	$100
Model Aircraft Flying Area	$27	$25
OWA—Thermalito Afterbay Outlet BR/DUA/Campground	$2,450	$300
OWA Dispersed River and Pond Access Sites	$350	$20
Dispersed Use Sites	$25	$10
Cultural Resources	$19,600	$360
Land Use, Management, and Aesthetics	$750	$75
Annual Estimate of Future Recreation Capital Improvements and Replacements	$0	$1,000
TOTAL CAPITAL AND ANNUAL COST	**$70,018**	**$12,640**
LEVELIZED ANNUAL COST	**$17,727**	

Notes: BIC = Boat-in Camp; BR = Boat Ramp; DUA = Day-Use Area
Source: developed by MWH

Table D.4.7-3. Estimated costs for PM&E measures—Alternative 2 ($1,000).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Temperature Criteria/Targets	$12,130	$418
Natural Salmonid Spawning and Rearing Habitat	$22,390	$1,059
Salmonid Genetics	$4,100	$215
Feather River Fish Hatchery	$32,500	$2,350
Lower Feather River Fishery	$8,000	$1,105
Sport Fishery Management	$0	$234
Thermalito Afterbay Terrestrial Habitat	$965	$107
OWA Terrestrial Habitat same as PA	$8	$185
Vegetation and Wildlife Management	$500	$112
Water Quality same as PA	$25	$75
Recreation— P2100 (general, incl. trails, restrooms, wildfire evac. plan, law enforcement, final RMP, and monitoring)	$1,094	$750
Bidwell Canyon BR/Campground/DUA/Marina	$11,268	$912
Loafer Creek BR/DUA/Campground/Group Campground/Equestrian Campground	$5,420	$1050
Lime Saddle BR/DUA/Campground/Marina	$3,460	$575
Spillway BR/DUA	$1,650	$675
Enterprise BR	$3,500	$200
Vinton Gulch Car-top BR	$33	$40
Dark Canyon Car-top BR	$33	$50
Foreman Creek Car-top BR	$2,863	$250
Stringtown Car-top BR	$334	$70
Lake Oroville Visitors Center	$200	425
Saddle Dam Trailhead	$113	$50
Bloomer Area BICs	$0	$50
Goat Ranch BIC	$0	$50
Foreman Creek BIC	$0	$50
Craig Saddle BIC	$0	$50
Oroville Dam Overlook DUA	$64	$75
Floating Campsites	$450	$510
Upper North Fork Arm below Poe Powerhouse	$50	$5
Diversion Pool DUA (West side)	$33,600	$550
Lakeland Boulevard Trailhead	$1,950	$150
Recreation – Low Flow Channel/Feather River Fish Hatchery	$200	$75
North Thermalito Forebay	$470	$550
South Thermalito Forebay	$200	$115
Thermalito Afterbay—Wilbur Road BR	$10	$25
Thermalito Afterbay—Larkin Road Car-top BR	$250	$50
Thermalito Afterbay—Monument Hill BR/DUA	$0	$100

Table D.4.7-3. Estimated costs for PM&E measures—Alternative 2 ($1,000).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Model Aircraft Flying Area	$27	$25
OWA—Thermalito Afterbay Outlet BR/DUA/Campground	$2,450	$300
OWA Dispersed River and Pond Access Sites	$350	$20
Dispersed Use Sites	$25	$10
Cultural Resources	$19,650	$360
Land Use, Management, and Aesthetics	$850	$125
Annual Estimate of Future Recreation Capital Improvements and Replacements	$0	$1,200
TOTAL	**$171,182**	**$15,352**
LEVELIZED ANNUAL COST	**$27,788**	

Notes: BIC = Boat-in Camp; BR = Boat Ramp; DUA = Day-Use Area
Source: Developed by MWH

5.0 ANNUAL VALUE OF EXISTING OROVILLE FACILITIES POWER

Using FERC's economic criteria as outlined in the Developmental Analysis presented in Chapter 6.0 of the PDEA, the 30-year levelized annual power benefits of the existing Oroville Facilities based on current hydrology are are approximately $33.49per MWh based on CEC energy price forecasts and DWR's assumptions regarding future value of ancillary services derived through participation in CAISO. Subtracting the annual cost of levelized bond costs, operations, environmental/recreation measures, capital improvements, and FERC relicensing costs and the cost of pumpback energy results in a levelized annual net benefit of $9.33 per MWh.

6.0 REVENUES AND FINANCING

The Oroville Facilities have been financed from the issuance of general obligation bonds, power revenue bonds, and Water System Revenue Bonds. The payment of the scheduled principal and interest on all outstanding bonds is secured by revenues received from SWP contractors pursuant to the payment provisions under the Water Supply Contracts.

DWR performs an annual financial analysis to ensure the Oroville Facilities will have sufficient funds to meet construction obligations; project operation; maintenance, power, and replacement costs; and debt service payments. DWR's annual financial analysis is available to the public at the following web site address:

http://www.swpao.water.ca.gov

DWR's financial information is included in Exhibit H and further demonstrates its ability to meet all potential obligations under the terms of the new license.

DWR continues to operate the Oroville Facilities in a cost efficient manner while meeting existing environmental and recreation commitments. See Bulletin 132-03 for further details.

7.0 COST OF LICENSE APPLICATION

The administrative cost of preparing the Oroville Facilities License Application is $65 million.

8.0 ON-PEAK AND OFF-PEAK VALUES OF PROJECT POWER (2005)

The estimated average on-peak and off-peak value for Oroville Facilities energy is $34.03/MWh and $26.14/MWh, respectively. The on-peak energy value does not include the value of ancillary services which need to be added to arrive at an overall total value. For this analysis, the value of the power benefits from the Oroville Facilities is assumed to be equal to the price that would be paid for the same amount of power from an alternative source. Future inflation is assumed to be zero. The value of energy was assumed to be equal to the values projected for the ISO zones North of Path 15 (NP-15) by the California Energy Commission (CEC). Energy prices are projected to vary with the time of day, time of year, and future power market conditions. To estimate the total energy value for each alternative, time-of-day energy prices were applied to the time-of-day (or hourly) shape of the generation. This generation shape was derived from the historical hourly generation records for the Oroville Facilities for the period from 1998 through 2002. The estimated value of ancillary services was then added to the above energy values, based on the assumption that DWR will continue to participate in the California ISO ancillary services market in future years.

The operations modeling work conducted for the Oroville Facilities relicensing studies used current (2001) and future (2020) as the years for the level-of-development benchmark studies (refer to Appendix C). The FERC Guidelines require that the year in which the new license application is filed with FERC (in this case, 2005) be used as the base-case year in the developmental analysis and that the period of economic analysis be set at 30 years. Results of the above-mentioned benchmark modeling studies were used to derive the base-case annual generation amounts for the economic analyses of the No-Action Alternative, the Proposed Action, and Alternative 2.

The modeled annual net power generation figure of 2,334,000 MWh per year represents 2001 Existing Conditions. This value changes for each of the alternatives studied. The CALSIM II modeling provided energy estimates for each alternative. Then a detailed assessment was made of the time-of-day power price projections prepared by the CEC, as described above, and applied to these energy estimates in order to estimate future annual net energy benefits for each alternative. Ancillary service benefits were then added to arrive at a total annual net benefit for each alternative.

9.0 ANNUAL INCREASE OR DECREASE IN GENERATION AND POWER VALUES

9.1 GENERATION VALUES

Certain measures proposed or recommended by stakeholders during the relicensing effort would affect project economics by adding to the energy production costs (i.e., requiring new capital expenditures or additional annual costs for operation and maintenance.) Other measures considered under the alternatives would reduce future power production from the Oroville Facilities, thereby reducing annual power benefits. Table D.9.1-1 illustrates how proposed operational changes considered under the various alternatives would affect future power generation by the Oroville Facilities.

Table D.9.1-1. Effect of Alternatives on generation at the Oroville Facilities.

Alternative	Average Annual Generation (MWh)	
	Gross	Net
No-Action Alternative	2,708,000	2,318,100
Proposed Action	2,708,000	2,318,100
Alternative 2	2,697,000	2,310,300

9.2 POWER VALUES

Under the No-Action Alternative, there would be no funding of new PM&E measures beyond what is currently being provided or arising from existing legal obligations. The project would continue to provide 762 MW of capacity and generate a net average of approximately 2,318,100 MWh of electricity annually. This value of generation would be the same for the Proposed Action; however, under Alternative 2 this value reduces to 2,310,300 MWh due to increased flow releases into the LFC, bypassing Thermalito Pumping-Generating Plant. The differential amount of generation is 11,000 MWh (gross value, not accounting for offsetting pump-back energy requirements) and 7,800 MWh (net). The resulting 30-year levelized annual value of lost power generation, assuming a power value of $45.09/MWh, is approximately $496,000 (gross) and $350,000 (net).

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State of California
The Resources Agency
Department of Water Resources

REVISED EXHIBIT H
INFORMATION REQUIRED FOR NEW LICENSE

Oroville Facilities
FERC Project No. 2100

August 2005

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EXHIBIT H

INFORMATION REQUIRED FOR NEW LICENSE

The following information is provided in compliance with the requirements of CFR 18, Chapter 1, Subchapter B, §16.10.

1.0 OPERATION FOR EFFICIENT AND RELIABLE ELECTRIC SERVICE

1.1 GENERAL PROJECT DESCRIPTION

1.1.1 Overview

The Oroville Facilities (FERC Project No. 2100) were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose 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, and southern California. The Oroville Facilities are also operated for flood management, power generation, improvement of water quality in the Delta, and recreation and fish and wildlife enhancement.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, 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, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure H.1.1-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5 million acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

1.1.2 Existing Power Facilities

The hydroelectric facilities have a combined licensed generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 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.

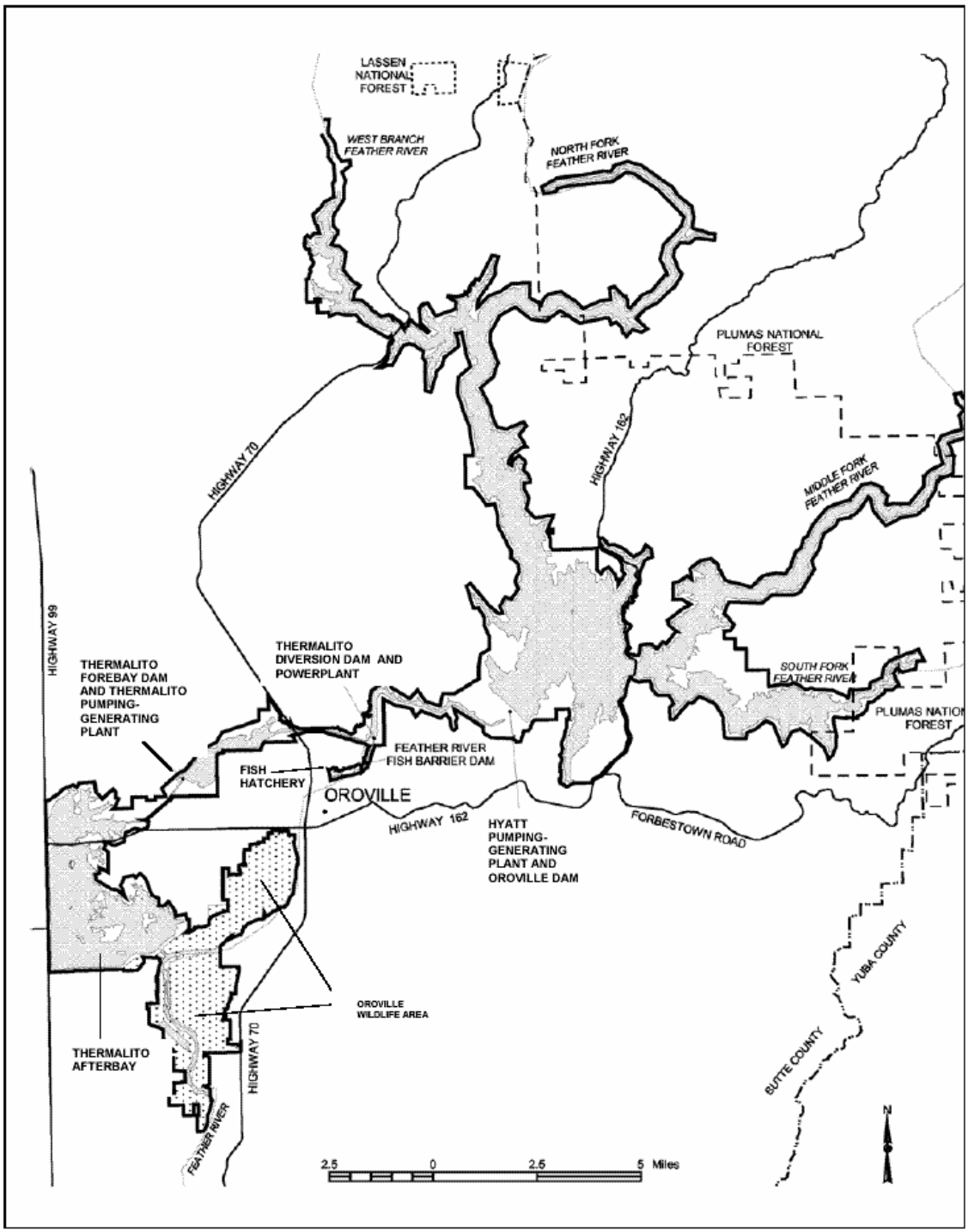

Figure H.1.1-1. Oroville Facilities features location map.

Thermalito Diversion Dam, four miles downstream of the Oroville Dam creates a tail water 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 the Diversion Dam. The power plant releases a maximum of 615 cubic feet per second (cfs) of water into the river.

The Thermalito Power Canal is a 10,000-foot-long channel designed to convey generating flows up to 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The 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 pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. The Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from the Afterbay.

1.1.3 Existing Environmental and Recreation Commitments

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Afterbay outlet, and provides attraction flow for the hatchery. The hatchery was constructed to compensate for spawning grounds and rearing areas lost to returning salmon and steelhead trout and their offspring from the construction of Oroville Dam. The hatchery has recently accommodated over 20,000 adult fish and 15,000,000 young fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. They include: 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, hunting, and visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, Spillway, Lime Saddle, North and South Thermalito Forebay, and Thermalito Afterbay. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitors Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the 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 airplane grounds, three boat launches on Thermalito Afterbay and two on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

1.2 PLANS TO INCREASE CAPACITY OR GENERATION

1.2.1 Proposed New Development

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.

The report on Evaluation of Potential Generation Improvements resulted in Engineering and Operations Work Group participants' desire to explore the potential for developing additional generation capacity through hydropower improvements or construction additions to the Oroville Facilities. The report documents the studies conducted by DWR under SP-E3 to provide information on the issue of cost-efficient development of hydropower improvements or additions to the Oroville Facilities, in support of relicensing. SP-E3 explores the overall power potential of the Oroville Facilities in light of current technology, regulatory requirements, water delivery requirements, and expected future power market conditions. The overriding premise has been to evaluate potential environmentally acceptable improvements that would not adversely affect the primary purpose of the Oroville Facilities, which is water supply.

The report does not identify any preferred option, but rather presents possible design concepts for each potential new project, and provides a discussion of major issues, fatal flaws, benefits, and costs for each option.

The study results are summarized in the following Table H.1.2-1:

Table H.1.2-1. Summary of SP-E3 potential generation improvements study results.

Improvement Option	Installed MW / Avg. Energy (MWh)	Environmental Issues	Capital Costs	B/C Ratio
Hyatt Pumping-Generating Plant Modernization	645 MW (Existing)	None	Not estimated/ modernization program underway	N/A
Sutter Butte Canal Outlet small hydro plant-conventional turbine option	2.4 / 7,823	Minor	$8,953,000	0.69
Sutter Butte Canal Outlet-Hydromatrix™ option	1.2 / 4,411	Minor	$3,785,000	0.82
Palermo Canal Outlet Small Hydro Plant	0.5 / 1,604	Minor	$2,906,000	0.45
Hyatt Powerplant – Operations During Floods	N/A	None	Not estimated	N/A
Oroville-Thermalito Power Complex-Phase II	1,015 / 180,000	Significant	$1,719,263,000	0.54 **
Thermalito Pumping-Generating Pplant-Feasibility of Refurbishment of Unit 1	32 / 400	None	$7,064,000	0.05
Thermalito Pumping-Generating Plant-Evaluation of Potential to Convert Units 2, 3, & 4 to Variable Speed	85 / 13,397	None	Not estimated	N/A EIRR = 5.47%
Thermalito Afterbay River Outlet Small Hydro Plant	2.16 / 9,051	Minor	$6,534,000	1.10
Kinetic Energy of Water Flowing in Thermalito Power Canal	N/A	Minor	Not estimated	N/A
Additional Hydropower Generation at Thermalito Diversion Dam	5.0 / 7,554	Minor	$22,788,000	0.21
Fish Barrier Dam Small Hydro Plant	0.5 / 4,129	Minor	$7,404,000	0.45
Increased Spinning Reserves	N/A	None	Not estimated	N/A

1.2.2 Proposed Protection, Mitigation and Enhancement Measures

Operational changes or additional facilities to accommodate environmental, fishery, and recreation enhancement measures are being determined through a negotiated settlement agreement process. Costs for any facilities or programs currently under consideration can be found in Section 6.2 of the Preliminary Draft Environmental Assessment (PDEA) document.

1.3 PROJECT OPERATIONS

The licensed Oroville Facilities must operate within the constraints imposed by the much larger SWP, its complex operating rules, and existing Environmental Commitments. The SWP was authorized by the State Legislature in 1951 to "store runoff in Northern California and deliver to areas of need throughout the State." The SWP is a complex water storage and delivery system, involving 28 dams and reservoirs, 8 hydroelectric power plants (3 which are pumping-generating plants), 17 pumping plants, and more than 600 miles of pipelines and aqueducts. The SWP is a multipurpose water project, responsible for 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 control, and power generation is secondary. Water releases from various SWP reservoirs and diversion dams are dictated and controlled by essentially all authorized project purposes. The SWP has conveyed an average annual 2.4 maf of water to the 29 long-term SWP contractors.

Existing Operations

Lake Oroville stores and releases water that flows into the lake from upstream reservoir releases and runoff from the intervening area between Lake Oroville and the upper storage reservoirs. Water is released from Lake Oroville to the Feather River to meet water supply, flood protection, water quality improvement, fish and wildlife enhancement, and recreation requirements. Typically, power is generated when water is released from Lake Oroville through the Oroville Facilities for these purposes, or when pumped-storage operations at the Hyatt and Thermalito plants are in effect.

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). The day-to-day operation of the Oroville Facilities is done through the Oroville Field Division (OFD). 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 Operations

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. Typically, Lake Oroville is filled to its maximum annual level of 900 ft mean sea level (msl) in June and then can be lowered as necessary to meet downstream requirements, to its minimum level in December or January. During and following dry years, the lake 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. During wetter hydrologic conditions, Lake Oroville is managed to control downstream flooding. The U.S. Army Corps of Engineers (USACE) requires Lake Oroville to be operated to maintain up to 750,000 acre-feet (af) of storage space to capture significant inflows for flood control. Historically, the maximum flood flows released from Lake Oroville were about 160,000 cfs in 1997.

1.3.1 Annual Water Operations Planning

Water operations planning requires coordination with other Federal, State, and local agencies and considers many factors. The OCO develops an annual water operations plan that considers forecasted water supply, projected operations of the Central Valley Project, and regulatory (flood management, instream requirements, and water quality) and contractual obligations. Details of the OCO operations are available to the public through the following web site:

http://wwwoco.water.ca.gov

The first official water operations plan is completed in early December of each year as part of the allocation process and is a significant component in determining the amount of forecasted deliveries to SWP contractors. This monthly time-step water operations plan includes projected releases to the Feather River, forecasts of Oroville inflow, Lake Oroville end-of-month storage, and local demands. The water operations plan is updated each month through April to reflect changes in hydrology and downstream operations. The Oroville Facilities power plants operate within the constraints established by the water operations plan.

1.3.2 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: (1) local water supply demands; (2) Delta water quality and quantity requirements; (3) instream flow and temperature requirements; (4) SWP pumping requirements in the Delta; and (5) minimum flood management space. The weekly plan is revised as needed to meet changing operational conditions both upstream and downstream of the Oroville Facilities.

1.3.3 Daily Water Operations Scheduling

Hourly water releases through the Oroville Facilities power plants are scheduled. 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 required for participation in the electric utility market and bid into the California Independent Operator (CAISO) are scheduled on an hourly basis. These ancillary services include regulation up and down, spinning reserves, standby reserves, supplemental energy market, and voltage regulation. The hourly schedule is scheduled to maximize power benefits as long as Oroville Facilities operations fit within the constraints of the overall daily Feather River release objective downstream of Thermalito Afterbay.

