

Placer County Water Agency Middle Fork American River Project (FERC Project No. 2079)

***DRAFT* BIOLOGICAL ASSESSMENT/ BIOLOGICAL EVALUATION**



Placer County Water Agency
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List of Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
ac-ft	acre-feet
AMP	Aquatic Monitoring Plan
APLIC	Avian Power Line Interaction Committee
ASRA	Auburn State Recreation Area
BA/BE	Biological Assessment/Biological Evaluation
Basin Plan	Sacramento River Basin and San Joaquin River Basin Water Quality Control Plan
BCC	Bird of Conservation Concern
BEMP	Bald Eagle Management Plan
BMI	benthic macroinvertebrate
BMIMP	Benthic Macroinvertebrate Monitoring Plan
CDFG	California Department of Fish and Game
CFP	California Fully Protected
CFR	Code of Federal Regulations
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRLF	California red-legged frog
CSBP	California Stream Bioassessment Procedure
CSC	California Species of Concern
CV	Central Valley
CVP	Central Valley Project
dbh	diameter at breast height
DPS	distinct population segment
DSOD	California Department of Water Resources, Division of Safety of Dams
EAP	Emergency Action Plan
EDWPA	El Dorado Water and Power Authority
ENF	Eldorado National Forest
ESA	Federal Endangered Species Act
ESU	Evolutionarily Significant Unit
ETP	Employee Training Program
FC	federal candidate
FD	federal delisted
FE	federal endangered
FERC	Federal Energy Regulatory Commission

List of Acronyms and Abbreviations (continued)

FP	federal proposed
FPMP	Fish Population Monitoring Plan
FPSP	Fire Prevention and Suppression Plan
FPUD	Foresthill Public Utility District
FRMP	Flow and Reservoir Monitoring Plan
FSS	Forest Service Sensitive
FT	federal threatened
FYLF	foothill yellow-legged frog
FYLFMP	Foothill Yellow-legged Frog Monitoring Plan
GDPUD	Georgetown Divide Public Utility District
GIS	Geographic Information System
GP/IRMP	General Plan/Interim Management Plan
GRMP	Geomorphology/Riparian Monitoring Plan
HPMP	Historic Properties Management Plan
HRCA	Home Range Core Area
IBI	index of biotic integrity
IFRM	Instream Flow and Reservoir Minimum Pool Measure
ILP	Integrated Licensing Process
km	kilometer(s)
kV	kilovolt(s)
LRMP	Land and Resource Management Plan
MBIOMP	Mercury Bioaccumulation Monitoring Plan
MFP or Project	Middle Fork American River Project
mg/L	milligram(s) per liter
MIF	minimum instream flow
MIS	Management Indicator Species
Model	Middle Fork Project Operations Simulation Model
msl	mean sea level
MW	megawatt(s)
MWh	megawatt-hour(s)
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NMFS	National Marine Fisheries Service
NOAA Fisheries	National Oceanic and Atmospheric Administration – Fisheries Division
NRHP	National Register of Historic Places

List of Acronyms and Abbreviations (continued)

OCAP BiOP	Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and California State Water Project
PAD	Pre-Application Document
PCA	pest control advisor
PCWA	Placer County Water Agency
PG&E	Pacific Gas and Electric Company
RM	River Mile
RPA	reasonable and prudent alternative
SCT	State of California Threatened
SD	Supporting Document
SE	State of California Endangered
SMP	Sediment Management Plan
SMUD	Sacramento Municipal Utility District
SNFPA	Sierra Nevada Forest Plan Amendment
ST	State of California Threatened
State Parks	California Department of Parks and Recreation
State Water Board	California State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
THP	timber harvest plan
TNF	Tahoe National Forest
TSMP	Transportation System Management Plan
TSP	Technical Study Plan
TSR	Technical Study Report
TWG	Technical Working Group
UARP	Upper American River Project
USBR	United States Department of the Interior, Bureau of Reclamation
USDA-FS	United States Department of Agriculture-Forest Service United States Fish and Wildlife Service
USGS	United States Geological Survey
VIPMP	Vegetation and Integrated Pest Management Plan
VRMP	Visual Resource Management Plan
Watershed	Middle Fork American River Watershed
WPT	western pond turtle
WPTMP	Western Pond Turtle Monitoring Plan
WQMP	Water Quality Monitoring Plan
WQPP	Water Quality Protection Plan

List of Acronyms and Abbreviations (continued)

WSE	water surface elevation
WTMP	Water Temperature Monitoring Plan
WUA	weighted usable area

1.0 INTRODUCTION

The purpose of this Biological Assessment/Biological Evaluation (BA/BE) is to evaluate Placer County Water Agency's (PCWA) Middle Fork American River Project (MFP or Project) to determine the effect of the Project relicensing (Proposed Action) on federally listed threatened, endangered, candidate, and proposed species, or on any trend toward a Forest Service Sensitive (FSS) species becoming federally listed. This BA/BE is prepared in accordance with legal requirements set forth under Section 7 of the federal Endangered Species Act (ESA) (16 United States Code [USC] §1531 et seq.) and with the standards established in the Forest Service Manual (FSM 2672.42 and 2672.43). This document also follows other guidance from the United States Department of Agriculture-Forest Service (USDA-FS) (USDA-FS 1996) and the Federal Energy Regulatory Commission (FERC or Commission) (FERC 2001a).

The Project is located within the Middle Fork American River Watershed (Watershed), the majority of which is located in Placer County, California (BA/BE Map 1). A small component (a portion of Ralston Afterbay Dam) is located in El Dorado County, California. The Project occupies 1,883 acres of land within the Tahoe National Forest (TNF) and 1,385 acres of land within the Eldorado National Forest (ENF), both of which are administered by the USDA-FS. Portions of the Project are located on privately owned timberland.

Currently, the MFP serves as a multipurpose water supply and hydrogeneration project designed to conserve and control waters of the Middle Fork American River, the Rubicon River, Duncan Creek, North Fork Long Canyon Creek, and South Fork Long Canyon Creek. The Project consists of two major storage reservoirs, two medium regulating reservoirs, three small diversion pools, and five powerhouses that began operation in 1967. The Project's major storage reservoirs, French Meadows and Hell Hole, have a combined capacity of 342,583 acre-feet (ac-ft). The Project has a total dependable generation capacity of 223.7 megawatts (MW) and has an average annual energy production of 1,039,078 megawatt-hours (MWh).

In February 2008, PCWA was designated as the nonfederal representative for the purpose of conducting Section 7 consultation, pursuant to the ESA, with the United States Fish and Wildlife Service (USFWS) for the relicensing of the MFP. The MFP is being relicensed using the FERC's Integrated Licensing Process (ILP).

This assessment of sensitive resources was based on a review of existing information relevant to the Project facilities, extensive agency and other stakeholder consultation, and field surveys. Detailed descriptions of the methods and results are included as supporting documents in PCWA's Application for New License (License Application) (Exhibit E – Supporting Document [SD] A). These documents are incorporated by reference into this BA/BE.

Special-status species are defined as any species that is granted status by the USFWS as threatened (FT), endangered (FE), candidate (FC), proposed (FP) species, or species that have been delisted (FD), as well as FSS species. BA/BE Tables 1 and 2

provide a list of the special-status species that are known or could potentially occur in the vicinity of the MFP based on the USFWS Species List (USFWS 2011; BA/BE Appendix A), Regional Forester's List of Sensitive Plant and Animal Species for Region 5 (USDA-FS 2007), forest-specific lists of sensitive plants (USDA-FS 2006a and 2006b), and the California Natural Diversity Database (CNDDDB) (CDFG 2010a).

Special-status plant and wildlife species identified in BA/BE Tables 1 and 2 as being unlikely to occur in the vicinity of the MFP study (i.e., due to lack of suitable habitat, or whose elevational or geographic range does not fall within the study area) are not discussed further in this document. Special-status plant species identified in BA/BE Table 1 that are not currently known to occur in the MFP (based on the results of TERR 2 – Special-Status Plant Surveys Technical Study Report (TSR) (PCWA 2011a; SD B), USDA-FS survey data (USDA-FS 2006c) and CNDDDB records (CNDDDB 2010) are also not discussed further in this document. Those wildlife species that are known to occur or could potentially occur in vicinity of the MFP based on habitat and elevational and geographic range are listed below and addressed in this document. Wildlife species identified as potentially occurring in the study area are species that have the potential to nest, winter, forage, den, or roost in the study area.

1.1 DOCUMENT ORGANIZATION

The organization of this BA/BE is as follows:

- Section 2.0 of this BA/BE provides a consultation history and summary.
- Section 3.0 provides current regulatory management.
- Section 4.0 provides a description of the No-Action Alternative and the Proposed Action.
- Section 5.0 provides a description of the existing environment.
- Section 6.0 provides the effects of Proposed Action and management recommendations.
- Section 7.0 provides the effects of the No-Action Alternative.
- Section 8.0 provides the cumulative effects analysis.
- Section 9.0 provides the conclusions and determinations.
- Section 10.0 presents the literature cited.
- Section 11.0 provides a list of preparers.

Several supporting tables, figures, and appendices are attached to this BA/BE. BA/BE appendices include the USFWS Species List (BA/BE Appendix A), detailed species life-history and habitat information (BA/BE Appendix B), Proposed Action facility

modification/construction information and concept designs (BA/BE Appendix C), California Red-Legged Frog Site Assessment (BA/BE Appendix D), and California Red-Legged Frog Protocol-Level Survey Report (BA/BE Appendix E).

1.2 SPECIES LISTED UNDER THE ESA, CANDIDATES FOR LISTING, AND CRITICAL HABITAT

No plant species listed as endangered or threatened under the ESA, or candidates for listing, are known to occur in the MFP. Two animal species, one listed as threatened under the ESA and one candidate for listing, may potentially occur in the vicinity of the MFP. These species are listed below. Refer to BA/BE Tables 1 and 2 for species occurrences or the potential for occurrence in the MFP. BA/BE Appendix B provides description of the life history and habitat requirements for each species.

1.2.1 Amphibians

- California red-legged frog (CRLF) (*Rana aurora draytonii*) – FT, California Species of Concern (CSC)

No USFWS-designated critical habitat for CRLF lies within the MFP. The closest critical habitat units are the ELD-1 unit, located in El Dorado County approximately 30 miles south of the MFP, and the NEV-1 unit, located in Nevada County approximately 40 miles to the northwest of the MFP.

1.2.2 Mammals

- Pacific fisher (*Martes pennanti [pacifica]*) – FC, FSS, SCT (candidate for listing as California Threatened), CSC

USFWS has not designated critical habitat for this candidate species.

1.3 FOREST SERVICE SENSITIVE SPECIES

Sixteen FSS species were identified as known to occur or potentially occurring in the study area. One of these species, Pacific fisher, is also a candidate for listing under the ESA and is, therefore, included in Section 1.2, above. The remaining species are listed below. Refer to BA/BE Tables 1 and 2 for species occurrences or the potential for occurrence in the MFP. BA/BE Appendix B provides description of the life history and habitat requirements for each species.

1.3.1 Plants

- Brandegee's clarkia (*Clarkia biloba* ssp. *brandegeae*) – FSS, California Native Plant Society (CNPS) 1B.2
- Butte County fritillary (*Fritillaria eastwoodiae*) – FSS, CNPS 3.2
- Saw-toothed lewisia (*Lewisia serrata*) – FSS, CNPS 1B.1
- Stebbins' phacelia (*Phacelia stebbinsii*) – FSS, CNPS 1B.2

1.3.2 Fish

- Hardhead (*Mylopharodon conocephalus*) – FSS, CSC

1.3.3 Amphibians

- Foothill yellow-legged frog (FYLF) (*Rana boylii*) – FSS, CSC

1.3.4 Reptiles

- Western pond turtle (WPT) (*Emys marmorata marmorata*) – FSS, CSC

1.3.5 Birds

- Northern goshawk (*Accipiter gentilis*) – FSS, CSC
- Bald eagle (*Haliaeetus leucocephalus*) – FD, FSS, USFWS Bird of Conservation Concern (BCC), State of California Endangered (SE), CSC
- California spotted owl (*Strix occidentalis occidentalis*) – FSS, USDA-FS Management Indicator Species (MIS), BCC, CSC

1.3.6 Mammals

- Pallid bat (*Antrozous pallidus*) – FSS, CSC
- Townsend's big-eared bat (*Corynorhinus townsendii*) – FSS, CSC
- Western red bat (*Lasiurus blossevillei*) – FSS, CSC
- California wolverine (*Gulo gulo luteus*) – FSS, State of California Threatened (ST), California Fully Protected (CFP)
- American (Sierra) marten (*Martes americana (sierrae)*) – FSS, MIS

2.0 CONSULTATION HISTORY AND SUMMARY

The following provides an overview of consultation conducted as part of the MFP ILP, and additional consultation and associated activities conducted with USFWS.

2.1 INTEGRATED LICENSING PROCESS CONSULTATION

PCWA, with active participation by representatives of federal and state resource agencies, Native American tribes, local and regional authorities, nongovernment organizations, and the public has been engaged in a consultation process associated with the relicensing of the MFP for the past 6 years. Consultation activities were undertaken by PCWA to comply with FERC regulations, ESA, and National Historic Preservation Act. USDA-FS has participated as a stakeholder in the ILP, and USDA-FS representatives have attended Technical Working Group (TWG) and Plenary Group meetings listed below. Focused ESA consultation meetings were conducted with USFWS to review and discuss materials from TWG and Plenary Group meetings. A summary of focused consultation with USFWS is provided in Section 2.2 and BA/BE Figure 1. Provided below is a summary of key consultation activities associated with the ILP.

- In August 2004, PCWA initiated informal consultation activities to support the preparation and filing of the Pre-Application Document (PAD) for the MFP. Early outreach activities involved: meeting with individual state and federal resource agencies and Native American tribes; conducting workshops; conducting site tours and site visits; meeting with the FERC and; establishing a publicly accessible website.
- During April and May 2006, PCWA conducted several Introductory Stakeholder Meetings and organized a Plenary Group, which was open to all interested relicensing participants, to facilitate communication and decision making during relicensing.
- In May–September 2007, the Plenary Group (including USDA-FS) approved all technical study plans (TSPs) for special-status aquatic and terrestrial biological resources.
- PCWA filed its Notice of Intent and PAD, including approved TSPs, with FERC on December 13, 2007.
- FERC issued Scoping Document 1 on February 11, 2008. The Scoping Document: provided a brief overview of the relicensing process; identified environmental and cultural issues associated with the Proposed Action; identified reasonable alternatives; determined the depth of analysis needed; and identified how the Project would or would not contribute to cumulative effects.

- PCWA began implementing the FERC-approved TSPs in 2008, with select studies beginning earlier to allow for multiple years of data collection. Implementation of technical studies continued through 2011.
- For each TSP developed to address potential resource issues for the MFP, PCWA prepared a detailed TSR. As soon as the individual reports were available, PCWA provided the TSRs (in hardcopy and/or electronic format) to appropriate TWGs and posted the reports on the MFP relicensing website for review and use by all relicensing participants.
- Focused Plenary Group meetings were organized and scheduled on a topic-specific basis to develop proposed environmental measures and management and monitoring plans. Specific topic areas pertinent to this BA/BE that were developed include:
 - Instream Flow and Reservoir Minimum Pool Measures
 - Aquatic Monitoring Plans (AMP)
 - Sediment Management Plan (SMP)
 - Transportation System Management Plan (TSMP)
 - Recreation Plan
 - Vegetation and Integrated Pest Management Plan (VIPMP)
 - Bald Eagle Management Plan (BEMP)
- The Draft License Application for the MFP was filed with FERC and distributed to relicensing participants on September 28, 2010. The Draft License Application included environmental measures proposed by PCWA for the MFP (draft license measures and management and monitoring plans). The draft comment period ended on December 17, 2010. A total of 17 comment letters were received.
- The Application for New License will be filed with FERC and distributed to relicensing participants on February 24, 2011, and including responses to requests for additional information-gathering and studies filed with comments on the Draft License Application. Further, for those Draft License Application Comments that PCWA did not agree with, a basis for declining respond is provided in the response to comments table.

2.2 ADDITIONAL CONSULTATION

USFWS, pursuant to the federal ESA, must be consulted with regard to projects that may affect the continued existence of a federally listed species. Species are defined as threatened or endangered by USFWS if they are listed in Title 50 of the Code of Federal Regulations (CFR)(§§ 17.11 or 17.12). As described in Section 2.1 and provided in

BA/BE Figure 1 and provided in BA/BE Figure 1, USFWS received materials from all Working Group and Plenary Group meetings. A brief summary of additional key USFWS consultation conducted during the ILP is provided below:

- November 2006: USFWS approval of TERR 2 – Special-status Plants and AQ 12 – Special-Status Amphibians and Reptiles TSPs.
- March 15, 2007: Meeting with USFWS to review ILP process, schedule, and documents prepared.
- May 2007: USFWS approval of TERR 5 – Bald Eagle TSP.
- October–November 2007: USFWS provided approval of all final TSPs.
- December 6, 2007: Letter provided by PCWA to FERC requesting authorization to act as the nonfederal designee for informal Section 7 consultation.
- January 2008–February 2010: USFWS review approval of all TSRs, including AQ 12, Attachment A, CRLF Site Assessment.
- February 11, 2008: Letter provided by FERC designating PCWA as the nonfederal designee for informal Section 7 consultation.
- March 27 2008: USFWS provided a letter requesting protocol-level CRLF surveys at Horseshoe Bar and Ralston Ridge, based on information provided in the CRLF site assessment. A follow-up conference call with USFWS was conducted on March 28, 2008.
- June 2008: PCWA obtained landowner approval to conduct CRLF surveys on private land at Horseshoe Bar.
- March 6, 2009: Meeting with USFWS to provide a relicensing process update and discussing the schedule for protocol-level CRLF surveys.
- August 11, 2009: Conference call with USFWS to review and discuss requirements of and measures included in the BEMP.
- September 18, 2009: Meeting is held with USFWS to review and discuss potential environmental measures and CRLF protocol-level survey results.
- September 29, 2009: CRLF protocol survey report submitted to USFWS.
- November 3, 19, and December 1, 2009: Meetings/conference calls with USFWS to review and discuss potential environmental measures.
- January 20, 2010: USFWS approval of BEMP.

- September 28, 2010: Draft License Application, including the Draft BA/BE, submitted to USFWS for a 90-day comment period. No comments received from USFWS.
- January 11, 2011: USFWS states in a telephone message that the Draft BA/BE had been reviewed, and that it included all necessary information to evaluate potential project effects under ESA Section 7.

The Draft BA/BE, which incorporates relicensing participant comments, is included in the Final License Application. This Draft BA/BE will be reviewed by FERC and used in conducting interagency consultation with USFWS. FERC will initiate this consultation by providing USFWS with a copy of the Draft BA/BE (as approved by FERC) and requesting formal consultation after submittal of the Final License Application by PCWA. FERC will also request that USFWS provide a biological opinion on their findings no later than 135 days from receipt of the request for formal consultation.

3.0 CURRENT REGULATORY MANAGEMENT

This section summarizes current regulatory management as it pertains to the management of special-status species listed under the ESA, as well as species considered sensitive by USDA-FS.

3.1 ENDANGERED SPECIES ACT

Pursuant to the federal ESA, the USFWS and National Oceanic and Atmospheric Administration – Fisheries Division (NOAA Fisheries) must be consulted with regard to Projects that may affect the continued existence of a federally listed species. Species are defined as threatened or endangered by USFWS if they are listed in 50 CFR §§17.11 or 17.12. ESA Section 9 and federal regulations prohibit the “take” of federally listed species; take is defined under ESA, in part, as killing, harming, or harassment of such species. Under federal regulations, take is further defined to include habitat modification or degradation where it actually results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. An incidental “take” permit under Section 10(a), or federal consultation under Section 7, is required if the Project might affect a federally listed species.

For Projects where federal action is not involved and take of a listed species may occur, the Project proponent must secure an incidental take permit under Section 10(a) of the federal ESA. Because the MFP requires a federal action, this process does not apply and is not discussed further.

Take of a federally listed species may be approved through Section 7 consultation between USFWS and another federal agency, if the proposed Project is sponsored by or under another federal agency’s jurisdiction. For this Project, Section 7 is applicable because PCWA is filing an application with the FERC to obtain new licenses for the MFP. As part of the process, PCWA is the nonfederal designee for Section 7 consultation and initiates informal consultation with USFWS on behalf of the FERC. Prior to completion of a BA, USFWS determines whether the proposed Project would have “no effect” on listed threatened or endangered species or “may affect” these species. Should USFWS render a “may affect” determination, formal consultation would be initiated between USFWS and the FERC via submittal of the BA to USFWS. A BA provides an evaluation of the effects of a Project on listed and proposed threatened and endangered species. USFWS then prepares a Biological Opinion regarding whether the Project would jeopardize the continued existence of a species. This document is a BA/BE to aid in this determination by the USFWS Endangered Species Division.

3.2 BIOLOGICAL OPINION AND CONFERENCE OPINION ON THE LONG-TERM OPERATIONS OF THE CENTRAL VALLEY PROJECT AND CALIFORNIA STATE WATER PROJECT (OCAP BIOP)

National Marine Fisheries Service's (NMFS) OCAP BiOP, issued on June 4, 2009, reviewed proposed long-term operations of the Central Valley Project and State Water Project (referred to as CVP/SWP operations) in the Central Valley, California, and its

effects on listed anadromous fishes and marine mammal species, and designated and proposed critical habitats, in accordance with ESA Section 7, as amended (16 USC 1531 *et seq.*). NMFS' opinion concluded that planned long-term CVP/SWP operations would jeopardize the continued existence of federally listed species and would also likely eliminate or adversely modify designated critical habitat for these species. Included in NMFS' OCAP BiOP is a reasonable and prudent alternative (RPA), which they believed would remove jeopardy and allow the proposed long-term CVP/SWP operations to precede. The following discusses elements of the OCAP BiOP the relevant to the MFP.

Folsom Dam and Reservoir are located within the American River basin, downstream of the MFP, and is one of seven dam/reservoir complexes included within CVP/SWP operations. Folsom Reservoir has a water storage capacity of 966,000 ac-ft, representing about 6% of the total CVP/SWP storage capacity.

The RPA included in NMFS' OCAP BiOP describes lower American River flow and temperature management standards, improvements to an existing temperature control structure on Folsom Dam, and, in the future, evaluation of potential passage at Nimbus and Folsom Dams to restore Central Valley (CV) steelhead (*Oncorhynchus mykiss*) to native habitat within the American River basin, upstream of Folsom Reservoir.

NMFS listed the CV steelhead distinct population segment (DPS) as "threatened" under the ESA. CV steelhead presently occur in the lower American River, downstream of the United States Department of the Interior, Bureau of Reclamation's (USBR's) Folsom and Nimbus dams, which was designated critical habitat for this DPS on September 2, 2005. The RPA in NMFS' OCAP BiOP includes the development of a Fish Passage Program to reintroduce steelhead above Shasta Dam in the Sacramento River and above Folsom Dam in the American River.

If a pilot program were implemented in the upper American River, then CV steelhead introduced above Folsom Reservoir would likely be designated as an experimental population under ESA Section 10 [16 USC 1539] (a)(1)(j). PCWA is committed to collaborate with the NMFS regarding potential reintroductions into the American River Basin, including the Fish Passage Committee. PCWA acknowledges the potential need to reevaluate the new License Order if a viable population of CV steelhead is established in reaches of the North Fork American River or Middle Fork American River affected by MFP operations and the population is determined to be essential for the continued existence of CV steelhead.

3.3 PUBLIC DRAFT RECOVERY PLAN FOR CENTRAL VALLEY WINTER-RUN AND SPRING-RUN CHINOOK SALMON AND STEELHEAD

The federal ESA mandates that NMFS develop and implement plans (i.e., recovery plans) for the conservation and survival of ESA-listed species. Winter-run Chinook salmon are listed as endangered under the federal ESA (as well as the California ESA), and spring-run Chinook salmon and steelhead are listed as threatened. Implementation of the Recovery Plan for the Sacramento River winter-run Chinook salmon

Evolutionarily Significant Unit (ESU), Central Valley spring-run Chinook salmon ESU, and CV steelhead DPS is important to the continued persistence and recovery of these populations. The Draft Recovery Plan serves as a guideline for achieving recovery goals by describing the steps that must be taken to improve the status of the species.

The Draft Recovery Plan includes a conceptual recovery scenario that, among other actions, includes the reintroduction of steelhead above Folsom Dam into the North, Middle, and/or South forks of the American River (as also identified above in the OCAP BiOP). The OCAP BiOP states that by January 2011, USBR, with the assistance from a Steering Committee, will complete a 3-year plan for a Fish Passage Pilot Program, including the American River Basin.

The Draft Recovery Plan identifies recovery actions specific to the American River including:

- 1.9.7.1 Develop and implement a phased approach to steelhead reintroduction planning to re-colonize historic habitats above Folsom Dam.
 - Conduct feasibility studies.
 - Conduct habitat evaluations.
 - Conduct 3–5 year pilot testing program.
 - Implement long-term fish passage program.
- 1.9.7.2 Implement physical and structural modifications to the American River Division of the CVP to improve water temperature management.

However, to date, most of the actions associated with this evaluation have not been implemented. Elements of the potential reintroduction are “virtually untested” and “prototype” (pg. 666, NOAA 2009). The results of the pilot program will be used to determine the feasibility of long-term passage alternatives and evaluate whether comprehensive fish passage programs should be pursued. If a pilot program is implemented in the upper American River, then CV steelhead introduced above Folsom Reservoir would likely be designated as an experimental population under ESA Section 10 [16 USC 1539] (a)(1)(j). PCWA is committed to collaborate with the NMFS regarding potential reintroductions into the American River Basin, including the Fish Passage Committee. PCWA acknowledges the potential need to reevaluate the new License Order if a viable population of CV steelhead is established in reaches of the North Fork American River or Middle Fork American River affected by MFP operations and the population is determined to be essential for the continued existence of CV steelhead.

3.4 BALD AND GOLDEN EAGLE PROTECTION ACT

The Bald and Golden Eagle Protection Act (The Eagle Act), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs.

The Eagle Act provides criminal and civil penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.”

The Eagle Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” “Disturb” means to “agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

3.5 NATIONAL BALD EAGLE MANAGEMENT GUIDELINES

USFWS developed the National Bald Eagle Management Guidelines (USFWS 2007) to publicize the provisions of the Eagle Act that continue to protect bald eagles after the removal of the bald eagle from protection under the ESA; and to advise landowners, land managers and the general public of the potential for various human activities to disturb bald eagles. These guidelines include recommendations for avoiding disturbance at nesting and roosting sites.

To avoid disturbing nesting bald eagles, USFWS recommends (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. Activities are separated into eight categories (A–H) based on the nature and magnitude of impacts to bald eagles that usually result from the type of activity. Applicable activities are listed below:

- Category A and B (Construction activities of various kinds including buildings, roads, and powerlines): Avoid activity within 660 feet of bald eagle nest during the breeding period.
- Category D (Off-road vehicle use): During the breeding season, do not operate off-road vehicles within 330 feet of the nest.
- Category E (Motorized watercraft use): During the breeding season, within 330 feet of the nest, (1) do not operate jet skis (personal watercraft), and (2) avoid concentrations of noisy vessels (e.g., commercial fishing boats and tour boats), except where eagles have demonstrated tolerance for such activity.
- Category F (Nonmotorized recreation and human entry (e.g., hiking, camping, fishing, hunting, birdwatching, kayaking, canoeing): If the activity will be visible or highly audible from the nest, maintain a 330-foot buffer during the breeding season, particularly where eagles are unaccustomed to such activity.

3.6 MIGRATORY BIRD TREATY ACT

Passed in 1918, the Migratory Bird Treaty Act implements various treaties and conventions between the United States and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. The Act prohibits taking, killing or possessing migratory birds. Migratory birds, as defined under the Act, include most birds including all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows and others, including their body parts (feathers, plumes etc), nests, and eggs. The Act does not differentiate between live and dead birds.

3.7 NATIONAL FOREST MANAGEMENT ACT

The National Forest Management Act (NFMA) of 1976 reorganized, expanded, and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on national forest lands. The NFMA is the primary statute governing the administration of national forests. The NFMA requires the Secretary of Agriculture to develop and implement resource management plans for each unit of the National Forest System. The Secretary must specify procedures to ensure management plans are in accordance with the National Environmental Policy Act (NEPA) and ensure consideration of both economic and environmental factors; provide for wildlife and fish; provide for the diversity of plant and animal communities; ensure timber harvesting will occur only where water quality and fish habitat are adequately protected from serious detriment; ensure clearcutting and other harvesting will occur only where it may be done in a manner consistent with the protection of soil, watersheds, fish, wildlife, recreation, aesthetic resources and regeneration of the timber resource. Plans must be updated every 15 years.

3.8 TAHOE AND ELDORADO NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLANS

The TNF and ENF Land and Resource Management Plans (LRMPs) were developed by the USDA-FS to direct the management of the TNF and the ENF. The goal of these plans is to provide a management program that reflects a variety of activities, allows use and protection of Forest resources, and fulfills legislative requirements while addressing local, regional, and national issues. The LRMP describes the desired future state of the forests, forestwide management direction, and prescriptions for individual management areas, management standards and guidelines, location maps, schedules of proposed and possible outputs and activities, monitoring and evaluation requirements, and how issues were resolved. The LRMP applies to all National Forest Land administered by TNF and ENF. The LRMP states that USDA-FS will manage sensitive species to avoid future listings of those species as threatened or endangered and will ensure maintenance of genetic and geographic diversity and viable populations for sensitive species. The LRMP recognizes hydropower and recreation as two very important beneficial uses of the Forest.

3.9 FINAL ENVIRONMENTAL IMPACT STATEMENT AND RECORD OF DECISION, SIERRA NEVADA FOREST PLAN AMENDMENT

The Sierra Nevada Forest Plan Amendment (SNFPA) is an amendment to the Pacific Southwest Regional Guide, the Intermountain Regional Guide, and LRMPs for national forests in the Sierra Nevada and Modoc Plateau, including the ENF and TNF (USDA-FS 2004). The SNFPA addresses five problem areas, including old forest ecosystems and associated species and aquatic, riparian, and meadow ecosystems and associated species, which were considered by USDA-FS to need urgent attention at the Sierra rangewide scale. Management recommendations in the SNFPA strive to protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve their associated species (e.g., California spotted owl, Pacific fisher, and American marten) and to protect and restore desired conditions of aquatic, riparian, and meadow ecosystems. The SNFPA addresses the stated needs of (1) sustaining desired conditions of old forest ecosystems; (2) protecting and restoring riparian, aquatic, and meadow ecosystems; (3) combating noxious weeds; (4) improving fire and fuels management; and (5) sustaining desired conditions of lower westside hardwood ecosystems in the affected national forests. The Record of Decision was submitted with the Final Environmental Impact Statement and rationale for the decision of selected alternative. The preferred alternative applies a cautious approach for vegetation and fuels management in habitats for sensitive wildlife species, particularly those associated with old forest ecosystems, while recognizing the need to reduce fire threat to human communities.

3.10 REGIONAL WATER QUALITY CONTROL BOARD BASIN PLAN

The objectives presented in the Sacramento River Basin and San Joaquin River Basin Water Quality Control Plan (Basin Plan) are designed to ensure the protection of the beneficial uses of water within the basin. These beneficial uses include:

- Municipal and Domestic Supply (MUN) – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- Irrigation and Stock Watering-Agricultural Supply (AGR) – Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing.
- Hydropower Generation (POW) – Uses of water for hydropower generation.
- Water Contact Recreation (REC 1) – Uses of water for recreational activities involving body contact with water, where the ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, whitewater activities, fishing, or use of natural hot springs.
- Non-Contact Water Recreation (REC 2) – Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with

water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

- Warm Freshwater Habitat (WARM) – Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- Cold Freshwater Habitat (COLD) – Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- Spawning, Reproductive, and/or Early Development (SPWN) – Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
- Wildlife Habitat (WILD) – Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation or enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

The Basin Plan also provides a list of water quality objectives that sets the limits or levels of water quality constituents or characteristics that are established for the protection of the beneficial uses of the river. The achievement of these objectives, where not already demonstrated as being met through testing, depends on consideration of controllable water quality factors. The applicant is responsible for identifying the water quality impact caused by controllable factors due to operations of the Project and recommending measures that may be reasonably applied to control impacts to beneficial uses (including water quality).

4.0 NO-ACTION ALTERNATIVE AND PROPOSED ACTION

4.1 NO-ACTION ALTERNATIVE

The following section summarizes the No-Action Alternative for the MFP. Under the No-Action Alternative, the MFP will continue to operate and be maintained under the terms and conditions of the current FERC license. BA/BE Table 3 provides a brief overview of the development history of the MFP and its operations.

This section was developed to meet the requirements for the description of the existing project as specified in Title 18 of the CFR § 5.18(b)(4). The description of the No-Action Alternative has been organized into the following major subsections.

4.1.1 Existing Project Components

4.1.2 Project Boundary

4.1.3 Routine Facility Inspections, Testing, and Maintenance

4.1.4 Project Safety

4.1.5 Project Operations

4.1.6 Existing Environmental Programs, Measures, or Facilities

Throughout this section references are included to direct the reader to applicable TSRs that provide additional information. Note that descriptions of operations and maintenance activities and Project facilities included in the TSRs have been updated, during the relicensing process, following implementation of TSPs and development of TSRs. The information presented in this section represents the most current Project information.

4.1.1 Existing Project Components

This section details existing MFP components including dams, reservoirs, diversion pools, water conveyance systems, powerhouses, gaging stations and weirs, communication lines and powerlines, support facilities, roads, trails, and recreation facilities. A list of these Project components is provided in BA/BE Tables 4 and 5. A summary of the Project facility specifications is provided in BA/BE Table 6. BA/BE Map 1 provides a geographic overview of the MFP. BA/BE Maps 2a–2e show the location of each Project facility and recreation facility. The general elevation profile of the MFP is shown on BA/BE Figure 2.

4.1.1.1 Large Dams and Reservoirs

The MFP includes two large dams and reservoirs as described below. The reservoirs have a combined gross storage of 342,583 ac-ft and combined active storage of 332,415 ac-ft.

- French Meadows Dam and French Meadows Reservoir

French Meadows Dam (also referred to as L L Anderson Dam) is a 231-foot-high, 2,700-foot-long rock and gravel filled structure with a crest elevation of 5,273 feet above mean sea level (msl). French Meadows Dam impounds the Middle Fork American River forming French Meadows Reservoir. The reservoir has a gross storage capacity of 134,993 ac-ft and an active storage capacity of 127,358 ac-ft. The dam has an existing approximately 40-foot-wide spillway channel that is controlled by two 20-foot-wide radial spillway gates. PCWA is currently engaged in widening the existing spillway to conform to a revised Probable Maximum Flood calculation. The existing spillway is being widened and new larger gates are being installed; work is anticipated to be completed in 2012. The new spillway will be 82 feet wide and controlled by two 36.5-foot-wide spillway gates. The new spillway structure will have a capacity of 39,957 cubic feet per second (cfs). The spillway channel joins the Middle Fork American River approximately 1,000 feet downstream of the dam.

The dam is equipped with outlet works consisting of one 8-inch-diameter pipe for instream flows and a second 72-inch-diameter pipe, upstream slide gate, and a 60-inch ring-jet valve for low-level discharge. The 8-inch pipe has an estimated maximum discharge capacity of 8 cfs. The 72-inch-diameter pipe for low-level discharge has a maximum calculated release capacity of 1,430 cfs at full reservoir.

- Hell Hole Dam and Hell Hole Reservoir

Hell Hole Dam is a 410-foot-high, 1,570-foot-long rock fill structure with a crest elevation of 4,650 feet msl. Hell Hole Dam impounds the Rubicon River and Five Lakes Creek to form Hell Hole Reservoir. The reservoir has 207,590 ac-ft of gross storage and an active storage capacity of 205,057 ac-ft. The dam includes a 350-foot-wide uncontrolled spillway with a maximum capacity of 89,500 cfs. An outlet tunnel with control and energy dissipating valves (outlet works) and a weir for measurement of dam leakage are located adjacent to the downstream face of the dam.

The outlet works consist of a 16-inch-diameter pipe with a 12-inch hollow-cone valve for instream flows and a 48-inch-diameter pipe and hollow-cone valve for low-level discharge. A 20-inch-diameter pipe that supplies water to the Hell Hole Powerhouse is connected to the 48-inch pipe. The 48-inch-diameter Howell-Bunger (HB) valve has a maximum calculated discharge capacity of 852 cfs at full reservoir. However, nonemergency flow through the dam outlet works is

limited to approximately 200 cfs to protect structural integrity of the upstream butterfly valve. In addition, releases from the 48-inch HB valve have the potential to flood the powerhouse and erode the powerhouse access road.

4.1.1.2 Medium Dams and Reservoirs

The MFP includes two medium dams and reservoirs as described below.

- Middle Fork Interbay Dam and Middle Fork Interbay

Middle Fork Interbay Dam is a 70.5-foot-high, 233-foot-long concrete gravity structure with a crest elevation of 2,536 feet msl. The dam impounds the Middle Fork American River forming Middle Fork Interbay. The reservoir has a maximum operating surface area of about 7 acres, contains 175 ac-ft of gross storage, and 173 ac-ft of active storage capacity. The dam includes a 140-foot-wide spillway, 80 feet of which are controlled by four 20-foot-wide radial spillway gates. The spillway and spillway gates have a maximum capacity of 36,506 cfs.

The dam outlet works consist of a 60-inch-diameter pipe with a slide gate and a 23-inch stream maintenance pipe and slide gate. The 60-inch pipe has a maximum calculated capacity of 890 cfs and the instream flow pipe has a capacity of 23 cfs at full reservoir.

- Ralston Afterbay Dam and Ralston Afterbay

Ralston Afterbay Dam is an 89-foot-high, 560-foot-long concrete gravity structure with a crest elevation of 1,189 feet msl. The dam is located just below the confluence of the Middle Fork American and the Rubicon rivers. The dam impounds the Middle Fork American and Rubicon rivers and forms the Ralston Afterbay. Ralston Afterbay has 2,782 ac-ft of gross storage capacity and an active storage capacity of 1,804 ac-ft (at 1,179 feet msl water surface elevation [WSE]). The amount of Ralston Afterbay storage available for use by the Oxbow Powerhouse is 756 ac-ft. The dam has a 232-foot-wide controlled spillway. The spillway includes five 40-foot-wide radial spillway gates and has a capacity of 171,200 cfs. The dam includes a 30-inch pipe controlled by a slide gate and ring-jet valve that is used for release of instream flows. The instream flow pipe has a maximum capacity of 155 cfs at full reservoir. The dam also includes a 72-inch-diameter low-level discharge pipe controlled by a slide gate. This pipe has a maximum calculated capacity of 1,132 cfs at full reservoir.

4.1.1.3 Small Dams and Diversion Pools

The MFP includes three small dams and associated diversion pools as described below.

- Duncan Creek Diversion Dam and Diversion Pool

The Duncan Creek Diversion Dam is a 32-foot-high, 165-foot-long concrete gravity structure with a crest elevation of 5,275 feet msl. The dam forms the Duncan Creek Diversion Pool, with approximately 20 ac-ft of gross storage. The dam incorporates a 100-foot-wide uncontrolled spillway that has a capacity of 7,200 cfs and includes a 10-inch outlet pipe controlled by an angle valve. This pipe provides instream flows and has a release capacity of up to 8 cfs. The dam also includes a 60-inch-diameter outlet pipe controlled by a 60-inch gate valve.

- North Fork Long Canyon Diversion Dam and Diversion Pool

The North Fork Long Canyon Diversion Dam is a 10-foot-high, 120-foot-long concrete gravity structure with a crest elevation of 4,720 feet msl. The dam forms a small diversion pool with less than 1 ac-ft of storage on North Fork Long Canyon Creek. The width of the dam crest acts as an uncontrolled spillway with a 3,000 cfs discharge capacity. The diversion dam includes a 12-inch-diameter pipe to provide instream flows and a 36-inch-diameter outlet pipe controlled with a slide gate.

- South Fork Long Canyon Diversion Dam and Diversion Pool

The South Fork Long Canyon Diversion Dam is a 27-foot-high, 145-foot-long concrete gravity structure with a crest elevation of 4,650 feet msl. The dam forms a small diversion pool with less than 1 ac-ft of storage on South Fork Long Canyon Creek. The dam includes a 60-foot-wide uncontrolled spillway, which has a capacity of 4,000 cfs. The diversion includes a 12-inch-diameter pipe to provide instream flows and a 36-inch-diameter outlet pipe controlled with a slide gate.

Historically, diversions have been reduced at the small diversion (Duncan Creek, North Fork Long Canyon, and South Fork Long Canyon), under existing license conditions, due to debris buildup at the intakes and/or concerns regarding large rocks entering the Hell Hole – Middle Fork Tunnel during high-flow events causing damage to the Middle Fork Powerhouse turbine. In the future, PCWA will modify the trash rack/intake associated with each small diversion, as part of ongoing operations and maintenance of the MFP, to address these issues. Once these modifications are completed, PCWA will be able to take their full diversion of water at these diversions, consistent with existing license conditions.

4.1.1.4 Water Conveyance Systems

The MFP includes seven water conveyance systems to transport water from diversions to reservoirs and powerhouses. The water conveyance systems include features such as intakes, tunnels, diversion pipes, drop inlets, surge shafts and tanks, adits, removable sections, portals, gatehouses, valve houses, and penstocks. These water conveyances are described as follows:

- Duncan Creek – Middle Fork Tunnel

Water is routed from Duncan Creek Diversion to the French Meadows Reservoir via the Duncan Creek – Middle Fork Tunnel. This tunnel is approximately 9 feet wide by 10 feet high and is 7,864 feet long. The tunnel is lined with concrete along approximately 300 feet of its length; the remainder is unlined. The maximum discharge capacity of the tunnel is 400 cfs.

The tunnel intake is located at the southern side of the diversion pool. A trash rack is fitted over the intake structure to prevent debris from entering the tunnel. The tunnel ends at an open portal, located near the northern end of the French Meadows Dam. Water discharges from the tunnel into French Meadows Reservoir.

- French Meadows – Hell Hole Tunnel

The French Meadows – Hell Hole Tunnel routes water from French Meadows Reservoir through French Meadows Powerhouse to Hell Hole Reservoir. The tunnel consists of a 12.3-foot-wide horseshoe cross-section that is 13,694 feet long. The first approximately 1,617 feet is concrete lined and the last approximately 317 feet, at the end of the tunnel, is steel-lined. The remaining 11,760 feet of the tunnel is unlined. Water enters the tunnel through an inlet structure located on the reservoir bottom approximately 1,000 feet from the southern shoreline. A slide gate at the French Meadows – Hell Hole Gatehouse controls flow into the tunnel. The current maximum discharge capacity of the tunnel is approximately 400 cfs.