Releases from Lake Oroville are scheduled on a weekly basis to accommodate (1) water supply, quality, and quantity requirements in the Sacramento-San Joaquin Delta, (2) instream flow requirements in the Feather River, and (3) minimum flood control space. Weekly operational plans are updated as needed to respond to changing conditions. The Thermalito Diversion Dam Pool and the Thermalito Forebay and Afterbay are too small for seasonal storage so they are used only in weekly and daily operations planning. Releases through Hyatt and Thermalito Pumping-Generating Plants are scheduled on an hourly basis to maximum 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 impacted 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 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 pump-back operations. The pump-back 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 six or seven 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 the 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 pump-back operations into Lake Oroville may occur. By the end of the weekend, the elevation of the Afterbay is lowered to prepare for a similar operation the following week.

1.4 COORDINATION WITH AREA ELECTRICAL SYSTEMS

Overall, the SWP uses more energy than it produces. To balance SWP loads with available resources, DWR relies upon a suite of options that include 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) allow 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 provides SCE with up to 350 MW of capacity and approximately 40 percent of the energy from the Oroville Facilities. In return, DWR receives 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 is 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.

Load Management

The SWP controls the timing of its pumping load through an extensive computerized network. That 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 pumping cost for SWP water deliveries. During high water delivery periods/years there is a substantial amount of pumping during on-peak periods.

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 of 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. Through these contracts, DWR sells excess capacity and energy at market rates.

Additionally, ancillary services required for participation in the electric utility market and bid into the California Independent System Operator (CAISO) are also scheduled on an

hourly basis. These services include spinning reserve, non-spinning reserve, supplemental energy market, and regulation.

2.0 NEED FOR POWER GENERATED BY THE PROJECT

2.1 USES OF OROVILLE FACILITIES GENERATION

The continued operation of the Oroville Facilities for electric power generation alleviates the need for new power resources that would otherwise be required to replace the 762 MW of capacity and roughly 2.4 million MWh per year of energy generated by the three power plants. This power capacity and generation is vital to the State of California, in that it provides a large portion of the electricity needed to pump water through the SWP at a lower cost than potential replacement power sources. Not only would replacement power sources be more expensive and lead to higher costs for SWP users, there is much uncertainty surrounding the future availability of such sources. For example, given current power supply and demand trends in California, the California Energy Commission (CEC) estimates that approximately 10,000 MW of additional generation (including reserves) or power demand reduction will be needed to meet the needs of the State's growing economy by 2013 (CEC 2003a). The CEC also predicts California only has adequate power supplies and planned transmission upgrades to meet projected demands through the year 2009, and this assumes that a number of adverse scenarios do not occur. If such adverse circumstances as earlier-than-expected retirement of older generation plants or more frequent dry water years do occur, California's power plant reserve margins could reach unacceptable levels as early as 2006 (CEC 2003b).

Thus, continued operation of the Oroville Facilities for electric power generation is critical to DWR achieving its mission of providing a reliable and affordable supply of water.

Power operations of the Oroville Facilities are heavily influenced by SWP-related agreements and other commitments. Continued operation and maintenance of the power features of the Oroville Facilities must be consistent with the operational criteria dictated by the operation of the entire SWP. The operation of the SWP is further described in Section 2.3 of the PDEA.

Oroville Facilities operations are planned and scheduled in concert with other SWP and U.S. Bureau of Reclamation (USBR) Central Valley Project (CVP) water storage, pumping, and conveyance facilities. The primary operating function of the Oroville Facilities power plants is to provide electricity to SWP pumps that move water through the SWP system. Overall, the SWP uses more energy than it produces. Thus, any decrease in power generation at the Oroville Facilities would need to be offset by increased purchases of energy from other resources and/or by construction of new power generating facilities. In 2000, the SWP required 9,190,000 MWh of generation to meet pumping requirements and station service usage. In the same year, the Oroville Facilities generated roughly 2,760,000 MWh of that total, which amounts to nearly one-third of the system's total requirements.

By generating hydroelectric power, the Oroville Facilities help reduce the amount of generation that is needed from fossil fuel power plants, thereby avoiding the emission of

such pollutants as hydrocarbons, nitrogen oxides, carbon monoxide, and particulate matter. Hydroelectric generation at the project's facilities possibly avoids the construction of new power plant facilities, thus avoiding other adverse environmental effects. Power from the Oroville Facilities contributes to a diversified generation mix and helps meet power needs within and beyond the region. Regional power benefits from the Oroville Facilities include those often referred to as ancillary system benefits, including spinning reserves, non-spinning reserves, peaking capacity, and grid stability. Additional information regarding power operations and benefits is included in Chapter 6.0 of the PDEA.

2.2 HISTORICAL ANNUAL GENERATION

Hydroelectric generation provides the largest share of SWP power resources. However, hydroelectric generation at the Oroville Facilities is greatly affected by the amount of annual runoff to the Feather River watershed. Over the past 20 years, the combined output of the Oroville Facilities has averaged 2,382,000 MWh. During that period, the range of generation has varied from below 1,000,000 MWh in 1991 and 1992 (critically dry years) to over 4,000,000 MWh in 1982-1983 (very wet years).

Monthly generation made available to the SWP in recent years (calendar years 1982 through 2003) from the Oroville Facilities operation is summarized in Table H.2.2-1. This generation data represents the combined generation output from Hyatt Pumping-Generating Plant, Thermalito Pumping-Generating Plant, and Thermalito Diversion Dam Powerplant.

Offsetting the above annual generation figures is the amount of pumping energy consumed each year by the Oroville Facilities as a result of the pump-back operation between Thermalito Afterbay and Lake Oroville. Pump-back operations provide peaking benefits for Oroville Facilities power generation. The Oroville Facilities' monthly pumping energy requirement in recent years (calendar years 1982 through 2003) is summarized in Table H.2.2-2. This pumping energy data represents the combined requirements of the Hyatt Pumping-Generating Plant and Thermalito Pumping-Generating Plant. The average for this 22-year period was approximately 162,000 MWh per year.

Table H.2.2-1. Energy generation at Oroville Facilities (in MWh).

(based on historic recorded data)													
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1982	429,640	395,540	454,680	571,280	436,870	280,310	267,590	327,870	255,520	155,500	162,840	343,190	4,080,830
1983	344,020	465,550	567,570	569,240	545,240	465,220	367,900	310,930	263,430	149,210	296,980	557,690	4,902,980
1984	424,271	212,858	243,067	152,246	210,121	240,974	355,041	245,820	169,706	97,762	86,117	171,631	2,609,613
1985	81,346	98,338	93,010	122,271	281,487	281,771	261,860	189,716	71,431	104,412	75,650	40,312	1,701,604
1986	44,328	303,708	536,715	148,440	169,867	167,344	313,108	223,153	201,884	154,054	99,610	88,309	2,450,519
1987	82,617	51,729	57,869	120,870	163,863	190,229	237,272	162,645	100,238	74,113	69,733	69,342	1,380,522
1988	55,793	60,745	135,001	162,764	132,289	189,829	241,443	160,824	129,878	102,966	101,286	78,985	1,551,802
1989	64,461	96,394	71,345	62,779	185,708	209,653	358,240	284,111	146,058	108,406	109,782	217,248	1,914,185
1990	117,732	84,179	107,931	260,023	176,892	134,446	189,071	174,741	54,550	46,763	44,906	123,939	1,515,173
1991	48,891	23,140	22,069	21,298	123,030	159,435	135,414	73,922	53,706	49,385	33,452	67,414	811,155
1992	32,071	19,512	55,578	21,099	143,544	119,619	138,679	112,213	90,795	51,847	35,663	47,004	867,625
1993	24,470	48,070	357,360	287,330	286,590	296,330	380,550	363,150	107,230	103,550	124,791	241,446	2,620,866
1994	77,973	51,685	76,006	125,148	168,379	185,184	215,556	172,927	137,847	120,330	80,103	89,486	1,500,625
1995	195,787	396,768	452,975	464,888	498,362	490,316	271,232	304,381	292,478	149,933	125,742	233,661	3,876,523
1996	233,353	506,606	347,132	361,981	384,562	275,606	382,597	301,526	113,114	122,279	131,504	432,231	3,592,492
1997	456,211	390,657	138,176	114,526	200,586	258,449	402,518	254,237	129,519	162,086	117,753	103,711	2,728,428
1998	250,092	470,162	420,671	324,009	383,016	423,400	343,632	325,401	263,785	155,809	97,969	411,109	3,869,053
1999	268,034	457,775	307,517	157,986	210,662	191,981	465,021	280,865	164,538	152,924	127,640	162,475	2,947,416
2000	108,827	259,837	369,124	175,572	245,297	281,055	384,404	308,198	166,922	162,972	150,533	133,188	2,745,929
2001	97,975	57,222	79,772	78,292	192,980	162,097	149,266	139,137	55,685	89,326	63,770	69,149	1,234,668
2002	54,056	27,758	43,077	78,699	155,011	218,519	307,655	222,950	121,503	102,656	71,772	81,966	1,485,621
2003	58,889	161,478	49,901	44,260	133,028	226,402	483,349	317,098	171,804	114,585	140,792	111,891	2,013,478
Average 1982-2003	161,402	210,896	226,661	201,136	246,699	247,644	302,336	238,901	148,255	115,040	106,745	176,153	2,381,869

Table H.2.2-2. Pumping energy requirements of the Oroville Facilities (in MWh).

(based on historic recorded data)													
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
1984	142	11,257	9,542	44,885	357	5,159	13,829	28,863	32,165	19,566	7,427	4,623	177,815
1985	508	469	533	24,103	561	255	5,304	11,104	6,455	3,871	4,804	7,121	65,086
1986	617	1,168	34	31,628	45,197	12,084	21,177	27,832	15,455	4,874	6,757	6,880	173,703
1987	41,295	5,005	17,665	1,087	12,923	5,190	1,941	17,959	15,244	7,974	41,122	39,254	206,660
1988	41,592	30,947	10,297	536	3,481	7,489	905	15,280	37,522	50,013	68,451	54,478	320,991
1989	46,678	19,770	38,671	34,286	2,790	5,521	56	6,804	23,633	13,435	4,641	115	196,400
1990	30,118	54,541	37,412	26	34,728	53,897	26,938	110	148	186	204	106	238,412
1991	241	7,948	7,180	15,360	41,428	58,376	32,018	298	210	33	73	226	163,390
1992	357	4,152	57,228	11,829	9,863	33,860	16,210	137	284	21	37	275	134,254
1993	23,396	39,721	32,382	92	117	102	39	604	94	150	23,240	7	119,944
1994	14,025	7,440	26,322	31,549	15,103	34,380	12,934	24,625	31,977	25,597	32,157	54,006	310,117
1995	33,932	738	9,740	3,298	683	28	2,072	6,098	338	31	28,280	6,090	91,329
1996	43,209	0	32	2	4,512	23,432	7,417	5,221	32,299	142	7,068	3,037	126,369
1997	24	18	19,596	47,713	26,570	31,433	6,573	45,107	46,469	20,115	17,824	22,952	284,394
1998	16,025	1,521	394	25	3	19	11	1	38	64	3	1	18,104
1999	64	3	21	64	22	287	0	188	27,302	796	8,158	8,213	45,118
2000	5,566	15,988	55	6,447	136	71	330	8,983	42,951	49,877	54,654	39,767	224,825
2001	34,040	25,824	44,176	38,534	42,116	7,523	4,539	5,669	2,098	36	118	7,954	212,626
2002	17,843	15,285	17,728	21,077	14,694	1,578	0	2	3	0	11	139	88,360
2003	124	8,602	15,785	20,489	5,545	0	0	13	19	22	1	184	50,784
Average 1984-2003	17,490	12,520	17,240	16,651	13,041	14,034	7,615	10,245	15,735	9,840	15,251	12,771	162,434

3.0 COST AND AVAILABILITY OF ALTERNATIVE SOURCES OF POWER

3.1 ANNUAL AVERAGE COST OF PROJECT POWER

Table H.3.1-1 shows the current annual costs of the existing Oroville facilities.

Table H.3.1-1. Annual costs of Oroville Facilities.

Annual Cost Item	Amount
Levelized Bond Cost (1)	$16,845,000
Operations and Maintenance (2)	$ 26,431,000
Existing Environmental/Recreation Measures (3)	$10,016,000
Capital Improvements/Additions (4	$4,527,000
Amortized FERC Relicensing Costs (5)	$4,722,000
FERC Annual Charges (6)	(included in O&M – see below)
Transmission Wheeling	N/A
Total	**$ 62,541,000**

(1) Levelized Bond Cost is based on a residual of $401,462,526 in outstanding revenue bond repayment obligations, which is the Oroville Facilities' share of the Burns-Porter General Obligation Bonds, the Small Hydro Bonds, the WSRB "Water System" Bonds, and the WSRB Surcharge. The bond obligations extend from 2005 through 2029.
(2) O&M costs include operation, maintenance, administrative and management overhead/general expense costs, FERC administrative fees, but exclude pumpback energy costs.
(3) Refer to Exhibit D, Table D.4.7-1 and Table 6.2-1 of the PDEA for the cost basis of existing environmental and recreation measures and programs.
(4) Estimated levelized annual value of major equipment renewals and replacements and infrastructure repairs/improvements to water and power related facilities.
(5) Based on a total of $65 million in relicensing program expenditures through January 2005. SWP Analysis Office relicensing program costs and subcontracted services are included in this line item.
(6) Annual administrative charges DWR has paid to FERC for the period beginning 1996 through 2002 are:

1996	$374,600	2000	$147,400
1997	$307,300	2001	$38,300
1998	$383,200	2002	$53,200
1999	$274,700		

Based on an average annual historical generation of approximately 2,400,000 MWh, the above annual cost translates into a historical average annual power cost of $26.06 per MWh.

3.2 RESOURCES REQUIRED TO MEET CAPACITY AND ENERGY REQUIREMENTS

SWP power requirements are met by several contractual arrangements as well as the Oroville Facilities and other SWP facilities. The power purchase arrangements include capacity and energy purchases from other utilities in California, the Northwest, and the Southwest. The contractual arrangements include joint development projects, energy exchanges, purchases, and access to transmission service.

Several power purchase and sale 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 the solicitation and negotiations were not available at the time this document was prepared.

As noted above, the Oroville Facilities are a critical aspect of the SWP water storage and conveyance system. Overall, the SWP uses more energy than it produces. Thus, any decrease in power generation at the Oroville Facilities would need to be offset by increased purchases of energy from other resources and/or by construction of new power generating facilities. In 2000, the SWP required 9,190,000 MWh of generation to meet water pumping requirements and station service requirements. In the same year, the Oroville Facilities generated 2,760,000 MWh, roughly one-third of the system's total requirements.

The SWP controls the timing of its pumping load through an extensive computerized network. That 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 to sell 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.

On average over the five-year period beginning 1997 through 2000, the Oroville Facilities contributed approximately 50 percent of the total energy generated by SWP generation plants. The total energy generated by the Oroville Facilities and other SWP generation plants is supplemented by various power purchase agreements and arrangements to balance SWP generation resources and pumping load requirements. The contribution of the Oroville Facilities power generation toward total SWP generation can be viewed in Table 10-2 of Bulletin 132 and is available to the public through publications link at the following web site:

http://wwwswpao.water.ca.gov

Capacity and energy purchases supplementing Oroville Facilities generation is accomplished by continually pursuing economic options for power purchases under long-term or short-term arrangements. The capacity and energy purchases supplementing Oroville Facilities power generation can be viewed in Table 10-3 of Bulletin 132 and is available at the web site link above.

3.3 ANNUAL COSTS OF ALTERNATIVE SOURCES OF POWER

If the Oroville Facilities generation plants were not available, DWR would seek alternative economical generation resources to meet its pumping capacity and energy requirements. However, SWP contractors would become vulnerable to potentially higher water costs if the cost of alternative generation sources exceed the cost of Oroville Facilities power generation. DWR's ability to protect the financial stability of SWP operations from the volatility of California's energy markets is an integral part of DWR's mission. Table H.3.3-1 shows the annual levelized cost of alternative energy over a 20 or 30 year period as published by the California Energy Commission. The levelized annual costs are based on a study by CEC entitled *Comparative Cost of California Central Station Energy Technologies*.

Table H.3.3-1. Alternative supply costs.

Technology	Energy Source	Operating Mode	Economic Life (Years)	Gross Capacity (MW)	Levelized Cost ($/MWh)
Simple Cycle	Natural Gas	Peaking	20	100	$157.10
Combined Cycle	Natural Gas	Baseload	20	500	$51.80
Wind	Wind; Resource Limited	Intermittent	30	100	$49.30
Solar Thermal	Sun; Resouce Limited	Load Following	30	110	$135.20 to $215.30
Photovoltaic	Sun; Resource Limited	Load Following	30	50	$427.20
Fuel Cell	Natural Gas	Base Load	20	25	$94.10 to $212.70

Source: Table 1 and 5, California Energy Commission, Comparative Cost of California Central Station Electricity Generation Technologies, Staff Report, Publication No. 100-03-001, August 2003, pgs. 3 and 11.

The least cost alternative energy supply would cost approximately $124 million per year on a levelized annual basis.

3.4 EFFECTS OF ALTERNATIVES ON CUSTOMERS

Oroville Facilities power generation plants were constructed to meet a portion of the SWP pumping capacity and energy requirements. The financial stability of SWP operations could be jeopardized if DWR was required to seek alternative power generation sources in California's volatile energy markets to replace the 762 MW

capacity of the Oroville Facilities. Any power cost increases would likely have to be passed on to the SWP contractors. Under the least cost alternative energy supply scenario (i.e. combined cycle), the SWP contractors would incur a theoretical levelized annual cost increase of approximately $52 million per year based on a comparison with the estimated annual cost of the No Action Alternative shown in Chapter 6 of the PDEA.

4.0 INDUSTRIAL FACILITY USE

DWR does not operate any industrial facilities with power generated by the Oroville Facilities.

5.0 INDIAN TRIBE NEEDS

The California Department of Water Resources (DWR) has no claims as an Indian Tribe.

6.0 TRANSMISSION SYSTEM IMPACTS

Two sets of double circuit towers carrying three 230-kV circuits extend from the Hyatt Pumping-Generating Plant's 230-kV Switchyard to the Table Mountain Tap. One set of double circuit towers extends from the Thermalito Pumping-Generating Plant Switchyard to the Table Mountain Tap.

The distance from the Hyatt Pumping-Generating Plant 230-kV Switchyard to the Pacific Gas and Electric Company Table Mountain Substation is about nine miles. The distance from Thermalito Pumping-Generating Plant Switchyard to the Pacific Gas and Electric Company Table Mountain Substation is about 2.3 miles.

Also, two underground 15-kV power lines provide electric service to Thermalito Diversion Dam Powerplant and to the Feather River Fish Hatchery. One underground 15-kV power line, 3.9 miles long, connects Thermalito Diversion Dam Powerplant Switchyard with Hyatt Pumping-Generating Plant's Switchyard. The second underground 15-kV power line connects Thermalito Diversion Dam Powerplant with the downstream Feather River Fish Hatchery.

Power operations of the Oroville Facilities are heavily influenced by the SWP-related agreements and other commitments described in Section 3.2 above. Continued operation and maintenance of the power features of the Oroville Facilities must be consistent with the operational criteria dictated by the operation of the entire SWP. The operation of the SWP is further described in Section 2.3 of the PDEA.

7.0 PLANS TO MODIFY EXISTING PROJECT FACILITIES OR OPERATIONS

7.1 MODIFICATIONS TO PROJECT FACILITIES

DWR has no immediate plans to modify existing project facilities.

7.2 MODIFICATIONS TO PROJECT OPERATION

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.

8.0 PLANS IF THERE ARE NO PROPOSED MODIFICATIONS

In order to identify issues, plan studies, and consider potential protection, mitigation, and enhancement (PM&E) measures, a Collaborative Team, including the licensee, State and federal agencies, Indian Tribes, local government officials, and interested members of the public actively participated in the relicensing process. This Collaborative Team worked together for over three years and adopted a Process Protocol that sets forth the structure and procedures for ALP. It is available for viewing at:

http://www.orovillerelicensing.water.ca.gov

During relicensing, the FPA requires FERC to consider "the plans and abilities of the applicant to operate and maintain the project in a manner most likely to provide efficient and reliable electric service." FERC licensing guidelines indicate that engineering studies for relicensing should include analyses of: 1) Project Operations; 2) Safety and Condition of Facilities and Equipment; and 3) Economics. The information to be gathered in these studies helps an applicant make a decision as to whether or not to propose project modifications, including generation improvements, in its license application.

As part of the collaborative process, Engineering and Operations Work Group participants' desired to explore the potential for developing additional generation capacity through hydropower improvements or construction additions to the Oroville Facilities. Subsequently, SP-E3 was prepared, a draft report documenting these studies conducted by DWR under SP-E3 to provide information on the issue of cost-efficient development of hydropower improvements or additions to the Oroville Facilities, in support of relicensing. SP-E3 explored the overall power potential of the Oroville Facilities in light of current technology, regulatory requirements, water delivery requirements, and expected future power market conditions. The overriding premise was to evaluate potential environmentally acceptable improvements that would not adversely affect the primary purpose of the Oroville Facilities, which is water supply.