The tunnel terminates at the French Meadows Powerhouse Penstock and Butterfly Valve House. The French Meadows – Hell Hole Tunnel Removable Section is located between the tunnel portal and butterfly valve house. This removable section provides access to the tunnel for inspection and maintenance. At the valve house, water flows into a 6.25-foot-diameter, 691-foot-long penstock, which terminates at the powerhouse. After flowing through the turbine, water is discharged from the powerhouse to Hell Hole Reservoir.

- Hell Hole – Middle Fork Tunnel

The Hell Hole – Middle Fork Tunnel routes water from Hell Hole Reservoir to the Middle Fork Powerhouse. The tunnel consists of a 13.4-foot-wide horseshoe

cross-section that is 55,006 feet long. The first approximately 6,780 feet is lined with concrete and the last approximately 5,180 feet is steel-lined. The remaining 43,046 feet of its length is unlined. Water enters the tunnel through an inlet located on the reservoir bottom, approximately 400 feet offshore. Water flow is controlled by the Hell Hole – Middle Fork Tunnel Gatehouse, located on the northern shore of Hell Hole Reservoir approximately 0.5 mile from the dam. The maximum discharge capacity of the tunnel is approximately 920 cfs.

Intersecting this tunnel are drop inlets (vertical shafts) from the North Fork and South Fork Long Canyon Creek diversions. The tunnel also includes the Hell Hole – Middle Fork Tunnel Surge Shaft and Tank, located approximately 1,800 feet from the tunnel outlet. The 8-foot-diameter surge shaft and 60-foot-diameter by 22-foot-high aboveground tank provides surge capacity for the tunnel during powerhouse operations.

At North Fork Long Canyon Creek, the tunnel is aboveground for a short distance. At this point, a concrete-encased steel pipe crosses North Fork Long Canyon Creek and joins a removable pipe section. The North Fork Long Canyon Crossing Removable Section provides access into the tunnel for inspection and maintenance. After the removable section, the tunnel continues underground.

The tunnel terminates at the Middle Fork Powerhouse Penstock and Butterfly Valve House. The penstock and butterfly valve house are located approximately 1,479 feet above the Middle Fork Powerhouse. The Hell Hole – Middle Fork Tunnel Removable Section is located between the tunnel portal and the butterfly valve house. This removable section provides a second access to the tunnel for inspection and maintenance. From the valve house, water flows to the powerhouse through a 3,653-foot-long (7.5- to 9-foot-diameter) penstock.

- North Fork Long Canyon Diversion Pipe and Drop Inlet

The North Fork Long Canyon Diversion Dam acts as a diversion structure, which routes water through a slide gate into North Fork Long Canyon Diversion Pipe and Drop Inlet. The diversion pipe is a 36-inch-diameter buried steel pipe, which is 3,530 feet long. From the pipe, water falls down a 403-foot-deep, 6-foot-diameter vertical drop inlet shaft to a 54-foot-long tunnel that intersects the Hell Hole – Middle Fork Tunnel. The drop inlet has a vent pipe that extends 20 feet above the surface to provide air to the shaft. The pipe and shaft have a maximum flow capacity of 100 cfs.

- South Fork Long Canyon Diversion Pipe and Drop Inlet

The South Fork Long Canyon Creek Diversion Dam acts as a diversion structure by routing water through a slide gate into the South Fork Long Canyon Diversion Pipe and Drop Inlet. The diversion pipe is a 50-foot-long, 42-inch-diameter buried steel pipe. From the pipe, water drops down a 387-foot-long vertical shaft to a 27-foot-long tunnel that intercepts the Hell Hole – Middle Fork Tunnel. The

drop inlet has a vent pipe that extends 20 feet above the surface to provide air to the shaft. The pipe and shaft have a maximum flow capacity of 200 cfs.

- Middle Fork – Ralston Tunnel

The Middle Fork – Ralston Tunnel routes water from Middle Fork Interbay to Ralston Powerhouse. The tunnel consists of a 13.4-foot-wide horseshoe cross-section that is 35,397 feet long. The first 8,245 feet of the tunnel is concrete-lined and the last 245 feet is steel-lined. The remaining 26,907 feet is unlined. Water enters the tunnel through the Middle Fork – Ralston Tunnel Intake and Gatehouse located in the Middle Fork Interbay adjacent to the Middle Fork Interbay Dam. The maximum discharge capacity of the tunnel is approximately 836 cfs.

The tunnel terminates at the Ralston Powerhouse Penstock and Butterfly Valve House. The butterfly valve house and entrance to the penstock are located about 1,105 feet above the Ralston Powerhouse. The Middle Fork – Ralston Tunnel Removable Section is located between the tunnel portal and butterfly valve house. This removable section provides access to the tunnel for inspection and maintenance. From the butterfly valve house, water flows to the powerhouse through the 1,670-foot-long Ralston Powerhouse Penstock. This penstock ranges from 8 to 9.5 feet in diameter. Water is discharged from the powerhouse into Ralston Afterbay.

The Middle Fork – Ralston Tunnel Surge Shaft and Tank is located approximately 500 feet from the tunnel portal and consists of a 10-foot-diameter surge shaft and a 60-foot-diameter by 22-foot-high aboveground tank. The shaft and pipe provide surge capacity for the tunnel during powerhouse operations.

- Ralston – Oxbow Tunnel

The Ralston – Oxbow Tunnel routes water from Ralston Afterbay to the Oxbow Powerhouse. Water enters the tunnel through the Ralston – Oxbow Tunnel Intake. The intake structure is located approximately 0.15 mile from the northern end of the Ralston Afterbay Dam. The tunnel consists of a 13.25-foot-wide horseshoe cross-section that is 403 feet long. It is lined with concrete along 343 feet of its length and with steel along the last 60 feet before the powerhouse. It has a flow capacity of 1,088 cfs when Ralston Afterbay is full. The tunnel terminates at the Oxbow Powerhouse Penstock (5-foot-long with a 9-foot inside diameter). The penstock provides water to the Oxbow Powerhouse.

4.1.1.5 Powerhouses

The MFP includes four powerhouses with switchyards and one powerhouse with an associated substation. The powerhouses have a total combined nameplate operating capacity of 223.7 MW. Provided below is a description of each powerhouse, switchyard, and points of interconnection with the Pacific Gas and Electric Company

(PG&E) transmission system. A schematic diagram showing the PG&E transmission system and the points of interconnection with the MFP is provided as BA/BE Figure 3. The PG&E transmission interconnections and transmission system are not part of the MFP.

- French Meadows Powerhouse and Switchyard

The French Meadows Powerhouse, located on the northern shore of Hell Hole Reservoir, contains a single Francis-type turbine and electrical generator with an installed generating capacity of 15.3 MW. The minimum estimated hydraulic capacity of the French Meadows Powerhouse is 50 cfs and the maximum estimated hydraulic capacity is 400 cfs. The above-grade portion of the powerhouse includes an approximately 45-foot by 68-foot concrete slab, a circular 7-foot-high generator housing, a small rectangular entry building, and a transformer. A moveable metal gantry crane stands over the powerhouse. Water to the powerhouse is delivered from French Meadows Reservoir via the French Meadows – Hell Hole Tunnel. Electricity generated at the powerhouse is increased to 60 kilovolts (kV) at the powerhouse main transformer bank and delivered to PG&E's Transmission System at the switchyard adjacent to the powerhouse. The switchyard includes metal towers and electrical switching gear. The French Meadows Powerhouse also includes a motor-generator that provides backup power to the powerhouse. The powerhouse and switchyard are enclosed in an approximately 223-foot by 58-foot fenced area that is graded.

- Hell Hole Powerhouse

The Hell Hole Powerhouse, located at the outlet works of the Hell Hole Dam, contains a single Francis-type turbine and electrical generator with an installed generating capacity of 0.73 MW. The minimum estimated hydraulic capacity of the Hell Hole Powerhouse is 10 cfs and the maximum estimated hydraulic capacity is 35 cfs. All powerhouse equipment is contained in a 24-foot by 26-foot concrete block building that is 10 feet high. Water to the powerhouse is delivered via a 20-inch-diameter pipe that is connected to the Hell Hole Dam outlet works and serves as the turbine penstock. Electricity generated at this powerhouse is increased to 12.47 kV and is transmitted on a Project powerline to the French Meadows Powerhouse via the Hell Hole Substation. The electricity is also used to provide power to nearby Project facilities.

- Hell Hole Substation

The Hell Hole Substation located near the French Meadows Powerhouse provides an interconnection to PG&E's 60 kV Transmission System, which allows PCWA to receive power from PG&E. This power can be used to run ancillary equipment and support facilities near Hell Hole Reservoir when French Meadows Powerhouse and Hell Hole Powerhouse are not in operation. The Hell Hole Substation is contained within an approximately 20-foot by 30-foot fenced area.

- Middle Fork Powerhouse and Upper and Lower Switchyards

The Middle Fork Powerhouse (also known as the L. J. Stephenson Powerhouse) contains two Pelton-type waterwheels, each connected to a 61.2 MW electrical generator with an installed generating capacity of 122.4 MW. The minimum estimated hydraulic capacity of the Middle Fork Powerhouse is 50 cfs and the maximum estimated hydraulic capacity is 940 cfs. The above-grade portion of the powerhouse includes an approximately 62-foot by 154-foot concrete slab, two circular 18-foot-high generator housings, a small rectangular entry building, and main transformers. A moveable metal gantry crane stands over the powerhouse. Water to the powerhouse is delivered from Hell Hole Reservoir via the Hell Hole – Middle Fork Tunnel and Penstock. Water from the powerhouse is discharged to Middle Fork Interbay.

Electricity generated at the powerhouse is increased to 60 kV at the powerhouse main transformer bank. Two switchyards are adjacent to the Middle Fork Powerhouse—the Upper and Lower switchyards. The switchyards provide interconnection to PG&E's 60 kV and 230 kV Transmission System. The switchyards include metal towers and electrical switching gear. The powerhouse and switchyards are contained within an approximately 250-foot by 360-foot fenced area that is graded.

- Ralston Powerhouse and Switchyard

The Ralston Powerhouse contains a single Pelton-type waterwheel and electrical generator with an installed generating capacity of 79.2 MW. The minimum estimated hydraulic capacity of the Ralston Powerhouse is 75 cfs and the maximum estimated hydraulic capacity is 924 cfs. Water to the powerhouse is delivered from Middle Fork Interbay via the Middle Fork – Ralston Tunnel and Penstock. The above-grade portion of the powerhouse includes an approximately 82-foot by 90-foot concrete slab, a circular 22-foot-high generator housing, and small rectangular entry building. A moveable metal gantry crane stands over the powerhouse. Water from the powerhouse is discharged to Ralston Afterbay.

Electricity generated at the powerhouse is increased to 230 kV at the powerhouse main transformer bank. The Ralston Powerhouse is interconnected to PG&E's 60 kV and 230 kV Transmission System through the switchyard located adjacent to the powerhouse. The switchyard includes metal towers and electrical switching gear. The powerhouse and switchyard are enclosed in an approximately 80-foot by 295-foot fenced area that is graded.

- Oxbow Powerhouse and Switchyard

The Oxbow Powerhouse contains a single Francis-type turbine and electrical generator with an installed generating capacity of 6.1 MW. The minimum estimated hydraulic capacity of the Oxbow Powerhouse is 200 cfs and the

maximum estimated hydraulic capacity is 1,025 cfs. Water to the powerhouse is delivered from the Ralston Afterbay via the Ralston – Oxbow Tunnel. The above-grade portion of the powerhouse includes an approximately 60-foot by 98-foot concrete slab, a small rectangular entry building, and transformer. A moveable metal gantry crane stands over the powerhouse. Water passing through the Oxbow Powerhouse is discharged to a short channel that joins the Middle Fork American River.

Electricity generated at the powerhouse is increased to 60 kV at the powerhouse main transformer bank and interconnected to PG&E's 60 kV Transmission System at the switchyard adjacent to the powerhouse. The switchyard includes metal towers and electrical switching gear. The powerhouse and switchyards are contained within a 120-foot by 145-foot fenced area that is graded.

4.1.1.6 Gaging Stations

PCWA currently maintains a network of nine gaging stations that measure streamflow; two gaging stations that measure diversion flow; six gages that measure reservoir elevation; four that measure flow at powerhouses; and seven weirs that measure dam leakage. Pole-mounted photovoltaic arrays (referred to as photovoltaic poles) and powerlines provide power to some of the gages. Refer to BA/BE Table 4 for additional information on the location of these facilities. All stream gaging stations have been incorporated into the United States Geological Survey (USGS) gaging network.

Stream Gages

Project stream gages are installed at the following locations:

- Duncan Creek near French Meadows (USGS Gage No. 11427700) – verifies compliance with FERC-required instream flows
- Duncan Creek below Diversion Dam (USGS Gage No. 11427750) – verifies compliance with FERC-required instream flows
- Middle Fork American River at French Meadows (USGS Gage No. 11427500) – verifies compliance with FERC-required instream flows
- Rubicon River below Hell Hole Dam (USGS Gage No. 11428800) – verifies compliance with FERC-required instream flows
- North Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433085) – verifies compliance with FERC-required instream flows
- South Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433065) – verifies compliance with FERC-required instream flows
- Middle Fork American River below Interbay Dam (USGS Gage No. 11427770) – verifies compliance with FERC-required instream flows

- Middle Fork American River above Middle Fork Powerhouse (USGS Gage No. 11427760) – collects real-time flow data
- Middle Fork American River near Foresthill (USGS Gage No. 11433300) – verifies compliance with FERC-required instream flows and monitors operations of Oxbow Powerhouse (ramping rate/maximum flows)

Diversion Gages

Diversion gages are located on the inlet at both the North and South Fork Long Canyon diversion tunnels. These gages directly measure diversion flows and are powered by photovoltaic cells located on nearby poles.

Reservoir Gages

Reservoir gages and reservoir staff gages are installed at the following locations:

- French Meadows Reservoir – reservoir gage and reservoir staff gage
- Hell Hole Reservoir – reservoir gage and reservoir staff gage
- Middle Fork Interbay – reservoir gage
- Ralston Afterbay – reservoir gage

Reservoir gages are used to directly measure the WSE and determine compliance with FERC license requirements such as minimum pool in the storage reservoirs (French Meadows and Hell Hole). They also provide measurements for use by Project operators.

Reservoir staff gages, which are a series of marked posts near the reservoir shore, are used to measure the WSE quarterly and provide calibration for the reservoir gages.

Powerhouse Gages

Gages are located in each of the Project powerhouses except for the Hell Hole Powerhouse. Flow is currently calculated for each powerhouse based on the measured power generated. In the future, flow will be measured directly with electronic measuring equipment.

Leakage Weirs

Six weirs that measure normal leakage are located on the downstream face of the French Meadows Dam. A single leakage weir is located on the downstream face of the Hell Hole Dam near the Hell Hole Powerhouse.

4.1.1.7 Communication Lines and Powerlines

Fourteen MFP communication lines and powerlines, which total approximately 6.5 miles in length, provide power to operate Project equipment and allow communication between Project facilities. BA/BE Figure 3 shows a schematic diagram of the transmission, power, and communication lines. BA/BE Maps 2a–2e show the location of these facilities. BA/BE Table 7 provides detailed information on each MFP communication or powerline. Ten lines serve dual purposes by providing both power and communication capabilities to MFP facilities. These dual lines have two types of lines on the same poles.

4.1.1.8 Support Facilities

Project support facilities consist of microwave reflectors and radio towers; disposal areas; ancillary facilities; and fences. Each of these support facilities is described below—the larger facilities are shown on BA/BE Maps 2a–e.

Microwave Reflectors and Radio Towers

Two passive microwave reflector stations and two radio towers with a repeater are maintained for communication purposes in the Project vicinity. The passive microwave reflector stations are located near Middle Fork Interbay and Ralston Afterbay. One radio tower and repeater are located near the Hell Hole – Middle Fork Tunnel Surge Shaft and Tank, and a second tower is located near the French Meadows – Hell Hole Tunnel Gatehouse.

Disposal Areas

Sediment removed from diversion pools and reservoirs is stored at four sediment disposal areas, including:

- Duncan Creek Diversion Sediment Disposal Area
- North Fork Long Canyon Crossing Sediment Disposal Area
- Middle Fork Interbay Sediment Disposal Area
- Ralston Ridge Sediment Disposal Area

Ancillary Facilities

- Dormitory Facility, Operator Cottages, Shop and Water Tank

The dormitory facility, operator cottages, and shop located near Hell Hole Dam provide housing for station attendants, as well as meeting facilities and temporary lodging for Project employees and associates. The dormitory consists of a 12-room, 24-bed building, which has kitchen, dining, and meeting areas. The operator housing consists of two cottages. A maintenance shop is located

near the cottages. A water tank that supplies potable water to the dormitory, cottages, and shop is located on a hill adjacent to the cottages.

- French Meadows Dam and Hell Hole Staging Areas

Maintenance work staging areas are located adjacent to the French Meadows Dam Spillway Discharge Channel and the Dormitory Facility at Hell Hole Reservoir. These unimproved staging areas are used for equipment mobilization and temporary storage of bulk materials.

- Generator Buildings

Generator buildings for site power are located at French Meadows Dam and Ralston Afterbay Dam. These facilities include fuel storage and an engine generator.

- Storage Building at Middle Fork – Ralston Tunnel Surge Shaft and Tank

A small storage building is located adjacent to the Middle Fork – Ralston Surge Shaft and Tank.

Fences

Fences are used at some facilities to contain falling rock and debris on slopes adjacent to MFP facilities and provide for PCWA worker and public safety. At French Meadows, a rock fence is maintained near the powerhouse penstock and a slope fence near the French Meadows Powerhouse. Slope fences are maintained near Long Canyon Crossing, Middle Fork Powerhouse Upper Switchyard, Middle Fork Interbay Dam, Ralston Powerhouse Penstock and Butterfly Valve House, Ralston Powerhouse, and Oxbow Powerhouse. Public safety fences are located adjacent to the Dormitory Facility, Hell Hole Dam General Parking Area, and the North Fork Long Canyon Crossing Removable Section.

Roads and Trails

Forty-six roads (totaling 19.7 miles) and eight trails (totaling 0.5 mile) are used for ongoing operation and maintenance of the MFP (BA/BE Maps 2a–e). A list of these Project features is provided in BA/BE Table 4. Descriptive information on each road and trail is provided in BA/BE Table 8. Refer to LAND 1 – Transportation System TSR – 2008 (LAND 1 – TSR) (PCWA 2011b; SD B) located in SD B for additional information on Project roads and trails.

4.1.1.9 Recreation Facilities

PCWA constructed 21 developed recreation facilities as part of the MFP. These facilities are concentrated around French Meadows Reservoir, Hell Hole Reservoir, South Fork Long Canyon Diversion Pool, and Ralston Afterbay (BA/BE Maps 2a–e). Amenities at each of the recreation facilities are presented in BA/BE Table 9.

Developed campgrounds are located near the higher elevation Project facilities, including French Meadows Reservoir (6 campgrounds with a total of 139 single sites and 7 group sites), Hell Hole Reservoir (3 campgrounds with a total of 77 single sites), and South Fork Long Canyon Diversion Pool (1 campground with 2 group sites). Day-use facilities such as boat ramps, picnic areas, parking lots and scenic vistas also support recreational activities at the higher elevation reservoirs (French Meadows and Hell Hole reservoirs). These overnight and day-use facilities are typically available from late spring to early fall as inclement weather and snow prevent year-round use. Water supplies have been developed at four locations to serve recreation facilities at the French Meadows Reservoir, and campgrounds near Hell Hole Reservoir and South Fork Long Canyon Creek. Detailed information on each water supply is provided in BA/BE Table 10.

Recreation facilities located near the lower elevation Project facilities are open year-round and consist entirely of day-use facilities. These facilities include one picnic area and cartop boat ramp located near the Middle Fork American River inflow to Ralston Afterbay, and one rafting access and parking area adjacent to the lower Middle Fork American River near the Oxbow Powerhouse. Refer to REC 1 – Recreation Use and Facilities TSR (REC 1 – TSR) (PCWA 2011c; SD B) located in SD B for additional information on Project recreation facilities.

4.1.2 Project Boundary

A list of Project facilities and features necessary for operation and maintenance of the MFP and a list of Project-related recreation facilities and features is provided in BA/BE Tables 4 and 5, respectively. Geographic Information System (GIS) maps illustrating the location of all existing Project facilities and features and Project-related recreation facilities and features in relationship to the current FERC Project boundary and land ownership data is provided in Exhibit E – Section 3.0, Maps 3-3a–e. Refer to LAND 4 – FERC Project Boundary and Authorization TSR – 2008 (LAND 4 – TSR) (PCWA 2011d; SD B) located in SD B for additional information on the FERC Project boundary.

4.1.3 Routine Facility Inspections, Testing, and Maintenance

Routine facility inspections, testing, and maintenance activities are implemented at Project facilities and Project recreation facilities to:

- Meet regulatory testing and inspection requirements.
- Maintain system reliability.
- Maintain facility access.
- Protect Project facilities and recreation facilities.
- Protect worker and public health and safety.
- Preserve Project flow and storage capacities.

Routine facility testing and maintenance activities include completion of testing, inspections, and maintenance at Project tunnels, powerhouses, and gates; vegetation management; pest management; sediment management; slope stabilization (falling rock control); debris management; facility painting; pole replacement; and road and trail maintenance (BA/BE Table 11). Recreation facility maintenance activities include annual maintenance, heavy maintenance, and vegetation management (BA/BE Table 12). Refer to BA/BE Tables 11 and 12 for detailed information on location and frequency of Project facility and Project recreation facility testing and maintenance activities. A description of each activity is provided below.

4.1.3.1 Tunnels and Powerhouses Inspection, Testing, and Maintenance

PCWA conducts annual inspection and testing of Project facilities to verify the structural and/or functional integrity of the facilities and to identify conditions that might disrupt operation or threaten dam safety. At Ralston – Oxbow Tunnel, these inspections require dewatering of the Ralston Afterbay to allow access to the tunnel to identify any structural deterioration. None of the other Project tunnels are routinely inspected due to concerns over tunnel integrity if they are dewatered.

PCWA also conducts annual mechanical and electrical inspections and maintenance at all five Project powerhouses. These activities typically occur in the fall for facilities in the lower Project area beginning in late September, and require that the lower MFP powerhouses (Middle Fork, Ralston, and Oxbow) be taken out of service for approximately 3 to 6 weeks. During the fall maintenance period, Middle Fork Interbay and Ralston Afterbay water levels are lowered to allow access to the facilities. Consumptive demands and instream flow requirements downstream of Oxbow Powerhouse during the fall outage are typically met by increasing flow releases from Hell Hole Reservoir into the Rubicon River. Inspection, testing, and maintenance of facilities in the upper Project area (i.e., French Meadows and Hell Hole powerhouses) typically occur during the spring, once roads to the Project facilities are passable.

4.1.3.2 Spillway Gate Testing

FERC requires partial operation of spillway gates annually and to full design height at least once every 5 years. This testing is performed at French Meadows Dam, Middle Fork Interbay Dam, and Ralston Afterbay Dam. At French Meadows Dam, the spillway gates are operated when the reservoir level is below the spillway crest elevation. At Middle Fork Interbay and Ralston Afterbay dams, the spillway gates are tested during the maintenance outage when the reservoir levels are below the spillway crest elevation. At the end of each calendar year, PCWA submits an Annual Spillway Gate Testing Report to FERC demonstrating license compliance.

4.1.3.3 Vegetation Management

Vegetation management, which includes vegetation trimming by hand and with equipment, and to a lesser extent, the use of herbicides and fungicides, is implemented at Project facilities and features, and Project recreation facilities. Vegetation

management at Project recreation facilities is completed by USDA-FS under Collection Agreements (No. 08-CO-11051700-009 and No. 08-CO-11050300-009). BA/BE Tables 11 and 12 provide the frequency of Project-related vegetation management activities. Most vegetation management activities occur during the spring and early summer to avoid work during high fire danger periods. Vegetation management is implemented within the area necessary to reduce fire hazard, provide access and protect Project facilities, and provide for worker/public health and safety. Specifically, vegetation management occurs in the following areas:

- Within 2 feet on either side of trails
- Within 5 feet around the perimeter of the dams; outside the perimeter fence of powerhouses, switchyards, and substations; around ancillary support facilities and Project fences
- Within 10 feet on either side of penstocks, valve houses, diversion pools, and removable sections on either side of communication lines, powerlines, photovoltaic poles and lines, and roads
- Within 50 feet around intakes, outlet works, gatehouses, surge tanks, adits, portals, microwave reflectors, radio towers, sediment disposal areas, drop inlets, and recreation facilities

A description of each vegetation management activity implemented for the MFP is provided below.

Trimming by Hand

Vegetation trimming by hand includes trimming of grasses and forbs with a string trimmer and trimming of shrubs and trees with a chain saw or other handheld saw. These activities are implemented annually or infrequently depending on location and facility type (BA/BE Tables 11 and 12).

Trimming with Equipment

Vegetation trimming with equipment includes removal of vegetation on the shoulder of Project roads using mechanical equipment such as a flail-type mower. A rubber-tired T- or Y-shaped flail mower is used along Project roads to cut grasses, other herbaceous vegetation, and woody vegetation (less than 0.75-inch-diameter) especially in locations with potential for contact with loose debris (e.g., gravel). The mower is attached to the hitch of a tractor or other vehicle. Trimming of vegetation with equipment is implemented annually (BA/BE Tables 11 and 12).

Herbicide and Fungicide Use

Herbicides are used in addition to manual and mechanical vegetation management activities on an annual basis within the perimeter fences of the Middle Fork Powerhouse and Upper and Lower Switchyards, the Oxbow Powerhouse and Switchyard, and

Ralston Powerhouse and Switchyard (BA/BE Tables 11 and 12). Herbicide use is restricted to the graveled parking areas within the perimeter fences. Small hand-held sprayers are used to apply over-the-counter herbicides (e.g., Roundup®). All herbicides are applied in accordance with label instructions.

Fungicides (e.g., Borax soap) are used infrequently by USDA-FS on tree stumps at Project recreation facilities to prevent the spread of fungus (Ed Moore and John Jue, pers. comm., 2006).

4.1.3.4 Pest Management

Management of rodent populations at Project facilities includes a combination of physical control and rodenticide use. The purpose of rodent control is to prevent rodent infestations in building interiors thereby protecting worker and public health and safety and maintaining system reliability. Methods are selected on a site-specific basis considering public health and safety, target species, and the effectiveness of the method. Rodent traps and over-the-counter rodenticides (e.g., d-CON®) are used in the interior of Project powerhouses; French Meadows Dam Generator Building; Hell Hole Dormitory Facility; Hell Hole Dormitory Facility and Cottages Water Supply Tank; Hell Hole Operator Cottages and Shop; and Ralston Afterbay Dam Generator Building.

4.1.3.5 Sediment Management

Sediment is routinely excavated from MFP diversion pools and select reservoirs on an as-needed basis (generally after episodic high-flow events). The MFP facilities where sediment management activities have historically occurred include:

- Duncan Creek Diversion Pool
- North Fork Long Canyon Diversion Pool
- South Fork Long Canyon Diversion Pool
- Middle Fork Interbay
- Ralston Afterbay

In the past, a single high-flow event (e.g., winters of 1986 and 1997) was sufficient to almost completely fill the small diversion pools and Middle Fork Interbay with sediment. At small diversion pools (Duncan Creek and North Fork Long Canyon and South Fork Long Canyon creeks) sediment is removed during the summer and fall low-flow period. Accumulated sediments in Middle Fork Interbay and Ralston Afterbay that are not immediately impacting operations are typically removed during scheduled maintenance outages, generally from mid-September through October. Once excavated, the sediment is hauled to an approved sediment disposal area on USDA-FS property or private property. All sediment removal with equipment is completed in accordance with state and federal permit conditions (e.g., USDA-FS Special Use Permits, California Department of Fish and Game [CDFG] Streambed Alteration Agreements).

The following describes operations of the diversions during high-flow events when sediments are mobilized and transported into Project diversion pools and reservoirs:

- In the recent past, during high-flow events, the low-level outlets at all the diversion dams have remained closed to prevent damage to the gates and/or potential blockage of the outlet.
- At Middle Fork Interbay and Ralston Afterbay, the spillway gates are opened during high flows to prevent overtopping and facilitate passage of floating debris and suspended fine sediment. The spillway gates are opened in anticipation of and during high-flow events to create storage space, as well as, to manage high flows to prevent facility damage. Both bedload and fine sediments are captured in the reservoirs.
- North Fork Long Canyon and South Fork Long Canyon diversions are typically closed during the early winter to prevent sediment from being entrained into the Middle Fork Powerhouse. The diversions are opened during late winter and maintained through the spring runoff period in an effort to capture high, but relatively sediment-free runoff. The diversions are opened and closed via manually operated slide gates. Flows greater than the capacity of the North Fork Long Canyon and South Fork Long Canyon intakes (100 and 200 cfs, respectively) pass over the spillway transporting floating debris and suspended fine sediment. Both bedload and fine sediments are captured in the diversion pools. If the diversion pools become filled with sediment, then bedload material is transported downstream of the dam.
- The Duncan Creek Diversion remains open year-round under typical operations. The diversion has a stop log gate that can be manually closed, if necessary. Water is diverted only when streamflow exceeds approximately 8 cfs. Flows greater than the capacity of the intake (400 cfs or less depending of the amount of debris on the intake) pass over the spillway transporting floating debris and suspended fine sediment. Both bedload and fine sediments are captured in the diversion pool. If the diversion pool becomes filled with sediment, then bedload material is transported downstream of the dam.

Sediment management (removal methods) currently implemented are as follows:

- Planned sediment removal occurs during dry nonstorm periods, typically in the late summer or fall. If a storm does occur, the work site is secured and maintained to prevent erosion and discharge of sediment to the downstream creek channels. Emergency sediment removal that is required to operate the MFP is completed as soon as possible.
- Prior to sediment removal activities, the diversion pools are dewatered and the reservoirs are drawn down. A streamflow bypass system is installed to capture and divert low flows around the work area and discharge water downstream of the dam to comply with instream flow requirements. Seepage pumps are placed

in the pools and used to keep the work area free from ponded water. Temporary access roads are also constructed for ingress and egress for excavation and hauling equipment.

- Standard excavation and hauling equipment (such as, tracked excavators, articulating off-road dump trucks, 10-wheeled dump trucks, bulldozers, backhoes, loaders, and pumps) are used to remove sediment from the diversion pools and reservoirs. Excavators and loaders are used to excavate the bulk of the material with smaller equipment performing intricate work in pools. Hauling is done with either on- or off-road dump trucks, depending on the amount of material being moved and the length of the haul. A bulldozer is used to spread and compact sediment at the disposal areas.
- An Emergency Response Plan, Spill Prevention Contingency and Countermeasure Plan, and Fire Prevention Plan are prepared in accordance with resource agency requirements prior to implementation of sediment removal.
- Secondary containment is provided for diesel- and gas-powered equipment by installing an oil absorbent boom downstream of the dam.

BA/BE Table 13 provides information on sediment removal activities at each diversion facility. The location of sediment disposal areas is provided on BA/BE Maps 2a, and 2c–e. Estimates of the available sediment storage capacity at each of the sediment disposal areas is provided in BA/BE Table 14.

4.1.3.6 Slope Stabilization (Falling Rock Control)

Guniting (a mixture of sand, cement, and water) is applied adjacent to Middle Fork Powerhouse Penstock using a high-pressure hose. Guniting is used on an infrequent basis to stabilize soils on the steep slopes beneath the penstock. Refer to BA/BE Table 4 for the location of Project fences.

4.1.3.7 Debris Management

Debris management includes removal of large woody debris at Project reservoirs and diversion pools, removal of small debris from trash racks at Project intakes, and installation of log booms at Project reservoirs. BA/BE Table 11 summarizes the location and frequency of these activities.

Large woody debris can accumulate in Project reservoirs and diversion pools. Woody debris accumulations are managed at Middle Fork Interbay and Ralston Afterbay by opening upper level gates on an infrequent basis to allow for the passage of woody debris. Woody debris that accumulates in Hell Hole Reservoir near the dam is gathered and burned on an infrequent basis.

Debris that accumulates on trash racks at Project intake structures is also routinely removed. Trash racks are located at Project intakes at the Duncan Creek Diversion, North Fork Long Canyon and South Fork Long Canyon diversions, Middle Fork

Interbay, and Ralston Afterbay. Floating log booms are also maintained to control debris accumulation on Project dams and to protect public safety at Duncan Creek Diversion, French Meadows Reservoir, Hell Hole Reservoir, Middle Fork Interbay, and Ralston Afterbay.

4.1.3.8 Facility Painting

Paint is applied to the exterior of Project facilities, including metal power poles, surge shafts and tanks, penstocks, butterfly valve houses, removable sections, Project buildings, cottages, and dormitories. Facility painting at recreation facilities, including water supply tanks, restrooms, signboards, and picnic tables is conducted on an as-needed basis by USDA-FS under an agreement with PCWA.

4.1.3.9 Pole Replacement

Damaged power and communication line poles are replaced as necessary. New poles are placed in, or immediately adjacent to previously existing holes, using line trucks. Helicopters are used if line trucks are unable to access locations where power or communication line poles need to be replaced.

4.1.3.10 Road and Trail Maintenance

PCWA and the USDA-FS have entered into various agreements related to the maintenance and use of Project roads located in the ENF and TNF. Currently, one agreement, executed on April 9, 2007 (Agreement No. 07-RO-11051754-006), is in effect for Project roads. The Agreement provides for formal meetings and informal consultation between PCWA and the USDA-FS to discuss and agree on actions related to the regular maintenance of these Project roads and to coordinate assignment of maintenance responsibilities. The agreement also provides for the development of Project agreements in which improvement of a road under the jurisdiction of one party is to be financed, in whole or in part, from funds or resources provided by the other party. The current agreement expires on December 31, 2011, unless extended.

As shown on BA/BE Table 11, maintenance of Project roads and trails includes annual and periodic maintenance. Annual maintenance generally includes, but is not limited to, the following types of activities: debris removal; vegetation management; basic repairs, including filling of potholes; maintenance of erosion control features such as culverts, drains, ditches, and water bars; repair, replacement, or installation of access control structures such as posts, cables, rails, gates, and barrier rock; repair and replacement of signage; and snow removal and sanding. Periodic maintenance generally includes, but is not limited to, the following types of activities: placement or replacement of culverts and other drainage features; bridge deck or ford replacement; major road repairs; grading; sealing; resurfacing; road replacement; and hazard tree removal. BA/BE Table 8 provides information on the location, length, and surface of all Project roads and trails.

4.1.3.11 Recreation Facility Maintenance

PCWA is responsible for the operation and maintenance of Project recreation facilities. PCWA has ongoing Collection Agreements (No. 08-CO-11051700-009 and No. 08-CO-11050300-009) with the TNF and ENF to provide the financial resources necessary to support a portion of the operation, maintenance, and restoration of these facilities by the respective National Forest. Project recreation facility maintenance includes annual and heavy maintenance, and vegetation management.

As identified on BA/BE Table 12, annual maintenance includes site cleaning, basic repairs and maintenance of facility features, garbage cleanup, signing, toilet cleaning and restocking, toilet pumping, graffiti removal; removal of debris from boat ramps, basic maintenance of pathways, routine testing of water supplies, annual winterizing and opening activities, and hazard tree removal. Heavy maintenance includes repair and resurfacing of parking areas and spurs; repair or replacement of barrier structures and devices; repair and/or replacement of site/facility amenities; repair and replacement of signage, information boards, and fee tubes; repair, maintenance, and painting of bathroom structures; repair and maintenance of potable water supplies and distribution lines; repair and maintenance of septic systems; repair and sealing of boat ramps; repair or installation of retaining walls; site leveling and removal of obstacles; fuels reduction; and maintenance of pathways.

4.1.4 Project Safety

This section summarizes existing Project safety measures implemented in accordance with 18 CFR Part 12 by PCWA in the vicinity of the MFP. It includes a discussion of the purpose and components of the Project's Emergency Action Plan (EAP); employee emergency training and annual training exercises; and dam inspections and reporting. In addition, it discusses procedures for Project emergencies not covered under the EAP; public and worker safety programs; the Project's Fire Plan; and Spill Prevention Control and Countermeasure Plans. Refer to LAND 3 – Emergency Action and Public Safety TSR (LAND 3 – TSR) (PCWA 2011e; SD B) and LAND 2 – Fire Prevention and Response TSR – 2008 (LAND 2 – TSR) (PCWA 2011f; SD B) located in SD B for additional information related to Project safety.

4.1.4.1 Emergency Action Plan

PCWA developed and maintains an EAP for the MFP (PCWA 2004, updated February 2010) in compliance with FERC regulations. The primary purposes of the EAP are to (1) provide early warning to downstream recreational users, dam operators, and other persons in the vicinity of the Middle Fork American River Canyon and Folsom Reservoir who might be affected by an imminent or actual sudden release of water from Hell Hole, French Meadows, or Ralston Afterbay dams; and (2) minimize property and environmental damage in these areas¹. Duncan Creek, North Fork Long Canyon, and

¹ In a letter dated June 29, 2010, PCWA requested that FERC exempt Duncan Creek Diversion Dam from EAP filing requirements. FERC approved this request for exemption in a letter dated September 7, 2010.

South Fork Long Canyon diversion pools and dams (<1 ac-ft storage) and Middle Fork Interbay and Dam (173 ac-ft storage) are not addressed in the EAP as public safety and flooding risk associated with failure of these individual facilities is considered minimal.

The EAP specifies pre-planned actions to be followed in the event of an emergency. The EAP includes provisions for (1) maintenance, operation, and inspection of the dams and related facilities; (2) early warning of developing emergency conditions; (3) evaluation of emergency situations and operational responses; and (4) timely notification of emergency response agencies and individuals in remote locations. Procedures for timely and reliable detection, evaluation, and classification of an existing or potential emergency situation are also identified.

PCWA is responsible for training its employees on the protocols and procedures specified in the EAP, implementing measures for the detection of potential emergency situations, and taking specific actions once the EAP is implemented. PCWA provides annual EAP training for its Project operators and other responsible personnel and general orientation training for the maintenance crew. To the extent feasible, PCWA conducts annual EAP training exercises with participation from all the responsible response agencies and organizations. The most recent training exercise occurred on May 20, 2009.

PCWA annually reviews and updates the EAP as required by FERC. PCWA collaborates with responsible agencies and organizations, including the Governor's Office of Emergency Services, land management agencies, and local emergency responders, to review and update the EAP as circumstances warrant and comments are received. PCWA notifies FERC each year if any changes are made or if none are required. PCWA also distributes any annual revisions with specific instructions for replacing outdated sections to all participating agencies/departments identified in the EAP.

Dam Inspections and Reporting

PCWA-trained operators visually inspect the dams for settlement, plugging of drains, sloughing, cracking, leakage, turbidity, vegetation, and rodent activity. Hell Hole and Ralston Afterbay dams are inspected daily, and French Meadows and Duncan Creek Diversion dams are inspected at least once per week. The leakage weirs at French Meadows and Hell Hole dams are read and recorded weekly when accessible, and analyzed for adverse trends.

All dams are surveyed for settlement at designated locations every other year. The survey data are analyzed and compared to previous surveys to determine if settlement is within expected limits. Piezometers (water level monitoring wells) at Ralston Afterbay and French Meadows dams are regularly checked and analyzed. The piezometers at Ralston Afterbay record daily and are analyzed monthly. The piezometers at French Meadows Dam are checked and recorded monthly.

Engineers from FERC and the California Department of Water Resources Division of Safety of Dams (DSOD) conduct annual inspections at each dam with PCWA personnel and review data. Once every 5 years, PCWA's FERC-approved dam safety consultant inspects each dam, reviews recent surveys and historical data, and issues a report on the stability and condition of the dams to FERC.

4.1.4.2 Procedures for Project Emergencies Not Covered Under the EAP

For planning and responding to emergencies not covered under the EAP, PCWA follows PG&E's Code of Safe Practices (PG&E 2002) and PCWA's Storm Book (PCWA 2008). The Code of Safe Practices includes basic safety requirements and helicopter safety. It also specifies safety procedures for operating motor vehicles; conducting pole handling operations, live line work projects, and electric transmission lines; and working in electric substations and hydroplants. The Storm Book outlines preparations for winter storm events and procedures for operations during events. It also includes a master phone list, including rental equipment numbers, gasoline supplies, and other emergency related numbers.

PCWA maintains notification and coordination procedures in the event of an emergency and cooperates with federal and state agencies and other local emergency responders when an emergency occurs within the FERC Project boundary or in the vicinity of the MFP.

4.1.4.3 Public and Worker Safety Programs

FERC is authorized by Section 10(c) of the Federal Power Act to provide regulatory oversight of dam operators to create and maintain safe hydropower projects (FERC 1992). FERC provides guidelines for establishing safety devices and other measures that could be used to enhance protection of the public from specific types of hazards. FERC also provides specific guidelines on safety signage at hydropower plants for dam operators (FERC 2001b). In accordance with the aforementioned FERC guidelines, PCWA implements the following public safety programs and measures:

- PCWA utilizes various audible (sirens and security alarms) and visual warning devices (lights, signage, buoys, and log booms) to warn the public of hazardous areas and potentially dangerous conditions.
- PCWA uses various devices to restrict public access to hazardous areas, including fences around Project facilities, gates limiting access onto Project roads, trash racks in tunnel intake structures, and guardrails on dams.
- PCWA maintains and operates several gaging stations that monitor WSEs in the rivers and reservoirs with alarms that transmit to the PCWA and PG&E communications systems. The alarm systems are activated if changes in river stage or reservoir WSE exceed specified rates.

- Two informal helicopter landing sites are located in the vicinity of the MFP (near the Hell Hole Dormitories and near Oxbow Powerhouse). These landing sites may be used by emergency responders during emergencies in the vicinity of the MFP.

4.1.4.4 Fire Plan

The MFP currently does not have a Fire Plan that addresses routine operations and maintenance of the Project. PCWA developed a Fire Plan (PCWA 1962) during the period of time when the MFP was under construction in the early 1960s. This Fire Plan only pertained to activities associated with the original construction of the Project. Since construction of the Project was completed, PCWA has developed and implemented several Project-specific fire plans for nonroutine Project activities that require a Special Use Permit from the USDA-FS.

4.1.4.5 Spill Prevention Control and Countermeasure Plan

In accordance with Section 10(c) of the Federal Power Act, PCWA maintains and implements four Spill Prevention Control and Countermeasure Plans to address and minimize the potential for fuel and other hazardous materials spills at the following locations:

- French Meadows Powerhouse (updated 2008)
- Middle Fork Powerhouse (updated 2006)
- Ralston Powerhouse (updated 2006)
- Oxbow Powerhouse (updated 2008)

Each describes procedures and available equipment for mitigation of any fuel or other hazardous materials spills that might occur. PCWA also has specific provisions for periodic inspections of all oil-containing equipment and devices to prevent spilled oil from escaping Project buildings and grounds. In addition, all oil transfer operations follow applicable United States Department of Transportation regulations.

4.1.5 Project Operations

This section provides an overview of MFP operations including PCWA's operating objectives; regulatory requirements and operating agreements/contracts; consumptive water and power demands; and water management during different periods of the annual operating cycle. Hydrology on bypass and peaking reaches affected by MFP operations is provided in Table 3-13. Project maintenance activities are described in Section 3.3.

4.1.5.1 Operating Objectives

The MFP has been operated for over 40 years by PCWA as a multipurpose project to benefit the people of Placer County. The MFP is operated with respect to four objectives, as follows:

- Meet FERC license requirements that protect environmental resources and provide for recreation.
- Meet PCWA's consumptive water demands.
- Generate power to help meet California's energy demand and provide valuable support services required to maintain the overall quality and reliability of the state's electrical supply system.
- Maintain Project facilities to ensure their continued availability and reliability.

These five key operating characteristics of the MFP allow PCWA to meet its operating objectives:

- Storage Flexibility—the flexibility to raise and lower reservoir levels (water storage) at different rates and times throughout the year subject to minimum storage level requirements. This flexibility allows:
 - Reasonable rates of drawdown through the summer to meet consumptive water demands and generate during periods of peak energy demand
 - Evacuation of sufficient reservoir storage space in the fall to provide adequate storage capacity to manage the following spring runoff with minimum potential for spill
 - Higher levels of drawdown of the reservoirs under drought conditions so that consumptive water supply needs can be met
- Combined Operation of Middle Fork and Ralston Powerhouses—the ability to operate the Middle Fork and Ralston powerhouses simultaneously over a range of flows and schedule periods. This capability is limited only by (1) powerhouse maximum flow capacity, (2) minimum pool (storage) requirements in upstream reservoirs, and (3) flows necessary to meet minimum instream flow (MIF) requirements.
- Operation of Oxbow Powerhouse and Ralston Afterbay—the ability to fluctuate Ralston Afterbay on a daily basis over a range of storage levels, so that releases to the Middle Fork American River below Oxbow Powerhouse meet MIF requirements and provide whitewater boating recreational opportunities without requiring operation of Middle Fork and Ralston powerhouses.

- Meet the Combined Patterns of Water and Energy Demand—the ability to meet the seasonal combined patterns of consumptive water demand and peak energy demand and weekly/daily peak energy demands. To meet these combined patterns of demand, the MFP must have:
 - The ability to release water from storage for downstream delivery at all times of the year in response to consumptive demand patterns
 - The ability to vary on a daily and hourly basis, releases through Middle Fork and Ralston powerhouses for power generation in response to changing electrical demand, grid needs, and water supply demand
- Fall Maintenance—the ability to shutdown operations during the fall, after the peak energy and water supply demand period and during favorable runoff and weather conditions to perform annual maintenance.

4.1.5.2 Regulatory Requirements and Operating Agreements/Contracts

Project operations for water supply and electric power generation are constrained by regulatory requirements; operating agreements and contracts; the physical capacities of the Project facilities; and water availability. Refer to BA/BE Table 6 for a list of the physical capacity of MFP facilities. Regulatory requirements affecting Project operations include conditions imposed by the existing FERC license, and water rights permits and license issued by the California State Water Rights Board (now the California State Water Resources Control Board [State Water Board]). Operating agreements/contracts affecting Project operations include conditions required in the existing power purchase contracts with PG&E, water supply contracts, and the Water Forum Agreement.

Regulatory Requirements

Regulatory requirements that influence MFP operations include provisions in the existing FERC license and water rights permits and license. Each is described below.

FERC License

The MFP was constructed and operates under a 50-year license (FERC Project No. 2079) that was issued on March 13, 1963. The following discussion summarizes only terms and conditions related to ongoing operations of the MFP (construction-related requirements are excluded). Subsequent to issuance of the original license by FERC, several amendments have been added, including changes to exhibits identifying MFP facilities, the addition of Hell Hole Powerhouse, changes to original license articles, inclusion of new license articles, and adjustments to rated generating capacity of MFP facilities. A complete copy of the existing FERC license and amendments is available at PCWA's publicly accessible Internet website <<http://relicensing.pcwa.net/>> and at a Resource Library, located at the PCWA Business Center, 144 Ferguson Road, Auburn, California.

The current license contains provisions that establish minimum pool (storage) requirements for Hell Hole and French Meadows reservoirs and Duncan Creek Diversion Pool. In addition, the license identifies MIF requirements downstream of Project diversions and ramping release requirements from Oxbow Powerhouse. BA/BE Table 16 summarizes the current minimum pool and MIF requirements. The license also requires PCWA to annually submit accurate flow and storage records from Project gaging stations to the USGS. In addition, the two tainter gates in the French Meadows Spillway must remain open annually from November 15 to April 1.

Water Rights

PCWA currently has five water rights permits and one license issued by the State Water Board related to the MFP. The water rights permits allow for the diversion and storage of water for consumptive use, power production, and incidental recreation. PCWA holds the necessary water rights to fully utilize all the capacity of MFP facilities. In addition, PCWA also holds sufficient water rights to meet current and reasonably foreseeable future consumptive water demand.

On January 10, 1963, the State Water Board issued four permits Nos. 13855, 13856, 13857, and 13858 to PCWA for the MFP. These permits provide for direct diversion and off-stream storage of waters from Duncan Creek, Middle Fork American River, Rubicon River, and North Fork Long Canyon and South Fork Long Canyon creeks. These permits were issued for two types of beneficial use: (1) power and incidental recreation; and (2) irrigation and incidental domestic, recreational, municipal, and industrial. Water for consumptive purposes is released from the American River Pump Station, located on the North Fork American River near the City of Auburn and Folsom Reservoir. Both points of re-diversion are located downstream of MFP facilities and neither are part of the MFP as defined by the FERC License.

In addition, Permit No. 18380 was issued to PCWA for diversions to the Hell Hole Powerhouse. This permit was reissued as License No. 12644 on May 17, 1990. PCWA also received Permit No. 20754 on August 18, 1994, to allow for the diversion of additional water for operation of the Hell Hole Powerhouse.

Key provisions of the permits and license relevant to the operations of the MFP are summarized in BA/BE Table 17. These permits and license also require:

- Protection of water quality and aquatic species
- Public access to Project lands and water
- Minimum pool and MIF requirements as described in BA/BE Table 16
- MIFs of 75 cfs below PCWA's American River Pump Station

PCWA's water right permits 13856 and 13858 are currently under review by the State Water Board. PCWA filed petitions for extension of time to fully develop use under the consumptive water rights for these permits with the State Water Board on November 15,

2007. PCWA is currently undertaking an environmental analysis for the petition for extension of time. Pursuant to State Water Board direction, this environmental analysis will be completed subsequent to the issuance of the new FERC License Order and State Water Board 401 Certification associated with the relicensing of the MFP.

Operating Agreements/Contracts

Operating agreements/contracts that influence MFP operations include a power purchase contract; several water supply contracts related to the sale and delivery of consumptive water; and the Water Forum Agreement that outlines water use goals, obligations, and limitations for the American River Watershed. Each agreement/contract is described below.

Power Purchase Contract

The electrical output of the MFP is currently contractually obligated to PG&E pursuant to the Middle Fork Project Power Purchase Contract, dated April 30, 1963. The contract expires on April 30, 2013.

PCWA is currently negotiating a new power purchase contract, which will be in place prior to the expiration of the current PG&E contract. It is anticipated that the new contract will be from 3 to 10 years in length, with provisions for renewal with the mutual agreement of both parties. This power purchase contract will be consistent with the FERC license conditions, water rights, and existing operating agreements/contracts and will not result in additional limitations or constraints in Project operations.

Water Supply Contracts

PCWA has contracts with USBR, San Juan Water District, the City of Roseville, and Sacramento Suburban Water District (formerly the Northridge Water District) regarding the sale and delivery of water from the MFP.

PCWA's contractual relationship with USBR is defined in four agreements: (1) the February 20, 1963, contract, which pertains to construction and operation of MFP reservoirs and PCWA's rediversion of water; (2) the 1970 Water Service Contract (as amended in 2002) wherein USBR agrees to provide water from the CVP to PCWA; (3) the 1977 Land Purchase Contract in which USBR agrees to provide for the rediversion of MFP water to PCWA; and (4) the 2002 contract related to the American River Pump Station (i.e., consumptive water diversion; not part of the MFP).

Key provisions of the water supply agreement between PCWA and USBR that are germane to the operations of the MFP include:

- PCWA is limited to a total diversion of 120,000 ac-ft per year from the Middle Fork American River for consumptive use.
- The rediversion of water for consumptive use at the American River Pump Station requires hourly MFP system balancing to meet continuous MIF

requirements below the pumping station. Whereas, in regard to the withdrawal of consumptive water from Folsom Reservoir, USBR allows for a 30-day balancing of supply and demand; therefore, those hourly or even daily releases from the MFP do not need to explicitly match consumptive deliveries from Folsom Reservoir.

- In dry years, when total flow into Folsom Reservoir is forecasted by the California Department of Water Resources to be less than 600,000 ac-ft, PCWA may be required to make releases to ensure that the total quantity of water stored in the MFP reservoirs at the end of the year is no more than at the beginning of the year.
- In dry years, PCWA may also be required to release sufficient water during the months of July through December such that the total quantity of water stored in MFP reservoirs at the end of each month is no more than the quantity stored at the beginning of each month.
- PCWA may, subject to certain limitations, withdraw up to 35,000 ac-ft from USBR's CVP at Folsom Reservoir or other locations as mutually agreed.

The water supply agreements between PCWA and local water districts provide for delivery of up to 84,000 ac-ft of water annually depending on water year type from the MFP (diverted at Folsom Reservoir) including:

- San Juan Water District—up to 25,000 ac-ft
- City of Roseville—up to 30,000 ac-ft
- Sacramento Suburban Water District—up to 29,000 ac-ft, if not required to meet PCWA customer needs

Water Forum Agreement

PCWA is a member of the Water Forum, which is a regional group of water purveyors, water users, environmental groups, and business interests focused on responsible water use planning for the Sacramento – Placer region. The Water Forum participants have produced a set of agreements outlining water use goals, obligations, and limitations for the American River Watershed referred to as the Water Forum Agreement (PCWA 2000).

PCWA's commitment within the framework of these agreements includes limiting its total water usage from the MFP to amounts commensurate with their water rights and water supply contracts. In addition, PCWA has committed, under certain conditions depending on consumptive water deliveries, to release up to 47,000 ac-ft in drier years to augment flows in the Lower American River, when the total unimpaired inflow into Folsom Reservoir from March through November is expected to be less than 950,000 ac-ft.

4.1.5.3 Consumptive Water and Power Demands

The MFP is operated to meet PCWA's consumptive water demands and generate power to help meet California's energy demand and provide valuable support services to maintain the overall quality and reliability of the state's electrical supply system. The following describes consumptive water demand and power demands associated with the MFP.

Consumptive Water Demand

PCWA provides water for consumptive uses from water diverted and/or stored at MFP facilities. Deliveries to meet consumptive demand vary from month to month but follow a general seasonal pattern as shown on BA/BE Figure 4. Demand is typically lowest during the winter then increases in the early summer to meet irrigation and landscape needs and remains high through the summer. Demand then decreases again in the fall and winter months. Consumptive demand proportionally increases in drier years and decreases in wet years.

Current water demand from the MFP is approximately 42,000 ac-ft. However, during the term of the next license, PCWA expects to utilize its full allocation of 120,000 ac-ft of water available annually from the MFP to meet increasing consumptive water demands. In drier years, when less water is available in storage, MFP releases to meet consumptive demand at full build-out may shift the timing of generation slightly to coincide with planned water deliveries. In wetter years, when water in storage is greater, releases to meet both consumptive water demand and peak energy demand can be scheduled without restrictions.

Power Demand

The MFP has sufficient reservoir storage capacity to operate some, but not all of the hours in a year, so the powerhouses are scheduled to operate at select times. By scheduling energy generation to occur during periods of peak energy demand, the greatest benefit from MFP power generation is realized.

The typical pattern of seasonal energy demand in Northern California is shown in BA/BE Figure 5. Demand is generally highest in the summer and early fall although a modest rise also occurs in the winter period. Energy demand also varies during different days of the week and hours of the day. BA/BE Figure 6 illustrates differences in energy demand during the week. Typically, energy demand is higher on weekdays than weekends. Within a day, demand is typically highest in the late afternoon and early evening. BA/BE Figure 6 also compares the timing of MFP generation with timing of typical peak energy demand. The extent that MFP generation can occur during peak energy demand periods is constrained by water availability and physical capacities of Project facilities. In drier years, when less water is available for generation, the hours of daily operation are reduced. In wetter years, the hours of daily operation are increased.

At some times, MFP generation facilities are run irrespective of the need for peak energy generation and may occur when water is moved through the system to balance

the storage reservoirs during the fill period or to move water from French Meadows Reservoir to Hell Hole Reservoir during the summer. At these times, MFP provides base load energy to the state's energy system.

An important characteristic of hydropower generation is its ability to be brought into service very rapidly or shutdown quickly, as hourly and daily energy demands change. This characteristic allows the MFP to follow daily and hourly load requirements to match peak energy demand and to provide voltage support, spinning reserve, and other services (ancillary services) to the state's energy supply system.

4.1.5.4 Water Management

Typical annual operation of the MFP results in the capture of runoff, which is diverted to increase storage in French Meadows and Hell Hole reservoirs in the winter and spring (filling period), and drawdown of the reservoirs during the summer, fall, and early winter (release period). Operation of the MFP varies from year to year based on the timing and magnitude of spring runoff, which is influenced by the amount of winter snow pack, ambient temperature conditions, and precipitation.

The amount of water annually available for capture and storage based on runoff into Project diversions and reservoirs also varies substantially from year-to-year. Total MFP inflow (combined flows from Duncan Creek, Middle Fork American River, Rubicon River, and Long Canyon Creek) from 1975 to 2007 is shown on BA/BE Figure 7. During this period total inflow has averaged approximately 379,015 ac-ft and ranged from a low of approximately 62,638 ac-ft to a high of more than 790,820 ac-ft per year (more than a tenfold difference). The high variability of inflow is one of the most important factors influencing annual MFP operations.

During the filling period (winter and spring), flows through MFP powerhouses are highly dependent on projected and actual runoff conditions. Flows through the powerhouses are used to manage the runoff to maximize water storage while minimizing spills. In drier years, power releases are minimized during the filling period to increase the volume of water in storage to meet upcoming summer consumptive use and peak power demands. In wetter years, power releases during the filling period are increased to minimize spills from the reservoirs. In years when storage levels to meet consumptive demands are reasonably assured and the chance of spilling is low, power releases are adjusted through the filling season based on the volume of water in storage, projected runoff, and current and projected power demands. Because the water available from runoff varies significantly from one year to the next, the amount of water held in storage at the end of the filling period (July 1) also may vary significantly. BA/BE Figure 8 shows combined reservoir storage levels (French Meadows and Hell Hole) and spills from 1974 through 2007. Combined reservoir storage varied from a low of approximately 70,400 ac-ft to a high of approximately 346,700 ac-ft.

During the release period (summer and fall), after the reservoirs have reached their maximum storage capacity, monthly releases for generation are largely predictable for the remainder of the year. However, daily and hourly releases for generation, which

respond to demand for electricity and electrical grid reliability, remain highly variable. During the release period, flows are managed to (1) meet storage and flow license requirements, (2) meet consumptive water supply requirements, (3) optimize power generation to meet peak electrical demand, and (4) achieve end of year carryover target storage levels.

Decisions on the extent of the drawdown and the carryover target storage level are based on balancing competing needs, including (1) providing sufficient reservoir storage space to minimize potential spills from the reservoirs during the next filling period if the runoff is high (wetter year) and (2) retaining enough water in storage to ensure that license requirements and consumptive demands can be met in the following year if the next filling period runoff is low (drier year).

Project operations are prioritized to first ensure consumptive water demand (deliveries) are met and second to maximize peak power generation.

However, in all but dry years, water supply demands typically can be met as a by-product of power generation. The reason is that existing consumptive water and present-day electrical demands tend to coincide seasonally. In addition, MFP generally controls and releases more water annually in most water years (except in drier years) than PCWA requires to meet consumptive water demand. Further, the majority of PCWA's consumptive deliveries are withdrawn from Folsom Reservoir (28.2 miles downstream of the last MFP powerhouse), where USBR allows for a 30-day balancing of supply and demand. Thus, hourly and daily releases from the MFP do not need to explicitly match withdrawals from Folsom Reservoir. Only the redirection of water for consumptive demand at the American River Pump Station near Auburn (maximum 100 cfs) requires hourly MFP system balancing to meet continuous MIF requirements below the pumping station.

French Meadows Powerhouse generates electricity when water is moved from French Meadows Reservoir to Hell Hole Reservoir. It is nearly always operated in block loaded condition with the duration of the block of operation set depending on the volume of water to be moved.

Hell Hole Powerhouse, located at the base of Hell Hole Dam, has an installed generating capacity of 0.73 MW. This powerhouse generates electricity opportunistically from flow releases from Hell Hole Dam. Project operations are not modified for power generation at Hell Hole Powerhouse.

The Middle Fork and Ralston powerhouses are the heart of MFP generation. These two powerhouses generally run in tandem, using water transported from Hell Hole Reservoir to Ralston Afterbay. Together the two powerhouses have a rated capacity of 201.6 MW and produce about 90% of the MFP annual generation. Although Middle Fork Interbay is located between these powerhouses, Middle Fork Interbay has little ability to regulate flows because of its small storage capacity (175 ac-ft). If flows through Middle Fork and Ralston powerhouses are not matched, then Middle Fork Interbay would be either drained or overtopped very quickly.

These powerhouses, running in tandem, are often used to help maintain reliable operations of the state's transmission grid by fine-tuning the flow of electricity in the grid to balance supply and demand. When operated to provide grid regulation, flow rates through the powerhouses vary quickly to meet constantly changing energy supply and demand conditions. These powerhouses are also frequently block loaded. When block loaded, flows through the powerhouses are usually set at an efficient operating level and run for a prescribed number of hours per day depending upon hydrology.

Oxbow Powerhouse frequently runs in tandem with Middle Fork and Ralston powerhouses. The capacity of Oxbow Powerhouse (1,025 cfs) is slightly higher than the present capacity of Ralston Powerhouse (924 cfs), which allows Oxbow Powerhouse to utilize water supplied by Ralston Powerhouse as well as inflow from the Middle Fork American and Rubicon rivers. Ralston Afterbay also has sufficient operational storage capacity to allow Oxbow Powerhouse to operate independently of Middle Fork and Ralston powerhouses for several hours at a time, depending on generation level. This independent operational flexibility is used to meet the ramping rate requirement downstream of Oxbow Powerhouse and to make releases for whitewater boating without requiring operation of the Middle Fork and Ralston powerhouses. Because Ralston Afterbay is used primarily as a regulating facility, WSEs may fluctuate on a day-to-day or hour-to-hour basis. Ralston Afterbay does not follow a seasonal fill and release pattern like Hell Hole or French Meadows reservoirs.

Fluctuations at Ralston Afterbay occur daily throughout the year, but the daily pattern varies depending upon season. Hourly and daily WSE plots for representative winter, spring, summer, and fall weekdays are provided as BA/BE Figures 9 through 12, respectively. Ralston Afterbay WSE fluctuation patterns vary with water year type, electrical demand, and MFP scheduled and emergency maintenance activities.

The largest fluctuations in WSE in Ralston Afterbay typically occur during the summer and fall periods when the source of inflow is predominantly from Ralston Powerhouse generation (BA/BE Figures 11 and 12). During a typical 24-hour period in the summer, WSEs in Ralston Afterbay are highest from midnight to about 7:00 AM. Around 7:00 AM, releases through Oxbow Powerhouse begin to ramp up for recreational whitewater boating and energy production, while Ralston Powerhouse is off-line. Water levels in Ralston Afterbay decline as Oxbow Powerhouse continues to operate while Ralston Powerhouse remains off-line.

Water levels in Ralston Afterbay also fluctuate during the spring, but fluctuations typically are not as regular or as large. During this time, Ralston and Oxbow powerhouses are run more synchronously. In a typical 24-hour period in the spring, WSEs in Ralston Afterbay were highest during the late afternoon, usually at about 6:00 PM. WSE then recedes through the evening and is lowest at about midnight, at which point WSE begins to increase. During the spring, accretion flows (runoff from the Middle Fork and Rubicon watersheds) contribute substantially more water to Ralston Afterbay than during the summer, which tends to attenuate fluctuations in Ralston Afterbay.

During the winter, regular daily fluctuations are generally minimal, but fluctuations may occur over the course of days or weeks to allow for management of runoff resulting from winter storms. In the winter, Ralston and Oxbow powerhouses are run more synchronously. In general, WSEs in Ralston Afterbay remain relatively stable during the winter; although not at full pool, to allow the capture of runoff from winter storm events and to minimize reservoir spilling. If a large storm event is projected, Ralston Afterbay may be drawn down substantially in advance in preparation for high flows.

PCWA and PG&E currently coordinate with representatives from California Department of Parks and Recreation (State Parks) and a designated commercial whitewater boating representative to schedule MFP operations during the summer and early fall (June through Labor Day) to accommodate whitewater recreation in the Middle Fork American River below Oxbow Powerhouse. Whitewater boating releases are scheduled on a voluntary basis such that they minimize effects to power generation and do not compromise consumptive water deliveries or maintenance activities. When sufficient water is available, whitewater recreation flows (approximately 950 to 1,000 cfs) are provided by scheduling generation through Oxbow Powerhouse approximately two to 3 hours earlier than would otherwise occur to meet peak energy demand. Over the last decade, limitation of summer flow releases for whitewater boating has only occurred in one year (2001).

Flows are also voluntarily reduced in the Middle Fork American River below Oxbow Powerhouse for two annual competitive long-distance trail events (the Western States 100 mile Endurance Run and Western States Trail Ride), whose routes cross the river at Poverty Bar. During the races, Project operations are modified, to the extent practicable, to reduce flows in the river and facilitate river crossings by race participants.

4.1.5.5 Project Generation and Outflow Records

The total water available and physical capacity of the MFP limits the timing and number of hours of generation in a given year. In drier years, when less water is available, generation is concentrated during the summer and early fall as shown on BA/BE Figure 13 (1987–1992). In dry years, if MFP powerhouses are operated at full flow, generation is limited to an average of approximately 5 to 6 hours per day. In wetter years, generation occurs throughout the year as shown on BA/BE Figure 14 (1995–1998). In wet years, the powerhouses may be operated at full flow for 17 hours or more per day.

Annual net generation at MFP powerhouses is summarized in BA/BE Table 18. Annual net generation for French Meadows, Middle Fork, Ralston, and Oxbow powerhouses is based on 40 years of operation (1967–2006). Hell Hole Powerhouse began operation in 1983; therefore, annual net generation is based on 24 years of operation (1983–2006). During this period, annual generation ranged from 211,000 MWh (1977) to 1,845,000 MWh (1982). The MFP's annual average generation is 1,039,078 MWh, which represents the average net generation for the five Project powerhouses based on their respective period of record.

4.1.5.6 Climate Change

Recent information on climate change suggests that annual temperature patterns, the amount and type of precipitation (rain vs. snow), and the timing and volume of spring runoff may change in the future. However, information on how global warming may affect the timing or magnitude of inflows and future operations of the MFP is speculative at this time. To the extent that long-term temperature and precipitation patterns vary from the historical record, MFP operations may need to be changed. For example, if water storage in the snow pack is reduced by warmer winter temperatures and runoff occurs earlier in the year, then carryover storage targets and reservoir management during the reservoir filling period may need to be altered. If climate change increases the frequency of dry and critical dry water years, then changes in carryover storage targets will need to be adjusted to ensure sufficient water supply to meet future consumptive demand. These changes may also affect the total amount and timing of energy production from the MFP, but are likely to have a far smaller impact than existing annual variation in runoff volume and timing.

4.1.6 Existing Environmental Programs, Measures, or Facilities

The following section summarizes, by major resource category, existing environmental programs, measures, or facilities maintained by PCWA for the protection and enhancement of environmental resources. The discussion identifies whether the environmental program, measure, or facility is a FERC license requirement; a requirement under one of the State Water Board water right permits or license issued for the MFP; or voluntary. Programs, measures, or facilities related to public safety required to meet general FERC regulations are discussed in Exhibit E – Section 3.4, Project Safety. A complete copy of the existing FERC license and amendments is available at PCWA's publicly accessible Internet website <<http://relicensing.pcwa.net/>> and at a Resource Library, located at the PCWA Business Center, 144 Ferguson Road, Auburn, California.

4.1.6.1 Water Resources

- **Minimum Pool Requirements**

PCWA operates Project reservoirs in a manner that maintains minimum pool requirements as established in FERC License Article No. 36; State Water Board Permit Nos. 13855, 13856, 13857, 13858, and 20754; and State Water Board License No. 12644. Refer to BA/BE Table 16 for a description of minimum pool requirements at Project reservoirs.

- **Minimum Instream Flow Requirements**

PCWA provides MIF releases in accordance with FERC License Article No. 37, as amended; State Water Board Permit Nos. 13855, 13856, 13857, 13858, and 20754; and State Water Board License No. 12644. Refer to BA/BE Table 16 for a description of MIF requirements at Project facilities.

- **Project Gaging Stations**

PCWA maintains a network of stream, diversion, reservoir, and powerhouse gaging stations to monitor and record flow releases, flow diversions, and water storage at Project facilities in accordance with FERC License Article No. 6. This network consists of 11 stations that measure flow in streams or at diversions, six stations that measure reservoir elevation and storage at Project reservoirs, and four stations that report flows through Project powerhouses.

- **Ramping Requirements**

PCWA meets ramping rate requirements downstream of Oxbow Powerhouse in accordance with FERC License Article No. 37. The portion of License Article 37 pertaining to the Oxbow Powerhouse was amended on December 16, 1988, to require that releases from Oxbow Powerhouse will not cause vertical fluctuations at the stream gage (USGS Gage No. 11433212) greater than 3 feet per hour.

- **Tainter Gate Operation**

PCWA keeps the two tainter gates of the French Meadows Spillway in a fully open position from November 15 of each year until the following April 1, in accordance with FERC License Article No. 30.

4.1.6.2 Cultural Resources

- **Protection of Cultural Resources**

- PCWA provides training to its employees regarding the basic identification and management of cultural resources and educates them concerning the laws protecting cultural resources. If potential cultural resources are discovered during routine operation and maintenance or construction of capital improvement projects, the following measures are implemented:

- PCWA will stop work if cultural resources are discovered during ground-disturbing activities. If archaeological remains (chipped or ground stone, glass, bone, ceramic, building remains, or historic debris) are discovered during construction or maintenance, PCWA will stop all work in the immediate vicinity of the find; and a qualified archaeologist will be hired by PCWA to evaluate the find. Construction work may continue on other parts of the Project while archaeological mitigation takes place.
- In the event of discovery or recognition of any suspected human remains, disturbance of the site will cease and PCWA will immediately notify the Placer County Coroner and an archaeologist to evaluate the find. If human remains are determined to be of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification.

4.1.6.3 Recreation Resources

- Construction, Maintenance, and Operation of Project Recreation Facilities

PCWA is responsible for the construction, maintenance, and operation of Project recreation facilities in accordance with FERC License Article No. 46. Refer to BA/BE Table 12, which identifies the type and frequency of maintenance for Project recreation facilities.

Routine operation and maintenance activities associated with Project recreation facilities are administered by the USDA-FS under ongoing collection agreements with PCWA (ENF Collection Agreement No. 08-CO-11050300-009 and Tahoe National Forest Collection Agreement No. 08-CO-11051700-009). Entering into the collection agreements with the USDA-FS was a voluntary measure. Refer to the REC 1 – TSR (PCWA 2011c; SD B) located in SD B for additional information.

- Public Access

In accordance with FERC License Article No. 17, PCWA allows the public access to Project waters and adjacent Project lands for the purpose of full public utilization of lands and waters for navigation and recreation purposes, unless precluded due to public safety or facility security concerns. In addition, PCWA allows representatives of the State Water Board reasonable access to Project works to determine permit compliance in accordance with State Water Board Permit Nos. 13855, 13856, 13857, 13858, and 20754; and State Water Board License No. 12644.

4.1.6.4 Land Management

- Maintain Project Roads

PCWA conducts maintenance activities on Project roads in accordance with FERC License Article Nos. 18 and 19. BA/BE Table 11 identifies the type and frequency of maintenance for each Project road.

PCWA and the USDA-FS have entered into various voluntary agreements related to the maintenance and use of Project roads located in the ENF and TNF. Currently, one agreement, executed on April 9, 2007 (Agreement No. 07-RO-11051754-006), is in effect for Project roads. The Agreement provides for formal meetings and informal consultation between PCWA and the USDA-FS to discuss and agree on actions related to the regular maintenance of these Project roads and coordinate assignment of maintenance responsibilities. The agreement also allows by mutual consent for improvement of a road under the jurisdiction of one party to be financed, in whole or in part, from funds or resources provided by the other party. The current agreement expires on December 31, 2011, unless

extended. Refer to the LAND 1 – Transportation System TSR – 2008 (PCWA 2011b; SD B) located in SD B for additional information.

4.2 PROPOSED ACTION

This section describes the Proposed Action analyzed in this Application for New License (License Application). The Proposed Action represents PCWA's recommendations for continued operation and maintenance of the MFP, including new environmental programs, measures, and facilities. The Proposed Action considers input from state and federal resource agencies, Native American Tribes, nongovernmental organizations, and members of the public acquired during extensive consultation activities completed for the relicensing of the MFP. However, the Proposed Action represents PCWA's recommendations for balancing developmental and nondevelopmental values associated with the MFP. The Proposed Action was developed by PCWA in collaboration with the MFP Finance Authority and Placer County. The key consideration in developing the Proposed Action was to ensure that future operation of the MFP maximizes the benefits to the people of Placer County. These benefits include power generation, consumptive water supply, system capability and reliability, public services, and resource stewardship (BA/BE Figure 15). Environmental programs, measures, and facilities included in the Proposed Action were specifically developed to promote resource stewardship in the Watershed. An overview of resource stewardship under the Proposed Action is provided in BA/BE Figure 16.

PCWA is requesting renewal of its license to continue operation and maintenance of the MFP with a license term of 50 years (expiring on February 28, 2063). The new license term is based on the substantial costs associated with relicensing of the MFP; capital improvements; new environmental measures, programs, and facilities; and extensive monitoring and ongoing resource agency consultation to ensure continued resource protection over the term of the new license. The following describes the responsibility of PCWA and the Placer County to the people of Placer County, which guided the balancing of developmental and nondevelopmental values committed to in the Proposed Action.

PCWA was established by an Act of the California Legislature in 1957 (Placer County Water Agency Act). The purpose of PCWA is to secure and develop water rights in Placer County to ensure an adequate water supply for the county's future economic development. PCWA is also charged with advocating for water resource issues throughout Placer County. PCWA is governed by a five-member elected Board of Directors that represents the entire geographic area of Placer County.

In 1961, Placer County voters, with over 95% approval, authorized a \$140 million revenue bond issue to fund the construction of the MFP. Today, the MFP serves as a multipurpose water supply and hydrogeneration project to benefit the people of Placer County. PCWA owns the MFP and operates it under a 50-year license from the FERC (FERC Project No. 2079) issued in February 1963. Prior to construction of the MFP, PCWA entered into a long-term (50-year) contract with PG&E for the purchase of the power generated from the then proposed MFP (Exhibit E – Section 4.0,

Attachment 4-1). The power purchase contract requires PG&E to provide funding for the operation and maintenance of the MFP and for retirement of the revenue bonds sold to finance MFP construction, in return for all power produced. PCWA has both consumptive and power generation rights to the waters used by the MFP, issued by the State Water Board in 1963.

When PCWA was first formed, the Placer County Board of Supervisors served as the Agency Board of Directors. In 1974, the Act was amended to provide for an independently elected Board of Directors. The 1974 amendment also provided that PCWA and the County establish a business relationship for the purposes of approving future power sale contracts and the expenditure of power sale revenue. PCWA is the sole owner, operator, and Licensee for the MFP. In 2006, PCWA and the County formed the MFP Finance Authority through a Joint Exercise of Powers Agreement for the purpose of efficiently administering the partnership functions of approving power sale contracts and budgeting the expenditure of power sale revenue. The structure of the PCWA/County partnership, as well as the manner in which net MFP proceeds are distributed to the PCWA and Agency, can be found in the MFP Finance Authority originating documents (Exhibit E – Section 4.0, Attachment 4-2).

Beginning on May 1, 2013, PCWA and the County will begin to market energy under a new power sale agreement under the auspices of the Middle Fork Project Finance Authority Joint Powers Agreement. As shown in Exhibit E – Section 11.0, Table 11-5, PCWA and the County anticipate that with the operating conditions included in the License Application, the MFP can produce an average of approximately \$17.6 million dollars of net annual benefit to the people of Placer County.

In June 2008, PCWA Board of Directors passed Resolution 08-16 establishing a policy for the distribution and use of net power sale revenues derived from the operation of the MFP (Exhibit E – Section 4.0, Attachment 4-3). The policy states that the PCWA intends to invest its portion of net MFP revenues into projects and programs that benefit the people of Placer County, consistent with its authorities under the Placer County Water Agency Act. The resolutions states that the type of projects that would be eligible for funding include water supply, water supply reliability, water quality, ecosystem protection, recreation, public education, emergency financial aid, and energy system supply and reliability.

The County functions as a local government body to serve the needs of its residents. As geographical and political subdivisions of the state, the County serves a dual role, providing municipal services in the unincorporated areas and acting as administrative agents for state and federal government programs and services. The County provides a wide range of services to its residents, including public protection services, medical and health services, public assistance programs, sanitation services, the construction and maintenance of roads and infrastructure, environmental services, parks, libraries, and a variety of other general governmental services. Every resident of the County, directly or indirectly, benefits from these services. Most services performed by the County are provided for all residents, regardless of whether those residents live in cities or unincorporated areas. The County is governed by a five-member elected Board of

Supervisors that represents the entire geographic area of Placer County. The County anticipates that MFP revenues will be used in conjunction with other revenue sources to fulfill these responsibilities.

The people of Placer County expect PCWA and the County Government to be good stewards of the resources with which they are entrusted, including the infrastructure resources that have been constructed to serve water to residents of Placer County and the power generation resources of the MFP. The sale of MFP power will provide the financial resources that are needed to ensure the reliable future of facilities and help provide for the general welfare of the residents of Placer County. Stewardship also includes maintenance and enhancement of local environmental, cultural, and recreational resources, which benefit the people of Placer County. This License Application represents PCWA's and the County's best effort to balance all of its stewardship responsibilities while returning the benefits of the MFP to the people of Placer County that made the original investment in its construction (BA/BE Figure 15). To that end, PCWA and the County strongly believe that the rather sizable voluntary commitment of resources made to enhance the environmental, cultural, recreational, and other resources as specified in this License Application represents an appropriate use of revenue that would otherwise be distributed to the people of Placer County under the policies established by the PCWA Board of Directors and the Placer County Board of Supervisors (BA/BE Figure 16).

4.2.1 Project Components

Using the No-Action Alternative described in Section 4.0 as a baseline, this section identifies these changes that will occur to the MFP under the Proposed Action:

- Addition, removal, and modification of Project components (Section 4.1.1)
- Revisions to the existing FERC Project boundary (Section 4.1.2)
- Modification of testing and routine Project maintenance activities (Section 4.1.3)
- Construction or modification of Project facilities (Section 4.1.4)
- Changes in Project operations (Section 4.1.5)
- New environmental programs, measures, and facilities designed to protect, maintain, or enhance environmental and cultural resources (Section 4.1.6)

The following describes each of these changes to the MFP under the Proposed Action.

Project facilities and features and Project recreation facilities and features included under the Proposed Action are identified in BA/BE Tables 19 and 20. Using BA/BE Tables 4 and 5 from the No-Action Alternative as a baseline, BA/BE Tables 19 and 20 have been updated to reflect changes that will occur under the Proposed Action (changes from the No-Action Alternative are shown in red). The location of Project facilities and features and Project recreation facilities and features included under the

Proposed Action are depicted on BA/BE Maps 3a–e, and land jurisdictions in the immediate vicinity of the MFP are shown on Exhibit E – Section 4.0, Maps 4-2–e.

Changes under the Proposed Action are described below, organized by facility type.

4.2.1.1 Large Dams and Reservoirs

- French Meadows Dam Outlet Works (modified)

French Meadows Dam Outlet Works will be modified as part of the French Meadows Outlet Works Modification to provide and monitor new MIFs, pulse flows, and downramp or spill flow requirements under the Proposed Action. In addition, two new gages will be installed to monitor compliance with instream flow requirements.

- Hell Hole Dam Outlet Works (modified)

Hell Hole Dam Outlet Works will be modified as part of the Hell Hole Dam Outlet Works Modification to provide and monitor new MIFs, pulse flows, and downramp or spill flow requirements under the Proposed Action. Hell Hole Dam will be modified as part of the Hell Hole Reservoir Seasonal Storage Increase Improvement by adding 6-foot-high crest gates on the existing Hell Hole Dam Spillway. These crest gates may be raised under certain conditions to increase Hell Hole Reservoir storage.

4.2.1.2 Medium Dams and Reservoirs

- Middle Fork Interbay Dam Outlet Works (modified)

Middle Fork Interbay Dam Outlet Works will be modified to meet new MIFs.

- Ralston Afterbay Dam Outlet Works

A new gage will be installed at the Ralston Afterbay Dam Outlet Works to monitor MIFs.

4.2.1.3 Small Dams and Diversion Pools

The small diversions on Duncan Creek, North Fork Long Canyon Creek, and South Fork Long Canyon Creek will be modified to increase natural sediment delivery and transport of bedload and fine material downstream. Activities at the small diversions include installation of self-cleaning wedge-wire screens at the dams, modification of the low-level outlets to release the required instream flows, and modification or installation of gages. The small diversion modifications will result in diversion pools that are shallower and more riverine.

4.2.1.4 Water Conveyance Systems

The Proposed Action has no new or modified water conveyance systems .

4.2.1.5 Powerhouses

The Proposed Action has no new or modified powerhouses.

4.2.1.6 Gaging Stations

Stream Gages

The following gages will only be used to monitor instream flow requirements until new gages are installed (BA/BE Table 21).

- Duncan Creek near French Meadows (interim)

The gage at Duncan Creek near French Meadows (USGS Gage No. 11427700) will continue to monitor MIFs for compliance with the new license until the Duncan Creek Diversion Dam Modification is completed.

- Rubicon River below Hell Hole Dam (interim)

The gage at Rubicon River below Hell Hole Dam (USGS Gage No. 11428800) will monitor MIFs for compliance with the existing license conditions until the Hell Hole Dam Outlet Works Modification is completed.

- North Fork Long Canyon Creek below Diversion Dam (interim)

The gage at North Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433085) will monitor MIFs for compliance with the existing license conditions until the North Fork Long Canyon Diversion Dam Modification is completed and the new gage at North Fork Long Canyon Creek below Diversion Dam is constructed.

- South Fork Long Canyon Creek below Diversion Dam (interim)

The gage at South Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433065) will continue to monitor MIFs for compliance with the existing license conditions until the South Fork Long Canyon Diversion Dam Modification is completed and the new gage at South Fork Long Canyon Creek below Diversion Dam is constructed.

- Middle Fork American River below Interbay Dam (interim)

The gage at Middle Fork American River below Interbay Dam (USGS Gage No. 11427770) will monitor MIFs for compliance with the existing license conditions until the Middle Fork Interbay Dam Outlet Works Modification is

completed and the new gage at Middle Fork American River below Interbay Dam is constructed.

The following are new gages to be constructed as part of the Hell Hole Reservoir Seasonal Storage Increase Improvement or outlet works modifications under the Proposed Action.

- Middle Fork American River at French Meadows Dam (new)

The gages at Middle Fork American River at French Meadows Dam will be installed as part of the French Meadows Dam Outlet Works modification. Flow measurement equipment will monitor MIFs, pulse flows, and downramp of spill flows for compliance with the new license.

- Rubicon River at Hell Hole Dam Spillway (new)

The gage at Rubicon River at Hell Hole Dam Spillway will be installed as part of the Hell Hole Reservoir Seasonal Storage Increase Improvement to monitor pulse flows and downramp of spill flows for compliance with the new license.

- Rubicon River at Hell Hole Dam (new)

The gages at Rubicon River at Hell Hole Dam will be installed as part of the Hell Hole Dam Outlet Works Modification. Flow measurement equipment will monitor MIFs, pulse flows, and downramp of spill flows for compliance with the new license.

- Middle Fork American River at Ralston Afterbay Dam (new)

The gage at Middle Fork American River at Ralston Afterbay Dam will be installed at the end of the existing outlet pipe during routine maintenance activities to monitor MIFs for compliance with the new license.

The precise location of the following new gages has not been determined. Project-specific NEPA analysis will be conducted at a later date, and all necessary permits and approvals will be obtained prior to implementation of any construction activities.

- North Fork Long Canyon Creek below Diversion Dam (new)

The gage at North Fork Long Canyon Creek below Diversion Dam will be constructed downstream of the North Fork Long Canyon Diversion Dam to monitor MIFs and pulse flows for compliance with the new license. The gage will also be used to collect real-time flow information for public dissemination.

- South Fork Long Canyon Creek below Diversion Dam (new)

The gage at South Fork Long Canyon Creek below Diversion Dam will be constructed downstream of the South Fork Long Canyon Diversion Dam to

monitor MIFs and pulse flows for compliance with the new license. The gage will also be used to collect real-time flow information for public dissemination.

- Middle Fork American River below Interbay Dam (new)

The gage at Middle Fork American River below Interbay Dam will be constructed downstream of Middle Fork Interbay Dam to monitor MIFs and pulse flows for compliance with the new license. The gage will also be used to collect real-time flow information for public dissemination.

- North Fork American River above American River Pump Station (new)

The gage at North Fork American River above American River Pump Station will be constructed to monitor recreation flow releases on the North Fork American River, downstream of the Middle Fork American River confluence, and collect flow data for real-time flow dissemination to the public.

The remaining stream gages are existing gages that will be incorporated into the MFP.

- Rubicon River above Ralston Powerhouse (existing, added to MFP)

The gage at Rubicon River above Ralston Powerhouse is an existing gage that will be incorporated into the MFP. This gage will collect real-time flow data for public dissemination.

- Rubicon River above Ellicott Bridge (existing, added to MFP)

The gage at Rubicon River above Ellicott Bridge is an existing gage that will be incorporated into the MFP. This gage will collect real-time flow data for public dissemination.

Diversion Flow Gages

- Duncan Creek Diversion Tunnel (new)

The gage at Duncan Creek Diversion Tunnel will be constructed as part of the Duncan Creek Diversion Dam Modification to monitor MIFs and pulse flows for compliance with the new license.