The report does not identify any preferred option, but rather presents possible design concepts for each potential new project, and provides a discussion of major issues, fatal flaws, benefits, and costs for each option. As a result of this work, DWR has chosen not to conduct further studies at this time with the view that the full economic potential of the site has already been realized with the current development.

9.0 FINANCIAL AND PERSONNEL RESOURCES

Over the years, DWR has established automated business systems for its budgeting, accounting, and managing activities. Budgets are developed each fiscal year to the level of personnel resources needed to accomplish approved program objectives, consistent with available funds. As the year progresses, changes to work plans or activities are approved by Department management.

9.1 FINANCIAL RESOURCES

Funds from the sale of general obligation and revenue bonds have provided about 78 percent of financing for construction of the SWP, including the Oroville Facilities. Full repayment of these bond funds is being made by Project beneficiaries, rather than by the general taxpayer. Other funding sources have included tideland oil revenues, investment earnings, legislative appropriations for recreation, federal flood control payments, and SWP contractor advances. Currently, short-term financing is being obtained through commercial paper notes that are replaced periodically by long-term revenue bonds.

Annual costs of operation and maintenance include the salaries of a diversified team of engineers, biologists, and specialists trained in water development and power generation, hydroelectric plant technicians, and civil maintenance workers, as well as expenses (equipment, supplies, etc.) required to operate and maintain SWP facilities. Annual costs also include power purchases, exchanges and sales.

In calendar year 2000, annual payments by SWP contractors totaled about $670 million per year. Of that amount, operation and maintenance (O&M) costs for labor and equipment account for about 25 percent. The cost for power (power purchases minus power sales) amounts to about 32 percent. Bond debt service payments of principal and interest and repayments for other capital financing are about 37 percent. The remaining 6 percent includes deposits for replacement reserves, insurance and other miscellaneous costs.

The 29 SWP contractors repay all water supply related costs of the SWP. These repayments represent about 94 percent of the annual costs for operation and maintenance of SWP facilities. The remaining costs are funded by the federal government for joint operation of San Luis facilities (3 percent) and State general funds for recreation and fish and wildlife enhancement (3 percent).

SWP contractors also repaid principal and interest on about 89 percent of SWP capital expenditures made through 1995. Repayment of the remaining 11 percent comes from the federal government for flood control (2 percent), State general funds for recreation and fish and wildlife enhancement (5 percent), and from miscellaneous sources.

All SWP contractors pay the same rate per acre-foot for the cost of constructing and operating facilities that store and convey the SWP water supply. In addition, each SWP contractor pays a transportation charge that covers the cost of facilities required to deliver water to its service area. Thus, the SWP contractors more distant from the Harvey O. Banks Pumping Plant, which is the first SWP pumping plant on the main stem of the California Aqueduct, pay higher transportation charges than those near the Harvey O. Banks Pumping Plant.

Full payments are made each year for fixed SWP costs regardless of the variations in water deliveries that occur from year to year. Fixed costs include those for operation, maintenance and debt service. SWP contractors also pay costs that vary depending on the amount of water delivered during the year. These variable costs include the costs for energy used to pump water to their aqueduct turnout locations.

DWR performs financial analyses annually to ensure that the SWP financing program is sufficiently funded to meet construction obligations; project operation, maintenance, power, and replacement costs; and debt service payments for bonds expended for construction. In 2000, SWP costs were indirectly paid for by approximately 23 million water users served by the Project. Direct payments were received from the 29 long-term SWP contractors. DWR continues to pay bondholders as scheduled. In 2000, DWR received approximately $670 million in revenues for the SWP and spent approximately $670 million for SWP expenses.

A summary income statement is presented below. Additional information, including a detailed projection of expenses and income over the next 15 years, is available in Bulletin 132-02 from the publications link at the following web site address:

http://wwwswpao.water.ca.gov

The annual financial report for calendar year 2000 and all previous calendar years concluded that the SWP continues to be financially viable.

Table H.9.1-1. 2000 Income Statement for the State Water Project.

Revenues	Thousands of Dollars
SWP contractor payments	714,977
Revenue bond cover adjustments	(40,937)
Rate management adjustments	(33,000)
Other revenue	27,728
Total operating revenues	668,768
Expenses	**Thousands of Dollars**
Project operations, maintenance, and power	343,884
Deposits to reserves	57,959
Water bond principal	91,190
Water bond interest	175,735
Total operating expenses and debt service	668,768
Net system revenues	0

9.2 PERSONNEL RESOURCES

DWR's current workforce is comprised of approximately 2,500 positions. The job classifications are in the following general areas:

- Clerical and Office Support;
- Engineers and Scientists;
- Information Technology;
- Legal;
- Professional, Administration, and Financial Services;
- Crafts and Maintenance;
- Engineering and Scientific Technicians; and
- Printing Trades.

DWR's Oroville Field Division contains approximately 110 positions and is supported by approximately 175 positions in DWR's Division of Operations and Maintenance located at its headquarters building in Sacramento. DWR's Division of Operations and Maintenance is supported by a total of approximately 925 positions which are in its

headquarters location and in its field offices throughout Northern, Central, and Southern California. The Oroville Field Division is also supported by DWR's Northern District Office which provides assistance to local agencies and private citizens seeking information about the Oroville Facilities and the SWP in general.

DWR's current personnel resources in the Oroville Field Division, Division of Operations and Maintenance headquarters office, and other offices are more than sufficient to meet the obligations of a new license.

DWR's Training Office provides a high quality and extensive training program to meet the needs of DWR managers, supervisors and staff in all areas of professional, occupational and personal training and development. The Training Office also meets the changing needs of DWR by developing and providing instruction on new organizational, technical, business, and leadership practices and current DWR programs, policies and procedures.

10.0 ADDITIONAL LANDS NOTIFICATION

DWR is not proposing any significant purchases of new lands within the Oroville Facilities' Project Boundary.

11.0 ELECTRICITY CONSUMPTION EFFICIENCY IMPROVEMENT PROGRAM

11.1 PROMOTION AND ENCOURAGEMENT

California has an energy conservation program known as Flex Your Power which was implemented during calendar year 2001. Details of California's Flex Your Power program can be accessed at the following website:

http://www.fypower.com/

Highlights of the Flex Your Power program, as summarized on the web site, are noted below:

Flex Your Power is California's statewide energy efficiency marketing and outreach campaign. Initiated in 2001, Flex Your Power is a partnership of California's utilities, residents, businesses, institutions, government agencies and nonprofit organizations working to save energy. The campaign includes retail promotions, a comprehensive website, an electronic newsletter, educational materials and advertising. Flex Your Power has received national and international recognition, including an ENERGY STAR Award for excellence.

The campaign's primary funding comes from the Public Goods Charge as approved by the California Public Utilities Commission (CPUC), as well as contributing Municipalities and partner organizations and companies.

- During the energy crisis in 2001, 33 percent of California residents and nearly 30 percent of businesses reduced their energy consumption by 20 percent or more compared with the prior year. Ratepayers saved $600 million between January and June 2001 alone.

- For the third straight year, California leads the nation in sales of energy-efficient lighting, appliances and other products.

DWR's Office of Water Use Efficiency (OWUE) provides support for the stewardship of California's water resources and energy efficient use of water. This office is responsible for water use efficiency planning and coordination. Services include technical and financial assistance, information collection and dissemination, resources evaluation, and implementation. OWUE also provides expertise to local agencies and individuals regarding agricultural and urban water and energy conservation, reclamation and reuse of water, land and water use, and drainage management.

DWR manages the California Irrigation Management Information System (CIMIS) by collecting weather data from over 120 stations and disseminating calculated reference evapotranspiration to assist landscape and crop managers in irrigating their lands efficiently. To further its efforts in water use efficiency, OWUE assists in establishing mobile laboratories that conduct irrigation system evaluations through data analysis, demonstration projects, and research to achieve energy and water use efficiency.

OWUE also provides loans and grants to make more efficient use of water and energy resources. Additional information on DWR's water use efficiency programs can be accessed from the following web site provided below.

http://www.water.ca.gov/nav.cfm?topic=Local_Assistance&subtopic=Water_Use_Efficiency

11.2 COMPLIANCE WITH REGULATORY REQUIREMENTS FOR ENERGY CONSERVATION

DWR, as an agency of the State of California, supports the State of California's Flex Your Power program described in the previous section.

12.0 NATIVE AMERICAN TRIBES

No part of the existing Oroville Facilities is located on federally recognized tribal lands.

Several Indian tribes have expressed interest in the Oroville Facilities relicensing effort and may be affected by the project, as described below.

There are three federally-recognized Native American Tribes in Oroville who have been involved in the ALP process for the Oroville Facilities relicensing:

Berry Creek Rancheria of KonKow Maidu Indians

(Tribal Affiliation: KonKow, Tyme Maidu Indians)
Chairperson: Jim Edwards
5 Tyme Way
Oroville CA 95966-9115

Estom Yumeka (Enterprise Rancheria)

(Tribal Affiliation: Maidu)
Chairperson: Harvey Angle, Sr.
1940 Feather River Blvd., Suite B
Oroville CA 95965-4643

Mooretown Rancheria

(Tribal Affiliation: Concow Maidu)
Chairperson: Gary Archuleta
1 Alverda Drive
Oroville CA 95966-9379

In addition, another federally-recognized Native American Tribe (in Chico) has expressed interest in the ALP process for the Oroville Facilities relicensing.

Mechoopda Indian Tribe of Chico Rancheria

(Tribal Affiliation: Maidu)
Chairperson: Steve C. Santos
125 Mission Ranch Blvd.
Chico CA 95926

Also, an Oroville Tribe known as the Konkow Valley Band of Maidu is currently applying for federal recognition; they've expressed interest in the ALP and are participating actively.

Chairperson: Patsy Seek
1706 Sweem Street
Oroville, CA 95965

13.0 SAFETY OF PROJECT MANAGEMENT AND OPERATION

DWR, through its Division of Operations and Maintenance (O&M), monitors the Oroville Facilities to ensure safety and reliability. O&M staff conducts biennial and quinquennial inspections on the Oroville Facilities and prepares resultant reports to document any annual deficiencies. O&M staff collects and evaluates data on the performance of each generating and pumping unit in the Oroville Facilities plants. Engineers from the Division of Safety of Dams review instrumentation data and inspect Oroville dam annually to ensure that each dam is satisfactory for continued safe operation and evaluate any proposed modifications. Under FERC and California Water Code requirements, independent consulting engineers are retained to evaluate the safety of the Oroville Facilities' dams and power facilities every five years. These inspections allow the Oroville Facilities to be maintained at the highest level possible with available staff and resources. Finally, FERC inspects the Oroville Facilities annually. These annual inspections include a review of significant events, instrumentation data, and visual appearance of each dam, penstock, or power plant.

Operation of the Oroville Facilities are planned and scheduled in concert with other SWP facilities. Water deliveries from the Oroville Facilities complex to meet local and downstream requirements. Oroville Dam plays an important role in protecting lives and property downstream along the Feather and Sacramento rivers during periods of high flow. In addition, DWR operates the Oroville Facilities to offset some of the high energy costs associated with SWP pumping operations. Operation of the Oroville Facilities varies seasonally, weekly, and hourly depending on hydrology and the operational and regulatory objectives DWR plans to meet. Typically, releases to the Feather River are managed to conserve water while meeting instream, Sacramento-San Joaquin Delta, and other SWP requirements including flow, temperature, fisheries, recreation, water quality, and agricultural diversions.

Planning for and implementing the operations of the SWP is highly dependent on constraints placed upon the Oroville Facilities. The Oroville Facilities' operational planning is performed by the Operations Control Office (OCO). The day-to-day operation of the Oroville Facilities is done through the Oroville Field Division (OFD). 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 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.

DWR operates the Oroville Facilities consistent with its commitment to public and employee safety. Existing measures will be expanded over time as appropriate to ensure the safe, continued operation of the Oroville Facilities.

13.1 EXISTING AND PLANNED OPERATION DURING FLOODS

The Oroville Facilities are an integral component of the flood management system for the areas along the Feather River and Sacramento Rivers downstream of Oroville Dam. During the wintertime, the Oroville Facilities are operated under flood control requirements specified by the U.S. Army Corps of Engineers (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 the USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with the USACE.

The flood control requirements are designed for multiple use of reservoir space. 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 flood flows. The actual encroachment demarcation is 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., wetness in 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, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

Table H.13.1-1 lists the maximum flow targets at various locations along the Feather River.

Table H.13.1-1. Maximum Feather River flow rates.

Location	Max. Allowable Flow
Below Lake Oroville	150,000 cfs
Above Yuba River	180,000 cfs
Below Yuba River	300,000 cfs
Below Bear River	320,000 cfs

Source: Initial Information Package and Memo fro Maurice Roos to Lori Brown dated 7/18/03

Table H.13.1-2 presents the significant spills of record. The maximum release (excluding flows through the Hyatt Powerplant) of 150,000 cfs is considerably below the peak inflow of 266,000 cfs associated with that release. The largest total release of over 2 maf occurred between December 1996 and January 1997.

Table H.13.1-2. Significant spills of record.

Spill Begin	Period End	Peak Release (cfs)	Total Release (af)	Peak Inflow (cfs)
1-13-70	2-02-70	77,000	1,563,000	147,000
1-12-80	1-20-80	85,000	726,000	155,000
2-15-86	3-01-86	150,000	1,420,000	266,000
3-09-95	3-27-95	87,000	1,235,000	141,000
12-27-96	1-17-97	160,000	2,013,000	302,000

Source: Memo from Maurice Roos to Lori Brown dated 7/18/03

13.2 EMERGENCY NOTIFICATION AND WARNING DEVICES

The Oroville Facilities are operated by Oroville Field Division personnel comprised of highly trained and knowledgeable staff. The method of emergency notification is well regulated in accordance with comprehensive guidelines developed specifically in the Oroville Facilities' Emergency Action Plan (EAP).

The EAP defines responsibilities and provides procedures designed to identify unusual and unlikely conditions that may endanger Oroville Dam and its related facilities. The EAP also provides for orderly and timely notification procedures, mitigative action, and notification of the appropriate emergency management officials of a possible, impending, or actual failure of the dam. Response to an emergency will be based on the establishment of an Incident Command as defined in the Standardized Emergency Management System (SEMS). The EAP may also be used to provide notification when flood releases will create major flooding. The Oroville Facilities' EAP conforms to the revised guidelines which are consistent with the "Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners," Mitigation Directorate FEMA 64, October 1998 (Section 6-3.3, page 6-12).

The Oroville Facilities' EAP contains notification charts to be used when flood releases may create major flooding downstream of the facilities. These charts contain the contact information for responsible agencies that need to mobilize in anticipation of flood releases. For changes to project releases not requiring notification of emergency personnel a warning siren was installed on the Thermalito Diversion Dam. The warning siren is used to warn recreational users on the Feather River downstream and upstream of Thermalito of imminent opening and release of water through the spillway gates.

Official operations manuals and an EAP are centrally located in the Thermalito Pumping-Generating Plant and the Area Control Center located adjacent to the Hyatt Pumping-Generating Plant entrance portal. Emergency contacts are listed at each phone location throughout the principal project features. Safety barriers consisting of floating buoys are in place upstream of the Feather River Fish Barrier Dam, the Thermalito Diversion Dam and canal headworks structure.

13.3 EFFECTS OF PROPOSED OPERATION ON THE EAP

The last complete reprint of the Emergency Action Plan (EAP) was submitted to FERC on March 10, 2000, and FERC by its letter dated April 4, 2000 acknowledged that the reformatted EAP had been prepared in accordance with the revised Chapter 6 of the FERC Engineering Guidelines. The last annual update was submitted on December 31, 2003 and FERC by its letter dated January 15, 2004 confirmed that they had updated the copies of the EAP on file in its office.

13.4 MONITORING DEVICES

The Oroville Facilities are inspected on a routine basis by trained operations and engineering staff. The Oroville Facilities are also subject to detailed inspections following the occurrence of high flow flooding events and immediately after the threshold seismic event adopted for the Oroville Facilities. Specific monitoring activities for each major project component are described below. This description is from the Sixth Part 12 Independent Consultant Report dated September 1999.

13.4.1 Oroville Dam Facilities

The internal and external drainage systems and instrumentation throughout the facility are routinely monitored according to the schedule in Table H.13.4-1.

Table H.13.4-1. Oroville Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Seepage			
Foundation/Toe	1	1	Weekly
Grout Galleries	2	2	Weekly
Bypass/Access Galleries	2	2	Weekly
Terminal S (flow from broken piez. tubes)		3	Weekly
House T (flow from broken piez. tubes)		1	Weekly
Emergency Exit Tunnel	4	4	Weekly
River Outlet Chamber	1	1	Weekly
Grout Gallery Drain Holes	105	105	Quarterly
Core Block Drain Holes	26	26	Quarterly
Wet Area D.S. Face - Left	N.A.	N.A.	Annually
Hydraulic Piezometers	56	13	Weekly
Hydrodynamic Pore Pressure Cells	6	0	---
Grout Gallery Pore Pressure Cells	2	2	Quarterly
Broken Tube Bundle Monitoring			
Broken Tube Pressure Check (S & T)		5	Weekly
Core Block A/B Joint Pressure	2	2	Weekly
Sediment Transport Sample		4	Quarterly
Deformation			
Surface Settlement & Deflection	100	100	Annually
Fluid Level Settlement Devices	36	0	---
Crossarm Settlement Devices	2	0	---
Internal Horizontal Movement	14	14	Quarterly
Houses U & T	2	0	---
Core Block Extensometers	7	5	Quarterly
Core Block Joint Monitoring	38	38	Quarterly
Core Block Deformation Meters	8	0	---
Stress/Strain			
Core Block Stress Meters	20	13	Quarterly
Grout Gallery Stress Meters	21	11	Quarterly
Embankment Stress Meters - 30"	15	0	---
Embankment Stress Meters - 18"	27	10	Quarterly
Access Gallery Strain Meters	6	5	Quarterly
Grout Gallery Strain Meters	18	18	Quarterly
Thermometers			
Core Block Resistance Thermometer	62	51	Quarterly
Embankment Resistance Thermometer	13	13	Quarterly
Seismic			
Accelerometers-Force Balance	4	4	Annually
Accelerometers-Strong Motion	6	6	Annually

Table H.13.4-1. Oroville Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Digital Data Acquisition System	1	1	Annually
Flood Control Outlet			
Foundation Pore Pressure Cells	10	6	Semi-annually
Bay Wall Piezometers	68	41	During flood releases
Concrete Strain Meters	61	45	Semi-annually
Bidwell Canyon Saddle Dam			
Surface Settlement & Deflection	8	8	Bi-annually
Parish Camp Saddle Dam			
Surface Settlement & Deflection	3	3	Bi-annually
Area Wide			
Crustal Movement Survey			5 Years
Hyatt Powerplant			
Stress/Strain Monitoring	210	177	Monthly
Extensometers	14	14	Quarterly
Seepage/Hyatt Sump	1	1	Weekly

Source: Sixth FERC Part 12 Safety Inspection Report

13.4.2 Thermalito Diversion Dam Facilities

In addition to routine inspections, the Diversion Dam and facilities are monitored remotely (24-hours per day) from the Oroville ACC. The Senior Operator at the ACC can dispatch personnel to the site within one-half hour should it be necessary. The drainage system in the spillway gallery is routinely monitored according to the schedule in Table H.13.4-2.

Table H.13.4-2. Thermalito Diversion Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Foundation Drains			
Grout Gallery	64	64	Quarterly
Pressure Gages (Foundation Drains)			
Grout Gallery	8	6	Quarterly
Survey Monuments			
Spillway Crest Bridge	7	0	Discontinued 1979
Spillway Piers	6	6	Annually
Spillway Abutments	2	2	Annually
Powerhouse Structure	4	4	Annually
Retaining Walls (Powerhouse Area)	9	9	Annually
Penstock Area	1	1	Annually

Source: Sixth FERC Part 12 Safety Inspection Report

13.4.3 Thermalito Forebay Dam Facilities

The powerplant is manned at least one shift per day and is monitored remotely (24-hours per day) from the Oroville ACC. Similar to the Thermalito Diversion Dam, the Senior Operator can dispatch personnel to the site within one-half hour should the need arise. The toe drain and pressure relief systems are monitored daily as well. The instrumentation monitoring schedule is presented in Table H.13.4-3.