- North Fork Long Canyon Creek Diversion Tunnel (modified)

The gage at North Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433080) will be modified as part of the North Fork Long Canyon Diversion Dam Modification to monitor MIFs for compliance with the new license.

- South Fork Long Canyon Creek Diversion Tunnel (modified)

The gage at South Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433060) will be modified as part of the South Fork Long Canyon Diversion Dam Modification to monitor MIFs for compliance with the new license.

Reservoir Gages

The Proposed Action has no new or modified reservoir gages.

Powerhouse Gages

- Oxbow Powerhouse Penstock (new)

The gage at Oxbow Powerhouse Penstock will be installed within the existing powerhouse penstock during routine maintenance activities to monitor operations of the Oxbow Powerhouse (ramping rate and maximum flows) for compliance with the new license.

Leakage Weirs

The Proposed Action has no new or modified leakage weirs.

4.2.1.7 Communication Lines and Powerlines

- Hell Hole Dam Spillway Crest Gates Control Building Powerline (new)

Hell Hole Dam Spillway Crest Gates Control Building Powerline will be constructed as part of the Hell Hole Reservoir Seasonal Storage Increase Improvement to provide power to the control building for operation of the spillway crest gates.

4.2.1.8 Photovoltaic Poles and Powerlines

The following pole-mounted photovoltaic arrays (also referred to as photovoltaic poles) and powerlines will be constructed to provide power to operate new gages. The precise location of the photovoltaic poles and powerlines has not yet been determined, with the exception of the pole and powerline at Duncan Creek. Therefore, Project-specific NEPA analysis will be conducted, and all required permits and approvals will be obtained, prior to installation of these poles and powerlines.

- Photovoltaic Pole and Powerline at Duncan Creek Gage at Diversion Tunnel (new)
- Photovoltaic Pole and Powerline at Middle Fork American River Gage below Interbay Dam (new)

- Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam (new)
- Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam (new)
- Photovoltaic Pole and Powerline at North Fork American River Gage above American River Pump Station (new)

The following photovoltaic poles and powerlines are existing and will be incorporated into the MFP.

- Photovoltaic Pole and Powerline at Rubicon River Gage above Ralston Powerhouse (existing, added to MFP)
- Photovoltaic Pole and Powerline at Rubicon River Gage above Ellicott Bridge (existing, added to MFP)

4.2.1.9 Microwave Reflectors and Radio Towers

The Proposed Action has no new or modified microwave reflectors or radio towers.

4.2.1.10 Disposal Areas

The Proposed Action has no new disposal areas. However, new disposal areas may be necessary during the term of the new license if the capacity of the existing disposal areas is exceeded. The actual location of any potential new disposal area has not yet been determined. Therefore, if it is determined that new disposal areas are necessary, Project-specific NEPA analysis will be conducted, and all required permits and approvals will be obtained prior to use of any new disposal areas.

4.2.1.11 Sediment Augmentation Areas

- Middle Fork Interbay Augmentation Areas (new)

Middle Fork Interbay Augmentation Areas (two locations) will be developed downstream of Middle Fork Interbay Dam to enhance natural sediment delivery and transport. Sediment of the suitable size, to benefit the aquatic ecosystem that is excavated from Middle Fork Interbay during sediment management activities will be placed at the augmentation areas.

- Junction Bar Augmentation Area (new)

Junction Bar Augmentation Area will be developed downstream of Indian Bar to enhance sediment delivery and transport. Sediment of the suitable size, to benefit the aquatic ecosystem that is excavated from Ralston Afterbay during sediment management activities will be placed at the augmentation area. A temporary construction bridge will be placed at the northern end of Indian Bar

and span the active channel and Willow Bar to provide access during each augmentation event.

The following augmentation area is existing and will be incorporated into the MFP.

- Indian Bar Augmentation Area (existing, added to MFP)

Indian Bar Augmentation Area is an existing augmentation area that will be incorporated into the MFP to enhance sediment delivery and transport under the Proposed Action. Sediment of the suitable size, to benefit the aquatic ecosystem that is excavated from Ralston Afterbay during sediment management activities will be placed at the augmentation area.

4.2.1.12 Ancillary Facilities

- Hell Hole Dam Spillway Crest Gates Control Building (new)

Hell Hole Dam Spillway Crest Gates Control Building will be constructed as part of the Hell Hole Reservoir Seasonal Storage Increase Improvement to house equipment to power the new spillway crest gates.

- Ralston Afterbay Sediment Removal Access Point (converted)

Ralston Afterbay Sediment Removal Access Point will be converted to the Ralston Afterbay Sediment Access Point Boat Launch to provide public boat launching access to the reservoir.

4.2.1.13 Fences

The Proposed Action has no new or modified Project fences.

4.2.1.14 Roads and Trails

Roads

- Hell Hole Dam Spillway Gates Road (new)

Hell Hole Dam Spillway Gates Road will be constructed as part of the Hell Hole Reservoir Seasonal Storage Increase Improvement to provide access to the new spillway gates.

Trails

The following trails will be constructed to provide access to operate and maintain new MFP gages. The precise location of these new trails has not yet been determined. Therefore, Project-specific NEPA analysis will be conducted at a later date and all required permits and approvals will be obtained prior to implementation of any construction activities.

- North Fork Long Canyon Creek Gage below Diversion Dam Trail (new)

North Fork Long Canyon Creek Gage below Diversion Dam Trail is a new trail that will be constructed to provide access to the new North Fork Long Canyon Creek Gage below Diversion Dam.

- South Fork Long Canyon Creek Gage below Diversion Dam Trail (new)

South Fork Long Canyon Creek Gage below Diversion Dam Trail is a new trail that will be constructed to provide access to the new South Fork Long Canyon Creek Gage below Diversion Dam.

- Middle Fork American River Gage below Interbay Dam Trail (new)

Middle Fork American River Gage below Interbay Dam Trail is a new trail that will be constructed to provide access to the new Middle Fork American River Gage below Interbay Dam.

- North Fork American River Gage above American River Pump Station Trail (new)

North Fork American River Gage above American River Pump Station Trail is a new trail that will be constructed to provide access to the new North Fork American River Gage above American River Pump Station.

The following trail is existing and will be incorporated into the Project.

- Rubicon River Gage above Ralston Powerhouse Trail (existing, added to MFP)

Rubicon River Gage above Ralston Powerhouse Trail is an existing trail that provides access to the Rubicon River Gage above Ralston Powerhouse and is necessary for operation of the Project.

4.2.1.15 Recreation Facilities

- Duncan Creek Diversion Primitive Recreation Site (new)

Duncan Creek Diversion Primitive Recreation Site will be developed under the Proposed Action to address sanitation issues in the Duncan Creek Diversion area and to reduce potential resource impacts related to dispersed recreation. Development of the site will include installation of the following features: one single-unit accessible vault toilet, barrier rocks to limit vehicle use and camping to specific areas, and a bear-resistant garbage container.

- Ahart Campground (enhanced)

Ahart Campground will be enhanced under the Proposed Action to provide a potable water source for recreation visitors and to reduce dust, erosion, and sedimentation along the campground access and loop roads. Specific

enhancements will include installing a groundwater well and hand pump within the recreation facility, paving the campground road and spurs to reduce dust and erosion, and paving about 0.6 mile of Forest Road 96 from the end of the existing pavement to approximately 200 feet past the Ahart Campground entrance.

- Poppy Campground (reduced)

Poppy Campground will be reduced under the Proposed Action because the site is underutilized based on use data and capacity information. Reduction of the site will involve removing all of the tables, fire rings, stoves, and user-created fire rings from four sites and allowing vegetation in the vicinity of each removed campsite and along remnant trails to return to natural conditions.

- French Meadows Boat Ramp (enhanced)

Under the Proposed Action, French Meadows Boat Ramp will be extended up to 365 linear feet, to an elevation of about 5,175 feet, which is 25 vertical feet lower than the bottom of the existing boat ramp.

- McGuire Picnic Area and Beach (converted)

McGuire Picnic Area and Beach will be converted to the McGuire Group Campground under the Proposed Action due to low day-use levels. This conversion will involve removing all of the amenities at the existing picnic sites and reconfiguring the site for group use. Buoys and signage in the vicinity of the beach will be removed and the beach area will be allowed to return to natural conditions.

- McGuire Group Campground (new)

McGuire Picnic Area will be converted to the McGuire Group Campground to provide additional group camping opportunities. The campground will include two group camp sites. Development of the group campground will require the installation of new accessible picnic and serving tables, fire rings and benches, cooking grills, bear-resistant food storage lockers, signage, and barriers to delineate each site. The existing bathroom will be converted to meet accessibility standards or will be replaced.

- McGuire Boat Ramp and Associated Parking (modified)

McGuire Boat Ramp and Associated Parking Areas and the Poppy Campground Parking Area (and associated support facilities) will be consolidated due to low use levels. Consolidating these areas involves: removing the Poppy Campground Trailhead Parking Area and access road, installing barrier rock at the entrance to the Parking Area access road to prohibit future vehicle use, treating the surface of the road and parking area to allow for natural revegetation, removing one wood toilet building, replacing the existing vault toilet building,

relocating water faucets, extending the Poppy Trail to one of the McGuire Boat Ramp Parking Areas, and relocating the trailhead signage and information boards.

- Hell Hole Campground (reduced)

Hell Hole Campground will be reduced under the Proposed Action due to low-use levels and to protect nearby sensitive resources. Reduction of the site will involve removing all tables, concrete and steel grills, fire pits, and site markers from two sites. The campsites will be allowed to naturally revegetate and a new barrier will be installed at the southeast boundary of the campground to limit recreation use to within the campground boundary.

- Upper Hell Hole Campground (removed)

Upper Hell Hole Campground will be removed under the Proposed Action due to low-use levels and to protect nearby sensitive resources. The following features will be removed: all tables, fire rings, masonry stoves, and user-created fire rings from sites 1–13; four pit toilets; and existing signage and information boards. Vegetation within the campground will be allowed to return to natural conditions.

- Hell Hole Boat Ramp (enhanced)

Under the Proposed Action, Hell Hole Boat Ramp will be extended up to 250 linear feet, to an elevation of about 4,485 feet, which is 45 vertical feet lower than the bottom of the existing boat ramp.

- Ralston Afterbay Picnic Area (reduced)

Ralston Afterbay Picnic Area will be reduced under the Proposed Action because the site is underutilized based on use data and capacity information. Reduction of the site will involve removing the table, pedestal grill, and signage from one site, and allowing the vegetation in the vicinity of the site and along the trail to the site to return to natural conditions.

- Ralston Afterbay Sediment Removal Access Point Boat Ramp (new)

Ralston Afterbay Sediment Removal Access Point will be improved to accommodate boat launching by the public. This improvement includes delineating the boat ramp and parking area with barrier rocks or other barrier devices, grading the ramp to remove large cobbles and rocks, and installing signage and barriers to limit parking and direct visitors to the Ralston Afterbay Picnic Area for additional parking.

- Indian Bar Rafting Access and General Parking (enhanced)

Indian Bar Rafting Access and General Parking will be enhanced under the Proposed Action to accommodate recreation use by commercial whitewater

boaters and to improve conditions for other day use visitors. This enhancement includes installing an additional accessible vault toilet or modifying the existing vault toilet to accommodate peak use, installing powered ventilation systems in the existing toilets, reconstructing the existing boat ramp and installing a supplemental slide ramp downstream of the existing ramp, and installing a changing pavilion.

4.2.2 Project Boundary Modifications

The FERC Project boundary will be modified under the Proposed Action as follows:

- Increase the boundary to include:
 - New Project facilities constructed as part of the Proposed Action
 - Existing facilities added to the MFP that are necessary for operation and maintenance of the Project
 - Footprint of all Project recreation facilities
- Decrease the boundary to remove excess lands currently within the existing FERC Project boundary that are not necessary for operation and maintenance of the MFP (particularly around Project reservoirs).

These revisions are depicted on Exhibit E – Section 4.0, Map 4-3 (includes Maps 4-3a–o). Detailed maps and specific parcel and acreage information is available in Exhibits A and G of Exhibit E in this License Application.

Under the No-Action Alternative, the FERC Project boundary encompasses 4,554 acres of land including 1,883 acres within TNF and 1,385 acres within ENF. The remainder of the MFP is located on PCWA-owned land or private land.

Under the Proposed Action, the revised FERC Project boundary will encompass 4,150 acres of land including 1,746 acres within the TNF and 1,306 acres within the ENF. The remainder of the MFP will be located on PCWA-owned land, private land, or land owned by the Bureau of Land Management.

4.2.3 Project Operations

Overall, the Proposed Action has relatively minor modifications to Project operations. Under the Proposed Action, Project operations will be modified to comply with the Instream Flow and Reservoir Minimum Pool Measure (IFRM) (PCWA 2011g; SD A). This measure modifies Project operations compared to the No-Action Alternative by requiring:

- Higher MIF releases in the bypass and peaking reaches
- Spring pulse flows in the bypass reaches

- Downramp of spill flows from May–July below Hell Hole Reservoir and French Meadows Reservoir
- Modified ramping rates at Oxbow Powerhouse in the peaking reach
- Cap on flow releases from Oxbow Powerhouse (Saturday of Memorial Day weekend to Labor Day) in Dry, Critical, and Extreme Critical water years
- Consultation with representatives for the Tevis Cup and Western States 100 to identify and provide flows suitable for adequate trail crossing conditions (when flows are controllable by the MFP)
- Recreational flow releases in the peaking reach
- Modified minimum reservoir pool requirements in Hell Hole Reservoir and French Meadows Reservoir

The Hell Hole Reservoir Seasonal Storage Increase Improvement also modifies Project operations by providing an additional 7,600 ac-ft of storage capacity in Hell Hole Reservoir.

4.2.3.1 Operating Objectives

Under the Proposed Action, operating objectives of the MFP will continue to be met. The MFP will continue to be operated to meet the four objectives identified in Section 4.2.3.1, namely:

- Meet FERC license requirements that protect environmental resources and provide for recreation.
- Meet PCWA's consumptive water demands.
- Generate power to help meet California's energy demand and provide valuable support services required to maintain the overall quality and reliability of the state's electrical supply system.
- Maintain Project facilities to ensure their continued availability and reliability.

In addition, the Proposed Action maintains the five key operating characteristics of the MFP that allow PCWA to meet its operating objectives. These characteristics are:

- Storage Flexibility—the flexibility to raise and lower reservoir levels (water storage) at different rates and times throughout the year subject to minimum storage level requirements. This flexibility allows:
 - Reasonable rates of drawdown through the summer to meet consumptive water demands and generate during periods of peak energy demand

- Evacuation of sufficient reservoir storage space in the fall to provide adequate storage capacity to manage the following spring runoff with minimum potential for spill
- Higher levels of drawdown of the reservoirs under drought conditions so that consumptive water supply needs can be met
- Combined Operation of Middle Fork and Ralston Powerhouses—the ability to operate the Middle Fork and Ralston powerhouses simultaneously over a range of flows and schedule periods. This capability is limited only by (1) powerhouse maximum flow capacity, (2) minimum pool (storage) requirements in upstream reservoirs, and (3) flows necessary to meet MIF requirements.
- Operation of Oxbow Powerhouse and Ralston Afterbay—the ability to fluctuate Ralston Afterbay on a daily basis over a range of storage levels, so that releases to the Middle Fork American River below Oxbow Powerhouse meet MIF requirements and provide whitewater boating recreational opportunities without requiring operation of Middle Fork and Ralston powerhouses.
- Meet the Combined Patterns of Water and Energy Demand—the ability to meet the seasonal combined patterns of consumptive water demand and peak energy demand and weekly/daily peak energy demands. To meet these combined patterns of demand, the MFP must have:
 - The ability to release water from storage for downstream delivery at all times of the year in response to consumptive demand patterns
 - The ability to vary on a daily and hourly basis, releases through Middle Fork and Ralston powerhouses for power generation in response to changing electrical demand, grid needs, and water supply demand
- Fall Maintenance—the ability to shutdown operations during the fall, after the peak energy and water supply demand period and during favorable runoff and weather conditions to perform annual maintenance.

4.2.3.2 Regulatory Requirements and Operating Agreements/Contracts

Under the Proposed Action, the regulatory requirements affecting Project operations identified in Section 4.1.5 (i.e., water rights permits and license issued by the State Water Board) will remain in effect. New license conditions issued by FERC for the MFP will replace the existing license conditions. The Hell Hole Reservoir Seasonal Storage Increase Improvement requires a new water right from the State Water Board to allow for additional storage for power generation (nonconsumptive use) at Hell Hole Reservoir.

Operating agreements/contracts affecting Project operations identified in Section 4.1.5 (i.e., water supply contracts and the Water Forum Agreement) will remain in effect with the exception of the existing power purchase contract, which expires on April 30, 2013.

PCWA is currently negotiating a new power purchase contract, which will be in place prior to the expiration of the current PG&E contract. It is anticipated that the new contract will be from 3 to 10 years in length, with provisions for renewal with the mutual agreement of both parties. This power purchase contract will be consistent with the FERC license conditions, water rights, and existing operating agreements/contracts and will not result in additional limitations or constraints in Project operations.

4.2.3.3 Consumptive Water and Power Demands

Consumptive water and power demands are unchanged under the Proposed Action. An overview of consumptive water and power demands is provided in Section 4.1.5.4.

4.2.3.4 Water Management

PCWA's overall water management strategy will not change substantially under the Proposed Action. An overview of water management is provided in Section 4.1.5.4.

A minor change in water management will occur as a result of the Hell Hole Reservoir Seasonal Storage Increase Improvement. This improvement will allow PCWA to utilize a portion of the existing flood control pool, above the present normal maximum operating water level, to store additional water during the spring and summer after the peak runoff period. An approximate 7,600-ac-ft increase in seasonal storage capacity in the reservoir will be achieved by installing 6-foot-high crest gates on the existing dam spillway. In years when either French Meadows or Hell Hole reservoirs would have spilled, this improvement allows the MFP to capture additional water in storage in Hell Hole Reservoir, which can later be used to increase net annual energy generation. In all but the driest years, this improvement also allows the MFP to shift the timing of some generation from the spring runoff period to the summer peak energy demand period.

4.2.3.5 Project Generation

Project generation will be reduced by 4.59% under the Proposed Action compared to the No-Action Alternative as a result of implementation of the new IFRM (PCWA 2011g; SD A) and construction of the Hell Hole Reservoir Seasonal Storage Increase Improvement. Annual net generation at MFP powerhouses is summarized in BA/BE Table 18. Annual net generation for French Meadows, Middle Fork, Ralston, and Oxbow powerhouses is based on 40 years of operation (1967–2006). Hell Hole Powerhouse began operation in 1983; therefore, annual net generation is based on 24 years of operation (1983–2006). Under the No-Action Alternative, the MFP's annual average generation is 1,039,078 MWh, which represents the average net generation for the five Project powerhouses based on their respective period of record. Under the Proposed Action, the MFP will have an annual average generation of 991,384 MWh (a reduction of 47,694 MWh).

4.2.4 Routine Facility Inspections, Testing, and Maintenance

As identified in BA/BE Tables 22, 23, and 24, under the Proposed Action, routine facility inspections, testing, and maintenance activities related to Project facilities and features,

Project roads and trails, and Project recreation facilities and features are modified from the No-Action Alternative. These modifications include revisions in the location, timing, and methods for implementation of routine maintenance activities. In addition, the Proposed Action specifies additional programs and measures for protection of environmental and cultural resources. These modifications have been incorporated within various management plans, as described in Section 4.1.6 – Existing Environmental Programs, Measures, and Facilities.

Changes in routine facility inspections, testing, and maintenance under the Proposed Action are summarized below.

4.2.4.1 Tunnel and Powerhouse Inspections, Testing, and Maintenance

Tunnel and powerhouse inspections, testing, and maintenance activities will remain the same as the No-Action Alternative.

4.2.4.2 Spillway Gate and Tainter Gate Testing

Spillway gate and tainter gate testing will remain the same under the Proposed Action at all facilities except Hell Hole Dam. At Hell Hole Dam, the new spillway crest gates installed as part of the Hell Hole Reservoir Seasonal Storage Increase Improvement will be inspected and tested annually.

4.2.4.3 Vegetation Management

As described in the VIPMP (PCWA 2011h; SD A), the following changes to vegetation management will occur under the Proposed Action:

- Implementation of vegetation management (trimming by hand, trimming with equipment, and/or herbicide use) at new Project facilities and features, Project roads and trails, and Project recreation facilities and features
- Authorized application of herbicides and surfactants at existing Project facilities and features and Project roads where herbicides were not previously used
- Implementation of additional programs and measures to protect and enhance environmental and cultural resources during vegetation management

4.2.4.4 Pest Management

As described in the VIPMP (PCWA 2011h; SD A), the following changes to pest management will occur under the Proposed Action:

- Implementation of physical rodent control (e.g., snap traps) and over-the-counter rodenticides (e.g., d-CON®) at new Project facilities
- Authorized rodenticide use (e.g., fumigants) at Hell Hole and French Meadows dams

- Established methods for rodenticide use to reduce the risk of secondary poisoning of nontarget species

4.2.4.5 Noxious Weed Management

Noxious weed management was not a Project maintenance activity under the No-Action Alternative. However, as described in the VIPMP (PCWA 2011h; SD A), implementation of noxious weed management will result in the following changes under the Proposed Action:

- Required manual and chemical (herbicide use) noxious weed control
- Establishment of protective buffers around streams, reservoirs, and other aquatic sites when applying herbicides
- Implementation of measures to limit the introduction or spread of noxious weeds
- Implementation of measures and programs to protect and enhance environmental resources during noxious weed management
- Required monitoring of noxious weed manual and chemical treatment sites

4.2.4.6 Sediment Management

As described in the SMP (PCWA 2011i; SD A), the following changes to sediment management at the small diversion pools and medium reservoirs will occur under the Proposed Action:

Small Diversions

Sediment management at small diversions (Duncan Creek Diversion, North Fork Long Canyon Diversion, and South Fork Long Canyon Diversion) will include interim and contingency sediment management and long-term routine maintenance.

Interim Sediment Management will be conducted at small diversions prior to modification of diversion dams. Similar to the No-Action Alternative, interim sediment management includes physical removal of sediment by heavy equipment during the low-flow period (late summer or fall) on an as-needed basis. However, under the Proposed Action, the following changes will occur:

- Implementation only during the interim years between license issuance and completion of the infrastructure modifications
- Reduced level of sediment removal activity (duration, extent of equipment needed, volume of sediment removed, and disposal area)
- Implementation of additional measures to protect and enhance environmental and cultural resources during sediment management

Contingency Sediment Management will be conducted following implementation of the small diversion modifications. Under the Proposed Action, implementation of contingency sediment management (physical removal with equipment) is considered to be unlikely, but may be necessary following implementation of the small diversion modifications. Contingency sediment management will result in the following changes from the No-Action Alternative:

- Reduced level of sediment removal activity (duration, extent of equipment needed, volume of sediment removed, and disposal area)
- Implementation of additional measures to protect and enhance environmental and cultural resources during sediment management

Long-term Routine Maintenance of the modified small diversions will change under the Proposed Action. Specifically, this change includes the following:

- Substantially reduce the need for routine physical removal of sediment by heavy equipment.
- Reduce the need for trash rack cleaning.
- Reduce monitoring of intakes during winter and spring storm event.

Medium Reservoirs

As described in the SMP (PCWA 2011i; SD A) the following changes to sediment management at the medium reservoirs will occur under the Proposed Action:

- Establishment of new augmentation areas (Middle Fork Interbay Augmentation Areas and Junction Bar Augmentation Area) and use of an existing augmentation area (Indian Bar Augmentation Area)
- Required sediment augmentation below Middle Fork Interbay and Ralston Afterbay
- Required sediment transport monitoring at augmentation areas and replenishment of sediment transported from the area
- Reduction in the volume of sediment stored and decreased need for additional sediment disposal areas
- Implementation of additional measures to protect and enhance environmental resources during sediment management activities

4.2.4.7 Slope Stabilization (Falling Rock Control)

Slope stabilization activities will remain the same as the No-Action Alternative.

4.2.4.8 Debris Management

Following implementation of the small diversion infrastructure modifications, debris management may occur as part of contingency sediment management activities as described in the SMP (PCWA 2011i; SD A). This debris management includes:

- Accumulated sediment, woody debris, and/or vegetation within the existing diversion pool that restricts or threatens operations of the diversion facility or natural sediment transport downstream will be removed.
- Large woody debris removed during contingency activities will either be placed downstream of the diversion or disposed of at an approved disposal area in consultation with resource agencies

4.2.4.9 Facility Painting

Facility painting will remain the same as the No-Action Alternative except that PCWA will consult with the USDA-FS on the selection of appropriate colors per the Visual Resource Management Plan (VRMP) (PCWA 2011j; SD A).

4.2.4.10 Pole Replacement/Retrofit

As described in the BEMP (PCWA 2011k; SD A), the following changes to pole replacement/retrofit will occur under the Proposed Action:

- Scheduled replacement/retrofit of Project powerlines will meet Avian Power Line Interaction Committee (APLIC) guidelines within 15 years of license issuance.
- New powerline designs will be consistent with APLIC guidelines.

4.2.4.11 Road and Trail Maintenance

As described in the TSMP (PCWA 2011l; SD A), the following changes to road and trail maintenance will occur under the Proposed Action:

- Required annual and periodic maintenance of new Project roads and trails
- Established schedule for implementation of annual and periodic maintenance at existing and new roads and trails
- Implementation of additional programs and measures to protect and enhance environmental and cultural resources during annual and periodic road and trail maintenance

4.2.4.12 Recreation Facility Maintenance

As described in the Recreation Plan (PCWA 2011m; SD A), the following changes to recreation facility maintenance will occur under the Proposed Action:

- Required annual and heavy maintenance of new Project recreation facilities
- Established schedule for implementation of heavy maintenance at existing Project recreation facilities
- Implementation of additional programs and measures to protect and enhance environmental and cultural resources during annual and heavy maintenance

4.2.5 New Environmental Programs, Measures, and Facilities

This section identifies new environmental programs, measures, and facilities to be implemented under the Proposed Action that are designed to protect, maintain, or enhance environmental and cultural resources over the term of the new license. The following subsections provide a description of each environmental program and/or measure.

4.2.5.1 Aquatic Resources

Instream Flow and Reservoir Minimum Pool Measure

PCWA currently provides MIFs for aquatic habitat and protection of beneficial uses in accordance with existing FERC license conditions and permits issued by the State Water Board. The IFRM (PCWA 2011g; SD A) includes higher MIFs, spring pulse flows, downramp of spill flows, modified operation of Oxbow Powerhouse (ramping rate, maximum flow release), required recreation flows, and modified reservoir minimum pool requirements.

Aquatic Management and Monitoring Plans

PCWA will implement ten aquatic monitoring plans under the Proposed Action, these include:

- Flow and Reservoir Monitoring Plan (FRMP)

The FRMP (PCWA 2011n; SD A) identifies the methods used to document compliance and reporting of instream flow releases and reservoir levels specified in the new FERC License. Specifically, the FRMP (PCWA 2011n; SD A) addresses the following instream flow requirements:

- MIFs in the bypass and peaking reaches
- Pulse flows in the bypass reaches
- Recreation flow releases in the peaking reach
- Ramping rates and maximum flow releases for Oxbow Powerhouse
- Downramping for spills from Hell Hole Dam and French Meadows Dam

- Minimum pool requirements in Hell Hole and French Meadows reservoirs
- Fish Population Monitoring Plan (FPMP)

The FPMP (PCWA 2011o; SD A) describes methods, analyses, reporting, and agency consultation associated with collection of fish species composition, abundance, condition factor, and population age class structure data at select sites in the bypass and peaking reaches associated with the MFP over the term of the license. The FPMP (PCWA 2011o; SD A) also includes three shorter-term special purpose monitoring studies. Specific objectives of the FPMP (PCWA 2011o; SD A) are to:

- Monitor fish species composition, abundance, condition factor, and population age class structure at select sites in the bypass and peaking reaches associated with the MFP over the term of the license.
 - Conduct young-of-the-year and juvenile fish targeted sampling in the Middle Fork American River peaking reach.
 - Monitor hardhead movement in Ralston Afterbay in relation to Project operations.
 - Monitor fish entrainment at the Ralston Powerhouse and Oxbow Powerhouse intakes.
- Foothill Yellow-legged Frog Monitoring Plan (FYLFMP)

The FYLFMP (PCWA 2011p; SD A) describes methods and analyses for the periodic collection of FYLF population data at select sites in the bypass and peaking reaches associated with the MFP over the term of the license. The FYLFMP (PCWA 2011p; SD A) also includes three special purpose monitoring studies. Specifically, the objectives of the FYLFMP (PCWA 2011p; SD A) are to:

- Monitor FYLF species abundance (egg masses, tadpoles, and young-of-the-year) in select locations in the bypass and peaking reaches, including tributaries.
- Document the approximate upstream distribution of FYLF in the Rubicon River and the Middle Fork American River (upstream of Ralston Afterbay).
- Determine the approximate timing of the initiation of FYLF breeding season in the Rubicon River and Middle Fork American River (upstream of Ralston Afterbay).
- Monitor FYLF initiation of breeding timing in relation to the pulse flow releases during the initial implementation years (Middle Fork American River and Rubicon River).

- Monitor FYLF in relation to flows during the annual fall maintenance outage during the initial implementation years (Middle Fork American River and Rubicon River); and
- Monitor FYLF in relation to potential flow changes during emergency power outages.

The FYLFMP (PCWA 2011p; SD A) also describes reporting requirements and agency consultation to be implemented.

- Geomorphology/Riparian Monitoring Plan (GRMP)

The GRMP (PCWA 2011q; SD A) describes monitoring and analyses of channel and sediment conditions and riparian vegetation data over the term of the new license. Specifically, the objectives of the GRMP (PCWA 2011q; SD A) are to monitor the following parameters at select sites in the bypass and peaking reaches:

- Channel and sediment conditions, including general channel shape, bank erosion, and fine sediment in pools
- Riparian vegetation communities, including species composition, age class structure, relative cover, vegetation community structure, position along the stream channel, and health

The GRMP (PCWA 2011q; SD A) also describes reporting requirements and agency consultation to be implemented.

- Sediment Management Plan (SMP)

The SMP (PCWA 2011i; SD A) describes sediment management activities necessary for continued operation of the MFP at the three small diversion pools (Duncan Creek, North Fork Long Canyon Creek, and South Fork Long Canyon Creek) and two medium reservoirs (Middle Fork Interbay and Ralston Afterbay). Implementation of the SMP (PCWA 2011i; SD A) will result in improved system reliability, reduced facility maintenance, increased natural delivery and transport of sediment (bedload and suspended load) downstream of Project diversions, and enhanced aquatic and riparian habitat downstream of Project diversions.

The SMP (PCWA 2011i; SD A) includes measures to protect water quality and biological resources, prevent fires, and protect public/worker health during implementation of sediment management activities.

The SMP (PCWA 2011i; SD A) also includes several types of monitoring, including turbidity monitoring at small diversions and medium reservoirs, methylmercury monitoring at Ralston Afterbay, sediment transport and channel sediment condition monitoring associated with the augmentation areas, and hardhead monitoring in Ralston Afterbay. In addition to monitoring, the SMP

(PCWA 2011i; SD A) also describes reporting requirements and agency consultation associated with sediment management activities to be implemented over the term of the new license.

- Water Temperature Monitoring Plan (WTMP)

The WTMP (PCWA 2011r; SD A) describes methods and analyses for collection of water temperature data at select sites in bypass and peaking reaches associated with the MFP. This information will be used to characterize water temperatures within the studied reaches over time and will be used to aid interpretation of biological monitoring data. In addition, the WTMP also describes reporting requirements and agency consultation to be implemented over the term of the new license.

- Western Pond Turtle Monitoring Plan (WPTMP)

The WPTMP (PCWA 2011s; SD A) describes monitoring methods, data analyses, reporting requirements, and agency consultation associated with periodic collection of WPT distribution and abundance data in selected bypass and peaking reaches and Project reservoirs associated with the MFP during the term of the new license. The specific objectives of the WPTMP (PCWA 2011s; SD A) are to:

- Document the distribution of WPT in the vicinity of the MFP.
- Define existing WPT relative abundance and size/age class conditions.
- Monitor WPT relative abundance and size/age class conditions at select sites in the bypass and peaking reaches, and Project reservoirs associated with the MFP, for the duration of the license.

- Water Quality Monitoring Plan (WQMP)

The WQMP (PCWA 2011t; SD A) describes monitoring methods and data analyses approaches for the periodic collection of water quality data in the bypass and peaking reaches and reservoirs associated with the MFP over the term of the new license. Water quality monitoring required as part of other monitoring plans (e.g., sediment management) and/or as part of Project construction activities will be conducted and reported as part of those activities and not the WQMP. The specific objective of the WQMP (PCWA 2011t; SD A) is to:

- Monitor physical, chemical, and bacterial water quality conditions in the bypass reaches, the peaking reach, and Project reservoirs.

In addition, the WQMP (PCWA 2011t; SD A) also describes reporting requirements and agency consultation.

- Mercury Bioaccumulation Monitoring Plan (MBIOMP)

The MBIOMP (PCWA 2011u; SDA) describes monitoring methods, data analyses, reporting requirements, and agency consultation associated with periodic monitoring of methylmercury concentrations in sport fish muscle tissue in Hell Hole Reservoir, French Meadows Reservoir, Ralston Afterbay, and the Middle Fork American River near Otter Creek.

- Benthic Macroinvertebrate Monitoring Plan (BMIMP)

The BMIMP (PCWA 2011v; SDA) describes the monitoring and data analysis approaches for the periodic collection of benthic macroinvertebrate (BMI) data at select sites in the bypass and peaking reaches associated with the MFP. The BMIMP (PCWA 2011v; SDA) also defines reporting requirements and associated agency consultation.

4.2.5.2 Cultural Resources

Historic Properties Management Plan

The Draft Historic Properties Management Plan (HPMP) (PCWA 2011w; SD E) addresses the management of cultural resources that are eligible for inclusion on the National Register of Historic Places (NRHP). Specifically, the Draft HPMP (PCWA 2011w; SD E) identifies measures that PCWA will implement at the four NRHP-eligible sites during operation and maintenance of the MFP and/or recreation use. These measures include implementation of an Employee Resource Awareness Training Program, development of public education materials, and implementation of avoidance measures and providing notification to local Tribes prior to construction or ground-disturbing activities. The Draft HPMP also includes conducting additional surveys at Hell Hole Reservoir, monitoring of NRHP-eligible sites; and implementing specific procedures if unavoidable impacts to cultural resources are identified.

In addition, the Draft HPMP includes several measures that PCWA will implement that are not related to NRHP-eligible properties, as follows:

- PCWA will work with the USDA-FS and Native American Tribes to protect the cultural values of cultural resources that are located within MFP Area of Potential Effects but are not eligible for the NRHP, consistent with PCWA's existing cultural resources management policy.
- PCWA will implement specific measures (notification and signage) to avoid impacting traditional gathering areas should they be identified in the vicinity of the Project.
- PCWA will implement specific measures to protect a site located along a Project road from damage. This site is important to the Colfax Todds Valley Consolidated Tribe.

All of these measures will be implemented in consultation with the USDA-FS and local Native American Tribes.

4.2.5.3 Land Management

Transportation System Management Plan

The TSMP (PCWA 2011l; SD A) identifies PCWA's responsibilities over the term of the new license related to the operation and maintenance of (1) Project roads and trails and (2) Project recreation facility access roads. Specific commitments and measures identified in the TSMP (PCWA 2011l; SD A) include funding of land management agency administrative oversight activities, implementation of routine annual and periodic maintenance activities, documenting road and trail conditions, implementation of special road and trail projects, and conducting traffic counts. The TSMP (PCWA 2011l; SD A) also includes measures for the protection of environmental and cultural resources and consultation with appropriate land management agencies.

Fire Prevention and Suppression Plan

The Fire Prevention and Suppression Plan (FPSP) (PCWA 2011x; SD A) outlines the responsibility of PCWA and its contractors for fire prevention and suppression activities; sets up reporting and attack procedures in the event of a fire in the vicinity of the MFP; and ensures that fire prevention and suppression techniques are carried out in accordance with federal, state, and local regulations. The FPSP (PCWA 2011x; SD A) includes fire prevention and fire suppression measures that will be implemented during Project operation, maintenance, and construction activities; specific fire response procedures and emergency coordination; and agency consultation requirements to be implemented over the term of the new license.

4.2.5.4 Recreation Resources

Recreation Plan

The Recreation Plan (PCWA 2011m; SD A) identifies PCWA's responsibilities related to the management of recreation resources associated with the MFP over the term of the new license. The Recreation Plan (PCWA 2011m; SD A) specifies the measures/commitments that PCWA will implement related to (1) operation, maintenance, and enhancement of Project recreation facilities; and (2) enhancement of Project recreation opportunities. Specific measures and commitments identified in the Recreation Plan (PCWA 2011m; SD A) include:

- Reimbursement of land management agency administrative oversight
- Routine annual and heavy maintenance of Project recreation facilities
- Removal, reduction, consolidation, conversion, enhancement, and improvements to select Project recreation facilities

- Periodic recreation use monitoring
- Resource protection and enhancement measures

Specific measures included in the Recreation Plan (PCWA 2011m; SD A) that are designed to maintain or enhance Project recreation opportunities include:

- Dissemination of real-time flow information in the bypass and peaking reaches
- Dissemination of reservoir WSE information
- Development and distribution of recreation opportunity marketing information
- Fish stocking in large Project reservoirs
- Trail enhancements

The Recreation Plan (PCWA 2011m; SD A) also includes an implementation schedule and specifies PCWA's commitments regarding consultation with the land management agencies over the term of the new license.

Visual Resource Management Plan

The VRMP (PCWA 2011j; SD A) identifies and describes the measures that PCWA will implement over the term of the new license to help improve the existing visual condition of select MFP facilities with respect to USDA-FS objectives, standards, and guidelines. In addition, the VRMP describes how PCWA will consult and coordinate with the USDA-FS when implementing future projects that have the potential to affect visual resources on USDA-FS lands, including modification of existing MFP facilities or the construction of new MFP facilities.

4.2.5.5 Terrestrial Resources

Vegetation and Integrated Pest Management Plan

The VIPMP (PCWA 2011h; SD A) describes vegetation management (i.e., trimming by hand or with equipment and use of herbicides, surfactants, and fungicides) and pest management activities (i.e., noxious weed management and rodent control) to be implemented at Project facilities and features, Project roads and trails, and Project recreation facilities and features, as well as measures for the enhancement and/or protection of environmental and cultural resources during implementation of these activities.

Pest management conducted under the VIPMP (PCWA 2011h; SD A) includes both noxious weed management and rodent control. The noxious weed management program includes manual/chemical treatment of noxious weeds, measures to reduce the introduction or spread of noxious weeds and implementation of noxious weed training program. This program will enhance habitat for native plant and wildlife species

in the MFP and could promote establishment of new special-status plant populations through improved habitat conditions by reducing competition with invasive noxious weeds.

Rodent control, which includes both physical control (e.g., snap traps) and rodenticide use (over-the-counter rodenticides and fumigants), is necessary to protect the structural integrity of dams and prevent rodent infestations in building interiors. The VIPMP (PCWA 2011h; SD A) includes specific rodenticide application methods to be used to protect water quality and prevent secondary poisoning of raptors and other scavengers.

The VIPMP (PCWA 2011h; SD A) also includes several additional measures to enhance environmental resources including conducting special-status plant and noxious weed inventory surveys, implementation of an Environmental Training Program, and consulting annually with resource agencies.

Bald Eagle Management Plan

The BEMP (PCWA 2011k; SD A) addresses management of the bald eagle during routine maintenance and operation of the MFP. Specifically, the BEMP (PCWA 2011k; SD A) describes methods for evaluation and reporting for all power poles/powerlines involved in electrocution of a bald eagle or other raptor; reporting protocols for bald eagle and other raptor mortalities; implementation of raptor safe design configuration for all new and/or replaced power poles/powerlines; measures to protect nests; and implementation of an Environmental Training Program. The BEMP (PCWA 2011k; SD A) also includes methods for conducting annual bald eagle nest monitoring and 5-bald eagle nest and roost surveys to document newly occupied bald eagle territories or nesting activity in the vicinity of the MFP. In addition, the BEMP (PCWA 2011k; SD A) describes reporting requirements, and agency consultation to be implemented over the term of the new license.

Implementation of the BEMP (PCWA 2011k; SD A) will reduce the risk of bald eagle or other raptor electrocution on Project power poles/powerlines, increase monitoring of bald eagle nests and winter roosts in the vicinity of the MFP, and protect future bald eagle nests or roosts that may be identified during the term of the new license.

4.2.6 Construction Projects

Under the Proposed Action, several construction projects will be implemented to improve operations and maintenance of the Project, enhance environmental resources, and/or meet the requirements specified in new environmental programs and measures. The construction projects include modifications to existing and construction of new Project facilities and features. The location of each modified/new Project facility is depicted on BA/BE Maps 3a–3e. Refer to Exhibit E – Appendix A, Modified or New Facilities Construction Activities and Concept Designs for detailed information on construction activities and schedule, associated BMPs and avoidance and protection measures (as applicable), and concept design drawings for each modified/new facility. Cost information associated with each modified/new facility is included in Exhibit E –

Section 11.0, Economic Analysis. The objective of each of these construction projects is briefly described below.

4.2.6.1 Hell Hole Reservoir Seasonal Storage Increase Improvement

The Proposed Action includes construction of the Hell Hole Reservoir Seasonal Storage Increase Improvement. The objective of this improvement is to seasonally increase the storage capacity of Hell Hole Reservoir. The improvement will utilize a portion of the existing flood control pool, above the present normal maximum operating water level, to store additional water during the spring and summer after the peak of the runoff period. An approximate 7,600 ac-ft increase in seasonal storage in the reservoir will be achieved by installing 6-foot-high crest gates on the existing dam spillway. The crest gates may be raised between April 15 and October 30 to increase reservoir storage.

4.2.6.2 Small Diversion Modifications

The Proposed Action includes modification of Duncan Creek, North Fork Long Canyon, and South Fork Long Canyon diversion dams to:

- Improve MFP system reliability.
- Increase natural sediment delivery and transport of bedload and fine material downstream of the small diversions.
- Enhance aquatic and riparian habitat downstream of the small diversions by re-establishing sediment connectivity.
- Reduce operation and maintenance costs by reducing the need for manual debris removal and periodic sediment removal from each diversion.

4.2.6.3 Outlet Works Modifications

The Proposed Action includes modification of outlet works at French Meadows Dam, Hell Hole Dam, and Middle Fork Interbay Dam. The purpose of these modifications is to enhance the ability of the outlet works to release new instream flow requirements, and where appropriate, install new gages to collect flow data necessary for documenting compliance under the new license.

4.2.6.4 Gage Construction

The Proposed Action includes modification of existing gages and construction of new gages to monitor flows for compliance with the new license and collect flow data for real-time flow dissemination to the public. Modifications will occur at existing Project facilities (i.e., dam outlet works, spillways, diversion tunnels, and penstocks). New gage construction will occur along stream/river locations in the bypass and peaking reaches and includes installation of pole-mounted photovoltaic arrays (referred to as photovoltaic poles) and powerlines to provide power, and development of a new trail to provide access. The precise location of the new gages, trails, and photovoltaic poles and

powerlines along stream/river locations has not yet been determined. Project-specific NEPA analysis will be conducted at a later date for these gages and all necessary permits and approvals will be obtained prior to implementation of any construction activities.

5.0 EXISTING ENVIRONMENT

5.1 METHODS

Information on species included in this BA/BE is based on review of relevant information, extensive agency and stakeholder consultation, and field surveys conducted as part of the MFP relicensing process. A summary of agency and stakeholder consultation is provided in Section 2.0, Consultation, and in PCWA's Application for New License, Exhibit E – Section 14.0, Consultation Documentation. Detailed descriptions of the MFP field survey methods and study results, including comprehensive maps of the location of aquatic and terrestrial resources are provided in the following TSRs included in the Application for New License:

- AQ 1 – Instream Flow TSR (PCWA 2011y; SD B)
- AQ 2 – Fish Population TSR (PCWA 2011z; SD B)
- AQ 3 – Macroinvertebrate and Aquatic Mollusk TSR (PCWA 2011aa; SD B)
- AQ 4 – Water Temperature TSR (PCWA 2011bb; SD B)
- AQ 6 – Fish Passage TSR (PCWA 2011cc; SD B)
- AQ 8 – Reservoir Fish Habitat TSR (PCWA 2011dd; SD B)
- AQ 11 – Water Quality TSR (PCWA 2011ee; SD B)
- AQ 12 – Special-Status Amphibian and Aquatic Reptile TSR (PCWA 2011ff; SD B)
- AQ 12 – Special-Status Amphibian and Aquatic Reptile Supplemental Report: California Red-Legged Frog Protocol-Level Survey Report (PCWA 2011gg; SD B)
- TERR 1 – Vegetation Communities and Wildlife Habitat TSR (TERR 1 – TSR) (PCWA 2011hh; SD B)
- TERR 2 – Special-Status Plants TSR (TERR 2 – TSR) (PCWA 2011a; SD B)
- TERR 3 – Noxious Weeds TSR (TERR 3 – TSR) (PCWA 2011ii; SD B)
- TERR 4 – Special-Status Wildlife TSR (TERR 4 – TSR) (PCWA 2011jj; SD B)
- TERR 5 – Bald Eagle TSR (TERR 5 – TSR) (PCWA 2011kk; SD B)
- TERR 6 – Special-Status Bats TSR (TERR 6 – TSR) (PCWA 2011ll; SD B)

5.2 LISTED AND CANDIDATE SPECIES UNDER THE ENDANGERED SPECIES ACT

Provided below is a brief description of the amphibians and mammals (listed and candidate species) known or potentially occurring in the vicinity of the MFP. Refer to BA/BE Appendix B for a detailed life history of each species.

5.2.1 Amphibians

5.2.1.1 California Red-Legged Frog

Only one CRLF record is known within 1 mile of the MFP area. This record is a single adult CRLF that was observed on the western end of Ralston Ridge in the right-of-way below a PG&E transmission line. No individuals have been observed at this location since 2001. This site was burned in the Ralston Ridge Fire in 2006. The closest known population in the vicinity of the MFP is located on private land more than a mile north of the MFP at Michigan Bluff.

No USFWS-designated critical habitat for CRLF is found in the vicinity of the MFP. The closest critical habitat units are the ELD-1 unit, located in El Dorado County approximately 30 miles south of the MFP, and the NEV-1 unit, located in Nevada County approximately 40 miles to the northwest of the MFP (BA/BE Appendix D). A recovery plan for CRLF was issued by USFWS in February 2002 (USFWS 2002). The objective of the recovery plan is to reduce threats and improve the population status of CRLF sufficiently to warrant delisting.

A site assessment and field studies were completed as part of the MFP relicensing to determine the presence of CRLF populations and potential habitat in the vicinity of the MFP. The site assessment is included as BA/BE Appendix D of this document. Based on the site assessments, field surveys, and consultation with USFWS, it was determined that rivers and reservoirs (e.g., the Middle Fork American River, Rubicon River, Hell Hole Reservoir and Ralston Afterbay) associated with MFP do not represent CRLF aquatic breeding habitat. As defined by USFWS (2006), these large rivers and reservoirs represent barriers that would restrict the northward and/or southward movement of CRLF throughout the study area.

Potential aquatic breeding habitat was identified by USFWS at three off-channel ponds at Horseshoe Bar (Ponds C, E, and F). As requested by USFWS, protocol-level surveys were completed at these sites. No CRLF were observed (BA/BE Appendix E). The CRLF protocol-level survey report is included as BA/BE Appendix E of this document. Potential CRLF dispersal habitats in the vicinity of the MFP would include riparian areas, grasslands that contain seeps and springs (USFWS 2002), or deeply shaded forest streams immediately adjacent to aquatic breeding areas (Barry, pers. comm., 2007). However, any habitat that does not contain significant barriers to dispersal may also potentially be used by CRLF during dispersal (USFWS 2002).

5.2.2 Mammals (Mesocarnivore)

5.2.2.1 Pacific Fisher

The MFP is within the historical range of Pacific fisher. Two recorded occurrences are found in the vicinity of French Meadows Reservoir, including one occurrence approximately 1 mile east of French Meadows Reservoir, near the Forest Service Station. However, this species is now thought to be absent from the central Sierra Nevada (CDFG 2010b). Refer to BA/BE Maps 4a and b for the location of historical Pacific fisher detections in the MFAR watershed.

The USDA-FS has identified management areas (i.e., Forest Carnivore Den Sites) for Pacific fisher to provide direction to land managers for designing and developing fuels and vegetation management projects (USDA-FS 2004). Forest Carnivore Den Sites buffer areas are delineated for Pacific fisher based on the location of verified natal (birthing) and maternal (kit-rearing) dens, and include a 700-acre buffer of the highest quality habitat, defined as conifer forest with medium to large trees (11 to 24 inch diameter at breast height [dbh]), and a canopy cover closure exceeding 80%. In addition, USDA-FS desired conditions state that areas surrounding fisher den sites should include at least two large (greater than 40 inches dbh) conifers per acre, and one or more oaks (greater than 20 inches dbh) per acre with suitable denning cavities (USDA-FS 2004).

TNF biologists report that currently no Pacific Fisher Forest Carnivore Den Sites are found in the TNF within the Watershed (Triggs, pers. comm., 2006). Pacific fisher data for the ENF are not currently available.

5.3 FOREST SERVICE SENSITIVE SPECIES

Provided below is a brief description of the status of FSS plant, amphibians, reptiles, birds, and mammals known or potentially occurring in the vicinity of the MFP. Refer to BA/BE Appendix B for a detailed life history of each species.

5.3.1 Plants

Four upland FSS plants—Brandegge's clarkia (*Clarkia biloba* ssp. *brandegeae* [FSS, CNPS 1B.2]), Butte County fritillary (*Fritillaria eastwoodiae* [FSS, CNPS 3.2]), saw-toothed lewisia (*Lewisia serrata* [FSS, CNPS 1B.1]), and Stebbins' phacelia (*Phacelia stebbinsii* [FSS, CNPS 1B.2])—have been documented in the vicinity of the MFP.

Populations of all four plants have been documented in CNDDDB (2010) and USDA-FS data (2006) in upland (i.e., nonriparian) areas in the steep, rocky river canyons within 200 feet of bypass rivers and streams and along the peaking reach. Refer to BA/BE Maps 6a through 6e for the location of these plants along the bypass reaches and the peaking reach.

In addition, Stebbins' phacelia was also identified within the study area around Project facilities during special-status plant surveys conducted for the relicensing of the MFP.

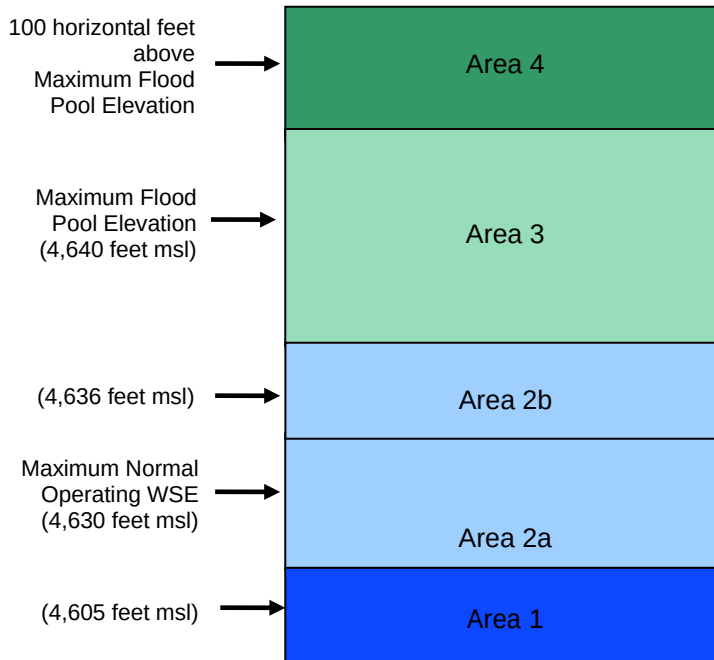
In general, Stebbins' phacelia populations were found above approximately 2,500 feet above msl within chaparral and oak woodland habitats with well-drained, rocky, granitic soils or in cracks in large granite outcroppings. Appropriate habitat for Stebbins' phacelia was especially prevalent along the shoreline of Hell Hole Reservoir, where 44 populations (estimated to include approximately 2.4 to 4.7 million individuals) were identified during special-status plant surveys conducted for the relicensing. Three other populations were also identified: two near Brushy Canyon (including approximately 200 individuals); and one near French Meadows Reservoir, consisting of one individual. During follow-up surveys conducted at new or existing gaging stations and trails to be added to the MFP, two additional Stebbins' phacelia populations, consisting of a total of four individuals, were documented in the vicinity of the Rubicon River Gage above Ellicott Bridge. In addition, a population of Stebbins' phacelia previously reported in the vicinity of Duncan Creek Diversion Pool was later determined (during follow-up surveys conducted in August 2010) to be a common species of phacelia.

A description of Stebbins' phacelia, including preferred habitat and life history, is included in BA/BE Appendix B. Maps of Stebbins' phacelia populations in the vicinity of the MFP are provided in BA/BE Maps 6a through 6e. Refer to BA/BE Table 25 for a list of each Stebbins' phacelia population identified in the vicinity of the Project and the estimated size and number of individuals in each population. BA/BE Table 26 provides the location of the population in proximity to routine operation and maintenance activities, as well as staging and construction areas associated with the modification of existing facilities or construction of new facilities. Additional information on and photographs of Stebbins' phacelia are provided in TERR 2 – TSR (PCWA 2011a; SD B).

A number of Stebbins' phacelia populations are located along the shoreline and within the existing flood pool of Hell Hole Reservoir. A schematic of specific elevations around Hell Hole Reservoir associated with the existing Project (No-Action Alternative) is provided below. Refer to BA/BE Table 27 for a list of Stebbins' phacelia populations within different elevation ranges at Hell Hole Reservoir, including the area (in square feet and acres) and estimated number of individuals. These elevation ranges include:

- **Area 1** includes those portions of special-status plant populations occurring at or below the current maximum normal operating WSE of 4,630 feet msl down to approximately 4,605 feet msl.
- **Area 2a** includes those portions of special-status plant populations occurring from the maximum normal operating WSE (4,630 feet msl) to 4,636 feet msl.
- **Area 2b** includes those portions of special-status plant populations occurring from 4,636 feet msl to the maximum flood pool elevation at 4,640 feet msl.
- **Area 3** includes those portions of special-status plant populations occurring from the maximum flood pool elevation (4,640 feet msl) to the upper limit of the study area. and

- **Area 4** includes those portions of the special-status plant populations intersecting Areas 1, 2, and/or 3 that extend beyond Area 3.



Under current operations, approximately 0.4 acre of habitat that support an estimated 9,000 to 18,000 Stebbins' phacelia individuals are located between reservoir elevation 4,605 feet msl and 4,630 feet msl (Area 1). Refer to Appendix C1c for an analysis of WSEs in Area 1 under existing conditions.

Approximately 2 acres of habitat that support an estimated 53,000 to 106,000 individuals are located within the current maximum normal operating WSE (4,630 feet msl to 4,636 feet msl) (Area 2a). Based on an analysis of reservoir elevation data, under existing conditions, plants in Area 2a are inundated during 7 of the 10 wet water years (for an average duration of 43 days per year), 3 of the 6 above normal water years (for an average duration of 14 days per year), 1 of the 6 below normal water years (for an average of 7 days per year), 0 of the 5 dry water years, and 0 of the 6 critical water years.

Approximately 5 acres of habitat, supporting an estimated 117,000 to 234,000 individuals, are located between WSE and the maximum flood pool elevation (4,636 feet msl and 4,640 feet msl) (Area 2b). Under current operations, areas above 4,636 feet msl are typically not inundated except during extreme spill events.

An additional 45.78 acres of habitat supporting an estimated 997,000 to 1,994,000 individuals exist within the study area (100 horizontal feet above current maximum flood pool elevation) (Area 3).

Refer to BA/BE Table 27 and BA/BE Maps 6d and 6e for a summary of the location and extent of Stebbins' phacelia populations around Hell Hole Reservoir.

5.3.2 Aquatic Species and Habitat

Three FSS species—hardhead, FYLF, and WPT—use aquatic (i.e., riverine and reservoir) habitats in the vicinity of the MFP.

This section is organized as follows:

- Sections 5.3.2.1 through 5.3.2.3 provide general information on the riverine physical environment, riverine aquatic community, and reservoir physical environment.
- Sections 5.3.2.4 through 5.3.2.6 provide species-specific information on the distribution and abundance of hardhead, FYLF, and WPT under the No-Action Alternative, as well as specific habitat locations and descriptions.

5.3.2.1 Riverine Physical Environment

The existing riverine physical environment in bypass and peaking reaches associated with the MFP is described below. The physical environment includes (1) hydrology, (2) channel geomorphology and sediment transport and supply, (3) riparian vegetation, and (4) water temperature and dissolved oxygen. BA/BE Map 7 provides the location of bypass and peaking reaches associated with the MFP.

Hydrology

A detailed description of MFP hydrology is included in Exhibit E – Section 7.3, Water Use Affected Environment. Overviews of typical flows in the bypass and peaking reaches of and accretion are provided in the following:

TYPICAL FLOWS IN THE BYPASS AND PEAKING REACHES

BYPASS REACHES

In the large river bypass reaches (Middle Fork American River and Rubicon River) flows are altered year-round due to operations of the MFP. Flows are typically reduced and more stable during the winter/spring as water is diverted into storage or used for power generation (Exhibit E – Section 7.3, Figure 7.3 2). During the summer and fall seasons, flows in the bypass reaches are typically equal to or greater than natural unimpaired conditions as water is released from storage to meet MIF requirements mandated in the FERC License.

In the smaller stream bypass reaches (Duncan, North and South Fork Long Canyon, and Long Canyon creeks) flows typically are lower and more stable (less variation in flow volume) than natural flows during the winter-spring season (Exhibit E – Section 7.3, Figure 7.3-3) due to diversions. During the summer-fall season, the diversions are not operated because of low inflow and MIF requirements. At this time, natural flows are present in the streams.

PEAKING REACH

In the peaking reach, flows can fluctuate substantially to meet daily power demands or to support whitewater recreation. Operations of the MFP (except in the wettest of water years and/or seasons of the year) can result in daily flow fluctuations in the peaking reach from about 75 cfs (FERC existing License MIF requirement) to the capacity of the Oxbow Powerhouse (approximately 1,025 cfs) (Figures in Exhibit E – Appendix B1). Winter-spring season flows are often similar to unimpaired flows due to the large amount of accretion from the North Fork of the Middle Fork American River and the North Fork American River (see below). Summer-fall season flows are typically higher and more variable than unimpaired conditions due to releases to meet consumptive water and power demands and provide for whitewater recreation.

ACCRETION

During the winter and spring seasons, flow accretion from the surrounding subwatersheds occurs along the length of the bypass and peaking reaches. The accretions in the Middle Fork American River, the Rubicon River, Duncan Creek, and Long Canyon Creek bypass reaches and in the peaking reach are large enough to transition the altered flow regimes at the top of the reaches (immediately downstream of Project dams) into a flow regime further downstream that has a more natural seasonal flow pattern (higher winter-spring flows and lower summer-fall flows) (Exhibit E – Section 7.3, Figure 7.3-2; and Figures in Appendix B1). Accretion flow is relatively small during the summer-fall period in the bypass and peaking reaches and has a limited affect on the summer-fall flow pattern.

Geomorphology and Sediment Supply/Transport

Details of the MFP geomorphology are included in Exhibit E – Section 7.7, Geomorphology Resources Affected Environment. Overviews of the river channels, fine sediment, gravel supply, and channel berms are provided below.

RIVER CHANNELS

The MFP is located in an area characterized by steep (2 to 4%, with local slopes up to 10%), V-shaped canyons and rugged terrain. Only the upper portions of the Long Canyon Creek (including North and South Fork Long Canyon creeks) and the Rubicon River (5.6 miles downstream of Hell Hole Dam) are found within wider, glacier-formed U-shaped valleys. The majority of the bypass streams are highly to moderately entrenched with no or limited adjacent floodplains. Longitudinal profiles of the MFP streams and rivers are shown in Exhibit E – Section 7.7, Figure 7.7-1.

The majority of the streams are mixed bedrock-alluvial channels with coarse substrates and with few alluvial sections that are adjustable. Some notable exceptions from the typical channels in the MFP are (1) the Rubicon River below Hell Hole Dam for about 1.5 miles consists of subsurface flow through alluvium deposited from the historic Hell Hole Dam failure, (2) North and South Fork Long Canyon Creeks have more abundant smaller substrate (gravels, small cobbles) than the other channels, and (3) the peaking

reach downstream of Ralston Afterbay is a low gradient (0.5%), alluvial channel with numerous alternating point bars and mid-channel bars (PCWA 2007).

FINE SEDIMENT AND GRAVELS

Fine sediment is very low in bypass and peaking reaches associated with the MFP. Pools have very little fine sediment storage (Exhibit E – Section 7.7, Table 7.7-7). Fine sediment content for in bulk samples collected in potential spawning habitat were within the established criteria to support high spawning success (Exhibit E – Section 7.7, Table 7.7-8).

All bypass and peaking reaches contain suitably sized spawning material (8–64 millimeters) (AQ 9 – TSR [PCWA 2011mm; SD B]). However, gravel is not overly abundant. MFP reservoirs and diversion pools capture a portion of the natural gravel supply, thereby, reducing sediment supply in the bypass and peaking reaches (Exhibit E – Section 7.7, Table 7.7-11).

CHANNEL BERMS

Sediment/channel conditions in the bypass and peaking reaches are being maintained by the current flow regime. Berm development, channelization, or aggradation/degradation is not occurring (Exhibit E – Section 7.7 and Section 7.8).

Riparian Vegetation

Details of the riparian resources are discussed in the Exhibit E – Section 7.8, Riparian Resources Affected Environment. The following summarizes the key findings on riparian vegetation along bypass and peaking reaches:

- Riparian vegetation was sparse and patchily distributed along the majority of the bypass reaches (Middle Fork American River from French Meadows Dam to Middle Fork Interbay, Rubicon River, Duncan Creek, South Fork Long Canyon Creek, and Long Canyon Creek) due to the confined valley walls and bedrock/coarse substrate.
- Wide corridors of riparian vegetation were relatively uncommon except in the peaking reach and on the Rubicon River immediately downstream from Hell Hole Dam.

Water Temperature and Dissolved Oxygen

Information in this section is based on Exhibit E – Section 7.5, Fish and Aquatics Resources Affected Environment. General water quality data in the bypass and peaking reaches, excluding temperature and dissolved oxygen, are available in AQ 11 – TSR (PCWA 2011ee; SD B) and are discussed in detail in Exhibit E – Section 7.4, Water Quality Affected Environment.

PCWA installed and continuously monitored water temperatures at 50 locations on streams and rivers associated with the MFP, as well as on comparison rivers and tributary streams from 2005 to 2010 (PCWA 2007 and PCWA 2011jj; SD B). The locations of temperature monitoring stations and meteorological stations used to collect information to support the relicensing studies are shown on Exhibit E – Section 7.5, Map 7.5-2. The data were used to characterize and evaluate water temperature conditions in the reservoirs and streams associated with the MFP. The data were also used in the development of the stream and reservoir water temperature models (AQ 4 – TSR [PCWA 2011bb; SD B). Dissolved oxygen measurements were collected at 31 locations during the spring and fall of 2007 in the bypass and peaking reaches (AQ 11 – TSR [PCWA 2011ee; SD B).

Dissolved oxygen concentrations in the bypass and peaking reaches ranged between 7.1 and 11.7 during the spring and fall sampling events (AQ 11 – TSR [PCWA 2011ee; SD B]). These measurements are consistent with the Basin Plan objective of 7.0 milligrams per liter (mg/L) (CVRWQCB 1994).²

Project operations have altered the water temperature regimes in the large bypass and peaking reaches, particularly during the summer and early fall. An example of modeled unimpaired average water temperature for August 2007 compared to existing water temperature (August 2007) illustrates the cooling effect of MFP operations on the bypass and peaking reaches in late summer (Exhibit E – Section 7.5, Map 7.5-3a; and BA/BE Map 9).

The storage of cold water in French Meadows and Hell Hole reservoirs during the spring runoff period and its subsequent release from low-level outlets and powerhouses throughout the summer and fall have substantially reduced water temperatures of the Middle Fork American and Rubicon rivers by as much as 15 degrees Fahrenheit (°F) (e.g., from the low 60–70s to the mid 40–50s).

Under existing conditions, summer water temperatures in the large rivers are reset to cooler reservoir/powerhouse release temperatures (typically about 45–55°F) below French Meadows Reservoir, Hell Hole Reservoir, Middle Fork Interbay, and Ralston Afterbay. The cool water released at the top of the reaches is warmed by air temperature and solar radiation as it moves downstream. For example, the daily average water temperature in the Rubicon River warms from approximately 45°F to 72°F from the Hell Hole Reservoir release to Ralston Afterbay. The peaking reach has the least amount of warming during the summer along its length relative to the other

² However, at three locations during the spring sampling event, DO was below the Basin Plan objective of 7.0 mg/L. These locations included Duncan Creek above Middle Fork American River confluence (DC-3 RM0.2) and the Middle Fork American River above and below the Duncan Creek confluence (MFAR-3 RM39.9 and MFAR-4 RM39.5). DO concentrations at these locations were measured at 6.2 and 6.3. Based on DO concentrations measured at locations upstream and downstream from these sampling locations, these data are believed to be incorrect due to instrument malfunction or sampling error. These locations were not sampled in the fall due to the unsafe field conditions accessing the sampling locations.

reaches. The peaking reach has highest relative starting temperature (e.g., 55°F) and the largest amount of water; therefore, warming is relatively slow (the lower difference between air temperature and water temperature and the large thermal mass of the river reduces the rate of warming). The average temperature of the water flowing from the peaking reach into Folsom Reservoir during the summer is much cooler (e.g., 10°F) than it would have been under unimpaired conditions (Exhibit E – Section 7.5, Map 7.5 3a; and BA/BE Map 8).

Stream temperatures in the smaller bypass reaches (Duncan Creek and Long Canyon creeks) during the summer and fall are unaffected by the MFP because water is generally not diverted during this time period.

A seasonal summary of the 2006–2008 empirical water temperature data at various locations along the length of each river reach (Middle Fork American River bypass and peaking reaches, Rubicon River, and small streams) is shown in BA/BE Figures 17 through 20. Seasonally, the coldest temperatures are in the winter and the warmest in July and August. The temperature of the cool water releases from the reservoirs/powerhouses is relatively constant (very slight warming trend) from late spring through early fall.

In general, water temperature in the bypass and peaking reaches is ideal for coldwater species such as rainbow trout. Mean daily summer temperatures along the length of most of the reaches range between 7 degrees Celsius (°C)–20°C (45–68°F). The water temperatures are consistent with the Basin Plan beneficial uses for coldwater freshwater habitat (COLD) and habitat for reproduction and early development of fish (CVRWQCB 1994).

Two river reaches have summer coldwater/warmer water transition zones and corresponding transition zones of coldwater/warmer water species (cold water trout and warmer water FYLF and hardhead). Transition zones are found in the lower portion of the Rubicon River and the lower portion of the Middle Fork American River below Middle Fork Interbay. These transition zones result from natural warming of the water along the length of the river reaches and are consistent with the beneficial uses designated for these streams in the Basin Plan (CVRWQCB 1994).

BA/BE Tables 28a and 28b show the river mile where the July–August 17°C (FYLF lower optimum temperature³) transition and the 20°C (trout upper temperature [Hokanson et al. 1977]) transition occur in critical, dry, and below normal water year types. These are the water year types that are most sensitive to MIF temperature alterations due to lower accretion flows (AQ 4 – TSR [PCWA 2011bb; SD B] for a discussion of modeling methods/documentation). The 17°C water temperature

³ Water temperature identified by FYLF experts, Dr. Amy Lind, USDA-FS and Dr. Sarah Yarnell, Cardno ENTRIX, as the approximate lower optimum summer (July through August) water temperature range for FYLF, which also corresponds approximately to the upstream distribution of FYLF in the Rubicon River and the Middle Fork American River.

transition location was the approximate upstream location of the FYLF distribution in the lower portion of the Rubicon River and the lower portion of the Middle Fork American River below Middle Fork Interbay in 2007 (Exhibit E – Section 7.5.9).

5.3.2.2 Riverine Aquatic Community

To assess the condition of the general aquatic community, technical studies were completed to characterize (1) algae, (2) BMIs, and (3) productivity and habitat diversity. The key findings from these studies are summarized below.

Algae

PCWA collected algae samples to identify whether *Didymosphenia geminata*, a nuisance algae species, was present in the study area and to document the abundance of algae. Algae samples were collected at each instream flow study site, at two comparison stream study sites (North Fork American River, South Fork Long Canyon Creek above the diversion), and at a study site at the top of the peaking reach (14 study sites total) (AQ 1 – TSR Appendix H, Table H-1 [PCWA 2011y; SD B]). Algae was assessed during late summer by using photographs and the field-based rapid periphyton survey protocol detailed in the Environmental Protection Agencies' Rapid Bioassessment Protocol For Use in Streams and Wadeable Rivers (Barbour et al. 1999).

Based on the summer algae abundance surveys, algae coverage was sparse at most of the instream flow sites (see photographs in AQ 1 – TSR Appendix H, Attachment A [PCWA 2011y; SD B]) but was relatively dense in the top of the peaking reach. Cumulative filamentous macroalgae and microalgae coverage ranged from a low of 10.7% at the Rubicon River near Ellicott Bridge (R20.9) to a high of 85.5% at Middle Fork American River below Ralston Afterbay (MF23.5) (AQ 1 – TSR Appendix H, Table H-2 [PCWA 2011y; SD B]).

D. geminata was found throughout the study area. The only streams/rivers where *D. geminata* was not documented were North Fork Long Canyon Creek and the North Fork American River (AQ 1 – TSR Appendix H, Table H-1 [PCWA 2011y; SD B]).

Benthic Macroinvertebrates

The streams and rivers associated with the MFP support diverse communities of BMIs (AQ 3 – TSR [PCWA 2011aa; SD B]). BMIs were sampled at 21 representative study sites, including unimpaired comparison rivers, using two survey methods: (1) Surface Water Ambient Monitoring Program (SWAMP) (Ode 2007) at 14 sites or (2) California Stream Bioassessment Procedure (CSBP) (CDFG 2003) at 7 sites. The CSBP surveys were conducted at the 7 sites to enable comparison with historical surveys. The macroinvertebrates in the bypass and peaking reaches were analyzed using two approaches: (1) a multimetric index of biotic integrity (IBI) for streams and rivers influenced by hydropower projects developed by Rehn (2008) and (2) a comparison of specific metrics to compare with historical (2001–2006) BMI data at certain sites (AQ 3 – TSR [PCWA 2011aa; SD B]).

Overall no difference in the IBI or the individual BMI metrics was observable at the study sites related to MFP operations or facilities, except at the study sites in the top of the peaking reach immediately below Ralston Afterbay/Oxbow Powerhouse. The key findings from the study are summarized below:

- In combination, the hydropower IBI and individual metric scores indicated lower biological conditions at the top of the Middle Fork American River peaking reach immediately below Ralston Afterbay Dam (MF24.4) and immediately below Oxbow Powerhouse (MF23.6), compared to the adjacent sites on bypass rivers (Rubicon and Middle Fork American rivers) and comparison sites (North Fork American and North Fork of the Middle Fork American rivers). Fewer intolerant EPT taxa, more high-tolerance individuals, and lower taxa richness were found.
- In the peaking reach, excluding the two sites at the top of the reach, biological conditions (IBI and individual scores) were similar to those in nonpeaking comparison sites (unimpaired comparison rivers and the Middle Fork American River and Rubicon River immediately upstream of Ralston Afterbay) (some variability occurred depending on the individual metric examined).
- Hydropower IBI scores were higher (indicating better biological conditions) at the higher elevation, colder water sampling sites in the MFP study area than at the lower elevation, warmer water sampling sites, suggesting that the hydropower IBI was correlated with elevation and water temperature.
- Hydropower IBI scores downstream of French Meadows and Hell Hole reservoirs were relatively high and within the range of those observed in unimpaired river reaches above hydropower reservoirs by Rehn (2008).
- The hydropower IBI scores for the sampling sites both above and below the diversions on South Fork Long Canyon and Duncan creeks were above the median hydropower IBI scores for streams located upstream of dams and diversions evaluated by Rehn (2008) (AQ 3 – TSR, Appendix D [PCWA 2011aa; SD B]).
- Repeated annual sampling results from above and below Duncan Creek Diversion did not indicate a consistent difference in hydropower IBI scores.

Productivity and Habitat Diversity

The methods used to characterize productivity and habitat diversity include wetted perimeter, spatial niche habitat, and effective habitat (for fluctuating flows in the peaking reach).

WETTED PERIMETER

Wetted perimeter and wetted bed versus flow relationships, useful for evaluating potential effects of flow regimes on productivity (algae and benthos), were relatively

monotonic in their rate of increase in wetted perimeter with flow in the bypass and peaking reaches. The rate of increase in wetted perimeter with increased flow was greatest at the lowest flows and least at the highest flows. However, the relationships typically did not have distinct inflection points (distinct breaks) where an increase in flow exhibited an obvious change in the wetted perimeter relationship. Plots showing these relationships are available in Exhibit E – Appendix B2 (also see AQ 1 – TSR, Appendix M [PCWA 2011y; SD B]).

SPATIAL NICHE HABITAT

Physical habitat (niche) utilization for different species and life stages is summarized in BA/BE Table 29. The spatial niche habitat versus flow relationships for each of the instream flow study sites are found in Exhibit E – Appendix B2. In the small streams, shallow water habitat was the dominant niche over a wide range of flows, while moderately deep water niche habitat was dominant in the large rivers. The diversity of spatial niche habitat types was least at low flow and generally greatest at intermediate flows. At low flow, shallow and/or slow velocity habitat was dominant at each of the study sites. As flows increased, deeper and faster water niches increased as a relative percentage of the total amount of habitat. At the highest flow, deep/fast water became the dominant habitat type. Generally, the diversity of habitat is positively related to the diversity of fish species and life stages in rivers. Several investigators have shown that species and life-stage diversity is directly related to stream hydraulics and the spatial diversity and stability of habitat (e.g., Gorman and Karr 1978; Statzner and Higler 1986; Schlosser 1987; Bain et al. 1988; Allan 1995; Bowen et al. 1998).

EFFECTIVE HABITAT (FLUCTUATING FLOWS IN THE PEAKING REACH)

Flow fluctuations related to hydroelectric generation peaking have the potential to reduce overall productivity of rivers (Morgan et al. 1991; Cushman 1985; Gislason 1985; Moog 1993; Bain 2009) and to affect the diversity of aquatic species and/or abundance of juvenile life stages (especially shallow, slow water species and life stages) (Bain et al. 1988; Kinsolving and Bain 1993; Scheidegger and Bain 1995; Bain 2009). Many aquatic species have specific habitat requirements and limited mobility (e.g., Edington 1968) and daily flow fluctuations modify the location and amount of habitat (depths and velocities and/or location of the channel margin), thereby, decreasing overall habitat quality and availability.

The effective habitat flow matrix tables and associated plots are presented in Exhibit E – Appendix B2 (also see AQ 1 – TSR, Appendix M [PCWA 2011y; SD B]) for the peaking reach study sites (MF4.8 and MF14.1). The effective habitat matrix results show that for low mobility species/life stages, such as macroinvertebrates (food production), changes in flow cause a large reduction in habitat. Figures 43 and 50 in Appendix B2. For example, at Fords Bar (MF14.1) the amount of food production habitat available at 1018 cfs would be reduced by 56% if flows fluctuate down to approximately 100 cfs (107,696 to 47,017 feet²/1000 feet). Under this same scenario, the food production habitat at Buckeye Bar (MF4.8) would be reduced by 69% (90,811 to 28,151 feet²/1000 feet).

The effective habitat results for fish and FYLF are discussed in the Section 6.2 – Effects on Aquatic Species and Habitats. Generally, the species/life stages with narrowest range of depth and velocity requirements (e.g., FYLF egg masses and tadpoles) shows a greater reduction in habitat with changing flow than species/life stages with broader depth and velocity habitat requirements (e.g., macroinvertebrate food production).

5.3.2.3 Reservoir Aquatic Environment

Hardhead are known to occur in Ralston Afterbay (coldwater reservoir), which has a maximum active storage of 1,804 ac-ft (76.8 surface acres), and a maximum depth of 79 feet (maximum operation elevation to streambed). Ralston Afterbay acts as both a forebay and afterbay for upstream and downstream powerhouses.

Ralston Afterbay does not have seasonal fill and release patterns like Hell Hole or French Meadows reservoirs. Ralston Afterbay WSEs are variable due to variable powerhouse inflows and outflows and, to some extent, accretion inflows. WSEs typically range from 1169 to 1175 feet elevation (6 feet variation). During each fall for annual maintenance and inspection, and occasionally to facilitate sediment management activities, this reservoir is drawn down at least to the level of the bottom of the spill gates (Exhibit E – Section 7.7).

Ralston Afterbay was relatively cold with high oxygen concentrations (AQ 8 – TSR [PCWA 2011dd; SD B]). Cold water inflows from Ralston Powerhouse are the dominate factor affecting water temperature in Ralston Afterbay during the summer and fall. Temperature stratification of the reservoir was very weak, likely due to the relatively short residence time for water. Water temperature ranged from about 48–53°F at the bottom of the reservoir to a maximum at the water surface of about 66°F (range 53–66°F). In the top 6–14 feet of the reservoir a 5–15°F linear warming profile (bottom to top) was often found during the summer; however, some sampling dates had very little warming of the surface layer. Dissolved oxygen concentrations were always greater than 7 mg/L (Basin Plan objective [CVRWQCB 1994]). Dissolved oxygen concentration was the lowest at the surface and highest at the bottom of the reservoir (up to about 11 mg/L), inversely related to observed water temperatures.

5.3.2.4 Hardhead

This section provides information on hardhead populations in the MFP, including (1) distribution, (2) growth/condition/abundance, (3) bypass reach habitat, and (4) peaking reach habitat. Refer to BA/BE Table 29 for species and life-stage periodicities for hardhead.

Distribution and Abundance

The pattern of hardhead distribution in the study area is primarily indicative of water temperature (Exhibit E – Section 7.5, Figure 7.5-2; and BA/BE Map 8) and fish barriers (Exhibit E – Section 7.5.8.2, Fish Passage Barriers). Hardhead were patchily distributed (Exhibit E – Section 7.5, Figure 7.5-2) and only observed in a few locations. The majority of the hardhead were found in Ralston Afterbay and the Middle Fork

American and Rubicon rivers immediately upstream of Ralston Afterbay. Hardhead were rare in the peaking reach (Exhibit E – Section 7.5, Table 7.5-5). In the comparison rivers, hardhead distribution was also patchy.

Many natural and human-made fish barriers unrelated to the MFP (e.g., Tunnel Chute) were present throughout the peaking and bypass reaches (BA/BE Map 9) (also see AQ 6 – TSR [PCWA 2011cc; SD B]). Barriers to upstream movement were frequent in nearly all river reaches; little opportunity existed for fish to move long distances upstream in the bypass reaches due to the presence of barriers. MFP facilities (four large dams, three small diversion structures, one tunnel stream crossing, one road crossing, three gage weirs) created additional barriers to upstream fish movement. However, these barriers were located in reaches that contain natural barriers and typically did not preclude fish from accessing large sections of river due to the nearby presence of natural and non-Project barriers.

Natural barriers limit the upstream distribution of hardhead in the Middle Fork American and Rubicon rivers. The upstream limit to hardhead distribution on the Middle Fork American River was a large natural barrier complex 0.5 miles above Ralston Afterbay. The upstream limit to their distribution on the Rubicon River above Ralston Afterbay was a series of natural barriers along several miles of river (River Miles [RM] 3.4 to RM8.2). The hardhead distribution ended at a natural waterfall at RM 6.0.

Natural barriers in the tributaries to the bypass and peaking reaches limit the ability of fish to utilize these streams. Nearly all of the tributaries to the bypass and peaking reaches had natural barriers very near their confluence that precluded upstream fish movement into the tributaries (16 of the 18 evaluated). Two tributaries to the peaking reach provided accessible habitat for fish: North Fork of the Middle Fork American River and Otter Creek (approximately the lower 1.5 miles of Otter Creek). MFP operations did not affect access to the bypass and peaking reach tributary streams (the only exception was a potential critical riffle temporary barrier at the Otter Creek confluence when flows were very low in Otter Creek and daily peaking flow in the peaking reach was low).

Growth and Condition

Few adult hardhead were observed or captured during studies for the relicensing (AQ 2 – TSR [PCWA 2011z; SD B]). Hardhead ranged in size from 35–471 millimeters. The largest fish were collected from Ralston Afterbay. Based on the literature (Moyle 2002), it appears that hardhead mainly spawn in April and May, but spawning may extend into August.

Bypass Reach Habitat

The habitat versus flow relationships and habitat time series analyses for hardhead (juvenile and adult) are summarized below. Plots and tables of weighted usable area (WUA) and percent of maximum WUA are presented for each study site in Appendix B2. Detailed presentation of the material is provided in the AQ 1 – TSR (PCWA 2011y; SD B).

HABITAT VERSUS FLOW

Species and life stages with the highest habitat versus flow relationships, in descending order, were typically adult rainbow trout, rainbow trout spawning, adult hardhead and Sacramento pikeminnow, juvenile rainbow trout, juvenile hardhead, pikeminnow of fry, and FYLF egg masses and tadpoles.

The amount of spawning habitat in the bypass reaches where hardhead are known to occur ranged from 42–93% of the maximum habitat under unimpaired flows depending on water year type (based on using the accretion approach).

HABITAT TIME SERIES

Extensive time series analyses of impaired and unimpaired flow conditions were used to provide an estimate of the difference between existing habitat (impaired) and the natural habitat potential (unimpaired) in the streams/rivers associated with the MFP. The data and detailed discussion are presented in AQ 1 – TSR (PCWA 2011y; SD B). A summary of the results is provided below.

In the Middle Fork American River bypass reach (Middle Fork Interbay to Ralston Afterbay), the impaired flow hardhead habitat was, in general, equal to or greater than unimpaired flow habitat conditions. This condition is in part due to augmented summer base flows required in the current FERC License minimum flow releases compared to the historical unimpaired flows. The results in the lower Rubicon River produced a pattern similar to that in the Middle Fork American River bypass reaches. Impaired habitat was equal to or greater than unimpaired habitat, again, in part, due to the current FERC License minimum flows being greater than unimpaired base flows.

Peaking Reach Habitat

Habitat bypass flow relationships were not developed for hardhead in the peaking reach due to their low abundance. Information on fish stranding resulting from fluctuations in flows in the peaking reach is provided below.

EMPIRICAL STRANDING EVALUATION

During the peaking flow stranding study conducted on June 5th, 2008, a total distance of 2.1 miles of the peaking reach was surveyed immediately after cessation of a daily peaking event of 900 cfs (900 cfs down to approximately 100 cfs) (AQ 1 – TSR [PCWA 2011y; SD B]). The areas surveyed represent areas with a high potential for stranding, characterized by large bar features with varying topography (e.g., low-lying or backwater areas) and relatively shallow slopes. One dead sculpin was observed stranded in the Fords Bar study area and approximately 289 live fish were observed temporally trapped (isolated) in disconnected pools in the Gray Eagle Bar – American Bar study area (Exhibit E – Section 7.5, Maps 7.5-6a–b and Table 7.5-9). No fish were observed that were permanently trapped. The majority of fish temporarily trapped (approximately 250 fish) were located in a dredge hole developed by recent mining activities. Temporarily trapped/isolated fish consisted of a mix of species (trout fry,

California roach, hardhead, Sacramento pikeminnow, and sculpin) that were found swimming in pool areas isolated from the main channel. It was estimated that the trapped fish would survive until another peaking event inundated the habitat. The trapping pools were very near to the active channel, and in most cases had some flow-through or were at groundwater level (i.e., had subsurface hydraulic connectivity to the main channel) (see photographs in Exhibit E – Appendix F, Attachment A; and AQ 1 – TSR [PCWA 2011y; SD B]).

5.3.2.5 Foothill Yellow-Legged Frog

This section provides information on existing FYLF populations in the vicinity of the MFP, including (1) distribution and abundance, (2) breeding timing, and (3) bypass and peaking reach habitat. Refer to BA/BE Table 29 for species and life-stage periodicities for FYLF.

Distribution and Abundance

Surveys for FYLF were conducted in spring and/or late summer and early fall along the bypass, peaking, and comparison reaches and their tributaries (total of 30 study sites) to document the distribution and abundance of FYLF (BA/BE Map 10). All of the surveys, except incidental one-time site visits followed the *Visual Encounter Protocol described in Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians* (Heyer et al. 1994). The study sites and survey methods are detailed in the AQ 12 –TSR (PCWA 2011ff; SD B). The following summarizes the findings.

FYLF were dispersed widely throughout the study area in varying densities depending on stream size, flow regulation, and water temperatures (BA/BE Map 11). Abundance was highest in the downstream reaches of the Rubicon River and in comparison reaches and tributaries. Abundance was low in the Middle Fork American River bypass reach upstream of Ralston Afterbay, and individuals were observed rarely in the Middle Fork American River peaking reach. No individuals were observed above approximately 1,800 feet in elevation on the Middle Fork American River, 3,350 feet elevation on the Rubicon River, and above 1,550 feet elevation on Long Canyon Creek (near the Long Canyon Creek confluence with the Rubicon River).