Table H.13.4-3. Thermalito Forebay Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Open Standpipe Piezometers *Embankment*	154	1	Semi-monthly
Toe Drain Outlets *Embankment*	5	5	Semi-monthly (1)
Relief Well System - Pump Use *Downstream of Embankment*	1	1	Monthly
Tail Channel Seepage *Tail Channel*	3	2	Semi-monthly
Survey Monuments *Embankment*	23	23	Annually
Stress Meters *Headworks Structure*	15	0	Quarterly (2)
Strain Meters *Headworks Structure*	2	0	Quarterly (2)
Uplift Cells *Headworks Structure*	14	0	Quarterly (2)
Grout Gallery Drains *Headworks Structure*	25	25	Quarterly
Grout Gallery Drains *Approach Channel Dam*	4	4	Quarterly
Grout Gallery Piezometers *Headworks Structure*	10	10	Quarterly
Survey Monuments *Headworks Structure*	7	7	Annually
Survey Monuments *Approach Channel Dam*	5	5	Annually

(1) Flows have not been regulary measured or plotted since 1987. Drain outlets are inspected during routine semi-monthly reading of piezometers.

(2) Instruments are read quarterly by DWR. However, data is no longer analyzed.

Source: Sixth FERC Part 12 Safety Inspection Report

13.4.4 Thermalito Afterbay Dam Facilities

In addition to the routine inspections of the facilities, the toe drain and pressure relief systems are routinely monitored. The instrumentation monitoring schedule is presented in Table H.13.4-4 and Table H.13.4-5 contains the piezometer monitoring schedule.

Table H.13.4-4. Thermalito Afterbay Dam facilities instrumentation monitoring.

Instrument/Monitoring Type/Location	Number Originally Installed	Number Currently in Service	Minimum Monitoring Frequency
Pore Pressures			
Observation Wells	Unknown	0	
Open Standpipe Piezometers	146	81	See Table H.13.4-5
Settlement Monuments			
Embankment	49	49	5 Years
River Outlet	5	5	Annually
Sutter-Butte Outlet	8	8	Annually
Western-Richvale Canal Outlet	10	10	Annually
Fish Barrier Bridge	3	3	Annually
Horizontal Monuments			
River Outlet	3	3	Annually
Sutter-Butte Outlet	4	4	Annually
Western-Richvale Canal Outlet	4	4	Annually
Fish Barrier Bridge	3	3	Annually
Seepage			
Embankment Toe Drains	17	17	Weekly
Seismicity			
Accelerometers	4	4	Seismic Events

Source: Sixth FERC Part 12 Safety Inspection Report

Table H.13.4-5. Thermalito Afterbay piezometer monitoring.

Piezometers Read Weekly				
19+00	P-70	86A-283	45+00	P-73
75+00	126+00	P-71	84A-167	170+00
84A-170	84A-170A	85A-173	84A-176	176+00
220+00	84A-180	180+00	P-77	84A-187
P-91	239+00	P-90	243+00	P-15
84-291A	P-92	84A-273	277+00	84A-277
86A-287	84A-277B	84A-280	283+00	84A-283
86A-291	86A-273	84A-287	86A-277	84A-291
86A-280				
Piezometers Read Monthly (1)				
12+00	P-69	P-49	P-72	P-48
P-25	P-28	98+00	P-74	P-155
111+00	P-114	P-29	132+00	138+00
P-30	150+00	160+00	P-76	84A-C176
P-21	P-31	84A-183	198+00	P-32
P-159	203+00	214+00	216+00	P-78
P-79	P-89	84A-342	84A-C283	342+50
P-95	P-93	P-94	312+00	319+00

(1) Piezometers reading higher than 2 ft. below ground level are read weekly.

Source: Sixth FERC Part 12 Safety Inspection Report

13.4.5 Feather River Fish Barrier Dam Facilities

The Fish Barrier Dam facilities are visited daily by DWR personnel in conjunction with the Oroville-Thermalito Power Complex facilities. Field inspections are performed at least annually by trained DWR staff. DWR staff currently monitor 2 survey monuments for horizontal (JEC 25) and vertical (BM “N”) control and 13 sets of monitoring bolts installed in the dam to track horizontal and vertical movement.

13.5 EMPLOYEE SAFETY

DWR is committed to employee safety and accident prevention and has implemented a comprehensive Injury and Illness Prevention Plan (IIPP) in the Oroville Field Division. Table H13.5-1 highlights DWR’s safety programs under its IIPP. In the past five years (2000 through 2004), DWR experienced a total of 50 lost time injuries in the Oroville Field Division.

Table H.13.5.1. Safety Programs under the Injury and Illness Prevention Plan.

First Aid/Cardio Pulmonary Resuscitation	Self-Containing Breathing Apparatus
Automatic External Defibrillator	Mobile Crane
Defensive Driver Training	Overhead Bridge Crane Training and Safety
Workplace Safety	Personnel Lift Truck Training and Safety
Accident Investigation	Automotive Lift
Standardized Emergency Management System (SEMS)	Excavation/Trenching
Audiometric Testing	Boating Safety
Respirator Equipment Physical	Compressed Gas
Respirator Fitness Test	Hanta-Virus
Electrical Apparel	Hearing Conservation
Switchyard and Substation Safety	Prohibited Smoking
National Electrical Code (NEC)	Fire Prevention Plan
Grounding	Fire Protection Sprinkler System – Foam, CO_2, Halon, Fire Hydrant
Forklift Training and Safety	Fall Protection
Confined Space	Battery Handling
Lead Related Construction	Accident Prevention Signage
OP2 *(Lockout/Tagout Operating Procedures)*	Flaggers/Traffic Control
Hazardous Waste Operation and Emergency Response *(HAZWOPER)*	Emergency Action Plan/Drills
Hiliti Tool Powdered Actuated	Hazardous Communication/Right-To-Know/Material Safety Data Sheets
Chain Saw Safety	Portable Fire Extinguisher
Pesticide/Herbicide Safety	Safety Orientation *(New Hires and Transferring Employees)*
Van Pool Driver Safety	Ergonomics/Back/Repetitive Motion Injury
Asbestos Awareness	Security Awareness
Asbestos Notification	Bloodborne Pathogens
Commercial Truck Training	

Source: Oroville Field Division Safety Officer

13.6 PUBLIC SAFETY

DWR continues implementation and improvement of its Oroville Facilities' public safety efforts through its education, accident prevention, and signage programs. Recreation facilities within and near the Oroville Facilities project boundary experience an average daily visitation total of approximately 4,700 recreation days. For the 12-month period beginning May 2002 to May 2003, the total combined recreation visitation was approximately 1,730,000 recreation days.

In the past five years (2000 through 2004), there were a total of 44 reported incidents resulting in injury or death within the Oroville Facilities Project Boundary. Oroville Facilities' reporting records indicated a total of 13 deaths. And seven of the 13 deaths resulted from drowning incidents.

14.0 CURRENT MANNER OF PROJECT OPERATION

The licensed Oroville Facilities must operate within the constraints imposed by the much larger SWP, its complex operating rules, and existing environmental commitments. The SWP was authorized by the State Legislature in 1951 to "store runoff in Northern California and deliver to areas of need throughout the State." The SWP is a complex water storage and delivery system, involving 28 dams and reservoirs, 8 hydroelectric power plants (3 of which are pumping-generating plants), 17 pumping plants, and more than 600 miles of pipelines and aqueducts. The SWP is a multipurpose water project, responsible for 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 control, and power generation is secondary. Water releases from various SWP reservoirs and diversion dams are dictated and controlled by essentially all authorized project purposes. The SWP has conveyed an average annual 2.4 maf of water to the 29 long-term SWP contractors.

Lake Oroville stores and releases water that flows into the lake from upstream reservoir releases and runoff from the intervening area between Lake Oroville and the upper storage reservoirs. Water is released from Lake Oroville to the Feather River to meet water supply, flood protection, water quality improvement, fish and wildlife enhancement, and recreation requirements. Typically, power is generated when water is released from Lake Oroville through the Oroville Facilities for these purposes, or when the pumped-storage operations at the Hyatt and Thermalito plants are in effect.

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). The day-to-day operation of the Oroville Facilities is done through the Oroville Field Division (OFD). 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.

14.1 PROJECT OPERATION CURVES

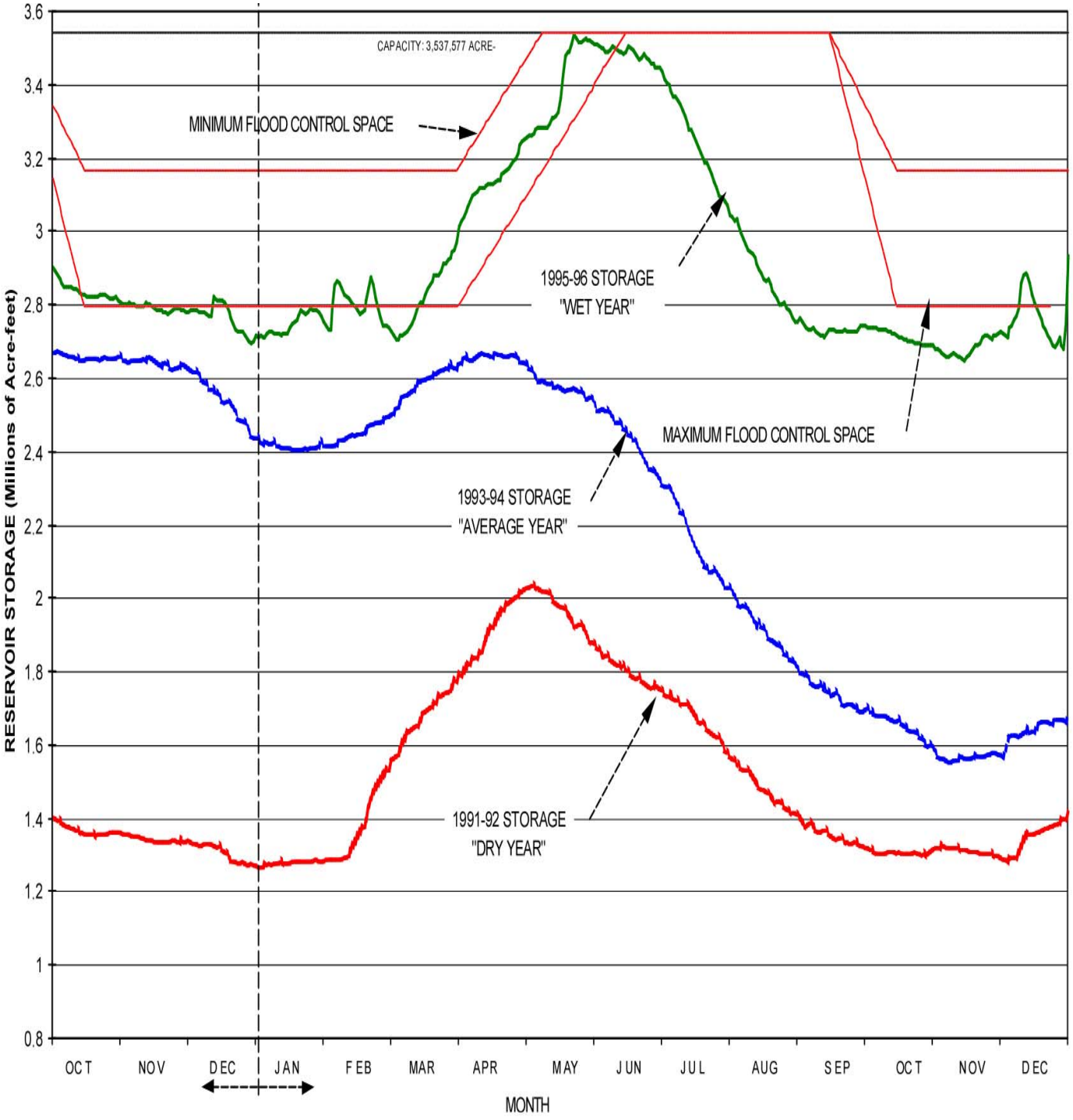

Figure H.14.1-1 Lake Oroville water levels for dry, average, and wet water years.

As seen in Figure H.14.1-1, the curve showing actual operations generally follows the shape of the flood control rule curve with:

- Lower levels in the late winter and early spring for flood control purposes;
- Higher levels in the late spring and early summer when higher flows may be captured without impacting flood protection; and
- Declining levels in the late summer and fall as the stored water is used.

Actual storage may encroach into the flood reservation during flood events to prevent or minimize downstream flooding along the Feather River.

14.2 FLOW AND TEMPERATURE REQUIREMENTS

Minimum flows in the Lower Feather River are established by a 1983 agreement between DWR and DFG, Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife. The agreement establishes criteria for flow and temperature for the Low Flow Channel of the Feather River and the reach of the Feather River below the Thermalito Afterbay Outlet to the confluence with the Sacramento River (High Flow Channel) for preservation of salmon spawning and rearing habitat.

The agreement specifies that DWR 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 outlet, Thermalito Diversion Dam Powerplant, and the Feather River Fish Hatchery pipeline.

Table H.14.2-1 lists the minimum instream flow requirements for the Feather River below the Thermalito Afterbay Outlet to the Feather River.

Table H.14.2-1. Feather River minimum flow requirements. (1)

Percent of Normal (2) Runoff (%)	Oct – Feb (cfs)	Mar (cfs)	Apr – Sep (cfs)
> 55	1,700	1,700	1,000
< 55	1,200	1,000	1,000

(1) If Oroville surface elevation is greater than 733 ft (msl).

(2) Normal is defined as the mean (1911 – 1960) April through July unimpaired runoff near Oroville of 1,942,000 af.

Source: Initial Information Package

The agreement includes a requirement that if during October 15 through November 30, the hourly flow is greater than 2,500 cfs then the flow minus 500 cfs must be maintained until the following March unless the high flow was due to flood management operations or mechanical problems. 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, the flows are maintained below 2,500 cfs from October 15 to November 30 to prevent spawning in the overbank areas.

Numerical water temperature criteria specific to the Feather River have been established at two locations associated with the Oroville Facilities: at the Feather River Fish Hatchery, and at Robinson Riffle in the Low Flow Channel of the Feather River. The hatchery objectives were established in a 1983 agreement between DWR and DFG concerning the operation of the Oroville Division of the SWP for management of fish and game. The temperature objectives for the Feather River Fish Hatchery are listed in Table H.14.2-2. The temperature objective for Robinson Riffle is not to exceed 65 degrees Fahrenheit (°F) between June 1 and September 30. The temperature criterion for Robinson Riffle was included in the NOAA Fisheries 2002 and 2004 Operations Criteria and Plan (OCAP) Biological Opinions (NOAA 2002 and 2004).

Table H.14.2-2. Feather River Fish Hatchery temperature objectives (±4°F between April 1 and November 30).

Period	Temperature (°F)
April through May 15	51
May 16-31	55
June 1-15	56
June 16 - August 15	60
August 16-31	58
September	52
October - November	51
December - March	55

Source: Initial Information Package (DWR 2001)

In May 1969, DWR entered into an agreement with water districts that are now the Joint Water District Board to provide them with water based upon prior rights. The agreement discusses diversion season and amounts of diversion, but it does not set numerical criteria for water temperature of agricultural diversions. A similar agreement between DWR and the Western Canal Water District discusses the diversion season and amount of diversion without setting any specific temperature requirement. These agreements were executed in 1969 to resolve protests filed by holders of senior water rights. Issues related to these diversions are addressed under the terms of these agreements or concerns among the parties of these agreements are being addressed separately.

The 1983 agreement between DWR and DFG also established a narrative water temperature objective for the Feather River downstream of the Thermalito Diversion Dam and Thermalito Afterbay Outlet. This narrative objective requires water temperatures that are suitable for fall-run Chinook salmon during the fall (after September 15) and suitable downstream of the Thermalito Afterbay Outlet for shad, striped bass, and other warmwater species from May through August. This objective has no direct effect on operations because it is not well defined, but it has encouraged

operators to seek opportunities to provide colder water to the High Flow Channel during the fall months.

15.0 HISTORY OF PROJECT UPGRADES

15.1 EXISTING FACILITIES

The Oroville Division was first authorized by the Legislature in 1951 as part of the Feather River Project. The original application for a license from the Federal Power Commission (FPC), predecessor to the Federal Energy Regulatory Commission, to construct facilities at Oroville was dated January 31, 1952. This license application was revised August 31, 1953, and further amended October 31, 1955. In 1955 the Division of Water Resources, Department of Public Works, predecessor to Department of Water Resources, submitted a second report to the Legislature on the Feather River Project. This report found that the Feather River Project, including the Oroville Facilities, had engineering and financial feasibility and recommended that construction proceed. The Federal Power Commission issued an order to the Water Project Authority issuing a license (major) on December 14, 1956, for the Oroville Facilities (Feather River Project, Oroville division). This order covered the project for a concrete dam and power generating facilities. Subsequently the Legislature set up a new agency, the Department of Water Resources, and gave it the authority to implement the State Water Plan. On February 11, 1957, the Federal Power Commission issued a 50-year license, effective February 11, 1957, to the Department of Water Resources to construct and operate the Oroville Facilities (FERC Project No. 2100) in Butte County, California. Funds were appropriated for construction in 1957.

DWR submitted an amendment to the Federal Power Commission dated October 30, 1959, which reflected changes to include an embankment type dam as opposed to the concrete type dam previously approved and added the Thermalito power features. This amendment included an increase in the power output of the project due to the addition of the Thermalito Pumping-Generating Plant and an increase in the capacity of Hyatt Pumping-Generating Plant (formerly called Oroville Powerplant). This amendment, with subsequent modifications, was finally approved by the FPC on July 11, 1962. The approval covered the zoned earth and rockfill section for Oroville Dam and the design proposed for the Thermalito Diversion Dam.

Table H.15.1-1 gives a brief description and summary of completion dates for major features of the Oroville Facilities.

Table H.15.1-1. Oroville Facilities original construction.

Oroville Facilities	
Hyatt Pumping-Generating Plant Completed	1967
Oroville Dam Completed	1968
Thermalito Diversion Dam Facilities	
Dam Completed	1968
Powerplant Completed	1987
Thermalito Forebay Dam Facilities	
Forebay Dam Completed	
Pumping-Generating Plant Operations Begin	1968
Pumping-Generating Plant Construction	1968
Complete	1969
Thermalito Afterbay Dam Facilities	
Afterbay Dam Completed	1968
Feather River Fish Barrier Dam Facilities	
Fish Barrier Dam Completed	1964
Fish Barrier Pool Completed	1964
Feather River Fish Hatchery Completed	1967

Table H.15.1-2 gives a brief description and summary of major O&M program upgrades since the original construction was completed.

Table H.15.1-2. Major capital additions/modifications to the Oroville Facilities.

Activity	Start of Construction	Construction Completed	Constructor
Dams, Reservoir & Power Facilities			
Motor/Generator Armature Windings (Spec. 78-51)	05-Jan-79	18-Jun-80	The Epoxylite Corporation
Furnishing 230KV Power Circuit Breaker (Spec. 82-29)	08-Oct-82	17-Oct-84	Brown Boveri Electric, Inc.
Thermalito Diversion Dam Powerplant (Spec. 84-44)	04-Dec-84	26-Aug-87	BRC-Resigned to Brown & Root, Inc.
Motor Generator Rewind Units 2, 3, and 4 (Emergency Contract), Thermalito Powerplant (Spec. 89-11)	24-Feb-89	09-Jul-90	Magnetek National Electric Const., Co.
Fiber Optic Cable (Spec. 89-18)	21-Jun-89	18-Apr-90	Clyde G. Steagal, Inc., Mid Valley Elec.
Boating Facilities Renovation – Lime Saddle Boat LA – Lake Oroville (Spec. 95-28)	19-Oct-95	17-Jul-96	Mark Guiton and Associates
Hatchery Expansion and ADA Modifications, Feather River Fish Hatchery and Oroville Area Control Center (Spec. 97-24)	06- May-98	17-Aug-99	Ginno
Turbine Refurbishment – Units 1, 3 and 5 (Spec. 98-22)	02-Feb-99	Estimated Apr 2005	Voest-Alpine MCE Corp.
Seal and Pave Roads (Spec. 99-13)	05-Aug-99	16-Aug-00	Franklin Construction
Furnishing Governor Replacement (Spec. 99-19)	24-Nov-99	08-Jan-04	Sulzer Compression, Inc
Fabrication/Rehabilitation, Thermalito Diversion Dam and Oroville Dam Spillway (Spec. 99-30)	03-Jan-00	26-Aug-02	Weston
Radial Gates Rehabilitation (Spec. 00-12)	18-Jul-00	26-Nov-01	ARB, Inc.
Radial Gate Rehabilitation (Spec. 00-11)	25-Jan-01	18-Mar-03	Dillingham Construction
Pump-Turbine Refurbishment Units 2, 4 and 6 (Spec. 01-11)	07-Nov-01	Work Continues	G.E. Hydro Power, Inc.
Fish Facilities			
Hatchery Expansion and ADA Modification, Feather River Fish Hatchery and Oroville Area Control Center (97-24)	06-May-98	17-Aug-99	Ginno & K9 Construction Inc.