In the study area, breeding was observed in the lower portions of the Rubicon River and Middle Fork American River bypass reaches, in four lower elevation tributaries to the peaking reach (American Canyon Creek, Gas Canyon Creek, Todd Creek, and Otter Creek), and in the comparison river reaches (BA/BE Map 12). No egg masses were observed in the mainstream of the Middle Fork American River peaking reach. Fall surveys results for adult, young-of-the-year, and tadpoles generally reflected the egg mass distribution with the highest number of observed tadpoles and young-of-the-year in the Rubicon River, peaking reach tributaries, and at comparison sites (BA/BE Map 11).

The density of egg masses at breeding locations, a common index of FYLF population size, varied by river reach (BA/BE Map 12). The Rubicon River bypass reach had the

highest density of egg masses (19 egg masses/km in the three lower sites) and the Middle Fork American River bypass reach had one of the lowest densities of egg masses (2 egg masses/kilometer [km]). The tributaries along the peaking reach (Todd Creek, Gas Canyon and Otter Creek) had moderate egg mass densities (average of 9 egg masses/km). Two of the unregulated comparison sites, Shirttail Creek and the upper site on the North Fork of the Middle Fork American River, had high egg mass densities similar to the lower Rubicon River of 17 egg masses/km and 14 egg masses/km, respectively. Two of the comparison survey sites, North Fork of the Middle Fork American River near the confluence with the Middle Fork American River and the mainstem of the North Fork American River near Shirttail Creek, had low egg mass densities (3 egg masses/km and 2 egg masses/km, respectively).

Breeding Timing

The timing of FYLF breeding is largely dependent on spring flows and water temperatures. Observations in the bypass and peaking reaches have shown that breeding season can extend from early May to mid-June. In the Rubicon River breeding was observed from early to mid-May in 2007, 2008, and 2009 (AQ 12 – TSR [PCWA 2011ff; SD B], AQ 1 – TSR [PCWA 2011y; SD B], personal communication with S. Yarnell 2010). In 2010, oviposition was delayed until mid-June, likely due to a relatively wet and cold spring (personal communication with S. Yarnell 2010). In the Middle Fork American River upstream of Ralston Afterbay breeding was observed in the last week of May and early June in 2007–2010. In tributaries to the peaking reach where FYLF breeding was observed (American Canyon Creek, Gas Canyon Creek, Todd Creek, Slug Gulch, Otter Creek, and the North Fork of the Middle Fork American River) breeding began from early to mid-May (AQ 12 – TSR [PCWA 2011ff; SD B], personal communication with R. Peek).

Bypass and Peaking Reach Habitat

Most of the perennial streams and rivers associated with the MFP below 4,500 feet in elevation provided suitable geomorphic habitat for one or more life stages of the FYLF. Adults in particular are adaptable and can use most types of stream habitat for foraging or refuge provided it has perennial or even occasionally ephemeral flow. Notable exceptions are large instream reservoirs that likely prohibit movement and contain large predatory fish. For a population to persist, however, adults must live in proximity, likely less than several km (R. Bourke, unpublished data), to suitable breeding and rearing habitat.

Suitable geomorphic breeding and rearing habitat were available in many of the study streams; however, it was limited in the upper Middle Fork American River, Duncan Creek, lower Long Canyon Creek, and some of the tributary streams due to confined channel conditions and high stream gradients. BA/BE Map 12 shows the distribution of suitable, limited, and unsuitable breeding and rearing habitats across the study area based on geomorphic channel characteristics.

Nonnative bullfrogs and smallmouth bass, potential predators of FYLF, were only observed in the comparison river study site in the lower North Fork American River upstream and downstream of Lake Clementine. This reach was the warmest in the study area. Bullfrogs and smallmouth bass were not observed in the cooler river reaches associated with the MFP. These predatory species may be a factor in the apparent absence of FYLF below Lake Clementine (not a part of the MFP). In the bypass and peaking reaches associated with the MFP, nonnative brown trout and crayfish were observed at several locations. Native aquatic garter snakes, a known predator of FYLF, were present throughout the study area. The presence of native and nonnative predators may limit reproductive success for FYLF and, thus, may decrease the quality of suitable breeding and rearing habitat in the study area, but the magnitude or importance of the relationship is uncertain.

Cold water temperatures and fluctuating flows can limit the suitability of breeding and rearing habitat (Jones et al. 2005; Kupferberg et al. 2007) of FYLF. Cold water temperatures (e.g., <60°F during summer) were observed in the upper portion of the following reaches: Middle Fork American River downstream of French Meadows Reservoir, Middle Fork American River downstream of Middle Fork Interbay, Middle Fork American River downstream of Ralston Afterbay, and in the upper one-third of Rubicon River downstream of Hell Hole Reservoir. Fluctuating late spring and summer flows were observed in the peaking reach of the Middle Fork American River downstream of Oxbow Powerhouse.

HABITAT VERSUS FLOW

Aquatic habitat for FYLF was characterized as a function of flow at two study sites where FYLF populations were found in the bypass reaches (MF26.2 and R3.5) and the two peaking reach study sites (MF14.1 and MF4.8) (AQ 1 – TSR [PCWA 2011y; SD B]). Specifically, standard WUA versus flow relationships were developed for FYLF egg masses and tadpoles using the univariate HSC. The results show that for both breeding and tadpoles the greatest amount of habitat occurs at low flows (Exhibit E – Appendix B2) when the most slow, shallow habitat is available.

The WUA relationships were also combined with hydrology (1975–2007 impaired and unimpaired flow conditions) at the FYLF study sites to develop habitat time series plots and habitat exceedance plots. Time series plots for FYLF for each site by water year type are provided in the AQ 1 – TSR, Appendix N (PCWA 2011y; SD B).

Both egg masses and tadpoles are sensitive to fluctuating flow events (e.g., releases or spills). Reservoir spills or sudden high-flow events have the potential to disrupt breeding, destroy egg masses, and flush tadpoles downstream. Additionally, a rapid decrease in flow has the potential to dewater egg masses and tadpoles. The effective habitat under fluctuating flows was quantified and summarized in the AQ 1 – TSR (PCWA 2011y; SD B).

Based on the FYLF effective habitat matrices (Exhibit E – Appendix B2; Figures 41, 42, 48, and 49) a relatively narrow range of flow fluctuations would be required in the

peaking reach to maintain breeding or tadpole habitat. For example, at MF4.8 a flow change from 1018 to 407 cfs would reduce the initial FYLF breeding habitat available by 83% (5202 to 895 feet²/1000 feet). Under this same scenario, breeding habitat at Fords Bar (MF14.1) would be reduced by 86% (2451 to 351 feet²/1000 feet). If flow changed from 1018 to approximately 100 cfs, only about 1–3% of the breeding habitat would remain. However, the cold water temperatures in the peaking reach alone may be sufficient to preclude FYLF.

5.3.2.6 Western Pond Turtle

Eight WPT turtles were observed during the 2007 CRLF, FYLF, and fish population surveys (AQ 12 – TSR [PCWA 2011ff; SD B]). Six of these observations were in the Middle Fork American River or tributaries downstream of Ralston Afterbay (peaking reach) and two were in the North Fork American River (comparison river not affected by the MFP). Two hatchlings were observed in Otter Creek (tributary to the peaking reach), while the remaining individuals were adults.

Several off-channel pond and wetland habitats were identified during CRLF site assessment survey and protocol level surveys (AQ 12 – TSR [PCWA 2011ff and 2011gg; SD B]). WPT were documented in some of the surveyed ponds located at Horseshoe Bar on the Middle Fork American River.

BA/BE Map 13 shows the locations of the 2007 WPT sightings and the historical WPT sightings in the study area. In addition to the WPT observations downstream of Ralston Afterbay in the peaking reach and in the Horseshoe Bar ponds (see above), WPT also were observed historically in a pond in Wallace Canyon (a tributary to Long Canyon Creek).

GIS and field mapping of potential WPT nesting habitat at the Project reservoirs and along bypass and peaking reaches found the following (AQ 12 – TSR [PCWA 2011ff; SD B]):

- Due to steep slopes, vegetation, and rocky soils, the amount of WPT nesting habitat on the Project reservoirs was very limited.
- Along the bypass and peaking river reaches locations of potential WPT nesting habitat (appropriate slope and aspect characteristics) are abundant.

5.3.3 Birds

Three FSS raptors are known to forage and nest in the vicinity of the MFP. Each of these is described below.

Bald Eagle

Bald eagle (*Haliaeetus leucocephalus* [FSS, FD, SE, CFP]) is the only federal or state listed wildlife species known to occur in the MFP vicinity. Project reservoirs and bypass and peaking reaches associated with the MFP provide aquatic foraging habitat for bald

eagles. Large trees provide potential nesting or roosting structures. Bald eagles were observed in flight at Hell Hole Reservoir and at several locations along the Middle Fork American River and the Rubicon River. One active bald eagle nest is present near the confluence of Rubicon River and Hell Hole Reservoir. Refer to Figure 7.6-1 for an overview of bald eagle breeding chronology and sensitivity to human activities. Three bald eagle winter night roosts are present along the shoreline of Hell Hole Reservoir. Detailed bald eagle life history and habitat information is included in the BA/BE Appendix B. Refer to the TERR 5 – TSR (PCWA 2011kk; SD B) for detailed survey methods and results. BA/BE Table 30 and BA/BE Map 16 provide the location of bald eagle roosts and nests in relation to Project facilities and features, Project recreation facilities and features, and proposed new facilities.

Following the delisting of bald eagles by USFWS on June 28, 2007, USFWS issued the National Bald Eagle Management Guidelines (USFWS 2007) to provide recommendations for protection of bald eagles on private and public lands. These guidelines recommend that certain activities be restricted within 660 feet of bald eagle nests, and also recommend modifying activities in the vicinity of bald eagle roosts. In addition, during the development of the BEMP (PCWA 2011k; SD A) for the MFP, resource agencies requested that a 0.25-mile-activity buffer around the bald eagle nest be used for Project impact analyses. The bald eagle nest and roosts are located within 0.25 mile only one MFP Project facility, Hell Hole Reservoir. All other facilities are located more than 0.25 mile from the nest and roosts.

Northern Goshawk

The USDA-FS has designated PACs for northern goshawk (FSS, CSC) in mixed conifer forests in the vicinity of the MFP. Forest habitat for northern goshawks is characterized by trees in the dominant and co-dominant crown classes averaging at least 24-inches dbh and at least 70% tree canopy cover.

USDA-FS has defined desired conditions for northern goshawk PACs based on the SNFPA – Final Supplemental Environmental Impact Statement (USDA-FS 2004). PACs are designated surrounding all known and newly discovered northern goshawk breeding territories on national forest lands based on the location of the most recently documented nest site and the location(s) of alternate nests. If the actual nest site is not located, the PAC designation is based on the location of territorial adult birds or recently fledged juvenile goshawks during the fledgling dependency period (USDA-FS 2004). In addition, USDA-FS desired conditions state that the PAC should include either “the best available 200-acres of forested habitat in the largest continuous patches, or the largest possible patches of habitat within 0.5 mile of one another.”

A description of northern goshawks including preferred habitat and life history, is included in the BA/BE Appendix B. Refer to the TERR 4 – TSR (PCWA 2011jj; SD B) for detailed survey methods and results. BA/BE Table 30 and BA/BE Map 14 provide the location of northern goshawk PACs and nests in relation to Project facilities and features, Project recreation facilities and features, and proposed new facilities.

California Spotted Owl

The USDA-FS has identified PACs and Home Range Core Area (HRCAs) for California spotted owl in mixed conifer forests in the vicinity of the MFP. Forest habitat for California spotted owl is characterized by two or more tree canopy layers; trees in the dominant and co-dominant crown classes averaging 24-inches dbh or greater; and at least 70% tree canopy cover (including hardwoods).

USDA-FS has defined desired conditions for California spotted owl PACs based on the SNFPA – Final Supplemental Environmental Impact Statement (USDA-FS 2004). PACs for California spotted owl in national forest lands are based on one of the following: the location of the most recent documented nest site or the most recent known roost site when a nest location remains unknown, or a central point based on repeated daytime detections, when neither nest or roost locations are known (USDA-FS 2004). Aerial photography interpretation and field verification are used as needed to delineate PACs. In addition, USDA-FS desired conditions state that each PAC should encompass “the best available 300 acres of habitat in as compact a unit as possible.”

In addition to PACs, HRCAs were established surrounding each California spotted owl activity center detected after 1986. The size of the HRCA is calculated as 20% of the area of the sum of average breeding pair home range size (for each forest) plus one standard error. The HRCA includes the PAC as well as the best available California spotted owl habitat in the closest proximity (within 1.5 miles) to the activity center (USDA-FS 2004).

A description of California spotted owls, including preferred habitat and life history, is included in the BA/BE Appendix B. Refer to TERR 4 – TSR (PCWA 2011jj; SD B) for detailed survey methods and results. BA/BE Table 30 and BA/BE Map 16 provide the location of PACs, HRCAs, and nests in relation to Project facilities and features, Project recreation facilities and features, and proposed new facilities.

5.3.4 Mammals

5.3.4.1 Bats

Three FSS bat species are known to forage in the vicinity of the MFP. Each of these is described below.

Pallid Bat

No pallid bat roosts are located in Project facilities and features. Potential roosting habitat in the MFP includes cliffs, caves, and rock crevices. Pallid bats were documented foraging over water at Project reservoirs and diversion pools during MFP relicensing studies, including French Meadows Reservoir, Middle Fork Interbay, Ralston Afterbay, and at North Fork Long Canyon Creek Diversion Pool. In addition, data from Clevenger’s 2003 study includes occurrences of this species in the vicinity of French Meadows Reservoir and on Duncan Creek upstream of the Duncan Creek Diversion (Clevenger 2005). Refer to BA/BE Map 4a–b for the location of special-status bat

detections in the MFP. Pallid bats are a year-long resident throughout most of their range.

Townsend's Western Big-Eared Bat

No Townsend's western big-eared bat roosts are located in Project facilities and features. Potential roosting habitat in the MFP includes human-made structures such as mines and buildings. Townsend's western big-eared bats were detected foraging over water during MFP relicensing studies at French Meadows Reservoir, Hell Hole Reservoir, Ralston Afterbay, and North Fork Long Canyon Creek Diversion Pool. Refer to BA/BE Map 4a–b for the location of special-status bat detections in the MFP. Townsend's western big-eared bats are a year-round resident throughout their range. However, this species typically hibernates from October through April.

Western Red Bat

No western red bat roosts are located in Project facilities and features. Potential roosting habitat is present in forested areas throughout the MFP. During MFP relicensing studies, western red bats were documented foraging over water at French Meadows Reservoir, Hell Hole Reservoir, Middle Fork Interbay, Ralston Afterbay, and North and South Fork Long Canyon Creek diversion pools. Refer to BA/BE Map 4a–b for the location of special-status bat detections in the MFP. Western red bats are a migratory species, and are likely absent from the MFP September through March.

5.3.4.2 Mesocarnivores

Two FSS mesocarnivores were identified as potentially occurring in the vicinity of the MFP. Each of these are described below.

California Wolverine

The MFP is within the historic range of California wolverine. However, this species is extremely rare in California. A single individual has been documented in the TNF since 2008. However, genetic tests have shown this individual is not of the subspecies *luteus*, but is related to wolverine populations in the western Rocky Mountains (Moriarty et al. 2009). Refer to BA/BE Map 4a–b for the historic location of special-status mesocarnivore detections in the vicinity of the MFP.

American (Sierra) Marten

The MFP is within the known geographic and elevational range of this species. A CNDDB report for this species includes portions of Duncan Creek Diversion Road. Refer to BA/BE Map 4a–b for the location of special-status mesocarnivore detections in the vicinity of the MFP.

The USDA-FS has delineated 100-acre buffer areas around verified American martin natal and maternal dens, consisting of the highest quality habitat in a compact arrangement surrounding the den site. Highest quality habitat is defined as a

multistoried forest with the dominant layer composed of large (<24-inch dbh) conifer trees, and a canopy cover closure of at least 60%. In addition, USDA-FS desired conditions state that areas surrounding marten den sites should have at least two conifers per acre greater than 24 inches dbh with suitable denning cavities, more than 10 tons per acre of coarse woody debris in decay classes 1 and 2, and an average of six snags per acre on the westside Sierra Nevada, and three per acre on the eastern side.

TNF biologists report that the TNF currently has no American marten den sites within the Watershed (Triggs, pers. comm., 2006).

6.0 EFFECTS OF PROPOSED ACTION AND MANAGEMENT RECOMMENDATIONS

This section provides an analysis of potential effects of the Proposed Action. Evaluation of potential environmental effects from implementation of the Proposed Action compared to the No-Action Alternative involved a three step process. The first step was to identify changes in MFP operations, maintenance, non-routine recreation facility activities, and facilities under the Proposed Action. These elements are summarized in BA/BE Figure 22 and described in Section 4.2 – Proposed Action.

The second step in the evaluation process was to identify the effect of these changes under the Proposed Action on the physical and biological environment (Resulting Conditions). Examples of resulting conditions include modified instream flows and reservoir WSEs, changes in habitat/physical environment, loss or disturbance of resources, changes in facility footprint, or increases in Project activities.

The third step was to determine potential effects on federal listed and candidate species, and FSS species. The analysis of potential effects in this section is grouped to include similar taxa (e.g., special-status plants, special-status bats, or special-status mesocarnivores) for which habitat use and impacts are also similar. The final effects determination for each resource area considers avoidance, protection, and enhancement measures included in management and monitoring plans (Exhibit E – SDA) and described in construction activities and concept designs (BA/BE Appendix C).

Some of the analysis of potential effects to resources from changes in Project operations under the Proposed Action required detailed modeling. The following describes the modeling analytical approach.

Changes in Project operations may affect streamflow in the bypass and peaking reaches, WSEs in Project reservoirs, current and future consumptive water supply deliveries, and hydroelectric power generation. To analyze these combined effects, PCWA developed the Middle Fork Project Operations Simulation Model (Model) (Exhibit E – Appendix C1). The Model was developed by PCWA in close coordination with the MFP Model Technical Team Subgroup, which was composed of representatives from CDFG, the State Water Board, and the USDA-FS. The Model includes a daily time step for analyzing WSEs in Project reservoirs, streamflows in the bypass and peaking reaches, and power generation. In addition, the Model includes an hourly time step for the peaking reach to more accurately analyze effects of daily peaking operations.

The Model uses inflow data over a 33-year period from 1975 to 2007, which encompasses the wettest and driest years on record in the Watershed). The inflow data were calculated based on historic hydrology records. The Rubicon River Watershed inflow includes flows impaired by SMUD's Upper American River Project (UARP) diversions. The Model accounts for accretion flows along the bypass and peaking reaches allowing for detailed longitudinal comparison of resulting flows. The Model run

outputs (results) and the historic empirical hydrology were used to compare resource effects between the No-Action Alternative and the Proposed Action.

The hydrology used to represent the No-Action Alternative in almost all the effects analyses was the historical impaired hydrology in the bypass and peaking reaches and reservoirs (1975 to 2007), referred to as the No-Action Alternative or the No-Action Alternative – Impaired Hydrology. The No-Action Alternative includes continued operations of the MFP with the existing Project facilities; existing FERC license conditions, operating agreements, and water rights; and current consumptive water demand (42,000 ac-ft).

Historical MFP operations, however, have changed over time (1975 to 2007) based on changes in consumptive water demand, power demands, facility upgrades, and routine maintenance activities. Therefore, in some locations the historical empirical hydrology does not accurately represent current operations of the MFP under the current license conditions. For example, (1) historic reservoir elevations were the result of much lower water demand than exists currently, and (2) historic diversions in the small streams were reduced due to debris buildup at the intakes or to prevent turbine damage from rocks during high-flow events. Planned screen/intake modifications will alleviate the small diversion issues in the future under the No-Action Alternative allowing unimpeded (full) diversion up to the existing water rights and FERC license conditions.

An additional model run was developed to more accurately reflect current and future operations of the MFP under the No-Action Alternative (existing FERC license conditions) in Hell Hole and French Meadows reservoirs (WSEs) and in the bypass reaches downstream of the small diversion dams. This model run is referred to as the No-Action Alternative – Existing License Conditions. The model run included unimpeded diversion rates at the small diversion and uses modeling parameters in the reservoirs that approximate current operations (e.g., total reservoir carryover target of 142,000 ac-ft on December 31, approximate water balancing between reservoirs, 30-day annual maintenance outage period in October).

The hydrology used to represent the Proposed Action in almost all the effects analyses includes an operations model run of the MFP with modified/new Project facilities; new IFRMs; existing operating agreements and contracts; an additional water right (i.e., Hell Hole Reservoir Seasonal Storage Increase Improvement requires a new nonconsumptive water right); and existing consumptive water demand (42,000 ac-ft/year). This model run is referred to as Proposed Action – Existing Demand.

A second model run of the Proposed Action was also developed that incorporates operations of the MFP with future consumptive water demand under full build-out (120,000 ac-ft/year). This model run is referred to as Proposed Action – Future Demand. The two Proposed Action model runs are very similar (almost indistinguishable) in terms of instream flows in the different water years in the bypass reaches. The primary difference of consequence between these model runs is the WSE in Hell Hole and French Meadows reservoirs in some water years. In the Proposed Action – Future Demand run, reservoir water levels are lower due to increased water

deliveries compared to the Proposed Action – Existing Demand. In the effects analysis, reservoir elevations at Hell Hole and French Meadows reservoirs under the No-Action Alternative – Existing License Conditions is compared to Proposed Action – Future Demand.

Provided below is an analysis of potential effects of the Proposed Action on special-status plants (Section 6.1), aquatic species (Section 6.2), raptors (Sections 6.3 and 6.4), and mammals (Sections 6.5 and 6.6).

6.1 EFFECTS ON PLANTS

No plants listed under the ESA have been identified in areas affected by operation and maintenance of the MFP. Therefore, the Proposed Action will have no effect on federally listed plant species.

Four FSS plants (Brandeggee's clarkia, Butte County fritillary, saw-toothed lewisia, and Stebbins' phacelia) have been documented in the vicinity of the MFP. Of these, only one species, Stebbins' phacelia, was documented during TERR 2 special-status plant surveys in the vicinity of Project facilities and features or Project recreation facilities and features where routine maintenance activities, non-routine recreation facility activities, modification of existing facilities, or construction of new facilities will be implemented. An analysis of the effect of potential effects of the Proposed Action on these populations of Stebbins' phacelia and habitat is provided in Section 6.1.1.

In addition, populations of all four plant species have been documented within approximately 200 feet of bypass rivers and streams and the peaking reach (CNDDDB 2010; USDA-FS 2006). These populations would not be affected by routine maintenance activities, non-routine recreation facility activities, modification of existing facilities, or construction of new facilities associated with the Proposed Action. However, these populations may potentially be affected by changes in operation of the MFP. Refer to Section 6.1.2 for a brief analysis of potential effects of operation of the MFP under the Proposed Action on FSS plants occurring along the bypass and peaking reaches.

6.1.1 Stebbins' Phacelia

6.1.1.1 Routine Maintenance and Non-Routine Recreation Facility Activities

Under the Proposed Action, implementation of routine maintenance activities and non-routine recreation facility activities could potentially result in loss of Stebbins' phacelia individuals. A summary of routine maintenance activities under the Proposed Action, including changes from the No-Action Alternative is provided in Section 4.2.6 and BA/BE Tables 22 through 24. Details on maintenance activities are provided in the SMP (PCWA 2011i; SD A), the VIPMP (PCWA 2011h; SD A), the Recreation Plan (PCWA 2011m; SD A), and the TSMP (PCWA 2011l; SD A). Refer to BA/BE Table 26 for a list of Project facilities and features and Project recreation facilities and features where Stebbins' phacelia populations occur. A summary of non-routine recreation facility activities is provided in the Recreation Plan (PCWA 2011m; SD A).

Routine maintenance activities that may impact Stebbins' phacelia include vegetation management, noxious weed management, road and trail maintenance, and recreation facility maintenance. Routine vegetation management, which includes trimming of vegetation by hand or with equipment, as well as limited application of herbicides, surfactants, or fungicides, could result in direct loss of Stebbins' phacelia individuals. Similar impacts could result from implementation of noxious weed management, which includes both mechanical (trimming by hand) and chemical (application of herbicides and surfactants) treatment of target noxious weed populations. Routine road and trail maintenance, which consists of annual or periodic maintenance, could result in loss of individuals in or along the shoulder of roads or trails. Routine recreation maintenance includes both annual and heavy maintenance. Implementation of annual maintenance, which includes activities such as garbage cleanup, removal of graffiti, and potable water supply testing, will not affect Stebbins' phacelia. However, implementation of heavy maintenance, which includes activities such as replacement of bathroom facilities, site leveling, and fuels reduction (i.e., brushing and thinning), could potentially result in the loss Stebbins' phacelia individuals from ground disturbance and use of heavy equipment.

Non-routine recreation facility removal or reduction projects could potentially impact Stebbins' phacelia. Specifically, reduction of Hell Hole Campground (removal of two campsites) and removal of the Upper Hell Hole Campground (removal of all 13 campsites), to be implemented in the second year following license issuance, could potentially result in loss of Stebbins' phacelia individuals from ground disturbance and use of equipment.

AP measures incorporated into the VIPMP, the Recreation Plan, and the TSMP will protect and enhance Stebbins' phacelia populations during the Project maintenance activities described above. These measures, organized by plan, include:

- VIPMP
 - Restrict vegetation trimming by hand or with equipment and manual noxious weed treatments within 50 feet of an existing population.
 - Restrict application of herbicides and surfactants for vegetation and noxious weed management within 100 feet of an existing population.
 - Implement vegetation management activities as soon as practical following snow melt (i.e., prior to seed germination).
 - Implement specific fungicide application methods to avoid nontarget species.
 - Implement specific pesticide measures requiring supervision of herbicide application by a licensed pest control advisor (PCA) and restrictive application and disposal methods.

- Conduct consultation with resource agencies to develop site-specific protective buffers around any new special-status plant populations identified during inventory surveys.
- Recreation Plan
 - Restrict heavy recreation facility maintenance within 50 feet of an existing population.
 - Implement vegetation and noxious weed management at Project recreation facilities consistent with the VIPMP.
- TSMP
 - Restrict annual road maintenance and periodic road maintenance (i.e., grading) activities to the road surface and adjacent shoulder within 50 feet of an existing population, or to the smallest area necessary for maintenance of the facility.
 - Implement vegetation and noxious weed management at Project roads and trails consistent with the VIPMP.

With implementation of AP measures included in the VIPMP, Recreation Plan, and TSMP, impacts to Stebbins' phacelia from routine maintenance and non-routine recreation maintenance under the Proposed Action would occur at three locations:

- Brushy Canyon Adit Road

Approximately 100 individuals are growing within the gravel surface of the road (populations BC01 and BC02) where routine vegetation management and road maintenance activities will be implemented.

- Hell Hole Dam Spillway Discharge Channel Road

Approximately 30 individuals are growing within the gravel surface of the road (populations HH01–HH06) where routine vegetation management and road maintenance activities will be implemented.

- Hell Hole Vista

Stebbins' phacelia individuals (population HH14, with a total of 47,000–94,000 individuals) are growing in and along the path, the viewpoint, and the picnic area where routine vegetation management and heavy recreation facility maintenance activities will be implemented.

Vegetation management, road maintenance, and recreation facility maintenance have been ongoing at these locations under the No-Action Alternative. These activities will be modified under the Proposed Action to incorporate additional AP measures for the

protection of Stebbins' phacelia. Specifically, implementation of AP measures included in the VIPMP (PCWA 2011h; SD A), the Recreation Plan (PCWA 2011m; SD A), and the TSMP (PCWA 2011l; SD A) will reduce the area where routine maintenance activities occurs from 2.2 to 0.4 acres. The AP measures will therefore protect and avoid approximately 1.8 additional acres, and approximately 38,300–76,600 additional individual Stebbins' phacelia (out of a total of 47,000–94,000 individuals in the populations) as compared to the No-Action Alternative.

In addition, a portion of one road, French Meadows Campground Water Supply Facility Access Road, was not included in the TERR 1 – TSR (PCWA 2011gg; SD B) conducted for the relicensing of the MFP. Therefore, routine maintenance along this road could potentially affect special-status plants, if present. The TSMP (PCWA 2011l; SD A) includes a measure requiring special-status plant surveys to be conducted at this road prior to implementation of routine maintenance. If any special-status plant populations are identified, PCWA will consult with resource agencies, as appropriate, to develop site-specific measures.

Implementation of routine noxious weed management will enhance existing Stebbins' phacelia during the term of the license. Management of noxious weeds may promote establishment of new special-status plant populations through improved habitat conditions by reducing competition with invasive noxious weeds. Elements of the noxious weed management that enhance habitat conditions in the vicinity of the MFP include:

- Manual/chemical treatment of noxious weeds and associated monitoring of treated sites
- Measures to prevent the introduction or spread of noxious weeds (truck and equipment cleaning, maintenance of stockpiles, inspection of workers clothing and boots, use of weed-free material for erosion control)
- Educating employees about noxious weed prevention measures

Because Stebbins' phacelia populations are located outside the campground boundaries of Hell Hole Campground and Upper Hell Hole Campground, implementation of non-routine recreation facility activities at these campgrounds (i.e., the reduction of Hell Hole Campground and the removal of Upper Hell Hole Campground) will not affect existing Stebbins' phacelia populations. If new populations of Stebbins' phacelia or other upland special-status plant populations are identified prior to implementation of non-routine recreation facility activities, PCWA would consult with resource agencies to review the measures included in Recreation Plan for adequacy in protecting special-status plants and develop new site-specific measures, if necessary. PCWA would also obtain all appropriate permits or agreements prior to construction. In addition, the reduction or removal of these facilities would eliminate the need for facility maintenance activities that have been ongoing as part of baseline conditions thereby allowing native vegetation to reestablish within the campground and improving habitat conditions for Stebbins' phacelia or other special-status plants.

6.1.1.2 Existing Facility Modification and Construction of New Facilities

Modification of existing facilities and construction of new facilities could potentially affect upland special-status plants, including Stebbins' phacelia. Potential impacts would include direct loss of plants through trampling, crushing, or removal of individual plants as a result of foot traffic, use of heavy equipment and ground disturbance associated with modification and construction activities. Refer to Section 4.2.6 and BA/BE Appendix C for a description of modification and construction activities to be implemented under the Proposed Action.

No populations of upland special-status plants, including Stebbins' phacelia, are known in the vicinity of construction or staging areas for modification of existing facilities or construction of new MFP facilities. If new upland special-status plant populations are identified prior to construction, PCWA would consult with resource agencies to review the measures included in Appendix A for adequacy in protecting special-status plants and develop new site-specific measures, if necessary. PCWA would also obtain all appropriate permits or agreements prior to construction. Any measures required by these permits or agreements would be implemented as part of the Project.

6.1.1.3 Routine Operations

Routine operations of the MFP modified under the Proposed Action have the potential to impact Stebbins' phacelia through loss of individuals or habitat. Specifically, changes in operations that affect WSEs at Hell Hole Reservoir (i.e., frequency and duration of inundation within the new maximum normal operating WSE) may result in loss of Stebbins' phacelia individuals or habitat.

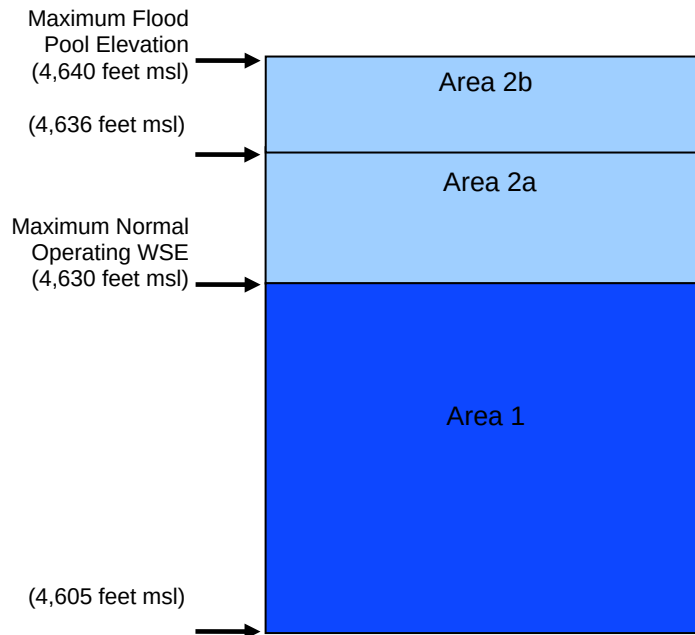
Under the Proposed Action, in years when French Meadows Dam and Hell Hole Dam will spill, operation of the Hell Hole Reservoir Seasonal Storage Increase Improvement (spillway crest gates) will allow storage of up to an additional 7,600 ac-ft of water. The spillway crest gates will result in an increase in the existing maximum normal operating WSE from 4,630 feet above msl to 4,636 feet msl in the early summer.

A schematic of specific elevations around Hell Hole Reservoir associated with the No-Action Alternative and Proposed Action is provided below.

Refer to BA/BE Table 27 for a list of Stebbins' phacelia populations within different WSE ranges at Hell Hole Reservoir, including the area (in square feet and acres) and estimated number of individuals. The elevation ranges include:

- **Area 1** includes those portions of special-status plant populations occurring at or below the current maximum normal operating WSE of 4,630 feet msl down to approximately 4,605 feet msl.
- **Area 2a** includes those portions of special-status plant populations occurring from the maximum normal operating WSE (4,630 feet msl) to 4,636 feet msl.

- **Area 2b** includes those portions of special-status plant populations occurring from 4,636 feet msl to the maximum flood pool elevation at 4,640 feet msl.



Refer to Exhibit E – Appendix C1c and to BA/BE Table 31 for a comparison of the frequency and duration of inundation at different reservoir elevations (areas) during the growing season of Stebbins' phacelia (April through August) under the No-Action Alternative and the Proposed Action. Two levels of water demand are evaluated under the Proposed Action: (1) current PCWA water delivery demand (42,000 ac-ft/year) and (2) future PCWA water delivery demand (120,000 ac-ft/year). This discussion focuses on reservoir elevation levels at future demand. Model results for Hell Hole Reservoir indicate that differences in WSEs under current and future demand are minimal (Exhibit E – Appendix C1c). The following summarizes this information by area:

- **Area 1:** Under current operations, approximately 0.4 acre of habitat that support an estimated 9,000 to 18,000 Stebbins' phacelia individuals are located in Area 1 (between reservoir elevation 4,605 feet msl and 4,630 feet msl). Model results for the Proposed Action indicate that the overall frequency of inundation (i.e., number of years in which inundation occurs) in Area 1 will be similar to the No-Action Alternative. Refer to Appendix C1c and Section 8.5.5.1 for additional analysis.
- **Area 2a:** Under current operations, approximately 2 acres of habitat that support an estimated 53,000 to 106,000 individuals are located in Area 2a (from the current maximum normal operating WSE (4,630 feet msl) to 4,636 feet msl. Model results for the Proposed Action indicate that the overall frequency of inundation in Area 2a during the growing season for Stebbins' phacelia for all water year types combined will increase from 11 to 14 years over the period of record (33 years modeled). This increase in inundation frequency occurs in

above normal and below normal water years under the Proposed Action. The average duration of inundation (average days per year) will increase under the Proposed Action by 8 days in wet years, by 9 days in above normal years, and by 8 days in below normal years. Similar to the No-Action Alternative, Area 2a will not be inundated in dry or critical water years under the Proposed Action.

- **Area 2b:** Under current operations, approximately 5 acres of habitat, supporting an estimated 117,000 to 234,000 individuals, are located in Area 2b (between 4,636 feet msl WSE and the maximum flood pool elevation 4,640 feet msl WSE). Model results for the Proposed Action indicate that portions of Area 2b, which was not inundated in any water year type in the period of record under the No-Action Alternative, will now be inundated in years when Hell Hole Reservoir spills (i.e., in 6 of 10 wet water years and in 1 of 6 above normal water years) during the growing season for Stebbins' phacelia. The average duration of inundation under the Proposed Action will be 22 days per year in wet water years and 15 days in above normal water years. Similar to the No-Action Alternative, Area 2b will not be inundated in below normal, dry, or critical water years under the Proposed Action.

Therefore, changes in operations that affect WSEs in Hell Hole Reservoir will result in only minor changes in the frequency and duration of inundation in areas that support Stebbins' phacelia in areas 1 and 2a. Therefore, conditions in areas 1 and 2a will not change substantially from the No-Action Alternative and it is expected that Stebbins' phacelia populations (and the seed bank) in these areas would continue to persist under the Proposed Action. Small increases in the duration of inundation in some years under the Proposed Action would not result in effects to Stebbins' phacelia populations in areas 1 and 2a. Habitat in Area 2b, which is not inundated under existing conditions, will be inundated under the Proposed Action in years when Hell Hole Reservoir would have spilled. However, the new inundation conditions in Area 2b are similar (but shorter in frequency and duration) to existing inundation conditions in areas 1 and 2a. Therefore, while some changes in the populations (i.e., loss of individuals) may occur, Stebbins' phacelia populations and their seed bank will persist in Area 2b under the Proposed Action. The new inundation resulting from operation of the new Hell Hole Reservoir Spillway Crest Gates would, therefore, result in only negligible impacts to the Stebbins' phacelia populations in Area 2b.

The analysis provided in this section was developed based on best available information, including the known presence of Stebbins' phacelia populations along the Hell Hole Reservoir shoreline and modeled Hell Hole Reservoir WSE fluctuations. During the term of the license, PCWA will conduct surveys for Stebbins' phacelia populations along the perimeter of Hell Hole Reservoir, in conjunction with special-status plant inventory surveys. Results of these surveys will be provided to resource agencies for review and comment. If requested, PCWA will schedule a meeting with resource agencies to discuss results.

6.1.2 Other Special-Status Plants

Changes in operation of the MFP include increased MIFs, pulse flows with recession rates (in the bypass reaches only), and downramping of spills below French Meadows and Hell Hole reservoirs. These changes could potentially affect special-status plants, including Brandegee's clarkia, Butte County fritillary, saw-toothed lewisia, and Stebbins' phacelia. Populations of these species are located within 200 feet of bypass peaking reaches (BA/BE Map 5). However, a review of data for these populations indicates that these populations grow primarily in rocky areas on the steep river canyon walls and in upland canyon live oak woodlands, both of which are elevated above the wetted perimeter of the bypass and peaking reaches. Some of these populations may experience inundation during infrequent, high-magnitude flows under the No-Action. However, because the frequency and magnitude of high-magnitude flows will not change under the Proposed Action, the Proposed Action will not result in effects to these populations.

6.1.3 Additional Measures to Protect Plants

The VIPMP (PCWA 2011h; SD A) contains the following additional measures to protect Stebbins' phacelia and other upland special-status plants that may be identified during the term of the license. These measures include:

- Conducting special-status plant inventory surveys in the vicinity of the MFP every 5 years following license issuance to identify any new populations of special-status plants
- Consulting annually with resource agencies to (1) discuss the effectiveness of AP measures to protect special-status plants, (2) modify or develop new AP measures as needed, and (3) develop site-specific protective measures for any new special-status plant populations identified during inventory surveys
- Reviewing resource agency special-status species lists annually
- Educating employees and contractors about the presence of upland special-status plants and measures to protect them (i.e., Employee Training Program [ETP])

6.2 EFFECTS ON AQUATIC SPECIES AND HABITATS

Changes in operation of the MFP under the Proposed Action, as well as routine maintenance, non-routine Project recreation facility activities, modification of existing facilities, or construction of new facilities, could potentially impact habitat on the four special-status aquatic species addressed in this BA/BE including hardhead, FYLF, CRLF, and WPT.

Section 6.2.1 provides a discussion of the potential effects of changes in MFP operations of the MFP on physical components of habitat for hardhead, FYLF, and WPT (i.e., riverine and reservoir aquatic habitats). Sections 6.2.2 and 6.2.3 provides a

discussion of the potential impacts of routine maintenance, non-routine Project recreation facility activities, modification of existing facilities, or construction of new facilities on aquatic habitats in the MFP. Section 6.2.4 provides a species-specific summary of impacts of the Proposed Action on hardhead, FYLF, CRLF, and WPT.

6.2.1 Routine Operations

This section, which provides an analysis of the changes in routine operations on aquatic habitats and species, is based on Exhibit E – Section 8.5, Fish and Aquatic Resources Environmental Effects. Some Exhibit E tables, figures, and appendices from Section 8.5, Fish and Aquatic Resources Environmental Effects or other Exhibit E sections are incorporated by reference into this section. The analysis of potential effects on aquatic resources from changes in Project operations under the Proposed Action required detailed modeling. Refer to the introduction to this section (Section 6.0) for a complete description of modeling conducted for this analysis. The following describes (1) riverine physical environment, (2) riverine aquatic community and (3) medium reservoir aquatic habitat.

6.2.1.1 Riverine Physical Environment

The Proposed Action will modify MIFs, environmental pulse flows, spill flows, operations of the Oxbow Powerhouse, recreation flows, and sediment management. The riverine physical habitat that the Proposed Action could potentially impact includes (1) hydrology, (2) channel geomorphology and sediment transport and supply, (3) riparian vegetation, (4) water temperature and dissolved oxygen, and (5) wetted perimeter.

Hydrology

The MFP (BA/BE Map 7) includes hydrological bypass reaches and a peaking reach. The bypass reaches are sections of streams/rivers below diversions or reservoirs where Project operations result in the diversion of a portion of the water from that reach. The peaking reach is the river below Oxbow Powerhouse. In this reach, flows fluctuate substantially to meet power demand or to support whitewater recreation.

- Bypass Reaches
 - Duncan Creek, North Fork Long Canyon Creek, South Fork Long Canyon Creek, Long Canyon Creek, Middle Fork American River below French Meadows Reservoir, Middle Fork American River below Middle Fork Interbay, and Rubicon River
- Peaking Reach
 - Middle Fork and North Fork American rivers below Oxbow Powerhouse

In the bypass and peaking reaches, the Proposed Action specifies modifications to hydrology, including:

- Higher MIFs in all bypass and peaking reaches
- Environmental pulse flows in the all bypass reaches and downramping of spill flows in the bypass reaches below French Meadows and Hell Hole reservoirs
- Specific operations requirements at Oxbow Powerhouse to reduce flow fluctuation in the peaking reach

MINIMUM INSTREAM FLOWS

The Proposed Action includes higher MIF requirements based on five water year types compared to the No-Action Alternative MIF requirements, which are based on one or two water year types (depending on location). The Proposed Action water year type designation allows better differentiation of water year types. In particular, it provides the ability to differentially enhance flows in the wettest water year types (wet and above normal), which is not possible with the more limited No-Action Alternative water year type designations (IFRM [PCWA 2011g; SD A]).