Source: Final Construction Reports

Recently, there have also been several interim recreation projects that have been completed. Early in the ALP, DWR agreed to consider implementing some actions before receiving a new license provided no license amendment was needed, no environmental review was required, and there was agreement to include the actions in

the new license application when filed. These interim projects are listed below and discussed in further detail in Section 3.1.2.2 of the PDEA:

- Restroom Upgrades;
- Loafer Creek Equestrian Camp Improvements;
- Group Staging Area at Thompson Flat
- Bidwell Bar Bridge Exhibit;
- Saddle Dam Improvements;
- Lake Oroville Overlook Improvements;
- Reseed Oroville Dam;
- Model Aircraft Flying Facility Improvements;
- Promote Existing Recreation Facilities;
- Boating Safety Training;
- Maidu Sewim-Bo River Path; and
- FRH Landscaping Improvements.

15.2 PROPOSED NEW FACILITIES AND CONSTRUCTION SCHEDULE

At present, the Department of Water Resources is not proposing any changes to the Oroville Facilities.

16.0 SUMMARY OF HISTORICAL LOST GENERATION

For the five-year period beginning 1998 through 2002, there were no major unscheduled outages at the Oroville Facilities that extended beyond 14 days.

Table H.16.0-1 shows the total hours of unscheduled outages for each of the Oroville Facilities plants.

Table H.16.0-1. Total hours of unscheduled outages for the Oroville Facilities, 1998-2002.

Plant	1998	1999	2000	2001	2002
Hyatt Pumping-Generating Plant	11	56	84	396	135
Thermalito Pumping-Generating Plant	48	30	152	50	126
Thermalito Diversion Dam Powerplant	0	4	2	28	0
Total	59	90	238	474	261

Source: DWR Division of Operations and Maintenance, Water and Plant Office

17.0 FERC LICENSE COMPLIANCE RECORD

DWR has a relatively good record of compliance with the terms and conditions of its existing FERC License for the Oroville Facilities, as it has been amended over the past 47 years. Demonstrating its commitment to continued improvement in this area, in 1998, DWR commissioned an audit of its compliance activities for all of its licensed hydroelectric projects, including Project No. 2100. Results indicated that with only a few exceptions mainly occurring many years ago, DWR's record of compliance with the Standard License Articles has been quite satisfactory. A listing of non-compliance events generally included the following:

- Transfers of property;
- Construction and operation of recreational facilities;
- Ensuring safe public access to the Facilities; and
- Compliance with FERC-imposed deadlines for submission of Project information.

As of the date of the filing of this License Application, DWR addressed and resolved all non-compliance events.

18.0 HISTORICAL PROJECT ACTIONS AFFECTING PUBLIC

The continued operation of the Oroville Facilities for electric power generation alleviates the need for new power resources that would otherwise be required to replace the 762 MW of capacity and roughly 2.4 million MWh per year of energy generated by the three Oroville power plants. This power capacity and generation is vital to the State of California, in that it provides a large portion of the electricity needed to pump water throughout the SWP service area at a lower cost than potential replacement power sources.

Continued operation of the Oroville Facilities for electric power generation is critical to DWR achieving its central mission of providing a reliable and affordable supply of water to water customers in the State of California.

By generating hydroelectric power, the Oroville Facilities help reduce the amount of generation that is needed from fossil fuel power plants, thereby avoiding the emission of such pollutants as hydrocarbons, nitrogen oxides, carbon monoxide, and particulate matter. Hydroelectric generation at the Oroville Facilities possibly avoids the construction of new power plant facilities, thus avoiding other adverse environmental effects. Power from the Oroville Facilities contributes to a diversified generation mix and helps meet power needs within and beyond the immediate region. Regional power benefits from the Oroville Facilities include those often referred to as ancillary system benefits, including spinning reserves, nonspinning reserves, peaking capacity, regulation, and grid stability.

19.0 COST REDUCTIONS UPON LICENSE TRANSFER

If DWR does not receive a new license for the Oroville Facilities, its annual costs would be reduced by $20.7 million because DWR would no longer be responsible for operating the Oroville Facilities' hydropower plants or paying the associated administrative fees. However, DWR would simultaneously incur a new annual cost far greater than the combined annual operating and ownership costs for the Oroville Facilities because it would be required to replace the power generated by the Project. The magnitude of the increased annual cost would depend upon the source of the replacement power, as described above.

20.0 ANNUAL FEES PAID UNDER PART I OF THE FPA

The Federal lands within the Oroville Facilities project boundary include a total of 6,200 acres. Both the U.S. Forest Service (USFS) and the U.S. Bureau of Land Management (BLM) manage federal lands within the project boundary. BLM property area totals 4,600 acres. USFS property area totals 1,600 acres. Most of the land within the project boundary is managed at the state level, with the state Department of Parks and Recreation (DPR) managing recreation use of project area lands, primarily under fee title ownership of the DWR.

Annual land charges DWR has paid to FERC for the past seven years are summarized in Table H.20.0-1:

Table H.20.0-1. Oroville Facilities annual land charges.

Calendar Year	Amount	Calendar Year	Amount
1996	$111,443	2000	$134,241
1997	$139,927	2001	$9,158
1998	$154,113	2002	$16,555
1999	$131,615		

Source: DWR State Water Project Analysis Office, Project Cost Branch

Total annual administrative charges, which include the land charges in the table above, DWR has paid to FERC for the past seven years are summarized in Table H.20.0-2:

Table H.20.0-2. Oroville Facilities annual FERC charges.

Calendar Year	Amount	Calendar Year	Amount
1996	$374,561	2000	$147,428
1997	$307,284	2001	$ 38,296
1998	$383,200	2002	$ 53,230
1999	$274,723		

Source: DWR State Water Project Analysis Office, Project Cost Branch.

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6.0 DEVELOPMENTAL AND ECONOMIC ANALYSIS

The FERC Guidelines (FERC 2001) require applicants to include a "developmental analysis" in their PDEAs to evaluate the economic benefits of the Proposed Action, the estimated costs of the various alternatives, and PM&E measures and their effect on project economics. This analysis typically evaluates economic benefits and costs of PM&E measures while focusing on power-related impacts and economic considerations. For each alternative considered, the analysis addresses the power benefits and costs derived within the context of DWR continuing to meet its operational requirements, including its water supply, flood management, and environmental commitments.

This chapter analyzes the use of available water resources of the Oroville Facilities to generate hydroelectric power after the other commitments noted above are met. It also provides estimates of the economic benefits of the Oroville Facilities and of the costs for proposed PM&E measures included in the alternatives, and quantifies the effects of these measures on Oroville Facilities operations.

Chapter 7.0, Comprehensive Development Analysis and Recommendations, takes a comprehensive look at how these resources, environmental effects, and costs could best be balanced, based on project goals and constraints.

Under the Proposed Action, DWR does not propose any modifications to the Oroville Facilities power generation plants under the new license. However, it does propose to continue to operate and maintain the Oroville Facilities for electric power generation under the terms and conditions of any new license issued by FERC. Of the Alternatives evaluated in the PDEA, only Alternative 2 includes measures that would negatively affect project operations and therefore would affect the amounts and associated costs of future power generation. The PM&E measures included in the Proposed Action and Alternative 2 would also adversely affect the cost of future water deliveries to the SWP contractors.

6.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

6.1.1 Background

6.1.1.1 SWP Water and Power Requirements

As described in Chapter 2.0, Purpose of Action and Need for Power, the Oroville Facilities are a part of the SWP, and their continued operation is vital to ensuring efficient and cost-effective water supply deliveries throughout California. The Oroville Facilities generate hydroelectric energy to meet a significant portion of the SWP's pumping load (the amount of power needed to operate pumping stations and other water conveyance facilities). Project facilities also provide other important ancillary electrical system benefits such as voltage support to California's interconnected electrical system, and thus benefit power customers throughout California. Chapter 2.0 and Section 3.1.1 of Chapter 3 describe the storage facilities, hydroelectric power plants, pumping-generating plants, and other infrastructure that comprises the Oroville

Facilities. Chapter 2.0 also describes the role of the Oroville Facilities as part of the SWP in the production of energy to supply water pumping loads as well as ancillary services required by the interconnected electrical system.

6.1.1.2 Oroville Water Supply

Oroville Facilities operations are planned and scheduled in concert with operations of other SWP and U.S. Bureau of Reclamation CVP water storage, pumping, and conveyance facilities. The economic benefits of the Oroville Facilities can only be understood within the context of their overall value as a component of the SWP. Water is generally not released from Lake Oroville for power generation purposes; except during times of pump-back operation, which are limited, power is generated only when water is released for other purposes, including water supply, flood management, meeting instream flow requirements, and/or water quality control in the Sacramento–San Joaquin Delta (Delta). Water supply costs will increase if structural or operational changes to the Oroville Facilities affecting future water deliveries are made as part of the FERC relicensing process, or if implementation of a PM&E measure reduces the amount of power generated at project facilities, thus requiring DWR to replace the lost power with more expensive and less reliable replacement sources.

In evaluating project operations, existing and future operations needed to meet water supply, flood management, and environmental commitments were simulated with the use of the CALSIM II and HYDROPS™ models (see Appendix C). Current operations were modeled using 2001 level of development modeling assumptions; future operations under the No-Action Alternative, Proposed Action, and Alternative 2 were modeled using 2020 level of development assumptions.

6.1.1.3 Oroville Power Supply

As noted above, the Oroville Facilities are a critical aspect of the SWP water storage and conveyance system. Overall, the SWP uses more energy than it produces. Thus, any decrease in power generation at the Oroville Facilities would need to be offset by increased purchases of energy from other resources and/or by construction of new power generating facilities. In 2000, the SWP required 9,190,000 MWh of generation to meet water pumping requirements and station service requirements. In the same year, the Oroville Facilities generated 2,760,000 MWh, roughly one-third of the system's total requirements.

As noted above, Oroville Facilities power operations are heavily constrained, and continued operation and maintenance of the power features of the Oroville Facilities must be consistent with DWR's many operational requirements. Moreover, power is generated at the Oroville Facilities when water is released pursuant to the SWP operating criteria, which include maintaining adequate flood control storage, Feather River flow and temperature protocols established by regulatory agencies, statutory Delta water quality requirements, Feather River Service Area (FRSA) entitlements, and export to the SWP contractors.

Potential future power generation improvements were studied under Study Plan Report SP-E3, *Evaluation of the Potential for Additional Hydropower Generation at Oroville,* but it was concluded that none of the alternatives studied had sufficient economic viability under DWR's evaluation guidelines to warrant development at any time in the near future. Therefore, no new generation facilities are being proposed as part of DWR's relicensing efforts.

Table 6.1-1 provides a comparison of average annual net power generation between the alternatives analyzed in this PDEA.

Table 6.1-1. Capacity and average annual gross power generation at the Oroville Facilities.

Alternative	Licensed Capacity (MW)	Average Gross Generation (MWh)	Foregone Capacity (MW)	Gross Foregone Generation (MWh)
2001 Existing Conditions	762	2,712,000	N/A	N/A
No-Action Alternative	762	2,708,000	0	0
Proposed Action	762	2,708,000	0	0
Alternative 2	762	2,697,000	0	11,000

Source: DWR CALSIM II modeling, 1922-1993

Based on the results of DWR's operations modeling, it is estimated that the long-term average annual generation from the three existing Oroville Facilities power plants under existing 2001 level of development is roughly 2,712,000 MWh per year. Average pump-back energy requirements are approximately 378,000 MWh per year, resulting in a net annual average generation of 2,334,000 MWh per year under 2001 Existing Conditions.

Using the 2020 level of development assumptions used to model and evaluate future conditions under the No-Action Alternative, these values would be reduced to 2,708,000 MWh, 389,900 MWh, and 2,318,100 MWh, respectively.

Under the 2020 level of development assumptions used to model and evaluate future conditions with the Proposed Action, and once these alternative PM&E measures are implemented, these values would be: 2,708,000 MWh, 389,900 MWh, and 2,318,100 MWh, respectively. The Proposed Action would not reduce power generation because the PM&E measures do not affect project operations.

Under the 2020 level of development assumptions used to model and evaluate Alternative 2, and once these alternative PM&E measures are implemented, these values would be 2,697,000 MWh, 386,700 MWh, and 2,310,300 MWh, respectively. The 800 cfs minimum flow requirement in the Low Flow Channel included in this alternative would require DWR to reduce diversions into the Thermalito Power Canal and Afterbay by approximately 200 cfs (relative to future No-Action conditions which assume the minimum flow requirement in Low Flow Channel is 600 cfs). This alternative also assesses a proposal to increase Thermalito Afterbay water temperature

by diverting 1,200 cfs into the Low Flow Channel from May 1 through June 15 each year. The additional flow releases would reduce the amount of water available for power generation and related pump-back operations.

6.1.2 Method of Economic Analysis

Table 6.1-2 illustrates the key parameters used for the economic analysis, and a brief description of each parameter follows.

Table 6.1-2. Summary of key modeling parameters for economic analysis of the Oroville Facilities.

Period of Analysis	30 years [1]
Term of Financing	30 years [1]
Interest/Discount Rate	6 percent [2]
Net Investment	$401,462,526 [3]
Relicensing Costs	$65,000,000 [4]
Annual O&M Cost	$30,958,000 per year [5]
Average On-Peak Energy Value (2005)	$34.03 per MWh [6]
Average Off-Peak Pump-back Energy Cost (2005)	$26.14 per MWh [6]
Capacity and Ancillary Services Value (2005)	1999-2002 services provided to CAISO [7]

Note: O&M = operations and maintenance
[1] DWR's average term of debt financing.
[2] DWR's average cost of debt financing.
[3] DWR's current net Investment in the Oroville Facilities, based on outstanding revenue bond repayment obligations, which is the Oroville Facilities' share of the Burns-Porter General Obligation Bonds, the Small Hydro Bonds, the WSRB "Water System" Bonds, and the WSRB Surcharge. The bond obligations extend from 2005 through 2029.[4] Licensing costs for the period covering 1999 through 2004.
[5] DWR 2004; average O&M program costs over a 5-year period, including major capital replacement and refurbishment of approximately $4.5 million per year. Excludes environmental and recreation measures/programs.
[6] DWR 2003, generation and pump-back values based on North of Path 15 (NP-15) power price projections from the California Energy Commission; excludes ancillary benefits derived through DWR's participation in the California ISO.
[7] Based on four years of historical services provided and 2002 market prices

The economic analysis is not entirely a first-year analysis in that certain costs, such as major capital investments for improvements, would not be experienced in a single year. For the current analysis, it was assumed that all capital costs would be incurred in the first year, which is assumed to be 2005. The costs were levelized over a 30-year period. For this analysis, levelized costs are the constant stream of annual values that are equivalent to the present value of the total costs, including capital costs, O&M costs, FERC licensing costs, and the cost of PM&E measures, using the given interest and discount rates, over the 30-year period of analysis.

6.1.2.1 Project Annual Costs

Annual costs of each of the alternatives were calculated by amortizing the net investment over the 30-year term of the economic analysis and adding the estimated

annual operation and maintenance (O&M) costs, annualized FERC licensing costs, and estimated annualized cost of PM&E measures included with the alternative.

6.1.2.2 Power Benefits

For this analysis, the value of the power benefits from the Oroville Facilities is assumed to be equal to the price that would be paid for the same amount of power from an alternative source. Future inflation is assumed to be zero. The value of energy was assumed to be equal to the values projected for the ISO zones North of Path 15 (NP-15) by the California Energy Commission (CEC). Energy prices are projected to vary with the time of day, time of year, and future power market conditions. To estimate the total energy value for each alternative, time-of-day energy prices were applied to the time-of-day (or hourly) shape of the generation. This generation shape was derived from the historical hourly generation records for the Oroville Facilities for the period from 1998 through 2002. The estimated value of ancillary services was then added to the above energy values, based on the assumption that DWR will continue to participate in the California ISO ancillary services market in future years.

The operations modeling work conducted for the Oroville Facilities relicensing studies used current (2001) and future (2020) as the years for the level-of-development benchmark studies (refer to Appendix C). The FERC Guidelines require that the year in which the new license application is filed with FERC (in this case, 2005) be used as the base-case year in the developmental analysis and that the period of economic analysis be set at 30 years. Results of the above-mentioned benchmark modeling studies were used to derive the base-case annual generation amounts for the economic analyses of the No-Action Alternative, the Proposed Action, and Alternative 2.

The modeled annual net power generation figure of 2,334,000 MWh per year represents 2001 Existing Conditions. This value changes for each of the alternatives studied. The CALSIM II modeling provided energy estimates for each alternative. Then a detailed assessment was made of the time-of-day power price projections prepared by the CEC, as described above, and applied to these energy estimates in order to estimate future annual net energy benefits for each alternative. Ancillary services benefits were then added to arrive at a total annual net benefit for each alternative.

6.1.2.3 Water Supply and Other Benefits

According to FERC practice, the economic value of a project's nonpower benefits—i.e., water supply, irrigation, navigation, recreation, and flood control—are typically excluded from the developmental analysis because water contractors, irrigators, recreation users, and downstream property owners, not the licensee, receive those benefits.

P2100 facilities construction, operation, and maintenance involve other State agencies, either through direct funding from DWR or other State sources stipulated by statute. Currently, DFG, DPR, and DBW manage land or fund projects located within the FERC boundary. Where these facilities and activities are expressly cited in existing P2100 license articles, we have included these costs in this analysis.

Lastly, the developmental analysis excluded benefits and costs attributable to portions of the SWP outside the Oroville Facilities project boundary. Thus, DWR's income and expenditures related to the operation of pumping plants, electric generation facilities, and water conveyances that are not part of the Oroville Facilities licensed features were excluded from the developmental analysis.

Notwithstanding the above, an analysis was performed for both the No-Action Alternative (base case) and the other two alternatives to determine the base water supply cost and estimated increase in water supply cost associated with expenditures for the various PM&E measures included within each alternative. That analysis is presented in Chapter 7.0, and related socioeconomic effects are addressed in Chapter 5.0, Section 5.12.

6.1.2.4 Economic Analysis

The values identified above yield reasonable estimates of power costs and benefits for the purposes of the economic analysis. The primary goals of the economic analysis were to provide a basis for:

- Measuring the economic benefits of continued operation of the Oroville Facilities;
- Estimating the reduction in power benefits and associated increase in water supply costs with implementation of proposed PM&E measures included in the various alternatives; and
- Estimating the cost of replacing power for any proposed PM&E measures that would reduce future Oroville Facilities power generation.

Because current-year costs were used, future increases or decreases in various cost components were not included in the evaluation of Oroville Facilities power or alternative power supply. Although the potential effects of inflation on the future cost of electricity were not explicitly considered, hydroelectric power generation is relatively insensitive to inflation compared to fossil-fueled generation.

6.1.2.5 Net Annual Benefits

Given the above annual costs and power benefits, the net annual benefits of each alternative (i.e., No-Action Alternative, Proposed Action, and Alternative 2) were estimated as:

Net annual benefits = [annual power value] – [annual project cost]

The net annual benefit serves as the basis for the analysis of the No-Action Alternative (i.e., continued operation of the Oroville Facilities under the existing FERC License) and the other two alternatives.

6.2 COST OF PROTECTION, MITIGATION, AND ENHANCEMENT MEASURES FOR THE ALTERNATIVES

6.2.1 Generation

Certain measures proposed or recommended by stakeholders during the relicensing effort would affect project economics by adding to the energy production cost (i.e., requiring new capital expenditures or additional annual costs for operation and maintenance). Other measures considered under the alternatives would reduce future power production from the Oroville Facilities, thereby reducing annual power benefits. Table 6.1-1, in Section 6.1.1.3, Oroville Power Supply, illustrates how proposed operational changes considered under the various alternatives would affect future power generation by the Oroville Facilities.

6.2.2 Environmental Measures and Other Enhancements

The cost of each PM&E measure is an annualized cost represented over the 30-year period of analysis. Tables 6.2-1 through 6.2-3 show the estimated capital cost, annual operating and maintenance cost, and levelized annual cost for the PM&E measures aggregated in each alternative**.**

Although no cost is shown for some current operational measures undertaken by DWR to meet a myriad of existing flow requirements for the Feather River, Bay-Delta estuary statutory water quality standards, and P2100 statutory flood control obligations, there are in fact significant costs to the Licensee in terms of both reduced power generation and water supply that would not be incurred absent these requirements. For example, DWR currently foregoes an estimated $500,000 to $750,000 per year in generation benefits to meet current minimum flow and ramping requirements in the Feather River. Moreover, an additional $4-6 million per year, and possibly more depending on the timing of flood inflows, is lost in power generation benefits due to the requirement to meet the USACE flood control obligation for Lake Oroville.

These tables do include an estimated capital cost to meet Feather River and Feather River Fish Hatchery temperature requirements under all of the alternatives. For the temperature modeling, DWR assumed that the existing Howell-Bunger (fixed cone dispersion type) river outlet valve from Oroville Dam could be used regularly in roughly one-third of the years in order to achieve temperature requirements for the FRH through year 2020. However, while theoretically possible, in reality this valve was not designed for such frequent use and cannot be used reliably to this end. Therefore, as a placeholder for a potential engineering solution to meet existing FRH temperature requirements under anticipated future operating conditions, we have included a $12 million estimated capital cost for achieving the same modeled temperature results under 2020 hydrologic supply and demand conditions. This estimated capital expenditure represents a mid-range value of the three reconnaissance level solutions that DWR is continuing to evaluate, although no environmental assessment of these potential solutions has been performed as yet.

Another significant cost included in the No-Action Alternative, and also carried through the other alternatives, is the approximately $1.5 million per year DWR expends on various environmental protection and conservation measures stipulated under the interim Operating Criteria and Planning Biological Opinion (OCAP BO) issued by NOAA Fisheries in 2002. These measures provide numerous benefits to aquatic species in the Feather River including federal and State listed species.

Additional capital costs delineated in Tables 6.2-1 (No-Action Alternative) and carried through to the other alternatives, reflect P2100 facilities improvements constructed or implemented by DWR since the year 2001 baseline established for this economic analysis. These enhancements generally fall within the area of recreation resources; we have referred to these improvements as “Interim Projects” in Chapter 3.0. These Interim Projects were those that could be achieved without significant permitting or study and without the need for a P2100 License amendment. These enhancements were implemented by DWR prior to filing the application for new license in good faith in anticipation that these would meet some future recreation needs. In addition, the estimated capital and annual O&M costs associated with early implementation of needed measures identified in the draft terrestrial BA are included.

Table 6.2-1. Estimated costs for PM&E measures— No-Action Alternative (in $1,000s).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Temperature Criteria/Targets	$12,130	$80
Natural Salmonid Spawning and Rearing Habitat	$0	$556
Salmonid Genetics	$0	$0
Feather River Fish Hatchery	$0	$1,625
Lower Feather River Fishery	$0	$985
Fishery Management	$0	$234
Thermalito Afterbay Terrestrial Habitat	$8	$73
OWA Terrestrial	$0	$10
Vegetation and Wildlife Management	$12	$27
Water Quality	$0	$50
Recreation— P2100 (general, incl. trails, restrooms, wildfire evac. plan, law enforcement, final RMP, and monitoring)	$244	$210
Bidwell Canyon BR/Campground/DUA/Marina	$0	$550
Loafer Creek BR/DUA/Campground/Group Campground/Equestrian Campground	$10	$675
Lime Saddle BR/DUA/Campground/Marina	$0	$425
Spillway BR/DUA	$164	$575
Enterprise BR	$0	$125
Vinton Gulch Car-top BR	$0	$30
Dark Canyon Car-top BR	$0	$40
Foreman Creek Car-top BR	$0	$170
Stringtown Car-top BR	$0	$50
Lake Oroville Visitors Center	$0	$340
Saddle Dam Equestrian Facilities and Trailhead Access	$38	$25
Bloomer Area BICs	$0	$40
Goat Ranch BIC	$0	$40
Foreman Creek BIC	$0	$40
Craig Saddle BIC	$0	$40
Oroville Dam Overlook DUA	$0	$25
Floating Campsites and Floating Restrooms	$0	$385
Upper North Fork Arm and Poe Powerhouse	$0	$0
Diversion Pool DUA (Northwest side)	$0	$25
Lakeland Boulevard	$71	$10
Recreation – Low Flow Channel/Feather River Fish Hatchery	$30	$25
North Thermalito Forebay	$0	$475
South Thermalito Forebay	$0	$80
Thermalito Afterbay—Wilbur Road BR	$7	$25
Thermalito Afterbay—Larkin Road Car-top BR	$0	$25
Thermalito Afterbay—Monument Hill BR/DUA	$0	$100
Model Aircraft Flying Area	$27	$25

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
OWA—Thermalito Afterbay Outlet BR/DUA/Campground	$0	$25
OWA Dispersed River and Pond Access Sites	$0	$10
Dispersed Use Sites	$0	$0
Cultural Resources	$0	$0
Land Use, Management, and Aesthetics	$0	$40
Annual Estimate of Future Recreation Capital Improvements and Replacements	$0	$800
TOTAL CAPITAL AND ANNUAL COST	**$12,741**	**$9,090**
LEVELIZED ANNUAL COST	**$10,016**	

Notes: BIC = Boat-in Camp; BR = Boat Ramp; DUA = Day Use Area
Source: developed by MWH

Table 6.2-2. Estimated costs for PM&E measures—Proposed Action (in $1,000s).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Temperature Criteria/Targets	$12,130	$80
Natural Salmonid Spawning and Rearing Habitat	$4,020	$731
Salmonid Genetics	$4,100	$215
Feather River Fish Hatchery	$0	$1,750
Lower Feather River Fishery	$0	$1,055
Lake Oroville Fishery Management	$0	$234
Thermalito Afterbay Terrestrial Habitat	$965	$107
OWA Terrestrial Habitat	$8	$100
Vegetation and Wildlife Management	$500	$112
Water Quality	$25	$75
Recreation— P2100 (general, incl. trails, restrooms, wildfire evac. plan, law enforcement, final RMP, and monitoring)	$994	$616
Bidwell Canyon BR/Parking/Campground/DUA/Marina	$9,268	$775
Loafer Creek BR/DUA/Campground/Group Campground/Equestrian Campground	$4,420	$1,050
Lime Saddle BR/DUA/Campground/Marina	$400	$500
Spillway BR/DUA	$50	$625
Enterprise BR	$3,500	$200
Vinton Gulch Car-top BR	$33	$40
Dark Canyon Car-top BR	$33	$50
Foreman Creek Car-top BR	$2,863	$250
Stringtown Car-top BR	$34	$60
Lake Oroville Visitors Center	$200	$425
Saddle Dam Trailhead	$113	$50
Bloomer Area BICs	$0	$50
Goat Ranch BIC	$0	$50
Foreman Creek BIC	$0	$50
Craig Saddle BIC	$0	$50
Oroville Dam Overlook DUA	$0	$25
Floating Campsites and Floating Restrooms	$50	$435
Upper North Fork Arm and Poe Powerhouse	$0	$0
Diversion Pool DUA (West side)	$200	$50
Lakeland Boulevard Equestrian Staging, DUA and Trail Access	$1,950	$150
Recreation – Low Flow Channel/Feather River Fish Hatchery	$30	$50

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
North Thermalito Forebay	$470	$550
South Thermalito Forebay	$200	$115
Thermalito Afterbay—Wilbur Road BR	$10	$25
Thermalito Afterbay—Larkin Road Car-top BR	$250	$50
Thermalito Afterbay—Monument Hill BR/DUA	$0	$100
Model Aircraft Flying Area	$27	$25
OWA—Thermalito Afterbay Outlet BR/DUA/Campground	$2,450	$300
OWA Dispersed River and Pond Access Sites	$350	$20
Dispersed Use Sites	$25	$10
Cultural Resources	$19,600	$360
Land Use, Management, and Aesthetics	$750	$75
Annual Estimate of Future Recreation Capital Improvements and Replacements	$0	$1,000
TOTAL CAPITAL AND ANNUAL COST	**$70,018**	**$12,640**
LEVELIZED ANNUAL COST	**$17,727**	

Notes: BIC = Boat-in Camp; BR = Boat Ramp; DUA = Day Use Area
Source: developed by MWH

Table 6.2-3. Estimated costs for PM&E measures—Alternative 2 (in $1,000s).

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Temperature Criteria/Targets	$12,130	$418
Natural Salmonid Spawning and Rearing Habitat	$22,390	$1,059
Salmonid Genetics	$4,100	$215
Feather River Fish Hatchery	$32,500	$2,350
Lower Feather River Fishery	$8,000	$1,105
Sport Fishery Management	$0	$234
Thermalito Afterbay Terrestrial Habitat	$965	$107
OWA Terrestrial Habitat same as PA	$8	$185
Vegetation and Wildlife Management	$500	$112
Water Quality same as PA	$25	$75
Recreation— P2100 (general, incl. trails, restrooms, wildfire evac. plan, law enforcement, final RMP, and monitoring)	$1,094	$750
Bidwell Canyon BR/Campground/DUA/Marina	$11,268	$912
Loafer Creek BR/DUA/Campground/Group Campground/Equestrian Campground	$5,420	$1050
Lime Saddle BR/DUA/Campground/Marina	$3,460	$575
Spillway BR/DUA	$1,650	$675
Enterprise BR	$3,500	$200
Vinton Gulch Car-top BR	$33	$40
Dark Canyon Car-top BR	$33	$50
Foreman Creek Car-top BR	$2,863	$250
Stringtown Car-top BR	$334	$70
Lake Oroville Visitors Center	$200	425
Saddle Dam Trailhead	$113	$50
Bloomer Area BICs	$0	$50
Goat Ranch BIC	$0	$50
Foreman Creek BIC	$0	$50
Craig Saddle BIC	$0	$50
Oroville Dam Overlook DUA	$64	$75
Floating Campsites	$450	$510
Upper North Fork Arm below Poe Powerhouse	$50	$5
Diversion Pool DUA (West side)	$33,600	$550
Lakeland Boulevard Trail	$1,950	$150
Recreation – Low Flow Channel/Feather River Fish Hatchery	$200	$75
North Thermalito Forebay	$470	$550
South Thermalito Forebay	$200	$115
Thermalito Afterbay—Wilbur Road BR	$10	$25
Thermalito Afterbay—Larkin Road Car-top BR	$250	$50
Thermalito Afterbay—Monument Hill BR/DUA	$0	$100

Item	Capital Cost ($1,000)	Annual Operating Cost ($1,000)
Model Aircraft Flying Area	$27	$25
OWA—Thermalito Afterbay Outlet BR/DUA/Campground	$2,450	$300
OWA Dispersed River and Pond Access Sites	$350	$20
Dispersed Use Sites	$25	$10
Cultural Resources	$19,650	$360
Land Use, Management, and Aesthetics	$850	$125
Annual Estimate of Future Recreation Capital Improvements and Replacements	$0	$1,200
TOTAL	**$171,182**	**$15,352**
LEVELIZED ANNUAL COST	**$27,788**	

Notes: BIC = Boat-in Camp; BR = Boat Ramp; DUA = Day Use Area
Source: developed by MWH

6.3 OTHER ECONOMIC CONSIDERATIONS

Other economic considerations associated with evaluation of the various alternatives include potential effects on future SWP costs, downstream flood protection benefits afforded by Lake Oroville under USACE flood operation criteria, and economic benefits related to avoiding an increase in fossil fuel emissions. Further discussion of those considerations is presented in Chapter 7.0, Comprehensive Development Analysis and Recommendations.

6.4 COMPARISON OF ALTERNATIVES

This section provides a discussion of the annual costs, annual power benefits, and annual net benefits for the No-Action Alternative, the Proposed Action, and Alternative 2. Table 6.4-1 presents a summary, and the detailed discussion of each parameter follows. Following this, Chapter 7.0 presents a summary of both the economic and environmental considerations supporting DWR's selection of the Proposed Action.

Under the No-Action Alternative, there would be no funding of new PM&E measures beyond what is currently being provided by or arising from existing legal obligations, and the project would continue power generation as it has in the past. By contrast, under the other alternatives (the Proposed Action and Alternative 2), DWR would implement various combinations of PM&E measures that include both structural and operational changes to project facilities. This section indicates the amount of decrease in average levelized annual net benefits of these alternatives resulting from the proposed PM&E measures. Under Alternative 2, there is also a decrease in net power generation and a resulting net decrease in benefits. In addition, based on CEC's projections of power values in 2005, the average annual power value of the project under the No-Action Alternative and under each alternative is provided. The levelized average annual cost, annual benefit, and resulting average annual net benefit are also estimated.

Table 6.4-1. Summary of estimated annual benefits and costs for the alternatives.

Levelized Annual Benefits	Alternative		
	No-Action	**Proposed Action**	**Alternative 2**
Gross Energy generation value	$91,734,000	$91,734,000	$91,362,000
Capacity and ancillary services value	$5,218,000	$5,218,000	$5,218,000
Total annual benefits	**$96,952,000**	**$96,952,000**	**$96,580,000**
Levelized Annual Costs	**Alternative**		
	No-Action	**Proposed Action**	**Alternative 2**
Levelized Water Bond cost	$16,845,000	$16,845,000	$16,845,000
Base O&M cost	$30,958,000	$30,958,000	$30,958,000
Pump-back energy cost	$9,414,000	$9,414,000	$9,337,000
Levelized FERC Relicensing cost	$4,722,000	$4,722,000	$4,722,000
Protection, Mitigation, & Enhancement Measures	$10,016,000	$17,727,000	$27,788,000
Total annual costs	**$71,955,000**	**$ 79,666,000**	**$ 89,650,000**
Total Levelized Annual Net Benefit	**$24,997,000**	**$17,286,000**	**$6,930,000**

Source: developed by MWH

6.4.1 No-Action Alternative

6.4.1.1 Power Generation

Under the No-Action Alternative, there would be no funding of new PM&E measures beyond what is currently being provided or arising from existing legal obligations, and the project would continue to provide 762 MW of capacity and generate a net average of approximately 2,318,100 MWh of electricity annually.

6.4.1.2 Levelized Annual Cost

The levelized annual cost for the No-Action Alternative would be $71,955,000 ($31.04/MWh).

6.4.1.3 Levelized Annual Benefits

Over the analysis period, the levelized annual benefits of the project under the No-Action Alternative would be $96,952,000 ($41.82/MWh).

6.4.1.4 Cost of Environmental Measures

The levelized annual cost of PM&E measures under the No-Action Alternative is estimated to be $10,016,000. Extrapolating these costs over an assumed 50-year license term, results in an estimated $482,280,000.

6.4.1.5 Lost Generation as a Result of Environmental Measures

None.

6.4.1.6 Cost of Lost Generation

None.

6.4.1.7 Resulting Levelized Net Annual Benefits

The levelized annual net benefit of the No-Action Alternative would be $ 24,997,000 ($10.78/MWh).

6.4.2 Proposed Action

6.4.2.1 Power Generation

Under the Proposed Action, there would be new PM&E measures implemented beyond those currently being provided under the No-Action Alternative. The project would still provide 762 MW of capacity and annual generation would average 2,318,100 MWh.

6.4.2.2 Levelized Annual Cost

The levelized annual cost for the Proposed Action would be $ 79,666,000 ($34.37/MWh).

6.4.2.3 Levelized Annual Benefits

Based on the estimate of the current cost of replacing this amount of power with no consideration of inflation over the 30-year period of the analysis, the levelized annual benefits of the project under the Proposed Action would be $96,952,000 ($41.82/MWh).

6.4.2.4 Cost of Environmental Measures

The levelized annual cost of PM&E measures under the Proposed Action is estimated to be $17,727,000. Extrapolating these costs over an assumed 50-year license term, results in an estimated $784,610,000.

6.4.2.5 Lost Generation as a Result of Environmental Measures

None.

6.4.2.6 Cost of Lost Generation

None.

6.4.2.7 Resulting Levelized Net Annual Benefits

The levelized annual net benefit of the Proposed Action would be $17,286,000 ($7.46/MWh).

Over the assumed 50-year new license period, this would result in a decrease in net benefits of approximately $385,550,000 over the No-Action Alternative.

6.4.3 Alternative 2

6.4.3.1 Power Generation

Under Alternative 2, there would be new PM&E measures implemented beyond those currently being provided under the No-Action Alternative and the Proposed Action. The project would still provide 762 MW of capacity but annual generation would be reduced to an average of 2,310,300 MWh.

6.4.3.2 Levelized Annual Cost

The levelized annual cost for Alternative 2 would be $89,650,000 ($38.80/MWh).

6.4.3.3 Levelized Annual Benefits

Based on the estimate of the current cost of replacing this amount of power with no consideration of inflation over the 30-year period of the analysis, the levelized annual benefits of the project under Alternative 2 would be $96,580,000 ($41.80/MWh).

6.4.3.4 Cost of Environmental Measures

The levelized annual cost of PM&E measures under Alternative 2 is estimated to be $27,788,000. Extrapolating these costs over an assumed 50-year license term, results in an estimated $1,140,680.

6.4.3.5 Lost Generation as a Result of Environmental Measures

Annual gross generation loss associated with Alternative 2 is estimated to be 11,000 MWh (7,800 MWh net generation loss).

6.4.3.6 Cost of Lost Generation

The cost of lost generation is estimated to be approximately $496,000 per year.

6.4.3.7 Resulting Levelized Net Annual Benefits

The levelized annual net benefit of Alternative 2 would be $6,930,000 ($3.00/MWh).

Over the assumed 50-year new license period, this would result in a decrease in net benefits of approximately $903,350,000 and $517,800,000 over the No-Action Alternative and Proposed Action, respectively.

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7.0 COMPREHENSIVE DEVELOPMENT ANALYSIS AND RECOMMENDATIONS

Sections 4(e) and 10(a)(1) of the Federal Power Act (FPA) require that FERC give equal consideration to developmental and nondevelopmental uses of the waterway on which a project is located. When FERC reviews a hydroelectric power project, it equally considers recreation, fish and wildlife, and other nondevelopmental values of the project, as well as the project's developmental values in determining whether, and under what conditions, a hydroelectric power license should be issued. Equal consideration has been given in this PDEA to both developmental and nondevelopmental resources to determine which alternative is in the best interests of the public and best adapted to a comprehensive plan for improving or developing the waterway.

7.1 SUMMARY OF ENVIRONMENTAL AND DEVELOPMENTAL EFFECTS

In Chapter 5.0 the environmental and developmental effects of the No-Action Alternative, the Proposed Action, and Alternative 2 are described and evaluated. In this chapter, Table 7.1-1 summarizes and compares the alternatives and their primary effects on the major resources.

The ALP generated over 500 potential PM&E measures for consideration. In conducting the environmental evaluation, potential new environmental measures were weighed in terms of their effectiveness in meeting specific identified resource needs, their potential cost impact on the project, and their potential for adverse effects on continuing operations that currently meet a wide variety of public purposes under the SWP authorization. Water impounded behind Oroville Dam is released for a variety of beneficial uses. Environmental protection measures address instream flow requirements for the protection of aquatic resources, fish hatchery operations, and water quality requirements in the Sacramento–San Joaquin Delta (Delta). The Oroville Facilities also provide extensive recreation opportunities. Developmental measures include water supply, irrigation, and flood control operations. The power generated while making these releases is used to partially offset the cost of purchasing power on the open market for pumping and conveying water from Lake Oroville to SWP customers statewide. Roughly one-third of SWP power needs are supplied by the Oroville Facilities, and this greatly enhances the reliability and cost effectiveness of delivering SWP water supplies, and their associated benefits statewide. If the amount of power generated at the Oroville Facilities were reduced, DWR would need to rely on more expensive and less reliable power sources to replace project power, thus increasing project operating costs and potentially reducing reliability. This potential increase in operating costs would need to be passed on to SWP water customers through higher water rates statewide.

The following section provides an overview of how the environmental and developmental aspects of the project were balanced in arriving at the Applicant's preferred alternative, designated as the Proposed Action.

7.2 RECOMMENDED ALTERNATIVE

Based on a review and evaluation of the No-Action Alternative, the Proposed Action, and Alternative 2, the Proposed Action has been selected as the preferred alternative. This alternative is recommended because impacts of the project are addressed with appropriate protection and mitigation measures, enhancements, all recreational needs are met, and the net benefits of the Proposed Action outweigh the consequences associated with the other alternatives. Under the Proposed Action:

- Issuance of a new license would allow the Applicant to continue to operate the Oroville Facilities as a dependable source of electric energy;
- Continued operation of the 762-MW project would avoid the need for an equivalent amount of fossil fuel-fired electric generation and capacity, continuing to help conserve nonrenewable energy resources and reduce atmospheric pollution;
- Implementation of the recommended PM&E measures would protect or enhance fisheries resources, water quality, terrestrial resources, improve recreational resources, and protect historic and archaeological resources within the project area; and
- The Applicant would continue to meet mandated project purposes covered by a wide variety of federal and State statutes and other legal requirements, including water rights, water supply, flood control, and Delta salinity control, without adverse effects.