The Proposed Action MIF requirements are either greater than or equal to the No-Action Alternative MIF requirements in all bypass and peaking reaches. The Proposed Action greatly increases the spring MIF requirements in all reaches in all water year types. Summer instream flows are also increased in all bypass and peaking reaches in wet and above normal water year types. Summer flows in the drier water year types (critical, dry, and below normal) are increased above or maintained at the No-Action Alternative MIF requirements, depending on location. Winter minimum flows are either increased or maintained compared to the No-Action Alternative (Exhibit E – Figures 8.5-1a–g); (PCWA 2011f; SD A).

In the peaking reach the Proposed Action includes annual maintenance outage MIF requirements (30-day period, beginning between the last Sunday in September and October 30). These flows are the same as or greater than the No-Action Alternative MIF requirements. The maintenance outage MIF requirements in extreme critical, critical, and dry water year types will be the same as in the No-Action Alternative (75 cfs), but in the other water year types (below normal, above normal, and wet) they will be 35 to 75 cfs higher than the No-Action Alternative.

BA/BE Figures 23 and 24 and Exhibit E – Section 8.5, Figures 8.5-2c–g show the minimum flow for each day of the year in the Proposed Action (resulting from implementation of the proposed flow measures) compared to the measured historical hydrology used to represent the No-Action Alternative. For each water year type, the analysis shows the minimum daily flow that occurred based on all the hydrology for years with the same water year type (i.e., a composite of all the data in each water year type for 1975–2007 hydrology period of record). In the peaking reach, the analysis for the Proposed Action is based on the hourly model data (minimum for each day) and in the No-Action Alternative the analysis is based on the 15-minute historical flow data (minimum for each day) for the 1988–2007 period of record. Some instances occur in the small streams (Duncan Creek, North Fork Long Canyon, and South Fork Long

Canyon) where the minimum daily flow is below the minimum flow line on the figures. The minimum flow requirement in these streams is the “minimum flow or inflow, whichever is less” and in some year types the inflow is less than the specified minimum flow. Also, on the figures, the Proposed Action minimum flow is often a few cfs higher than the minimum flow requirement, which represents a purposeful over-release of water in the hydrology operations model to mimic how the Project would be operated to avoid minimum flow violations.

ENVIRONMENTAL PULSE FLOWS (INCLUDING RESERVOIR SPILLS)

Scheduled environmental pulse flows are included in the Proposed Action in May of wet and above normal water year types in all bypass reaches. The wet and above normal water year types encompass approximately 50% of the water years in the 33-year period of record (1975–2007) (Exhibit E – Section 7.3, Table 7.3-2a). The No-Action Alternative does not specify environmental pulse flows; although, high spring flows have occurred historically as a result of reservoir spills or inflows exceeding the capacity of diversions. The Proposed Action increases the number of years that environmental pulse flows would occur in May by 71–300% (11–16 years during the period of record) compared to the No-Action Alternative (4–7 years during the period of record) depending on the reach (BA/BE Table 32). This analysis includes the reservoir spill flows or streamflows that exceed diversion capacity in May.

In the peaking reach, no environmental pulse flows are specified in the Proposed Action because natural high-flow events from unimpaired river inflows (North Fork of the Middle Fork American River, North Fork American River) and accretion flows from smaller watersheds in the reach provide high-flow events. Therefore, the frequency of high-flow events in the Proposed Action is maintained compared to the No-Action Alternative (refer to Channel Geomorphology and Sediment Section, below, for more detail).

The Proposed Action specifies streamflow release facility modifications (Section 4.0 – Proposed Action) and additional flow gaging stations (FRMP [PCWA 2011n; SD A]) necessary to release and monitor the environmental pulse flows into six bypass reaches. Environmental pulse flows and the downramp of the pulse flows would not be possible under the No-Action Alternative. In particular, modification of release facilities at Hell Hole Dam and modification of the small stream diversion structures (Duncan, North Fork Long Canyon, and South Fork Long Canyon) in the Proposed Action (Section 4.0) will allow pulse flow releases and flow gaging at these locations that could not occur with the No-Action Alternative.

The Proposed Action also requires that reservoir spills be downramped at Hell Hole Dam and French Meadows Dam when spill occurs in May–July (see downramp schedule in AQ 1 – TSR [PCWA 2011y; SD A]). In addition, at Hell Hole Dam some spills will be extended for 4 days and then downramped. In the No-Action Alternative, no downramping of May–July spills will occur at Hell Hole or French Meadows Dam. During 9 years (in the 33-year period of record) spills are downramped under the Proposed Action that, otherwise, would not occur under the No-Action Alternative.

In the Proposed Action, the shape of the downramp for both environmental pulse flows and reservoir spills provides a slowly declining hydrograph that provides riparian and other environmental/recreational benefits compared to the faster decline of spill flows for the No-Action Alternative. The Proposed Action downramp was set at an average rate of approximately 1.6 inches of stage per day. For the spill-event downramp the same rate was used for Hell Hole Dam, but a faster downramp (approximately twice as fast) was used below French Meadows Dam due in part to the different environmental resource conditions (e.g., FYLF are not present in the river reach between French Meadows Dam and Middle Fork Interbay; riparian vegetation is sparsely distributed due to the coarse substrate and bedrock-dominated channel).

Accretion flows along the length of the bypass reaches further shape the declining limb (recession) of the pulse flows. The recession of the wet and above normal water year Proposed Action and unimpaired hydrographs were compared. For comparison, the hydrographs between years were shifted to align the timing of the receding limbs (Exhibit E – Section 8.5, Figures 8.5-3a–b, 8.5-4a–b, and 8.5-5a–b). In addition, an average hydrograph by water year type was added to each of the figures. The average hydrographs were converted to stage using the average stage-discharge relationships at the instream flow study sites (PCWA 2011a; SD A) (Exhibit E – Section 8.5, Figures 8.5-6a–b, 8.5-7a–b, and 8.5-8a–b).

Accretion flows had a large effect on the recession hydrographs in the 29.7-mile-long reach of the Rubicon River. For example, in the lower 20 miles of the Rubicon River that contains FYLF (RM0.6–20.9), the Proposed Action flow recessions were similar to or slower than the unimpaired hydrograph recessions (Exhibit E – Section 8.5, Figures 8.5-6a–b and 8.5-7a–b). On average the Rubicon River Proposed Action recessions at Ellicott Bridge (R20.9) were approximately 1.0 inches stage/day (wet years) and 0.9 inches stage/day (above normal) compared to the unimpaired recessions of approximately 1.1 inches stage/day (wet and above normal years). Below Long Canyon on the Rubicon River (R3.5), the Proposed Action hydrograph recessions were approximately 0.8 inches stage/day (wet and above normal years) compared to the unimpaired recessions of approximately 1.0 inches stage/day (wet years) and 0.9 inches stage/day (above normal years).

For the Middle Fork American River below Middle Fork Interbay at MF 26.2, the effect of accretion is shown in Exhibit E – Section 8.5, Figure 8.5-8a–b. The distance from Middle Fork Interbay to Ralston Afterbay is approximately 9.5 miles (RM26.0 to 35.5). FYLF are present primarily in the lower 3 miles of the reach (RM26.0 to approximately RM29.0). The hydrograph recession rate at the bottom of the reach under the Proposed Action was approximately 0.9 inches stage/day (wet years) and 1.2 inches stage/day (above normal years) compared to the unimpaired recession of approximately 0.8 inches stage/day (wet years) and 1.4 inches stage/day (above normal years).

PEAKING REACH-SPECIFIC HYDROLOGY

In the peaking reach, the Proposed Action includes specific operation requirements at Oxbow Powerhouse to reduce (1) flow fluctuations and (2) powerhouse ramping rates.

FLOW FLUCTUATIONS

The Proposed Action includes a 900 cfs upper limit on Oxbow Powerhouse releases during the summer of extreme critical, critical, and dry water year types along with increased MIF requirements (in all water year types) that were designed to decrease potential flow fluctuations in the peaking reach by about 100 cfs or more compared to the existing license requirements in the No-Action Alternative. The Proposed Action minimum flow requirements, Oxbow Powerhouse maximum release requirement, and physical maximum release from Oxbow Powerhouse are shown in Exhibit E – Section 8.5, Figure 8.5-1g.

An analysis of flow fluctuations using the Proposed Action operations hourly model compared to the 15-minute historical flows in the peaking reach between 1988–2007 (when 15-minute flow data are available) is provided below. Two measures of flow fluctuation are used for the analysis (Moog 1993; Bain 2009):

Absolute fluctuation = daily maximum – daily minimum

Peaking discharge ratio = daily maximum / daily minimum

The daily flow fluctuations (absolute fluctuation and peaking discharge ratio) were summarized (averaged) for three seasons summer/fall (June–October), winter (November–February), and spring (March–May) and for each water year type (all, wet, above normal, below normal, dry, critical) (Exhibit E – Section 8.5, Figures 8.5-9a–b). In addition, flow fluctuation exceedance plots for each seasons and water year type were created to show all of the daily data (Exhibit E – Section 8.5, Figure 8.5-10a–c and 8.5-11a–c). Maximum, minimum, median and any exceedance value (e.g., 90% exceedance) of flow fluctuations can be identified in these plots. Time series plots (Exhibit E – Section 8.5, Figures 8.5-12a–e) of the Proposed Action and No-Action Alternative hydrographs show the flow fluctuations graphically. Five large run-off events with flows 20,000 cfs or greater were not included in the analysis; the events were not controllable by the MFP and they biased the flow fluctuation results

The results of the analyses show that the daily flow fluctuations under the Proposed Action were reduced in the summer and spring and were similar during the winter, compared to the No-Action Alternative (Exhibit E – Section 8.5, Figures 8.5-9a–b). During the winter the results varied by water year type. Proposed Action fluctuations were greater in the drier water year types and the fluctuations were less in the wetter water year types compared to the No-Action Alternative. Overall, all water year types had a 157 cfs reduction in absolute fluctuation, but a 0.05 increase in the peaking discharge ratio during the winter. During the summer the flow fluctuations in the Proposed Action were reduced in all water year types compared to the No-Action Alternative. The average reduction (across all water year types) was 88 cfs, absolute fluctuation, and 1.5, peaking discharge ratio (4.1 versus 5.6). The spring Proposed Action reductions in flow fluctuation were larger than those that occurred during the summer.

The daily flow fluctuation exceedance plots (Exhibit E – Section 8.5, Figure 8.5-10a–c and 8.5-11a–c) and time series plots (Exhibit E – Section 8.5, Figures 8.5-12a–e) show similar results as those described above. For example, the time series plots visually show that the Proposed Action increased minimum flows and Oxbow Powerhouse maximum flow release (900 cfs during the summer of dry, critical, extreme critical water year types) during the summer decrease daily flow fluctuations compared to the No-Action Alternative.

RAMPING RATES

The Proposed Action establishes Oxbow Powerhouse maximum ramping rate requirements that result in an approximate ramping rate of approximately 1.0 foot per-hour at numerous representative transects within the instream flow study sites in the peaking reach. This rate is 50% slower than the No-Action Alternative up ramping rate and 41% slower than the No-Action Alternative downramping rate requirement. The No-Action Alternative ramping rate requirement is 3.0 feet per-hour at the Middle Fork American River near Foresthill USGS gage (No. 114333000) (Foresthill Gage). Exhibit E – Section 8.5, Table 8.5-2 shows hourly increments of 1.0 foot per-hour flow change at the peaking reach instream flow study sites compared to the corresponding hourly stage change at the Foresthill Gage that is used for compliance in the No-Action Alternative. The 1.0 foot per-hour ramping rate in the Proposed Action corresponds to an average 1.50 feet per-hour up ramp and -1.77 foot per-hour downramp at the Foresthill Gage (the No-Action Alternative ramp rate requirement is 3.0 feet per-hour).

The Proposed Action ramping rate requirement is based on stepped flow change increments that approximate a 1.0 foot per-hour ramping rate (Exhibit E – Section 8.5, Figure 8.5-13) at the instream flow study sites. The actual increments of flow change at the Oxbow Powerhouse are compared to a continuous flow change relationship that would create a 1 foot per-hour stage-change at the instream flow sites in Exhibit E – Section 8.5, Figure 8.5-13. The stepped increments of ramping rate in the Proposed Action correspond closely to the continuous 1.0 foot per-hour ramping rate relationship.

The effects of the Proposed Action hourly ramping rate requirement on peaking reach hydrology is compared to historical impaired hydrology under the No-Action Alternative ramping rate requirement in Exhibit E – Section 8.5, Figure 8.5-14 for three seasons summer/fall (June–October), winter (November–February), and spring (March–May) (1988–2007 period of record). The Proposed Action, when compared to the No-Action Alternative, reduces the percent of time that maximum daily ramping rates are greater than 400 cfs change per hour to 27% versus 40% in the summer/fall, 23% versus 40% in the winter, and 5% versus 27% in the spring. Note that some of the highest ramping rates in the figures are the result of storm events that are not controlled by the MFP.

Channel Geomorphology and Sediment Transport and Supply

The Proposed Action results in changes to hydrology and sediment management compared to the No-Action Alternative that could modify (1) fine sediment in pools and gravels, (2) gravel supply, and (3) channel geometry.

FINE SEDIMENT IN POOLS AND GRAVELS

In the Middle Fork American and Rubicon rivers, the Proposed Action maintains/schedules a similar frequency of high-flow events (5-year recurrence and gravel initiation of motion flows) that has occurred historically in the No-Action Alternative⁴ (Exhibit E – Section 8.7, Tables 8.7-3a and 8.7-4a). Therefore, fine sediment in pools and spawning gravels will be maintained at the level of existing conditions (No-Action Alternative). Under existing conditions, the fine sediment volume in pools was very low (less than 8% and often much less) (Exhibit E – Section 8.7, Table 8.7-2) and the percentage of fine sediments in spawning gravels was low and conducive to high spawning success (Exhibit E – Section 7.7, Geomorphology Resources Affected Environment) in all river reaches (Exhibit E – Section 7.7, Table 7.7-8).

In the small streams (Duncan, North Fork Long Canyon, South Fork Long Canyon, and mainstem Long Canyon creeks), the number days and years that the 5-year recurrence flows and the gravel initiation of motion flows occur under the Proposed Action are reduced when compared to the existing conditions (No-Action Alternative) (Exhibit E – Section 8.7, Tables 8.7-3b and 8.7-4b). For example, the number of days of initiation motion in the Proposed Action is 50–80% of days in the No-Action Alternative. However, the number of days/years these flow events occur in the Proposed Action is sufficient to maintain low fine sediment content in pools and spawning gravels equivalent to the No-Action Alternative. In part, this condition is due to the low fine sediment supply present in the system (also see discussion below). The GRMP (PCWA 2011q; SD A) in the Proposed Action will be used to document fine sediment conditions in the small streams. A report summarizing the data collected each monitoring period will be prepared by PCWA and distributed to the USDA-FS, State Water Board, and CDFG for review and comment. Based on the results of the monitoring and/or comments received during the review process, PCWA and the agencies may call a meeting to discuss the results.

GRAVEL SUPPLY

The Proposed Action specifies modifications to the small diversions and sediment augmentation activities at the medium reservoirs (Middle Fork Interbay and Ralston Afterbay) that will enhance sediment supply, and particularly gravels, in five bypass reaches compared to the No-Action Alternative. Gravel supply would increase downstream of the following facilities: Duncan Creek Diversion, North Fork Long Canyon Creek Diversion, South Fork Long Canyon Diversion, Middle Fork Interbay, and Ralston Afterbay. Exhibit E – Section 7.7, Table 7.7-11 shows the estimated average annual amount of spawning gravel-sized sediment (75 to 2,645 cubic yards/year depending on location) that will pass downstream of these facilities in the Proposed

⁴ The No-Action Alternative does not include specified channel maintenance flows and while they have occurred in past operations, it is not guaranteed that they would continue in the future under the No-Action Alternative.

Action rather than being captured and removed from the reaches as under the No-Action Alternative (Exhibit E – Section 7.7, Table 7.7-11).

CHANNEL GEOMETRY

The Proposed Action would maintain the channel geometry similar to the No-Action Alternative. The bypass and peaking reaches exhibit limited adjustability and they do not have any berm development under existing conditions (No-Action Alternative) (Exhibit E – Section 7.7). The number days and years that the 5-year recurrence flows occur for the Proposed Action and No-Action Alternative are similar for all bypass reaches except the small streams (Exhibit E – Section 8.7, Table 8.7-3b). The GRMP (PCWA 2011q; SD A) in the Proposed Action will be used to document channel geometry in the small streams. A report summarizing the data collected each monitoring period will be prepared by PCWA and distributed to the USDA-FS, State Water Board, and CDFG for review and comment. Based on the results of the monitoring and/or comments received during the review process, PCWA and the agencies may call a meeting to discuss the results.

Riparian Vegetation

In the Proposed Action, the riparian corridor along the bypass and peaking reach streams will be maintained or enhanced (similar vegetation composition and position along the stream channel, better recruitment in most reaches) compared to the No-Action Alternative (see riparian impacts in Exhibit E – Section 8.8, Riparian Resources Environmental Effects).

Water Temperature and Dissolved Oxygen

The Proposed Action includes modifications to hydrology⁵ (pulse flows, increased MIFs) in the bypass reaches that have the potential to decrease water temperature. The Proposed Action, however, is not anticipated to affect hydrology in a manner that will modify dissolved oxygen concentrations in the bypass reaches. In the peaking reach, the Proposed Action is not anticipated to affect hydrology in a way that will affect either water temperature (i.e., daily magnitude of flow is similar) or dissolved oxygen concentrations (see discussion below).

Decreased water temperature in the bypass reaches could potentially impact the location of the transition zones of coldwater and warmer water species (cold water trout and warmer water FYLF and hardhead). Transition zones are found in the middle/lower portion of the Rubicon River and the lower portion of the Middle Fork American River below Middle Fork Interbay. Secondly, potential decreases in water temperature could delay the timing of life-history processes (e.g., breeding timing) or prolong development stages (e.g., egg incubation).

⁵ The effect of increased minimum flows from the South Fork Rubicon River as a result of the UARP's recent relicensing, FERC Project No. 2101 was incorporated into both the hydrology and the boundary condition water temperature inputs to the models in all of the water temperature analyses.

LATE SPRING

In late spring, higher MIFs in the Proposed Action have little effect on stream temperature due to cool air temperatures and accretion flows in the lower portion of the Rubicon River and Middle Fork American River below Middle Fork Interbay (AQ 4 – TSR [PCWA 2011bb; SD B]). The Proposed Action pulse flows in May, however, because they are high magnitude and occur when the rivers are beginning to warm, potentially can depress the water temperature or delay spring water temperature warming in these bypass reaches.

Analyses show that the Proposed Action pulse flows in wet and above normal water years decrease the river temperatures up to 4°C and delay spring water temperature warming compared to the No-Action Alternative. Water temperature sensitivity modeling of pulse flows in the lower portion of the Rubicon River (R3.7) and lower portion of the Middle Fork American River below Middle Fork Interbay (MF26) (Figures H-27 and H-16, respectively, AQ 4 – TSR, [PCWA 2011bb; SD B]) show that pulse flows of similar or greater magnitude to those in the Proposed Action result in water temperatures that are below the reported FYLF breeding threshold of approximately 12°C (54°F). When the pulse flow begins to recede, water temperatures quickly increase above the prepulse water temperature. These analyses indicate that pulse flows potentially result in water temperature decreases of approximately 4°C (7.2°F) during the pulse.

SUMMER/EARLY FALL

The largest potential water temperature effects of higher MIFs under the Proposed Action occur in the Rubicon River and Middle Fork American River below Middle Fork Interbay during the summer/early fall. Sensitivity modeling of wet years (e.g., 2006) and higher Proposed Action minimum flows indicate minor effects of the higher minimum flows on water temperature. Higher existing minimum flows and accretions in wet years minimize the effects of flow changes on water temperature. During drier water year types (critical, dry, and below normal water year types), however, when existing minimum flows are lower, the increased minimum flows described in the Proposed Action can decrease water temperature by several degrees Celsius (Section 6.4 of AQ 4 – TSR [PCWA 2011bb; SD B]).

Under the Proposed Action, June–September water temperatures are very similar to the No-Action Alternative water temperatures in the Rubicon River and Middle Fork American River below Middle Fork Interbay in critical, dry, and below normal water year types because little difference occurs between the minimum flows of the Proposed Action and the No-Action Alternative (Exhibit E – Section 8.5, Figure 8.5-1a–g). The exception is in the Rubicon River in critical water year types when the Proposed Action summer minimum flow is 15 cfs versus 10 cfs in the No-Action Alternative (see below).

Under the Proposed Action, the locations of species-specific water temperature transition in the Middle Fork American River below Middle Fork Interbay are similar to the No-Action Alternative. The river miles where the July through August 17°C (FYLF

lower optimum⁶ water temperature) transition and the 20°C (trout upper water temperature) transition occurs are shown in BA/BE Tables 33a–b. The greatest difference/change in the location of the 17°C transition is 0.1 mile, and no change occurs in the location of the 20°C transition.

For the Rubicon River, the location of the 17°C transition under the Proposed Action is similar to the No-Action Alternative in dry and below normal water year types, but is approximately one mile downstream in critical year types due to the increased minimum flow of 5 cfs in the critical water year type under the Proposed Action (10 cfs existing versus 15 cfs Proposed Action). Under the Proposed Action, the 20°C water temperature transition is 1.9 to 2.58 miles downstream compared to the No-Action Alternative, depending on water year type (BA/BE Table 33b).

Wetted Perimeter

The Proposed Action specifies higher MIFs and provides pulse flows that increase wetted perimeter. The effects of the MIFs on wetted perimeter are quantified below for three seasons in the bypass reaches (spring, summer/fall, and winter) and for four seasons in the peaking reach (spring, summer, October outage, and winter). In the bypass reaches, the percent change in the 50% exceedance value (median) of wetted perimeter is compared to the No-Action Alternative and the Existing License Condition for each water year type. The median value of wetted perimeter was derived from a daily time series analysis using the wetted perimeter versus discharge relationships in the AQ 1 – Instream Flow TSR (AQ 1 – TSR) (PCWA 2011y; SD B). In the peaking reach, the percent change in wetted bed area at the 2D modeling sites was used instead of wetted perimeter (wetted bed area is a readily available metric from the 2D models).

The analysis shows that the Proposed Action maintains or enhances wetted perimeter/bed area in all river reaches (BA/BE Tables 34 and 39) as discussed below, by season.

- **Spring.** Wetted perimeter increases approximately 10% or more at the top of the bypass reaches due to the increased MIFs in the Proposed Action compared to the No-Action Alternative. Spring wetted perimeter enhancement is less in the lower end of the bypass reaches because natural accretion augments the minimum flows such that the incremental effect of the increased minimum flow is reduced (i.e., “dilutes” the effect of the increases in minimum flow). In the peaking reach the average increase in wetted perimeter is 12%.

⁶ Water temperature identified by FYLF experts, Dr. Amy Lind, USDA-FS and Dr. Sarah Yarnell, Cardno ENTRIX, as the approximate lower optimum summer (July through August) water temperature range for FYLF, which also corresponds approximately to the upstream distribution of FYLF in the Rubicon River and the Middle Fork American River.

- **Summer.** Wetted perimeter increases approximately 5% in the Rubicon River and the Middle Fork American River reaches. Small streams have no change because they are typically at natural flow in the summer. In the peaking reach the average increase is 8%.
- **Winter.** Wetted perimeter increases approximately 10% in the Rubicon River and approximately 3% in the upper Middle Fork American River below French Meadows Reservoir bypass reach and in the peaking reach. In the Middle Fork American River below Middle Fork Interbay the wetted perimeter remains about the same. Small streams have a couple of instances, water year types, where the wetted perimeter decreases slightly due to a couple of water years when historically the diversions were not operated for various reasons, but they would be in the Proposed Action. The average wetted perimeter in the small streams, however, ranges from 98 to 100% of the No-Action Alternative.
- **Annual Maintenance Outage.** Wetted bed area increases in the peaking reach approximately 5% during wet, above normal, and below normal water year types due to the increased minimum flows in the Proposed Action compared to the No-Action Alternative. In dry and critical water year types, the wetted perimeter in the two alternatives are the same (i.e., both alternatives have the same minimum flows).

6.2.1.2 Riverine Aquatic Community

As described above, the Proposed Action modifies instream flows and physical habitat, which has the potential to affect (1) productivity (algae and benthos), (2) habitat and species diversity, (3) the seasonal hydrograph shape and year-to-year flow variability, and (4) intradaily flow fluctuations in the peaking reach. Each of these is described below.

Productivity (Algae and Benthos)

The Proposed Action predominately increases or maintains wetted perimeter in the bypass and peaking reaches compared to the No-Action Alternative (Exhibit E – Section 8.5.1.5). This increase in wetted perimeter in the Proposed Action will result in enhanced productivity (algae and benthos) compared to the No-Action Alternative. Productivity related to flow fluctuations in the peaking reach is discussed in the Peaking Reach Flow Fluctuations Section (Exhibit E – Section 8.5.2.4).

The BMIMP (PCWA 2011v; SD A) includes methods for the monitoring and reporting of benthic macroinvertebrate abundance and community metrics in selected bypass and peaking reaches associated with the MFP during the term of the new license.

Habitat and Species Diversity

The Proposed Action maintains or increases MIFs in all river reaches (Exhibit E – Section 8.5 and Section 8.5.1.1). The increases in MIF, where they occur, result in an

overall increase in total stream habitat (feet²/1000 feet) and a greater diversity of habitat types compared to the No-Action Alternative (Exhibit E – Appendix B2, Tables 1A–12B and Figures 1–36; AQ 1 – TSR, Appendix M [PCWA 2011y; SD B]). Within the range of instream flows encompassed by the Proposed Action and No-Action Alternative, the amount of deeper and faster water habitat types increase with increased flow. At the same time, the increases in MIFs result in relatively small changes in the amount of shallow and slower water habitat in each of the stream reaches. The increase in deeper and faster water, while maintaining shallow and slow water habitats, increases the diversity of habitat types and is an enhancement to the overall aquatic community under the Proposed Action (e.g., Exhibit E – Section 7.5, Table 7.5-3).

Seasonal Hydrograph Shape and Year-to-Year Flow Variability

The Proposed Action increases the dynamic nature of the flows in the bypass reaches associated with the MFP. The Proposed Action specifies higher MIFs in the wetter water year types and increases instream flows during the spring of all year types compared to the No-Action Alternative. The Proposed Action will create flow regimes in each of the bypass reaches that are more naturally shaped both seasonally and between water year types, which is typically viewed as a benefit to the aquatic community (Poff et al. 1997). The Proposed Action minimum instream and pulse flow regimes are, therefore, an enhancement to the aquatic community.

Peaking Reach Flow Fluctuations

Flow fluctuations related to hydroelectric generation peaking have the potential to reduce overall productivity of rivers (Morgan et al. 1991; Cushman 1985; Gislason 1985; Moog 1993; Bain 2009) and to affect the diversity of aquatic species and/or abundance of juvenile life stages (e.g., shallow, slow water species and life stages) (Bain et al. 1988; Kinsolving and Bain 1993; Scheidegger and Bain 1995; Bain 2009). Many aquatic species have specific habitat requirements and limited mobility (e.g., Edington 1968) and daily flow fluctuations modify the location and amount of habitat (depths and velocities and/or location of the channel margin) thereby decreasing overall habitat quality and availability. Habitat for relatively immobile species, such as aquatic macroinvertebrates, was modeled and quantified using an effective habitat analysis (quantifies the habitat that maintains suitability continuously over a specified time period such as a day or season) (AQ 1 – TSR [PCWA 2011y; SD B])

The Proposed Action reduces flow fluctuations in the peaking reach during the summer and spring and increases minimum flows in all seasons (Exhibit E – Section 8.5 and Section 8.5.1.1). Increases in effective food production habitat in the peaking reach were estimated using the effective food production plots in Appendix B2 (Figures 43 and 50). If for example, the Proposed Action peaking ranged from 1025 cfs (maximum Oxbow Powerhouse release) to 200 cfs (Proposed Action average summer MIF) instead of 1025 to 75 cfs (75 cfs is the No-Action Alternative summer minimum flow requirement), the increase in effective food production habitat would range from approximately 70–170% at the instream flows study sites in the peaking reach compared to the No-Action Alternative. Similar reductions in average peaking ratio to

5.1 = 1025 cfs/200 cfs from 13.7 = 1025 cfs/75 cfs using the data in Moog (1993) would result in a 160% increase in fish biomass. The actual amount of fish biomass increase under the Proposed Action is unknown, but fish biomass is expected to be enhanced compared to the No-Action Alternative.

The Proposed Action decrease in flow fluctuations, increased minimum flows (Exhibit E – Section 8.5.1.1), and increased wetted perimeter will also decrease the amount of varial zone area in the peaking reach (the area along the stream margin that is subject to wetting and drying resulting from hydropower peaking). Decreasing the varial zone should increase the abundance of species/life stages that use shallow–slow water habitat (e.g., BMIs) and, thus, the amount of productivity would be expected to increase (Gislason 1985; Blinn et al 1995; Cushman 1985). The reduction in flow fluctuations and increase in minimum flows under the Proposed Action will increase productivity and shallow-slow water habitat compared No-Action Alternative (e.g., Bain 2009).

6.2.1.3 Medium Reservoir Aquatic Environment

Under the Proposed Action physical habitat in Middle Fork Interbay and Ralston Afterbay will not change compared to the No-Action Alternative. Reservoir WSEs will continue to be operated similar to the way they were under the No-Action Alternative and water quality and water temperature will remain the same. Measured dissolved oxygen concentration under existing conditions (No-Action Alternative) were always greater than 7 mg/L (Exhibit E – Section 7.5.10) (Basin Plan objective [CVRWQCB 1994]). Dissolved oxygen under the Proposed Action will be maintained compared to the No-Action Alternative and will be consistent with the Basin Plan. The reservoirs will continue to be drained to the bottom of the spill gates annually for gate inspection and maintenance.

6.2.2 Additional Species-Specific Effects Analysis

Provided below is a discussion of the potential impacts of changes in the Proposed Action, described above, on hardhead, FYLF, CRLF, and WPT. BA/BE Figures 25–28 present a graphical summary, by river reach, of the specific fish and aquatic resources that are maintained or enhanced under the Proposed Action.

6.2.2.1 Hardhead

Modification of instream flows and water temperature under the Proposed Action could potentially impact hardhead by affecting (1) riverine aquatic habitats (i.e., the bypass and peaking reaches) and (2) medium reservoir aquatic habitats (i.e., Ralston Afterbay). A discussion of these potential effects is provided below.

Riverine Aquatic Habitat

Potential impacts from the Proposed Action on riverine fish include changes in (1) distribution, (2) growth/condition/abundance, (3) bypass reach habitat, and (4) peaking reach habitat. The discussion of riverine habitat is separated into effects in

the bypass and peaking reaches because of their different flow regimes (nonpeaking and peaking operations).

The Proposed Action will maintain the existing (No-Action Alternative) spatial distribution of fish species in the bypass and peaking reaches. As described in Section 5.3.2.1, the existing distribution of hardhead is primarily determined by water temperature and physical barriers (e.g., waterfalls) in the MFP area. The Proposed Action will not change barriers and will have very limited effect on water temperature (Exhibit E – Section 8.5.1.4). A slight decrease in summer temperature in the lower Rubicon is not anticipated to affect hardhead distribution, because the magnitude is small and limited to critical water years.

Growth and condition of fish in the bypass and peaking reaches is primarily determined by water temperature and food availability (productivity). The Proposed Action maintains or enhances productivity (Exhibit E – Section 8.5.2.1) and water temperature (Exhibit E – Section 8.5.1.4), and enhances spawning and/or rearing habitat availability in all river reaches. Therefore, the growth, condition, and abundance of fish will be enhanced in all river reaches compared to the No-Action Alternative.

BYPASS REACHES

The Proposed Action could potentially impact hardhead as a result of changes in summer/fall rearing and winter fish habitat in the bypass reaches could potentially impact hardhead.

The Proposed Action median habitat values (50% exceedance) compared to the No-Action Alternative show that the Proposed Action results in an overall enhancement of summer/fall rearing habitat for hardhead compared to the No-Action (BA/BE Tables 36 and 37). Small streams (BA/BE Table 37) have no change in the summer/fall rearing habitat for rainbow trout adult or juveniles because the MFP has little to no effect on flows during the summer/fall. There is little change in the hardhead rearing habitat (adult/juvenile) in the lower Rubicon River because, with accretion, the amount of flow and habitat was relatively high in the existing conditions (No-Action Alternative) and the increased flow from the Proposed Action results in minimal change to the amount of habitat.

The Proposed Action maintains or enhances flows during the winter time period and maintains or enhances wetted perimeter compared to the No-Action Alternative (Exhibit E – Section 8.5 and Section 8.5.1.5). The primary determinant for setting winter MIFs in the Proposed Action was to maintain winter flows similar to the fall flows and thereby maintain wetted channel habitat (e.g., wetted perimeter) and productivity of the river channels. The Proposed Action enhances winter habitat for hardhead as compared to the No-Action Alternative.

Enhancement of summer/fall rearing and winter fish habitat under the Proposed Action in the bypass reaches would enhance hardhead.

PEAKING REACH

In the peaking reach, fluctuating flows and the rate that the flows change could potentially result in changes in effective spawning habitat, fish abundance and production and fish stranding in the peaking reach, all of which could result in impacts to hardhead.

The Proposed Action increases MIF requirements compared to the No-Action Alternative resulting in higher instream flows that reduce potential flow fluctuations in the peaking reach during the spawning season (e.g., March–May) (Exhibit E – Section 8.5.1.1). Model runs of the Proposed Action show potential reductions in flow fluctuations compared to the No-Action Alternative (BA/BE Figures 23 and 24). The Proposed Action higher MIFs will also reduce the potential flow fluctuations compared to the No-Action Alternative; therefore, spawning habitat will be enhanced under the Proposed Action compared to the No-Action Alternative.

The Proposed Action results in reductions in flow fluctuations and increased minimum flows that will increase food production (Exhibit E – Section 8.5.2.1). Literature studies concluded that increased food production and reduced flow fluctuations or the reduction in the ratio between high and low flows (peaking discharge ratio) lead to increased fish production (e.g., Moog 1993). An approximate estimate of the increase in fish production in the peaking reach based on Moog (1993) is as high as 160% (Exhibit E – Section 8.5.2.4). Reductions in flow fluctuations below Glen Canyon Dam resulted in relatively large increases in fish abundance (McKinney et al. 2001) and increased growth of young-of-year fish (Korman and Campana 2009). Therefore, fish abundance and production will be maintained or enhanced under the Proposed Action compared to the No-Action Alternative.

Stranding study results (AQ 1 – TSR [PCWA 2011y; SD B]) showed that some temporary trapping/ isolation of fish occurred in the upper part of the peaking reach, depending on base flow. In the stranding study (AQ 1 – TSR [PCWA 2011y; SD B]), following the decline (downramping) of daily high flow (900 cfs) to a low base flow of approximately 100 cfs, fish were observed in permanently wetted locations that were disconnected from the main channel and would not be connected until flows were increased the following day (assuming no predation of the fish occurred). One sculpin was observed stranded and dead. The downramping rate requirement (river stage reduction per hour) under the Proposed Action (Exhibit E – Section 8.5.1.1) is slower than the No-Action Alternative ramping rate requirement. A decrease results in the frequency of time that high ramping rates (e.g., >400 cfs/hr) would occur (Exhibit E – Section 8.5.1.1). The decrease in ramping rates will provide fish additional time during downramp events to move from portions of the channel that will become disconnected from the main channel or that will become dewatered. Slower downramping rates have been shown to reduce stranding of fish (e.g., Irvine et al. 2009); however, it is possible in situations where fish are ‘trapped’ in large channel depressions or side channels that reduced ramping rates can have limited effect on ‘trapping’ of fish (Addley, pers. obsv., 2011). The Proposed Action reduced ramping rate will in general be an enhancement

to fish in the peaking reach by reducing the amount of temporary stranding and/or mortality compared to the No-Action Alternative.

Enhancement of fish spawning habitat, abundance, and production, as well as a potential reduction in stranding rates, would represent an enhancement for hardhead in the peaking reaches.

Medium Reservoir Aquatic Habitat

Because no change is expected in the reservoir habitat (water temperature, reservoir volumes), the Proposed Action will have no effect on the hardhead as compared to the No-Action Alternative.

The FPMP (PCWA 2011o; SD A) and the SMP (PCWA 2011i; SD A) include tagging studies designed to understand the movements of hardhead in Ralston Afterbay. These studies will benefit the understanding of hardhead behavior and applicable hardhead management approaches.

6.2.2.2 Foothill Yellow-Legged Frog

Under the Proposed Action, changes to MIFs, pulse flows, water temperature, spill flows, and operations of Oxbow Powerhouse could potentially affect FYLF distribution, abundance, and breeding timing in the bypass and peaking reaches.

Bypass Reach Aquatic Habitat

The Proposed Action was specifically designed to maintain the current No-Action Alternative upstream distribution/abundance of FYLF in the bypass reaches. The Proposed Action summer minimum flows in the Middle Fork American River below Middle Fork Interbay and Rubicon River were set to approximately maintain the existing location of the 17°C water temperature transition zone during critical, dry, and below normal water year types, when water temperature modeling showed that changes to minimum flows could affect water temperature (PCWA 2011u; SD B). Minimal change to the summer water temperature in these streams is expected to occur (Exhibit E – Section 8.5.1.4). Surveys and water temperature monitoring will be used in the Proposed Action to monitor FYLF. (PCWA 2011n and 2011o; SD A).

Pulse flows (wet and above normal water year types) in the Proposed Action are timed to start in early May prior to FYLF breeding initiation, which begins approximately mid-May through early June depending on the water year). The pulse flows also include a downramp recession designed to the extent practicable to mimic a snowmelt run-off hydrograph. Water temperature modeling indicates that the pulse flows would cool water temperatures and delay warming (Exhibit E – Section 8.5.1.4), which could potentially delay the onset of FYLF breeding (Exhibit E – Section 7.5). Any potential delay as a result of the Proposed Action pulse flows is not anticipated to result in adverse impacts to FYLF breeding because the pulse flow recedes prior to the end of the breeding season and would result in breeding timing more synchronized with natural

hydrology timing (late May and June). The shape and timing of the pulse flows would also provide breeding cues to FYLF similar to natural cues to which FYLF are adapted.

Spill flows from the reservoirs (Hell Hole and French Meadows/Middle Fork Interbay) will still occur in the Proposed Action similar to the No-Action Alternative (e.g., May–July), except that the Proposed Action includes provisions for downramping of the spills in May through July. Spill flows could disrupt breeding, destroy egg masses, and flush tadpoles downstream. During the recession of spill flows tadpoles could be stranded. The Proposed Action will downramp spill flows, which will minimize potential stranding of tadpoles. Also, a slight reduction occurs in the number of spill events below Hell Hole Reservoir that would affect FYLF under the Proposed Action (BA/BE Table 39) compared to the No-Action Alternative. These changes to minimum flow and pulse flows (and the subsequent effects on water temperature), and changes to spill ramping under the Proposed Action are considered an enhancement to FYLF distribution/abundance compared to the No-Action Alternative.

The FYLFMP (PCWA 2011p; SD A) will characterize and report FYLF distribution and abundance in the bypass reach associated with the MFP over the term of the license.

Peaking Reach Habitats

FYLF are present and breeding occurs in the tributaries to the peaking reach of the Middle Fork American River (below Oxbow Powerhouse). However, FYLF have rarely been observed along the peaking reach and no breeding has been documented. Cold water temperatures and fluctuating flows likely are the primary factors limiting the FYLF in the peaking reach.

The Proposed Action will have negligible effects to existing FYLF populations along the peaking reach and its tributaries compared to the No-Action Alternative. Under the Proposed Action, water temperatures would remain essentially the same (too cold) (Exhibit E – Section 8.5.1.4) and the reductions in flow fluctuations (magnitude and rate) are not anticipated to be large enough to allow FYLF breeding to occur in the peaking reach. Additionally, the Proposed Action does not affect tributaries to the peaking reach and, thus, is not expected to affect FYLF breeding or rearing that currently occurs in the tributaries to the peaking reach.

The FYLFMP (PCWA 2011p; SD A) includes characterization and reporting of distribution and abundance in the bypass and peaking reaches associated with the MFP over the term of the license. Based on the results of the FYLFMP monitoring and comments received during the results review process, PCWA and resource agencies may meet to discuss the results and/or modify the monitoring program.

The SMP (PCWA 2011i; SD A) could result in the removal of vegetation and placement of sediment on Indian Bar and Junction Bar in the peaking reach potentially impacting FYLF. However, avoidance and protection measures in the SMP specify that sediment management activities will not occur on these bars during the breeding season (May 15 to June 15) and that, prior to any sediment management activity, the bars will be

surveyed for FYLF and any FYLF within 100 m of any sediment management activity will be translocated downstream.

The FYLFMP (PCWA 2011p; SD A) will characterize and report FYLF distribution and abundance in the peaking reach associated with the MFP over the term of the license.

6.2.2.3 California Red-Legged Frog

Changes in the operation of the MFP could potentially affect CRLF and their habitats in the vicinity of the MFP. USFWS identified off-stream ponds at Horseshoe Bar along the Middle Fork American River (downstream of Ralston Afterbay) as potential aquatic breeding habitat for CRLF. Under the Proposed Action, changes in routine operations, routine maintenance, non-routine recreation facility maintenance, modification of existing facilities, and construction of new facilities will not impact Horseshoe Bar aquatic breeding habitat or adjacent areas. Additionally, CRLF are not known to exist in the MFP. Therefore, implementation of the Proposed Action will not affect CRLF breeding habitat or individuals.

6.2.3 Western Pond Turtle

Changes in the operation of the MFP could potentially affect WPT and their habitats in the vicinity of the MFP. WPT were observed downstream of Ralston Afterbay in the peaking reach and in the Horseshoe Bar ponds. The Proposed Action MIFs and pulse flows in the bypass reaches create more natural shaped hydrographs within water years (e.g., higher spring flows) and between water year types (higher flows in wetter water year types) as compared to the No-Action Alternative. In the peaking reach, the Proposed Action reduces flow fluctuations and modifies MIFs to create more natural shaped hydrographs compared to the No-Action Alternative. In addition, the Proposed Action will increase wetted perimeter (Exhibit E – Section 8.5.1.5) and enhance productivity (algae and benthos), increase habitat diversity (Exhibit E – Section 8.5.2.2), and maintain the river channels and create a more natural sediment supply (Exhibit E – Section 8.5.1.2). The Proposed Action will have no effect on the Horseshoe Bar ponds. Therefore, implementation of the Proposed Action will maintain or enhance WPT and their habitat in the bypass and peaking reaches compared to the No-Action Alternative, and will not affect habitats or individuals at Horseshoe Bar.