7.2.1 Existing Environmental and Recreation Measures that Would Continue

Under the Proposed Action, the Oroville Facilities would continue to be operated as they are now, but under the terms and conditions of a new FERC license specifying certain terms and conditions to further protect and enhance the environment. The existing project, which operates as a key component of the SWP, already offers substantial environmental and recreational benefits to the region while providing water to customers locally and throughout the State. Existing benefits are associated with: (1) water releases to meet a multitude of downstream needs including such measures as improvements to Delta water quality; (2) Feather River Fish Hatchery operations; (3) aquatic and terrestrial habitat management in the Low Flow Channel, the OWA, Lake Oroville, and Thermalito Afterbay; (4) recreation facilities and management programs; (5) environmental measures and monitoring programs that have been implemented by the Applicant over the years (including the existing water quality monitoring program and the "Interim Projects" implemented by DWR during relicensing as described in Chapter 3.0); and (6) a number of selected conservation measures recommended by

the U.S. Fish and Wildlife Service (USFWS) during development of the Draft terrestrial Biological Assessment (BA). The Oroville Facilities would continue to provide the following specific environmental and recreation-related benefits:

- One of the most diverse recreation experiences of any other similar sized reservoir, including power and non-power boating, camping, swimming, water skiing, hunting, angling, recreational vehicle (RV) use, hiking, biking, bird watching, equestrian use, and model airplane flying;
- One of the highest populations of anadromous fish in the Central Valley of California;
- A bass fishery in Lake Oroville widely acknowledged by anglers as world class;
- Significant migratory waterfowl habitat as part of the Pacific Flyway;
- The OWA, one of the most heavily visited State Wildlife Area in California;
- Non-motorized trails which are among the best developed and most popular within California's State Recreation Areas;
- Dedicated state-of-the-art equestrian camping facilities;
- Diverse and quality habitat for a number of special-status species including bald eagle, giant garter snake, valley elderberry longhorn beetle (VELB), and several species of fairy shrimp;
- The only fully self-contained, state-of-the-art floating campsites in the nation;
- A variety of no-fee recreation opportunities; and
- Excellent interpretive and educational opportunities at the Feather River Fish Hatchery and the Lake Oroville Visitors Center, as well as special event programs such as the Salmon Festival.

In addition to the above, numerous operating agreements are currently in place between the Applicant and other State and federal regulatory agencies, since the Oroville Facilities operate within the framework of the larger SWP. These agreements govern both project operations and water releases, and provide terms for protection of environmental resources. Due to these operating agreements, a large number of existing environmental measures that have been in place for many years would continue under the future project operation, and significant new PM&E measures would be implemented by the Applicant under the Proposed Action.

7.2.2 Proposed New PM&E Measures

Beneficial effects on the environment associated with the relicensing of the Oroville Facilities would result from both the above existing environmental measures that will

continue into the future and from new PM&E measures recommended for the protection and enhancement of natural resources and recreation opportunities in the project area. Key elements of the proposed new PM&E measures proposed under the Applicant's Proposal include the following actions:

Aquatic Resources

- Gravel Supplementation and Large Woody Debris Programs would be developed and implemented to increase the quantity and improve the quality of spawning habitat for salmonids, including federally listed spring-run Chinook salmon and steelhead in the Low Flow Channel.

- Fish barrier weirs and a salmon egg–taking station would be constructed and operated in the Low Flow Channel downstream of the Fish Barrier Dam to assist in recovery of species listed under the Federal Endangered Species Act (FESA).

- A Hatchery Adaptive Management Program would be developed to adaptively manage hatchery practices to respond to changing conditions.

Terrestrial Resources

- Procedures would be implemented to ensure that migratory and resident waterfowl brood ponds in Thermalito Afterbay retain sufficient water through recharge at 3-week intervals for the brooding period from approximately April 15 to June 30. In addition, four new brood ponds would be constructed to further enhance habitat.

- Improved terrestrial habitat would be provided through 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. Approximately 240 acres of waterfowl nesting cover would also be developed and maintained annually within the Thermalito Afterbay portion of the OWA on a rotational basis and additional wood duck/wildlife nesting boxes would be installed and maintained in the OWA.

- An Invasive Species Management Plan would be developed and implemented to reduce noxious non-native plant populations and replace them with appropriate native plants.

- Additional Draft terrestrial BA conservation measures recommended by USFWS would be adopted to further protect federally listed threatened and endangered species, including measures to address giant garter snake habitat, bald eagle habitat, vernal pool–related species, the California red-legged frog, and the VELB.

Water Quality

- Water quality monitoring would continue throughout the project area and public health-related information would be provided regarding bacteria levels in swimming areas and health risk issues.

Recreation Resources

- A Draft Recreation Management Plan has been prepared by the Applicant (Appendix I) to address recreation needs and clarify the roles of key entities responsible for management, maintenance, and development of recreational resources within the project boundary. This plan will be finalized after issuance of a new FERC License. The draft plan addresses such subjects as continued operations and maintenance (O&M) at existing and new recreation sites, periodic recreation monitoring through the term of the new license, compliance with requirements of the Americans with Disabilities Act (ADA), implementation of a non-motorized trails program, and development of a projectwide Interpretation and Education Program.

- Improved ADA access for disabled visitors would be provided at several recreation sites: Bidwell Canyon Campground/Marina, the Loafer Creek Campground area, the Lime Saddle Marina, the Diversion Pool Day Use Area, and the South Thermalito Forebay Boat Ramp (BR) area.

- Boat launch access and/or capacity (including extensions of several boat ramps to provide enhanced low-water access) would be improved at several recreation sites: the Bidwell Canyon Boat Ramp, the Enterprise BR area, and the Diversion Pool at Lakeland Boulevard.

- Day use and picnic facilities would be added or expanded at Enterprise Boat Ramp Foreman Creek, the Diversion Pool, the South Thermalito Forebay, the Larkin Road Car-top BR, and the Thermalito Afterbay Outlet located within the OWA.

- Camping facilities would be added or expanded at the Loafer Creek Complex and the OWA Thermalito Afterbay Outlet.

- Swimming opportunities would be enhanced at the North Thermalito Forebay, the South Thermalito Forebay, and the Larkin Road Car-top BR.

- Trails would be added or expanded at the North and South Thermalito Forebay and Saddle Dam.

- Improved or expanded vehicle parking, interpretive information, and safety signage would be provided at various recreation sites.

Cultural Resources

- Many historic properties would be stabilized and/or protected and a Historic Properties Management Plan (HPMP) would be developed and implemented as directed under Section 106 of the National Historic Preservation Act.

Land Management and Aesthetics

- The storage area north of the Oroville Dam emergency spillway would be screened to improve aesthetics.

7.2.3 Benefits of the Proposed Action

Along with the existing benefits that the Oroville Facilities already provide, the additional PM&E measures included in the Proposed Action would directly or indirectly provide a much greater level of benefit. The Proposed Action includes numerous measures that would greatly enhance recreational use of the Oroville Facilities, as well as providing overwhelming benefits to the environment and natural resources. The Proposed Action would continue to result in additional off-site benefits related to water supply, power, flood control, and the local economy. Some of the benefits that would result from implementing the measures recommended in the Proposed Action include:

- More diverse and improved recreation opportunities for local and regional visitors to the project;
- A greater level of public education and interpretive programs for visitors to the project;
- Improved access for disabled visitors;
- Greater protection of historic and cultural resources;
- Enhanced coordination between the Licensee and local communities through establishment of a License Coordination Unit located in Oroville;
- Enhancement of warmwater fishery and coldwater fishery, thereby enhancing and maintaining the recreational angling experience;
- Enhancement of salmonid rearing and spawning habitat;
- Protection of vernal pool species and other sensitive terrestrial wildlife;
- Invasive plant species management;
- Continued provision of water for habitat and water quality enhancement in the San Francisco Bay/Delta;

- Improved public awareness about project water quality and related public health issues;
- Decision-making flexibility provided through the use of adaptive management strategies;
- Millions of dollars in economic benefits to the region from expenditures by recreational visitors, local employment, and expenditures for project O&M and construction of new PM&E measures;
- Enhanced resource management via improved coordination and communication between the Licensee and other responsible State resource agencies;
- Flood protection for property valued in excess of $3 billion;
- 2.3 million MWh of electric power generated annually to enable reliable and affordable water supply deliveries throughout the State; and
- Continued supplemental water supply for diverse agricultural, municipal, and industrial users throughout the State.

7.2.4 Balancing of Developmental and Nondevelopmental Uses

The PM&E measures set forth in the Proposed Action would enhance or protect water quality and quantity, fisheries resources, terrestrial resources, recreation resources, cultural and historic properties, and other values associated with the Oroville Facilities. They are designed to work together collectively to minimize conflicts within and across the many different resource areas and project purposes. By comparison, the analysis of environmental effects supports a general finding that the additional PM&E measures analyzed under Alternative 2 are not warranted, since they either do not have a clear project nexus, would not represent the best balance of project resources, do not appear cost effective, or are not well supported by the study results. Some measures in Alternative 2, such as BLM land transfer and Fuel Load Management Plan, were not included because the necessary agency actions are beyond the control of the licensee. Further, most of the additional measures included in Alternative 2 are not preferred by the Applicant because they would either adversely affect operational flexibility or reduce future power output, which would ultimately increase the cost of water to SWP customers statewide. Alternative 2 does not represent the optimal development of this hydropower resource and is not in the best public interest. Specifically, selected PM&E measures in Alternative 2 are not supported for the following reasons:

Whitewater Park – The development and management of an off-stream whitewater park represents an economic development that is not appropriate for a hydropower Licensee. No need for such a facility was identified as other opportunities, both artificial (Reno whitewater park) and natural (North Fork Feather River), are available both locally and regionally. The preferred location could be a security risk, as it is in close proximity to critical project infrastructure. It would also require additional flows to be diverted from

the Feather River within the project area, resulting in potential adverse water quality effects and loss of power generation, while construction would result in the loss of habitat. It is unknown if the proposed site is technically or environmentally feasible.

Flexible Events Center – This facility would be primarily for equestrian special events due to its location at an enhanced equestrian staging area. No need for such a facility was identified in the Recreation Needs Analysis. As an Interim Project, the Thompson Flat group staging area was created to provide equestrian groups and others with a location similar to the existing equestrian staging area located on the opposite side of the Diversion Pool. The flexible events center would also result in additional habitat loss within the project boundary.

Campground Store Shell at Bidwell Canyon – No need for such a facility was identified in the Recreation Needs Analysis. A full-service store currently exists adjacent to the campground at the Bidwell Marina. Construction of a new facility would compete with this store and other private operations in close proximity to the campground.

Hatchery Water Sterilization – Hatchery water sterilization would provide minimal benefit to existing stocking programs and downstream fishery disease control; and disease does not appear to be a limiting factor in the river with regard to fishery health.

Low Flow Channel Seasonal Minimum Release Increase to 1200 cfs – Modeling results indicated no measurable benefit to water temperatures at Thermalito Afterbay agricultural diversions and that any benefit derived was dependent upon favorable meteorological conditions. This measure was not recommended due to the infrequent and marginal benefit as well as due to substantial power generation opportunity costs associated with it.

Shanghai Bench and Sunset Pumps Modifications for Sturgeon Passage – Although the Feather River is within the historical range of green sturgeon, extensive multi-year surveys during relicensing studies failed to find any sturgeon in the project area. Therefore, it would appear that this measure is unnecessary. Implementation of this measure could require significant and recurring channel modifications that could result in potential adverse effects on other aquatic species. Due to limitations on currently available scientific information on sturgeon swimming performance and fish passage behavior, considerable uncertainty exists regarding the potential success and risk of failure of this PM&E.

100% Hatchery Bred Salmon Marking Program – While this program could assist with the enforcement of angling regulations by providing easier differentiation between hatchery and wild fish, the value to overall regional salmonid recovery efforts would not be commensurate with the significant implementation costs. Benefits of this program to contribute to species recovery are dependent on third party actions, e.g. DFG fishing regulation changes that are outside of the Applicant's control.

Temporary Grandstand at Bidwell Canyon Boat Ramp – No need for such a facility was identified in the *Recreation Needs Analysis* (SP-R17) and this is not a preferred location

for bass tournament events. Fishing tournament organizers prefer to use the Spillway ramp facilities, which include low-water ramps, adequate parking, RV camping, and existing grandstands.

Whitewater Take-out – It is unlikely that any suitable sites exist for a take-out for the Big Bend run, as the shoreline around this area is very steep and no existing roads currently lead to the shoreline. Even if a new road is feasible, its construction would be unwarranted due to the relatively low use of this run, which is only available at low reservoir elevations and consequently is not runnable in most years.

The capital and O&M costs of implementing the proposed new PM&E measures set forth in the Proposed Action and Alternative 2 are substantial, and are additive to the significant costs associated with existing environmental measures already being undertaken by the Applicant. In comparing these two alternatives, the Proposed Action has been selected as the preferred alternative because it represents the optimal balance among environmental measures, capital and O&M costs, power production, SWP water supply deliveries and associated costs, operational flexibility, and the overall public interest.

As shown in Tables 6.2-2 and 6.2-3, the capital cost for PM&E measures associated with Alternative 2 would be over $100 million more than those associated with the Proposed Action. In addition, the annual operating cost would increase by nearly $3 million. Although many of the PM&E measures set forth in Alternative 2 were suggested by various stakeholders through the ALP process, the Applicant does not believe that the significant added costs associated with many of these PM&E measures are warranted in the broader public interest. For example, while the enhancement measure to create additional side channel habitat below the Fish Barrier Dam that was studied under Alternative 2 would increase the amount of habitat for spring-run Chinook and steelhead spawning and rearing, the added benefit is difficult to quantify, and the measure would require significant capital expenditures for construction, future O&M and monitoring, as well as power losses due to increasing minimum flows in the channel in order to make this new spawning habitat effective. Similarly, the estimated annual generation loss realized through the implementation of operational changes associated with Alternative 2 (i.e., increased flow releases to the Low Flow Channel, bypassing the Thermalito Pumping-Generating Plant), would be 11,000 MWh, costing approximately $0.5 million per year yet the increase in minimum flow from 600 cfs to 800 cfs would only nominally increase fishery habitat.

In addition, development or expansion of selected recreation facilities associated with Alternative 2 would require significant expenditures of funds to address the interests of a few stakeholders. Examples of these include additional expenditures for location-specific improvements such as the Whitewater Park, flexible event center, and numerous others without nexus to the project. None of these additional enhancements were cited as needed in the *Recreation Needs Analysis* (SP-R17). Further, the Applicant considers development of these projects to be primarily driven by economic development goals related to regional tourism, and as such, if economically viable, it is better suited for private entities and not appropriate for development by the Applicant.

In considering PM&E measures that truly address the public interest over the long-term operation of the project under a new license, the significant capital expenditures planned under the Proposed Action all address the broader public interest, minimize cross-resource conflicts, and optimize the use of the Applicant's available funds. As any applicant has limited funds, lands, and resources, implementing unwarranted, marginal, or clearly inferior measures uses precious resources that could be better applied toward more beneficial measures in the future.

In general, the Proposed Action provides project improvements and PM&E measures that address the broadest public interest while generating more power at a lower cost over time. In addition to the loss of annual generation and resulting increased power costs, the added PM&E measures and changes in operation that would be implemented under Alternative 2 would cost over $100 million in additional capital expenditures plus nearly $3 million annually for O&M. This increase would exceed $250 million over the 50-year license term, resulting in a significant increase in wholesale water supply costs to SWP contractors and their customers.

The Oroville Facilities ALP included thousands of hours of collaborative stakeholder meetings and the development and completion of 71 technical studies resulting in over 160 individual technical reports to support the development of alternatives and the evaluation of numerous PM&E measures. As a result of this exhaustive and inclusive effort, the Applicant strongly believes that the recommended Proposed Action appropriately balances the developmental and non-developmental aspects of the project and constitutes the best comprehensive plan for the waterway.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
PROJECT COSTS				
Average Annual Net Generation (MWh)	2,334,000 MWh	2,318,100 MWh (a 0.6% reduction from 2001 Existing Conditions)	2,318,100 MWh (same as the No-Action Alternative)	2,310,300 MWh (a 0.3% reduction from the Proposed Action)
Levelized Annual Cost of Power	$65,500,000 ($28.06/MWh)	$ 71,955,000 ($31.04/MWh)	$ 79,666,000 ($34.37/MWh)	$89,650,000 ($ 38.80/MWh)
Levelized Annual Cost of Environmental Measures	$9,134,000	$10,016,000	$17,727,000	$27,788,000
GEOLOGY, SOILS, AND PALEONTOLOGICAL RESOURCES				
Gravel Maintenance Flows	Current USACE flood management criteria define the storage capabilities and flood operations for the Oroville Facilities. High-flow releases are regulated by USACE guidelines, limiting the ability to provide regular, intermediate flushing flows.	Same as Existing Conditions.	Same as Existing Conditions.	Same as Existing Conditions.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Channel Morphology	Oroville Dam inhibits sediment and large woody debris transport from the reservoir area to the lower Feather River, affecting habitat complexity downstream of Oroville Dam. The 1983 agreement between DWR and DFG states that each year DFG will recommend to the licensee, for mutual agreement, a spawning substrate or gravel maintenance program.	Same as Existing Conditions.	Beneficial conditions associated with the Gravel Supplementation and Large Woody Debris Improvement Programs, and side channel enhancement to existing Moe's and Hatchery ditches	Same as Proposed Action plus additional benefit through creation of side channel habitat.
Lower Feather River Channel (downstream of Thermalito Afterbay Outlet) Geomorphic Function	Current USACE flood management criteria define the storage capabilities and flood operations for the Oroville Facilities. High-flow releases are regulated by USACE guidelines, limiting the ability to provide channel forming flows. Changes to the lower Feather River channel are limited by existing flood control levees, most of which were constructed prior to the Oroville Facilities.	Same as Existing Conditions.	Same as Existing Conditions.	Potential for increased short-term and localized channel erosion and incision associated with structural modifications for sturgeon passage and side channel creation.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
WATER QUANTITY				
Water Use	DWR provides water supply in accordance with existing terms and conditions of water right permits, SWP contracts, and Feather River Service Area (FRSA) agreements.	Same as Existing Conditions.	Same as Existing Conditions.	Same as Existing Conditions.
Surface Water Hydrology	DWR impounds precipitation and runoff, primarily winter flows, and releases water based on flood control criteria, fish and wildlife protections and enhancements, Bay/Delta water quality requirements, and water supply entitlements and contractual obligations.	Minor changes are expected in surface water hydrology at Lake Oroville, and in the Feather River downstream of the Thermalito Afterbay Outlet, due to modeled future increased “in-basin” demand. Under the Coordinated Operations Agreement (COA) the SWP and CVP operate jointly to meet Delta water quality requirements wand other water demands within the Sacramento River basin. These requirements are referred to as “in-basin” demands.	Same as No-Action Alternative.	Increasing minimum flow in the Low Flow Channel, including seasonal increases for Thermalito Afterbay temperature control, provides additional surface flow to support the creation of additional side channel habitat.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
WATER QUALITY				
Water Temperature	Water temperature objective at Robinson Riffle is less than 65 degrees between June and September. After September 15, water temperature should be suitable for fall-run Chinook salmon. 1969 Agreement between Joint Water Districts and DWR to provide water for agricultural production.	Modeling results indicate a slight beneficial effect in the lower Feather River due to release pattern changes.	Same as No-Action Alternative.	Temperature targets are lower than existing conditions at Robinson Riffle, providing slight benefit to habitat in the Low Flow Channel. Slight increase in Thermalito Afterbay water temperature under certain meteorological conditions could benefit various water users. Some slight reduction in coldwater pool volume and slight reduction to water temperatures in the High Flow Channel at some times of year in some water years.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Recreation-Related Effects	Lake Oroville and the Thermalito Complex impoundments have resulted in increased levels of recreation activities that have the potential to change water quality parameters such as suspended sediment, discharge of petroleum products, and increased nutrient concentrations. Oroville Dam impounds sediment that may contain elevated concentrations of metals as a result of historic mining practices, preventing further downstream dispersal. Fishing opportunities coupled with metal concentrations within the impounded sediments potentially expose the public to elevated contaminants in fish tissue. DWR, at the request of other public agencies, posts health hazard information associated with impaired water quality or fish consumption.	Same as Existing Conditions with minor increases in adverse recreation-related water quality effects as recreation use increases over time.	Same as No-Action Alternative with slightly greater potential to increase adverse effects because of higher levels of recreation use; however, all effects would still be minor. The Interpretation and Education (I&E) Program would provide beneficial informational material to enhance public awareness of potential risks associated with water contact and fish consumption from project waters.	Same as Proposed Action with the potential to increase adverse effects on water quality due to increased recreational use.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Other Effects	Current project operation and maintenance activities include the use of best management practices (BMPs) to limit the potential effects associated with localized short-term sedimentation resulting from erosion, petroleum discharges, pesticide use, and nutrient loading in project waters.	Same as Existing Conditions.	Same as Existing Conditions. Although additional construction may result from implementation of the Proposed Action, no adverse effects are expected as a result of continued implementation of BMPs.	Same as Proposed Action with additional adverse effects potential due to construction and operation of such additional facilities as the Whitewater Park.
AQUATIC RESOURCES				
Chinook Salmon Spawning Segregation	Spatial and temporal overlap of the spring-run and fall-run Chinook salmon spawning results in increased rates of redd superimposition and genetic introgression. Current hatchery operations provide some segregation through the selective timing of fish ladder use.	Same as Existing Conditions.	Increased spawning segregation and subsequent reduction of redd superimposition through the installation of the fish barrier weirs. Beneficial effects by reducing genetic introgression.	Same as Proposed Action.
Energy and Nutrient Passage	Blocked fish passage to upstream tributaries results in blockage of energy and nutrient transfer.	Same as Existing Conditions.	Same as Existing Conditions.	Same as Existing Conditions.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Macroinvertebrate Populations	Macroinvertebrate assemblages found downstream of project facilities are less diverse than those sampled upstream. Armored substrates provide less surface area, while lower summer water temperatures may alter life-stage development synchronicity with other species. The reduction in flow variability downstream of the project likely benefits these species, which are highly susceptible to being flushed from their habitats by high flows.	Same as Existing Conditions.	Improved conditions associated with the Large Woody Debris and Gravel Supplementation and Improvement Programs, and side channel enhancement would increase species diversity.	Same as Proposed Action conditions plus additional benefit from new side channel creation for increased macro-invertebrate populations and habitat.
Woody Debris Recruitment	Oroville Dam traps large woody debris from the upstream tributaries and blocks the transport of these resources to the lower Feather River, thus reducing habitat quality and complexity.	Same as Existing Conditions.	Improved conditions associated with the Large Woody Debris Supplementation and Improvement Program.	Same as Proposed Action.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Gravel Recruitment	Lake Oroville traps gravel and sediment from the upstream tributaries and blocks the transport of these resources to the lower Feather River, resulting in continued poor substrate quality and streambed armoring downstream of Oroville Dam. The 1983 agreement between DWR and DFG states that each year DFG will recommend to the licensee, for mutual agreement, a spawning gravel maintenance program.	Same as Existing Conditions.	Beneficial effects from improved quantity and quality of salmonid spawning habitat from the Gravel Supplementation and Improvement Program.	Same as Proposed Action conditions.
Channel Complexity	Oroville Dam traps sediment and large woody debris transport from the reservoir area to the lower Feather River, provides static flows in the Low Flow Channel and moderates the flow regime in the High Flow Channel affecting habitat complexity and diversity downstream of Oroville Dam.	Same as Existing Conditions.	Slightly beneficial conditions associated with the Large Woody Debris Supplementation and Improvement Program and side channel enhancements to the existing Moe's and Hatchery ditches.	Same as Proposed Action conditions plus additional benefit from new side channel creation.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Reservoir Fisheries	Lake Oroville is managed to promote a multi-species warmwater and coldwater fishery, benefiting a diverse angling community. The Lake Oroville coldwater fisheries for coho salmon and brown trout are sustained by hatchery stocking. DFG manages Thermalito Forebay as a put-and-take trout fishery to support recreational angling.	Same as Existing Conditions.	Same as Existing Conditions.	Same as Existing Conditions. Additionally, the reservoir fishery stocking program and downstream fishery would slightly benefit from water sterilization at the hatchery.
Lower Feather River Fish Species	Poor spawning gravel quality, minimal large woody debris cover, and decreased habitat complexity described above under “Woody Debris Recruitment” and “Gravel Recruitment” affects spawning and rearing success.	Continued degradation of spawning gravel, large woody debris cover, and habitat complexity.	Beneficial effects on lower Feather River fish species associated with the Hatchery Adaptive Management Program, Large Woody Debris Supplementation and Improvement Program, and Gravel Supplementation and Improvement Program.	Same as Proposed Action conditions plus additional beneficial effects on fall-run Chinook salmon associated with increased Low Flow Channel flows, decreased water temperatures, and new side channel habitat creation. Beneficial effects on green sturgeon (if present) associated with physical modification of potential passage impediments in the lower Feather River.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
WILDLIFE RESOURCES AND HABITATS				
Wildlife Habitat	• The project area provides a variety of terrestrial wildlife habitats. Project maintenance and recreational activities affect some freshwater emergent wetlands habitat.	• Slight improvement in montane hardwood conifer habitat due to implementation of Bald Eagle Management Plan. Beneficial effects will result from Implementation of the Vernal Pool Species Management Plan.	• Slightly adverse effects on blue oak/foothill pine and blue oak woodland habitats due to recreational developments. Beneficial effects on valley foothill riparian, montane hardwood conifer, and freshwater emergent wetland habitats associated with ESA protection of valley elderberry longhorn beetle habitat, bald eagle nesting habitat, and giant garter snake habitat.	• Same as Proposed Action conditions plus additional moderately adverse effects on blue oak/foothill pine and blue oak woodland habitats due to construction of the whitewater park and other recreation developments.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Wildlife Habitat (continued)	• Oroville Dam traps sediment and large woody debris transport from the reservoir area to the lower Feather River, affecting habitat complexity and diversity downstream of Oroville Dam.	• Same as Existing Conditions.	• Beneficial effects on riverine habitat due to the Gravel and Large Woody Debris Supplementation and Improvement Programs. Slightly adverse effects on annual grassland habitat due to minor habitat modifications associated with waterfowl enhancements and additional recreational developments.	• Same as Proposed Action.
Lake Oroville Wildlife Species	Fish habitat enhancements and fish stocking actions beneficially affect piscivorous species.	• No change from Existing Conditions for piscivorous species. • Beneficial effect on montane hardwood conifer habitat due to implementation of Bald Eagle Management Plan.	Same as No-Action Alternative.	Same as No-Action Alternative with additional adverse effects due to construction of the whitewater park and other recreation developments.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Feather River Wildlife Species	• Oroville Facilities operations affect downstream hydrology, which in turn adversely affect bank swallow nesting habitat, by altering erosion and sediment deposition along streambanks and inundating nest colonies. • Fisheries enhancement and stocking actions result in moderately beneficial effects on piscivorous species.	Same as Existing Conditions.	Same as Existing Conditions plus adverse effect on western pond turtle due to fish barrier weirs restricting movement or causing take through drowning.	Same as Proposed Action.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Thermalito Complex Wildlife Species	• Oroville project lands and waters in the project boundary provide forage for migratory and resident waterfowl. The waterfowl brood ponds have beneficial effects on migratory waterfowl and provide additional wetland habitat benefiting species such as giant garter snake. • Project operations, maintenance, and recreation activities may affect vernal pool species and their habitat. • High speed boating use and project water level fluctuations associated with the Thermalito Complex operation can affect nesting waterfowl.	• Same as Existing Conditions. • Beneficial effects would result from Implementation of the Vernal Pool Species Management Plan. • Same as Existing Conditions.	• Construction of additional waterfowl brood ponds would have increased beneficial effects on migratory waterfowl and provide additional wetland habitat benefiting species such as giant garter snake. • Increased beneficial effects would result from Implementation of additional vernal pool protection measures. • Same as Existing Conditions.	Same as Proposed Action.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Oroville Wildlife Area Wildlife Species	• Swainson's hawks utilize nesting and foraging habitat in the OWA. • Migratory and resident waterfowl utilize nesting and foraging habitat in the OWA.	Same as Existing Conditions.	• Same as Existing Conditions. • Additionally, beneficial effects on nesting and foraging waterfowl due to wildlife box program, and nest cover and foraging enhancements.	Same as Proposed Action conditions.
FEDERALLY LISTED THREATENED AND ENDANGERED FISH SPECIES				
Spring-run Chinook Salmon and Steelhead	• Spring-run Chinook salmon and steelhead have been affected by hydroelectric facilities constructed within the upper Feather River watershed leading to spawning superimposition downstream of the Oroville Facilities. • Oroville Dam traps sediment and large woody debris transport from the reservoir area to the lower Feather River, affecting habitat complexity and diversity downstream of Oroville Dam.	Same as Existing Conditions.	Beneficial effects on spring-run Chinook salmon and steelhead due to fish barrier weirs, the Hatchery Adaptive Management Program, and existing side channel enhancement. The Large Woody Debris and Gravel Supplementation and Improvement Programs would also benefit these species.	Same as Proposed Action. Additional beneficial effects associated with creation of new side channel habitat, increased quantity of spawning habitat from increased Low Flow Channel flows, and slight decrease in water temperatures.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
FEDERALLY LISTED THREATENED AND ENDANGERED WILDLIFE SPECIES				
Federally Listed Species and Habitats	• Bald eagles utilize nesting and foraging habitats within and adjacent to the project boundary. Recreation activities in proximity to nest and forage areas could disrupt bald eagle nesting and rearing activity. • Project lands provide habitat for giant garter snake. Project operations, maintenance, and recreation activities may affect vernal pool species and their habitat. • Riparian habitat within project boundary include valley elderberry longhorn beetle habitat. Road and levee maintenance activities affect valley elderberry longhorn beetle habitat.	• Beneficial effect on nesting bald eagles due to implementation of nest territory management plans and other conservation measures. • Beneficial effect on habitat for giant garter snake with continued activities to maintain existing brood ponds and to recharged the brood ponds at regular intervals. • Beneficial effect on valley elderberry longhorn beetle due to implementation of conservation measures identified in the USFWS draft BA.	• Same as No-Action. • Increased beneficial effects on giant garter snake, with construction of additional brood ponds and other measures identified in the USFWS draft BA. • Increased beneficial effects on the valley elderberry longhorn beetle and vernal pool fairy and tadpole shrimp due to implementation of conservation measures identified in the USFWS draft BA.	Same as Proposed Action.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
LAND USE				
Land Use and Management	Several public agencies manage lands independently within the FERC project boundary. DWR operation of the Oroville Facilities does not alter other public agencies' ability to manage lands within their jurisdiction; however, management plans specific to ESA species require periodic adjustment to recreation activities and access.	Same as Existing Conditions.	Moderately beneficial effects from improved interagency recreation management, recreation facilities enhancements and additions, and construction of four additional brood ponds.	Same as Proposed Action. In addition, beneficial effects would occur through the coordinated development and implementation of a Fuel Load Management Plan.
Land Ownership and Management Entities	In addition to the State, the USFS and BLM own property within the FERC project boundary.	Same as Existing Conditions.	Same as Existing Conditions.	The transfer of BLM lands within the FERC boundary to DWR is expected to have a beneficial effect on coordinated land management activities within the project boundary.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Agricultural Resources	• The Oroville Facilities provide reliable water supply for FRSA and SWP contractors for municipal and agriculture activities. Diversion canals within the FRSA contribute to non-native invasive weed species transfer. • Agricultural water withdrawals are made directly from Thermalito Afterbay at several points. Water temperature for these diversions varies with Oroville Facilities release water temperatures, meteorological conditions and afterbay residence time.	Same as Existing Conditions.	Slightly beneficial effect on agricultural weed control due to Invasive Species Management Plan.	• Same as Proposed Action. • Additionally, potential slight benefit from May to mid-June under certain meteorological conditions due to some warming of water temperature released at agricultural diversions with increased residence time within Thermalito Afterbay.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Public Health and Safety	• Numerous public safety entities share responsibilities for law enforcement and the provision of other public health and safety-related services at the Oroville Facilities. • DWR provides financial support to the local mosquito abatement district. • Wildfires caused by human activity occur within the project boundary.	• Same as Existing Conditions. • Potential adverse effects on fire suppression from increased fuel loads.	Same as Existing Conditions. Additionally, beneficial effect from improved coordination among all law enforcement and safety entities with management responsibilities within the project area.	Same as Proposed Action conditions. Additionally, beneficial effect associated with development of a coordinated Fuel Load Management Plan.
CULTURAL RESOURCES				
Cultural Sites Within/Near the Fluctuation Zone	Erosion and cyclical water level fluctuations affect archaeological resources and periodically limit access to culturally important locations.	Same as Existing Conditions.	Beneficial effects on archaeological and Ethnographic/Ethnohistoric resources would result through the implementation of an HPMP.	Same as Proposed Action.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Operations and Maintenance Activities	• Large woody debris is collected and removed at McCabe Creek which may adversely affect cultural resources. • Prior to O&M activities, surveys are conducted to determine potential effects on cultural resources.	• Adverse effects on cultural resources from woody debris removal would continue as well as potential effects from the installation of warmwater fishery habitat enhancements in Lake Oroville. Beneficial effects on archaeological and ethnographic/ ethnohistoric resources would occur in association with biological enhancements that would further restrict recreation activities. Historical Oroville Facilities structures could be adversely affected by maintenance, repairs, and replacement. • Same as Existing Conditions.	Beneficial effects on archaeological and ethnographic/ethnohistoric resources, and historic structures would occur with implementation of an HPMP and related cultural resources PM&E measures.	Same as Proposed Action.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Public Access to Fluctuation Zone	The fluctuation zone is accessible to the public during low reservoir water levels. Off-road motorized vehicle and pedestrian use occurs within the periodically exposed inundation zone.	Adverse effects on cultural resources from looting and vandalism are expected to continue through unauthorized public activity.	Potential adverse effects due to increased public use; however, beneficial effects are expected with implementation of the HPMP and appropriate access restrictions.	Same as Proposed Action.
Interpretation and Education	DPR develops and implements an I&E Program.	Same as Existing Conditions.	Beneficial effects on archaeological resources would occur as a result of the expanded site stewardship program, Curation Facility and expanded I&E Program.	Same as Proposed Action conditions plus slightly beneficial effects through funding of the Site Stewardship Program and the relocation of mortar cupules to an appropriate location.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
RECREATION				
Boating	Motorized and non-motorized boating opportunities occur on project waters. Numerous launching ramps and support facilities are provided at Lake Oroville and the Thermalito Complex.	Same as Existing Conditions including Interim Projects constructed prior to 2005.	Same as Existing Conditions plus beneficial effects would result with improved access for all users, facilitated launching and related safety improvements, increased usability of ramps/docks, and improved boating information. Short-term adverse effects may occur during construction of various recreation facilities. With enforcement of 5 MPH boat speed limit in Thermalito Afterbay north of Hwy 162, slightly beneficial to non-motorized boaters and slightly adverse to motorized boaters.	Same as Proposed Action with additional beneficial effects occurring with increased whitewater boating opportunities, parking, and additional low water access at Lake Oroville. Additional short term adverse effects may occur during construction of additional facilities. Construction of a whitewater park would provide enhanced recreation opportunities for whitewater boaters; however, it would result in additional short-term adverse effects due to construction and long-term adverse effects on other resources.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Camping	Widespread and varied forms of camping opportunities are available within the project boundary including: floating campsites, group and equestrian campsites, boat-in, tent, primitive, and RV camping.	Same as Existing Conditions including Interim Projects constructed prior to 2005.	Beneficial effects would result from improved access for all users, increased campsite capacity, opportunities for new camping experiences, and overall improvement to facilities. Short-term adverse effects would occur during construction of various recreation facilities. Slight adverse effects on Boat-in Campsites from periodic restricted access.	Same as Proposed Action with additional beneficial effects resulting from enhanced campground facilities, increased parking, and additional floating campsites.
Angling	Various cold and warmwater angling opportunities occur on project waters. Numerous day use facilities, fish cleaning stations and ADA accessible fishing piers are provided within the project boundary. Fish stocking in Lake Oroville and Thermalito Forebay, habitat enhancement programs, and the hatchery support angling opportunities.	Same as Existing Conditions.	Beneficial effects would result from improved access for all users, expanded and enhanced angling opportunities, enhanced fish habitat. Some reductions in angling opportunities would be associated with 'no fishing zones' adjacent to the fish barrier weirs.	Same as Proposed Action with additional beneficial effects resulting from improved low water access and new shoreline day use area. Adverse effects due to increased fishing restrictions expected with increased ESA habitat.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Trail Use	Numerous trails for non-motorized use are located within the project boundary and provide recreation opportunities for hikers, equestrians, and bicyclists. All trails are open to hikers. Some trails allow horses/stock or bicycle use. Restricted use designation on some trails limits opportunities to other user groups.	Same as Existing Conditions including Interim Projects constructed prior to 2005.	Beneficial effects would result from increased recreational access, new trail opportunities, enhanced trails experiences, and potential resolution of user conflicts as described in the RMP Trails Program. Short-term minor adverse effects would occur during construction of trails.	Same as Proposed Action. In addition, slightly beneficial effects on a broader spectrum of users, due to increased multi-use trail designation and new trail construction.
Swimming and Other Shoreline-based Day Use	Numerous swimming and other day use facilities are located within the project boundary. Shoreline-based day use facilities include picnic areas, shade ramadas, and restrooms.	Same as Existing Conditions including Interim Projects constructed prior to 2005.	Beneficial effects would result from improved access for all users, enhanced day use experiences, new day use activities, improvements to existing facilities, and additional picnic sites. Enhanced warmwater swimming opportunities would improve the day use experience. Short-term adverse effects would occur during construction of various recreation facilities.	Same as Proposed Action. Additional beneficial effects with expanded swimming opportunities and facilities, enhanced day use facilities, and new shoreline access.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Public Information, Education, and Interpretation Services	Numerous interpretive and educational programs and signage exist within the project boundary. Including tours and programs at the hatchery and the Lake Oroville Visitor Center.	Same as Existing Conditions including Interim Projects constructed prior to 2005.	Beneficial effects are expected from enhanced public information, education, signage, and interpretation services and facilities as included in the RMP I&E Program.	Same as Proposed Action. Beneficial effects with the development of a spawning riffle observation access near the fish hatchery. Short-term adverse effects would occur during construction of this trail.
Special Events	A variety of special events, including fishing tournaments, equestrian trail rides, the Salmon Festival, and holiday celebrations occur within the project boundary.	Same as Existing Conditions including Interim Projects constructed prior to 2005.	Same as No-Action Alternative.	Recreation experience should increase in quality based on facilities constructed to support special events. Long-term adverse effects on wildlife and habitat due to permanent support facilities. Short-term adverse effects would occur during construction.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Safety	Several entities provide law enforcement and public safety services within the project boundary. DWR also coordinates with FERC and other agencies related to facility security.	Same as Existing Conditions including Interim Projects constructed prior to 2005.	Beneficial effects for visitor safety would occur as a result of development of a Wildland Fire Evacuation Plan, debris management at recreation facilities, and implementation of safety-related I&E actions. Large Woody Debris Supplementation Program in the lower Feather River could cause some boating and swimming safety hazards, but LWD Program will be implemented in a way to reduce risks.	Same as Proposed Action Conditions. Additionally, adverse effects may occur as a result of recreational enhancements located in close proximity to sensitive project facilities.
Recreation Management	In coordination with DWR, DPR, DFG, and the California Department of Boating and Waterways (DBW) have statutory or contractual responsibilities for recreation management within the project boundary. Other federal and State agencies have lesser roles in recreation management activities.	Same as Existing Conditions.	Implementation of the RMP and clarification of management roles would result in more efficient and effective recreation management.	Same as Proposed Action Conditions.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
Recreation Operations and Maintenance	In coordination with DWR, DPR, DFG, and DBW have statutory or contractual responsibilities for recreation facilities operations and maintenance within the project boundary.	Same as Existing Conditions.	The recreation monitoring program and continued O&M at existing and new recreation sites as described in the Draft RMP would result in overall enhanced recreation opportunities.	Same as Proposed Action Conditions with additional beneficial effects due to increased maintenance activities at dispersed locations.
Project Facilities and Operational Effects on Recreation	The project facilities provide a wide array of land and water-based recreation opportunities. Normal operation of the project facilities results in variable water levels in project waters. The variability creates both beneficial and adverse effects on various recreational users.	Same as Existing Conditions. Additionally, minor beneficial and adverse effects could occur due to nominally increased fluctuations in Lake Oroville water surface elevations. These fluctuations may result from increased “in-basin” water demands under the modeled 2020 level of development.	Same as No-Action Alternative.	Same as No-Action Alternative.
AESTHETIC ENVIRONMENT				
Project Facilities	The project facilities provide a wide array of landscapes and features within the project boundary.	Same as Existing Conditions.	Most of the improvements and measures associated with the Proposed Action would have beneficial effects with regard to aesthetic values. Temporary moderately adverse effects would result during construction of some facilities.	Same as Proposed Action with additional modifications on the landscape associated with increased level of enhancement.

Table 7.1-1. Summary of potential effects on resource areas.

Resource	Existing Conditions	No-Action Alternative	Proposed Action	Alternative 2
SOCIOECONOMICS AND RELATED RESOURCES				
Local Economic Activity and Fiscal Resources	The Oroville Facilities create an opportunity for recreation and visitor spending as well as local procurement of goods and services for existing operation and maintenance of the project. The project contributes to regional income and employment opportunities related to visitor spending and O&M expenditures.	Same as Existing Conditions with additional visitor spending and employment opportunities attributed to increased population and recreation use.	Same as Existing Conditions with additional beneficial effects from increased income, employment, and expenditures resulting from the implementation and use of recreation enhancements.	Same as Proposed Action with the potential to marginally increase income and employment with construction of additional recreation facilities.
Population and Growth-Inducing Effects	The project facilities and recreation opportunities indirectly support minor local population growth.	Same as Existing Conditions.	Same as Existing Conditions.	Same as Existing Conditions.
Public Services	The project facilities provide additional law enforcement services within the project boundary to supplement regional entities with public service responsibilities.	Recreation visitation would slightly increase demands on local service providers.	Recreation activity associated with the Proposed Action would slightly increase public service demands from No-Action conditions.	Same as Proposed Action.
Environmental Justice	The Oroville Facilities provide non-fee recreational opportunities and access to some project facilities.	Same as Existing Conditions.	Same as Existing Conditions.	Same as Existing Conditions.

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