The WPTMP (PCWA 2011s; SD A) includes periodically characterizing and reporting on WPT distribution and abundance in the bypass and peaking reaches and Project reservoirs associated with the MFP during the term of the new license. Based on the results of the WPTMP monitoring and comments received during the results review process, PCWA and resource agencies may meet to discuss the results and/or modify the monitoring program.

Routine Maintenance

The use of herbicides, surfactants, and fungicides as part of routine vegetation and noxious weed management; or use of heavy equipment, ground-disturbing activities, or dewatering of diversion pools and reservoirs as part of routine sediment management

could potentially degrade water quality or directly impact fish (e.g., hardhead) or other aquatic species.

Refer to Section 6.3.7, the SMP, and the VIPMP for a description of routine vegetation and noxious weed and sediment management under the Proposed Action. A summary of these activities, including changes from the No-Action Alternative are provided in BA/BE Tables 22 through 24.

The use of herbicides, surfactants, and fungicides as part of routine vegetation and noxious weed management at Project facilities and features located adjacent to bypass streams or large and medium reservoirs could potentially degrade water quality and aquatic habitats. The VIPMP includes avoidance and protection measures to protect aquatic habitats by preventing the entry of potentially toxic chemicals into the watershed. These measures include:

- Restrictions on the use of herbicides, surfactants, and fungicides within protective buffers around bypass and peaking reaches;
- Use of herbicide formulations that are considered by the United States Environmental Protection Agency to be safe for aquatic areas;
- Specific measures requiring supervision of herbicide application by a licensed PCA and restrictive application and disposal methods; and
- Implementation of a Water Quality Monitoring Program to evaluate the effectiveness of protective measures included in the VIPMP.

Under the Proposed Action, routine sediment management would include periodic removal of sediment from medium reservoirs, as well as development of sediment augmentation areas below Middle Fork Interbay and Ralston Afterbay. Periodic sediment removal and development of the sediment augmentation areas could potentially temporarily degrade water quality from increased turbidity, erosion, sedimentation, and potential contamination from accidental hazardous material spills. In addition, direct loss of aquatic species could occur during dewatering of medium reservoirs and small diversion pools. The SMP includes the following measures to avoid and protect water quality and aquatic species during implementation of these activities:

- Implementation of USDA-FS Water Quality BMPs requiring development of an erosion control plan and a spill prevention, containment, and countermeasure plan; timing construction activities to occur in the dry season; implementation of slope stabilization measures; and minimization of in-channel excavation.
- Conducting fish captures prior to dewatering of diversion pools or reservoirs (or prior to placement of gravel at the Middle Fork Interbay Sediment Augmentation Areas) and relocating them upstream of the construction area.

- Implementation of measures to maintain MIFs and protect water quality below Middle Fork Interbay, where sediment (gravel) is being placed in the channel, including installation of a streamflow bypass pipe from upstream of Middle Fork Interbay to a point downstream of the augmentation area and placement of a silt screen to capture fine sediment.
- Surveying for FYLF prior to any sediment placement activities and, if any are present, translocating them downstream.
- Maintaining WSE at Ralston Afterbay during sediment removal no lower than the bottom of the spill gates (1,149 feet) to provide a refuge pool for aquatic species. This elevation is the same that Ralston Afterbay is maintained at during the Project annual maintenance outage. The minimum flow requirement applicable to the peaking reach will flow through Ralston Afterbay and the refuge pool (e.g., over the spill gates) to maintain water quality conditions in the refuge pool.
- A hardhead tagging study is also specified in the SMP during the first sediment removal event at Ralston Afterbay. The tagging study will provide information regarding hardhead movements during sediment management.
- Prior to implementation of sediment management activities, PCWA will consult with resource agencies and obtain appropriate permits. They may include a California Department of Fish and Game Streambed Alteration Agreement, United States Army Corps of Engineers Section 404 Permit; RWQCB 401 Certification, or a USDA-FS Special Use Authorization. Measures required in these permits will also be implemented.
- PCWA anticipates the preparation of a Project-specific Water Quality Protection Plan (WQPP) as a condition of the State Water Board 401 Certification for the MFP. PCWA will develop a WQPP in consultation with the State Water Board prior to commencement of any construction activities.

Implementation of AP measures incorporated into the VIPMP and SMP would protect water quality and fish or other aquatic species during implementation of the Proposed Action.

6.2.4 Existing Facility Modification and Construction of New Facilities

Under the Proposed Action, modification of existing MFP facilities and construction of new facilities could potentially impact water quality and result in temporary loss of habitat for aquatic species during construction. Refer to Section 4.2.6 and BA/BE Appendix C for a description of facility modifications and construction projects.

Construction of the modified diversion dams and new facilities associated with the Hell Hole Reservoir Seasonal Storage Increase Improvement could result in impacts to water quality from increased turbidity, erosion, sedimentation, and potential contamination from accidental hazardous material spills resulting from ground disturbing

activities and use of heavy equipment. Measures incorporated in BA/BE Appendix C require implementation of USDA-FS Water Quality BMPs including (but not limited to) development of an erosion control plan and a spill prevention, containment, and countermeasure plan; timing construction activities to occur in the dry season; implementation of slope stabilization measures; and minimization of in-channel excavation. Implementation of these BMPs would protect water quality during construction activities under the Proposed Action.

Under the Proposed Action, facility modification/construction activities will also result in temporary loss of habitat during dewatering of small diversion pools (Duncan Creek, North Fork Long Canyon Creek, South Fork Long Canyon Creek), and medium reservoirs (Middle Fork Interbay, Ralston Afterbay). Implementation of measures incorporated into BA/BE Appendix C will protect fish species during dewatering activities. These measures will include capturing all fish prior to dewatering of diversion pools or reservoirs and relocating them downstream of the construction area. Appropriate data (e.g., records of fish rescued) will be obtained during the fish rescue and provided to appropriate resource agencies following completion of the sediment management or modification/construction activities.

Although the facility modification/construction activities will result in a temporary loss of habitat for fish species, implementation of these activities under the Proposed Action will enhance aquatic habitats over the license term by:

- Providing increased sediment supply (e.g., spawning gravels) in several bypass stream reaches (Duncan Creek, North Fork Long Canyon Creek, South Fork Long Canyon Creek, and Middle Fork American River below Middle Fork Interbay) and in the peaking reach;
- Eliminating the need for periodic sediment removal activities at the small stream diversions (Duncan Creek, North Fork Long Canyon Creek, South Fork Long Canyon Creek)
- Providing the ability to implement new MIFs, new environmental pulse flows, and the downramp of spill flows.

With implementation of the BMPs to protect water quality and measures to minimize potential fish mortality, the Proposed Action facility modification and facility construction activities will maintain or protect fish and aquatic species. Implementation of the Proposed Action will be an overall enhancement to the fish and aquatic species and their habitat compared to the No-Action Alternative.

6.2.5 Additional Measures to Protect Aquatic Species and Habitat

The Proposed Action also includes measures in the FPMP (PCWA 2011o; SD A), FYLFMP (PCWA 2011p; SD A), WPTMP (PCWA 2011s; SD A), and WQMP (PCWA 2011t; SD A) to further protect aquatic resources as follows:

- Monitoring fish species composition, abundance, condition factor, and population age class structure at select sites in the bypass and peaking reaches over the term of the license.
- Monitoring species abundance, upstream distribution, and timing of initiation of breeding of FYLF populations at select sites in the bypass and peaking reaches.
- Collection of water temperature data at select sites in the bypass reaches to evaluate the potential effects of the flow regimes specified in the IFRM on water temperatures for FYLF breeding.
- Monitoring of physical, chemical, and bacterial water quality conditions in the bypass and peaking reaches and reservoirs associated with the MFP over the term of the new license, including reporting and agency consultation.

6.3 EFFECTS ON BALD EAGLE

One active bald eagle nest and three winter roosts were identified in the vicinity of Hell Hole Reservoir. Bald eagles are known to forage in Hell Hole and French Meadows reservoirs, as well as stream reaches along the Middle Fork American River and the Rubicon River. Provided below is a description of potential direct and indirect impacts on bald eagles under the Proposed Action. Potential direct effects include loss of individuals or disturbance of nesting or roosting eagles, and potential indirect effects include loss or degradation of aquatic foraging habitat.

6.3.1 Electrocution on Project Powerlines or Removal of Nests

Under existing conditions (No-Action Alternative), several MFP power poles and powerlines have design elements that may pose a potential risk for raptor electrocution (TERR 4 – TSR [PCWA 2011j; SD B]). However, no known mortalities result from electrocution of bald eagles or other raptors on MFP power poles and powerlines. Refer to the BEMP (PCWA 2011k, SD A) for a description of MFP power poles and powerlines, potential risk for electrocution, and measures to enhance the protection of bald eagles and other raptors in the vicinity of power poles and powerlines.

Under the No-Action Alternative, existing power poles and powerlines are replaced as necessary (i.e., when they are damaged or have exceeded their useable lifespan) using traditional design configurations. Under the Proposed Action, all MFP power poles and powerlines that have one or more elements that pose a risk of avian electrocution will be replaced/retrofitted pursuant to APLIC guidelines within 15 years of license issuance. The BEMP (PCWA 2011k; SD A) provides a detailed schedule for retrofitting or replacement of MFP power poles and powerlines. Raptor-safe design configurations as described in the APLIC guidelines (APLIC 2006) will be used for any new power poles and powerlines or when replacement of existing poles, phase conductors, and associated equipment is required. Specifically, the new Hell Hole Dam Spillway Crest Gates Control Building Communication Line/Powerline to be constructed as part of the

Hell Hole Reservoir Seasonal Storage Increase Improvement will be designed to conform to APLIC guidelines.

Additional AP measures included in the BEMP (PCWA 2011k; SD A) associated with bald eagle management in the vicinity of MFP power poles and powerlines during the license term include:

- Restrictions on the removal of bald eagle nests or other raptor nests from powerline poles;
- Evaluation and replacement/retrofitting of any power pole/powerline involved in an electrocution; and
- Annual agency consultation to discuss powerline replacement or retrofit activity.

In addition, while electrocution of bald eagles or other raptors on MFP power poles/powerlines is considered unlikely, replacement/retrofitting and construction of new power poles and powerlines using APLIC design configurations, and implementation of other measures included in the BEMP (PCWA 2011k; SD A) will protect bald eagles and their nests, as well as other raptor species, during the term of the license.

6.3.2 Secondary Poisoning

Under the Proposed Action, metal phosphide fumigants (i.e., gas cartridges) will be used in rodent burrows on earthen dams (i.e., French Meadows and Hell Hole dams) to control rodents at DSOD's request. Potential impacts to bald eagles could occur from secondary poisoning if eagles consume rodents that have been killed by the metal phosphide fumigants.

The VIPMP (PCWA 2011h; SD A) includes specific application methods to be used on earthen dams to protect bald eagles or other scavengers from secondary poisoning. These methods include:

- Requiring metal phosphide fumigants to be administered by a PCA
- Restriction of the use of fumigants to active rodent burrows
- Conducting follow-up monitoring of the application area, and collecting and disposing of rodent carcasses

Implementation of the methods described above during the application of rodenticides will protect bald eagles in the vicinity of French Meadows and Hell Hole dams from secondary poisoning.

6.3.3 Routine Maintenance and Non-Routine Recreation Facility Activities

Implementation of routine maintenance activities and non-routine recreation facility activities under the Proposed Action could potentially disturb breeding or roosting bald

eagles at Hell Hole Reservoir, or new bald eagle nests or winter roosts that may be identified during the term of the license. Section 4.1 and applicable management plans (i.e., the VIPMP [PCWA 2011h; SD A], the Recreation Plan [PCWA 2011m; SD A], the TSMP [PCWA 2011i; SD A], and the SMP [PCWA 2011j; SD A]) and BA/BE Tables 22 through 24 provide a summary of these activities under the Proposed Action, as well as changes from the No-Action Alternative.

USFWS National Bald Eagle Management Guidelines (USFWS 2007) recommend that activities be restricted within 660 feet of bald eagle nests, and also provide general guidelines for modifying activities in the vicinity of bald eagle roosts. In addition, during the development of the BEMP (PCWA 2011k; SD A), resource agencies requested that a 0.25 mile (1,320-foot) activity buffer around the bald eagle nest be used for MFP impact analyses. Therefore, potential disturbance of bald eagles would result if equipment noise and/or increased human presence during these activities occurred within 0.25 mile of an active nest or roost, particularly during the sensitive period for breeding bald eagles (e.g., nest building and courtship through the nestling period, January through July) (BA/BE Figure 21).

Under the Proposed Action, no routine maintenance activities or non-routine recreation facility activities will be implemented within 0.25 mile of the bald eagle nest at Hell Hole Reservoir. The closest MFP facility is Upper Hell Hole Campground (located approximately 0.5 mile from the nest). This recreation facility will be removed as part of the Proposed Action. Therefore, noise or increased human activity during implementation of routine and nonroutine activities will not result in disturbance of the bald eagle nest. In addition, because the three winter roosts are also located more than 0.25 mile from MFP facilities and recreation facilities where activities are implemented, and no activities are implemented at Hell Hole Reservoir during the winter months, implementation of the Proposed Action will not result in disturbance of bald eagle winter roosts.

If new bald eagle nests or winter roosts are identified within 0.25 miles of the locations where non-routine recreation facility activities would be implemented, PCWA would consult with resource agencies to review the measures included in BEMP (PCWA 2011k; SD A) and the Recreation Plan (PCWA 2011m; SD A) for adequacy in avoiding disturbance of these nests and roosts. PCWA would also obtain all appropriate permits or agreements prior to construction.

6.3.4 Recreation Use

Section 4.1.1.9 and the Recreation Plan (PCWA 2011m; SD A) provide a description of recreation use at MFP recreation facilities and features. Ongoing recreation facility use at MFP reservoirs and surrounding MFP recreation facilities could result in disturbance of breeding bald eagles at Hell Hole Reservoir, or new bald eagle nests that may be identified during the term of the license. MFP reservoirs and surrounding lands provide recreation opportunities such as fishing, boating, hiking, and camping. Hell Hole Reservoir supports a number of MFP-related recreation activities including developed and dispersed camping, boating, fishing, and hiking. The type or size of boats used on

the reservoir are not restricted, and no speed limits are imposed. Developed recreation facilities are typically open from May 15 to November 1, depending on snow conditions. The peak recreation period is between Memorial Day and Labor Day. Bald eagles forage, roost, and nest at Hell Hole Reservoir under existing recreational use.

Under the Proposed Action, recreational use at Hell Hole will be similar to the No-Action Alternative, and peak recreational use will continue to occur between Memorial Day and Labor Day, overlapping with the bald eagle breeding season. However, Upper Hell Hole Campground (located approximately 0.5 mile from the nest) will be removed under the Proposed Action. This removal will result in decreased recreational activity in the vicinity of the nest, including decreased foot traffic along the Hell Hole Trail, which provides access to the Upper Hell Hole Campground and passes within 70 feet of the bald eagle nest. Decreased recreational use at Upper Hell Hole Campground and along Hell Hole Trail is considered an enhancement for bald eagles at Hell Hole Reservoir.

6.3.5 Existing Facility Modification and Construction of New Facilities

Modification of existing MFP facilities and construction of new facilities could potentially disturb breeding bald eagles at Hell Hole Reservoir. Potential disturbance of bald eagles would result if equipment noise and/or increased human presence during these activities occurred within 0.25 mile of an active nest or roost, particularly during the sensitive period for breeding bald eagles.

Modification and construction projects under the Proposed Action will include implementation of the Hell Hole Reservoir Seasonal Storage Increase Improvement, outlet works modifications, small diversion modifications, and installation of new stream gages and weirs. Refer to Section 4.2.6 and BA/BE Appendix C for a description of these modification and construction projects. Three of these projects (i.e., Hell Hole Reservoir Seasonal Storage Increase Improvements, Hell Hole Dam Outlet Works Modification, and installation of the Rubicon River Gages at Hell Hole Dam Outlet Works) will occur near Hell Hole Reservoir. However, all construction activities will be located more than 4 miles from the active nest. This location greatly exceeds the 660-foot activity buffer recommended by USFWS, as well as the 0.25 mile buffer analyzed at the request of CDFG, for prevention of disturbance of bald eagles during construction activities.

If new bald eagle nests or winter roosts are identified within 0.25 mile of the locations where modification of existing MFP facilities and construction of new facilities will occur, PCWA would consult with resource agencies to review the measures included in Appendix A and the BEMP (PCWA 2011k; SD A) for adequacy in avoiding disturbance of these nests and roosts. PCWA would also obtain all appropriate permits or agreements prior to construction.

6.3.6 Routine Operations

Modifications in routine MFP operations under the Proposed Action could potentially affect aquatic foraging habitat and fish populations that form the prey base for bald eagles. Refer to Section 4.2.3 for a description of routine operations under the Proposed Action. Section 6.2 provides a detailed analysis of the affects of the Proposed Action on fish populations in the bypass and peaking reaches and large and medium reservoirs.

As described in Section 6.2, increased MIFs in the bypass and peaking reaches, as well as reduced flow fluctuations in the peaking reach, will increase habitat and food production (aquatic macroinvertebrates), and will likely increase fish abundance. Minimum pool requirements and other changes in reservoir WSEs from implementation of measures under the Proposed Action will result in little or no changes in reservoir volume, water temperature, dissolved oxygen levels or other parameters that could potentially affect reservoir fish populations. In addition, as described in the Recreation Plan (PCWA 2011m; SD A), PCWA will stock fish in Hell Hole and French Meadows reservoirs on an annual basis during the term of the license equivalent to 50% of CDFG's annual management target or 50% of the historical average stocking into the reservoir (2001–2009), whichever is less. Fish species and size class stocking targets will be determined in consultation with the CDFG but are expected to be similar to historic stocking efforts. Therefore, changes in routine operations under the Proposed Action will maintain or enhance aquatic habitats and fish populations during the license term. Maintenance or enhancement of fish populations in bypass streams and rivers, as well as MFP reservoirs, will potentially enhance bald eagles by increasing their prey base.

6.3.7 Routine Vegetation and Noxious Weed Management

The use of herbicides, surfactants, and fungicides as part of routine vegetation and noxious weed management at MFP facilities and features located adjacent to bypass streams or large and medium reservoirs could potentially degrade water quality and aquatic habitats where bald eagles forage. Refer to the Section 4.2.6 and the VIPMP (PCWA 2011h; SD A) for a description of vegetation and noxious weed management under the Proposed Action. BA/BE Tables 22 through 24 provide a summary of vegetation and noxious weed management activities, including changes from the No-Action Alternative.

The VIPMP (PCWA 2011h; SD A) includes AP measures to protect water quality and aquatic habitats by preventing the entry of potentially harmful chemicals into water bodies. These measures include:

- Restrictions on the use of herbicides, surfactants, and fungicides within protective buffers around bypass and peaking reaches and Special Aquatic Features (i.e., reservoir)

- Use of herbicide formulations that are considered by the United States Environmental Protection Agency to be safe for aquatic areas
- Supervision of herbicide application by a licensed PCA and restrictive application and disposal methods
- Implementation of a Water Quality Monitoring Program to evaluate the effectiveness of protective measures included in the VIPMP (PCWA 2011h; SD A)

Implementation of these measures will protect water quality and aquatic habitats where bald eagles are known to forage. Potential impacts associated with routine vegetation and noxious weed management are considered negligible.

6.3.8 Additional Measures to Protect Bald Eagles

The BEMP (PCWA 2011k; SD A) also includes measures to further protect the bald eagle nest and winter roosts at Hell Hole Reservoir, and any new nests or roosts identified in the vicinity of the MFP during the license term. These include:

- Conducting 5-year bald eagle wintering and nesting surveys in the vicinity of MFP reservoirs and bypass and peaking reaches
- Coordinating with resource agencies annually to monitor the status of known nests in the vicinity of the MFP
- Obtaining a permit from USFWS pursuant to the Bald and Golden Eagle Protection Act, if required, and consulting with CDFG regarding any pending activity under the federal permit
- Consulting annually with agencies to discuss annual and 5-year nest monitoring and reporting results, mortality monitoring results, identification of any new nests in the vicinity of the MFP and the appropriateness of AP measures, and power pole retrofit or replacement activities
- Implementing the ETP to increase awareness and sensitivity to bald eagle protection requirements and reporting procedures for bald eagle or other raptor mortalities

Implementation of these measures will protect bald eagles by providing an opportunity to evaluate the location of nests and roosts and modify AP measures, as necessary, and ensure PCWA employees and contractors understand and implement AP measures.

6.4 EFFECTS ON NORTHERN GOSHAWK AND CALIFORNIA SPOTTED OWL

6.4.1 Electrocuting on Project Powerlines

Under existing conditions (No-Action Alternative), several MFP power poles and powerlines have design elements that may pose a potential risk for electrocution of special-status raptors, including northern goshawk and California spotted owl. Refer to the Section 6.3.1 for a discussion of measures included in the BEMP (i.e., replacement/retrofitting of existing or construction of new power poles and powerlines using APLIC design configurations, and implementation of other measures, such as annual consultation with resource agencies) that will protect special-status raptor species during the license term.

6.4.2 Secondary Poisoning

Under the Proposed Action, metal phosphide fumigants (i.e., gas cartridges) will be used in rodent burrows on earthen dams (i.e., French Meadows and Hell Hole dams) to control rodent populations and meet DSOD's requirements. Secondary poisoning of raptors, including northern goshawk and California spotted owl, could occur if they consume rodents that have been killed by the metal phosphide fumigants.

Section 6.3.2 describes the specific application methods to be used on earthen dams to protect scavengers from secondary poisoning. These include requiring metal phosphide fumigants to be administered by a PCA; restriction of the use of fumigants to active rodent burrows; and conducting follow-up monitoring of the application area, and collecting and disposing of rodent carcasses. Implementation of these application methods will protect northern goshawk and California spotted owl scavenging in the vicinity of French Meadows and Hell Hole dams from secondary poisoning.

6.4.3 Disturbance of Raptor Nests

Routine maintenance activities and non-routine recreation facility activities could potentially result in disturbance of northern goshawk and California spotted owl nests in the vicinity of the MFP.

USDA-FS data show a number of California spotted owl and northern goshawk nest areas and PACs are present near MFP facilities. Refer to BA/BE Table 30 and BA/BE Maps 15 and 16 for the location of California spotted owl and northern goshawk nest areas PACs in relation to Project facilities.

Refer to Section 4.2.6 and to applicable management plans (i.e., the SMP, VIPMP, Recreation Plan, and TSMP) for a description of routine maintenance activities and non-routine recreation facility activities under the Proposed Action. BA/BE Tables 22 through 24 provide a summary of changes from the No-Action Alternative.

Currently, no known raptor nests or PACs are located in the vicinity of proposed non-routine recreation activities. However, under the Proposed Action, implementation of routine maintenance activities could result in disturbance of breeding raptors from

equipment noise and increased human activity. In consultation with resource agencies, it was decided that a 500-foot activity buffer would be sufficient to avoid disturbance of raptor nests. Therefore, disturbance would occur if maintenance activities are conducted within 500 feet of a nest during the breeding season (i.e., March 1 through August 31 for California spotted owl; February 15 through September 15 for northern goshawk). Currently, no known northern goshawk nests are within 500 feet of facilities where routine maintenance activities and nonroutine recreation facility activities will be implemented. Therefore, the Proposed Action will not result in impacts to northern goshawk.

Vegetation management and annual and periodic road maintenance will continue to be implemented at the Middle Fork Interbay Dam Road, which is within 500 feet of a California spotted owl nest. Under the Proposed Action, noxious weed management will also be conducted at these locations.

Measures incorporated into the TSMP (PCWA 2011i; SD A) and the VIPMP (PCWA 2011h; SD A) will protect California spotted owl nests during implementation of routine vegetation and noxious weed management and annual and periodic road maintenance by limiting the duration and extent of activities and by establishing limited operating periods. These measures will also apply to any new raptor nests that may be identified during the term of the license. These measures include:

- VIPMP
 - If routine vegetation or noxious weed management activities are implemented within 500 feet of a known nest, locate staging areas away from and limit the duration and extent of activities within the nest buffer.
 - Vegetation supporting nests will not be trimmed, unless approved by the appropriate state or federal agencies.
 - Pesticides will be applied using methods that will avoid impacts to nests.
- TSMP
 - If annual road or trail maintenance activities are implemented within 500 feet of a known nest, staging areas will be located away from and the duration and extent of activities within the nest buffer will be limited.
 - Periodic and special Project activities will be implemented outside the breeding season to the extent possible.
 - Preconstruction clearance surveys will be required prior to implementation of periodic road or trail maintenance implemented during the breeding season. If active nests are found, activities requiring the use of heavy equipment will not be implemented within 500 feet of the nest during the applicable nesting season.

In addition, although no raptor nest have been identified within 500 feet of routine sediment management or non-routine recreation facility activities requiring ground disturbing activities or use of heavy equipment, the Recreation Plan (PCWA 2011m; SD A) and the SMP (PCWA 2011i; SD A) include measures to protect raptor nests. These measures include:

- SMP
 - All sediment management activities will be conducted from September 15 to February 15, outside the raptor nesting season.
- Recreation Plan
 - Preconstruction clearance surveys will be required prior to implementation of ground disturbing and construction activities implemented during the breeding season. If active nests are found, activities requiring the use of heavy equipment will not be implemented within 500 feet of the nest during the nesting season.

Implementing these measures under the Proposed Action will protect California spotted owl and northern goshawk during the term of the license.

6.4.3.1 Modification of Existing Facilities and Construction of New Facilities

Modification of existing facilities and construction of new facilities could also potentially disturb California spotted owl and northern goshawk if construction activities were implemented within 500 feet of a nest during the breeding season. Refer to Section 4.2.6 and BA/BE Appendix C for a description of modification and construction activities to be implemented under the Proposed Action.

No California spotted owl or northern goshawk nests occur within 500 feet of any construction or staging areas for the small diversion and outlet works modifications, new gages and weirs, or new facilities associated with the Hell Hole Reservoir Seasonal Storage Increase Improvement. Therefore, facility modification and construction activities will not result in impacts to known nests. Measures incorporated into the Proposed Action (Section 4.2) will protect any new special-status nests potentially identified in the vicinity of the facility modification and construction projects. These measures include:

- Implementing construction activities outside the breeding season to the extent possible.
- Conducting preconstruction clearance surveys prior to implementing facility modification or construction activities. If active nests are found, construction activities will not be implemented within 500 feet of the nest during the nesting season.

Implementation of these measures will minimize the disturbance of any special-status raptor nests.

6.4.4 Loss or Degradation of Forest Habitat

Implementation of routine vegetation management, recreation facility maintenance, non-routine recreation facility activities, as well as modification of existing facilities and construction of new facilities, could potentially result in the loss or degradation of forested areas that represent habitat for northern goshawk or California spotted owl.

Refer to Section 6.3.7 and to the VIPMP (PCWA 2011h; SD A) and Recreation Plan (PCWA 2011m; SD A) for a description of vegetation and noxious weed management and recreation maintenance under the Proposed Action. BA/BE Tables 22–24 provide a summary of changes from the No-Action Alternative. Section 4.2.6 and BA/BE Appendix C provide a description of modification of existing facilities or construction of new facilities under the Proposed Action.

Vegetation management at Project facilities and features and Project recreation facilities and features is limited to trimming of shrubs and herbaceous vegetation and cutting of overhanging limbs to provide safe access and maintain efficient operation of Project facilities and features. In addition, hazard tree removal and fuels reduction (brushing and thinning) conducted as part of heavy recreation facility maintenance will be limited to removal of vegetation necessary to provide safe recreation opportunities and reduce fire risk. These activities are restricted to the perimeter of the recreation facilities. Implementation of these activities will not result in loss or degradation of habitat for northern goshawk and California spotted owl. Similarly, construction and staging areas for modification of existing facilities or construction of new facilities are located in disturbed, graveled or paved areas to avoid impacts to forest habitats or other natural vegetation. Forest habitats surrounding Project facilities and features and Project recreation facilities and features will, therefore, not be affected by the Proposed Action.

6.4.5 Additional Measures to Protect Northern Goshawk and California Spotted Owl

The Proposed Action also includes measures to further protect bats in the vicinity of the MFP during the license term. These measures include:

- Requiring annual agency consultation to discuss new nests to be protected during implementation of routine maintenance activities
- Implementation of the ETP for PCWA employees and contractors regarding special-status wildlife of the MFP and associated AP measures and specific work methods to be implemented for their protection

6.5 EFFECTS ON BATS

Under the Proposed Action, implementation of instream flow measures, minimum pool requirements, and sediment management activities could potentially affect aquatic

foraging habitat for special-status bats by affecting their prey base (aquatic macroinvertebrates) or through temporary loss of aquatic foraging habitat during implementation of sediment management activities. In addition, construction of modified small diversions at Duncan Creek, North Fork Long Canyon, and South Fork Long Canyon creeks would result in changes aquatic foraging habitat for special-status bats.

No federal or state listed bat species were identified utilizing (e.g., roosting in) any MFP facilities or features during MFP relicensing studies. Three FSS bat species (pallid bat, Townsend's big-eared bat, and western red bat) were detected foraging at the small diversion pools and medium and large reservoirs (TERR 6 – TSR [PCWA 2011II; SD B]).

Refer to Section 4.2.5 and 4.2.6 and to the SMP for a description of changes in operations and sediment management to be implemented under the Proposed Action, and to BA/BE Tables 22 through 24 for a summary of changes from the No-Action Alternative. Section 4.2.8 and BA/BE Appendix C provide a description of the construction of the modified diversion dams. Section 6.2 provides a detailed analysis of the affects of the Proposed Action on aquatic macroinvertebrate productivity in the bypass and peaking reaches, as well as large and medium reservoirs and small diversion pools.

As described previously, enhanced MIFs, modified pulse flows, and downramping of spills below French Meadows and Hell Hole reservoirs under the Proposed Action will increase the wetted perimeter of bypass rivers and streams. These conditions would maintain or enhance macroinvertebrate productivity in bypass reaches. Therefore, special-status bats foraging in these locations would be maintained or enhanced.

Small diversion modifications (Duncan Creek, North Fork Long Canyon, and South Fork Long Canyon creeks) will result in a temporary, short-term dewatering of the diversions pools where special-status bats are known to forage. Specifically, the modifications will require one-time dewatering of the diversions between July and November. Western red bat and spotted bat typically are not present the vicinity of the MFP in the fall. However, pallid bat, Townsend's big-eared bat, and greater western mastiff bat are year-round residents that would be present in the MFP during the months when dewatering will occur. Therefore, dewatering associated with initial modification of the diversion pools could result in temporary impacts to aquatic foraging habitat for pallid bat, Townsend's big-eared bat, and greater western mastiff bat.

However, under the No-Action Alternative, these diversions are routinely dewatered to conduct sediment management activities. Prior to diversion modification, sediment management activities will continue under the Proposed Action, but will be reduced (duration, extent of equipment needed, volume of sediment removed and disposal areas). After diversion modification the need for future sediment management is considered to be unlikely. Therefore, while implementation of the Proposed Action would result in a temporary loss of foraging habitat during the fall for pallid bat, Townsend's big-eared bat, and greater western mastiff bat during modification of the diversions, the resulting diversion improvements will reduce the frequency and need for

dewatering of the small diversion pools over the term of the license, as compared to the No-Action Alternative.

As described in Exhibit E – Section 8.5, Fish and Aquatic Resources Environmental Effects, following construction of the modified small diversions, the existing diversion pools will aggrade with sediment to near the top of the wedge-wire screen, resulting in new diversion pools becoming shallower. The footprint of the new diversion pools will remain approximately similar to the existing diversion pools. These changes in the depth of the diversion pool are expected to maintain, or potentially enhance, aquatic macroinvertebrate populations that form a prey base for special-status bats.

Although diversion modification will result in short-term, temporary loss of potential special-status bat foraging habitat, the diversion modifications will substantially reduce the need to conduct future routine sediment management, which requires dewatering of the diversions. Therefore, special-status bat foraging habitat will be maintained or enhanced under the Proposed Action. In addition, implementation of instream flow measures and minimum reservoir pool requirements under the Proposed Action will maintain or enhance aquatic macroinvertebrate populations that form a prey base for special-status bats. Therefore, impacts to special-status bats are considered negligible.

6.5.1 Additional Measures to Protect Bats

The Proposed Action also includes measures to further protect bats in the vicinity of the MFP during the license term. These measures include:

- Requiring annual agency consultation to discuss new bat roost sites to be protected during implementation of routine maintenance activities
- Implementation of the ETP for PCWA employees and contractors regarding special-status wildlife of the MFP and associated AP measures and specific work methods to be implemented for their protection

6.6 EFFECTS ON MESOCARNIVORES

6.6.1 Secondary Poisoning

Under the Proposed Action, metal phosphide fumigants (i.e., gas cartridges) will be used in rodent burrows on earthen dams (i.e., French Meadows and Hell Hole dams) to control rodent populations and meet DSOD's requirements. Secondary poisoning of scavengers, including American marten, Pacific fisher, or California wolverine, could occur if they consume rodents that have been killed by the metal phosphide fumigants.

Section 6.3.2 describes the specific application methods to be used on earthen dams to protect scavengers from secondary poisoning. These include requiring metal phosphide fumigants to be administered by a PCA; restriction of the use of fumigants to active rodent burrows; and conducting follow-up monitoring of the application area, and collecting and disposing of rodent carcasses. Implementation of these application

methods will protect American marten, Pacific fisher, or California wolverine scavenging in the vicinity of French Meadows and Hell Hole dams from secondary poisoning.

6.6.2 Loss or Degradation of Forest Habitat

Implementation of routine vegetation management, recreation facility maintenance, non-routine recreation facility activities, as well as modification of existing facilities and construction of new facilities, could potentially result in the loss or degradation of forested areas that represent habitat for special-status mesocarnivores.

American marten, pacific fisher, and California wolverine may potentially occur in forested habitats in the vicinity of the MFP. Pacific fisher and American marten are known to occur within 5 miles of Duncan Creek Diversion and French Meadows Reservoir (but outside of FERC Project boundaries). However, no denning areas for Pacific fisher or American marten are known and no wolverine occurrences or dens are recorded in the vicinity of the MFP.

Refer to Section 6.3.7 and to the VIPMP and Recreation Plan for a description of vegetation and noxious weed management and recreation maintenance under the Proposed Action. BA/BE Tables 22 through 24 provide a summary of changes from the No-Action Alternative. Section 4.2.6 and BA/BE Appendix C provide a description of modification of existing facilities or construction of new facilities under the Proposed Action.

6.6.3 Additional Measures to Protect Mesocarnivores

The Proposed Action also includes measures to further protect mesocarnivores in the vicinity of the MFP during the license term. These measures include:

- Requiring annual agency consultation to discuss new den sites to be protected during implementation of routine maintenance activities
- Implementation of the ETP for PCWA employees and contractors regarding special-status wildlife of the MFP and associated AP measures and specific work methods to be implemented for their protection

7.0 EFFECTS OF THE NO-ACTION ALTERNATIVE

The No-Action Alternative described in Section 4.1 maintains the existing baseline, with no benefits to existing resources (status quo). The MFP would continue to operate under the current license conditions and PCWA would continue to implement existing environmental and cultural measures for the protection and enhancement of resources in the vicinity of the MFP.

8.0 CUMULATIVE EFFECTS

USFWS is required to consider cumulative effects in formulating their biological opinions (50 CFR §402.14(g)(3) and (4)). Cumulative effects under ESA are defined as “...effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in the BA. Future federal actions that are unrelated to the proposed action are not considered because they require separate consultation pursuant to Section 7 of the Act.”

The action under consideration is the issuance of a new license for the MFP, which includes modification and construction of MFP facilities, changes in routine operation and maintenance activities, and implementation of new environmental programs, measures, and facilities as described in Section 4.2 – Proposed Action. Implementation of the Proposed Action in conjunction with contributing effects of other future federal, state, tribal, local or private actions will not result in cumulative effects to federal listed species, candidates for listing, and FSS species or their habitats in the action area.

As shown on BA/BE Map 17, other projects/actions considered in this cumulative effects analysis include:

- Sacramento Municipal Utility District's (SMUD) UARP (FERC Project No. 2101) that influences flow into Hell Hole Reservoir and along the South Fork Rubicon River, a tributary to the Rubicon River entering downstream of Hell Hole Reservoir
- El Dorado Water and Power Authority's (EDWPA) water rights application to store water in SMUD's UARP reservoirs
- Georgetown Divide Public Utility District's (GDPUD) Stumpy Meadows Project (non-FERC project), which affects flows in Pilot Creek, a tributary to the Rubicon River entering downstream of Hell Hole Reservoir
- Foresthill Public Utility District's (FPUD) Sugar Pine Dam Project, which diverts water from Shirttail Creek (a tributary to the North Fork American River) to provide consumptive water to the community of Foresthill
- PG&E's Drum-Spaulding Project (FERC No. 2310) that influences flow into the North Fork American River from the Towle Diversion on Canyon Creek and the Lake Valley Diversion on the North Fork of the North Fork American River
- Operations and maintenance of recreational facilities on Auburn State Project lands (referred to as the Auburn State Recreation Area [ASRA]) by USBR in the Middle Fork American River and North Fork American River downstream of Oxbow Powerhouse (peaking reach)
- PCWA's Pulp Mill Canal Diversion Dam Project that diverts water for consumptive use from Canyon Creek (a tributary to the North Fork American

River). PCWA's water rights allow for the diversion of up to 40 cfs from Canyon Creek

- PCWA's operation of the American River Pump Station diverts water from the North Fork American River near the city of Auburn to provide up to 35,500 ac-ft of consumptive water (under full build-out) from the MFP to meet PCWA's consumptive demand
- USDA-FS ENF manages lands in the vicinity of the MFP for recreation, timber harvest, fuels and fire reduction, noxious weed control, resource protection, and grazing in accordance with the SNFPA and ENF LRMP (USDA-FS 2004 and 1988)
- USDA-FS TNF manages lands in the vicinity of the MFP for recreation, timber harvest, fuels and fire reduction, noxious weed control, resource protection, and grazing in accordance with the SNFPA and TNF LRMP (USDA-FS 2004 and 1990)
- Lone Star Timber Harvesting, Sierra Pacific Industries, and other private landowners implement timber harvest plans on private lands in the Watershed
- Operations of Folsom Reservoir by the USBR to provide releases for downstream water uses and to protect aquatic resources in the Lower American River and the Delta; USBR's Congressionally authorized Auburn Dam and Reservoir Project that if built would inundate lands along the Middle Fork American River and North Fork American River downstream of Oxbow Powerhouse (peaking reach)
- NMFS OCAP BiOP and Public Draft Recovery Plan for Central Valley Winter-run and Spring-run Chinook Salmon and Steelhead (Draft Recovery Plan) defines lower American River flow and temperature management standards, improvements to an existing temperature control structure on Folsom Dam, and, in the future, evaluation of potential passage at Nimbus and Folsom dams to restore CV steelhead (*Oncorhynchus mykiss*) to native habitat within the American River basin, upstream of Folsom Reservoir

8.1 TARGET RESOURCES

The target resources considered for inclusion in the cumulative impacts analysis were identified based on: a review of the technical information developed in support of this Draft BA/BE; comments received during formal scoping meetings; comments received on the Draft License Application, as appropriate; and discussions with resource agencies, Native American Tribes, local and regional authorities, nongovernmental organizations, local communities and businesses, and members of the public.

For this analysis, target resources that may be affected cumulatively by the incremental actions of the Proposed Action in combination with other past, present, and reasonably

foreseeable future actions include water use (hydrology); water quality (water temperature); aquatic resources (hardhead, FYLF, and anadromous fish); and terrestrial resources.

8.1.1 Geographic Scope (Action Area)

The geographic scope for the cumulative impact analysis defines the physical limits or boundaries of the effects on target resources from implementation of the Proposed Action when considering effects from other projects/actions. The geographic scope appropriate for evaluating cumulative effects for the MFP is the Watershed including the North Fork American River from Folsom Reservoir upstream to the confluence of the Middle Fork American River and the Middle Fork American River, Rubicon River, and associated tributaries affected by the MFP (BA/BE Map 18). The rationale for limiting the geographic scope of this analysis to upstream of Folsom Reservoir is that Folsom Reservoir (independently operated by the USBR) has sufficient storage capacity (approximately 975,000 ac-ft) to control the timing and volume of discharge from Folsom Dam under the Proposed Project and No-Action Alternative. Therefore, any shift in the timing or volume of flows downstream of Folsom Dam is considered to be under the management of the USBR, and not a consequence of the operation of the MFP. However, this analysis does include an evaluation of the effect from changes in MFP operations under the Proposed Action in combination with other projects/actions on the timing, volume, and temperature of flows into Folsom Reservoir.

8.1.2 Temporal Scope

The temporal scope for the cumulative impact analysis defines the length of time analyzed when evaluating resource effects of the Proposed Action in the context of past, present, and reasonably foreseeable future actions. Evaluations of past and future actions are limited by the amount of available information for each target resource and by information defining future projects and actions. Based on the anticipated term of the new license for the MFP, the temporal scope used for the analysis of reasonably foreseeable future actions is 50 years.

8.2 CUMULATIVE EFFECTS ON WATER RESOURCES

8.2.1 Water Use (Hydrology)

Other water projects/actions, in addition to the MFP, that affect hydrology in the North and Middle Fork American River watersheds include SMUD's UARP, EDWPA's Water Rights Application, GDPUD's Stumpy Meadows Reservoir, FPUD's Sugar Pine Project, PG&E's Drum-Spaulding Project, PCWA's Pulp Mill Canal Diversion Dam Project, and PCWA's American River Pump Station Project. These projects have resulted or will result in modification to the timing and magnitude of natural flows in the bypass and peaking reaches associated with the MFP. Information on the hydrologic effects of operations of the MFP (that include the hydrology effects of these projects) is provided in Exhibit E – Section 7.3, Water Use Affected Environment and Section 8.3, Water Use

Environmental Effects, and in PCWA's PAD, SD F, Section 4.0 (PCWA 2007). A summary of these project effects is highlighted below.

PCWA's MFP operations as modified under the Proposed Action, affect flows in the bypass and peaking reaches and WSE/storage in Project reservoirs. In addition, increased water delivery from the MFP (to meet future consumptive demand under full build-out) will modify operations and affects instream flows and reservoir elevations. These changes are evaluated using the Middle Fork Project Operations Simulation Model (Model) (Exhibit E – Section 8.1, Analytical Approach for a description of the model runs). The Model incorporates both existing and future operations of the MFP and other water projects/actions in the Watershed as described in the following:

- SMUD's UARP historical operations will be altered by the issuance of a new FERC license. The No-Action Alternative and Proposed Action model runs incorporate the revised flow measures for the UARP, as described in the 2007 Settlement Agreement between stakeholders and SMUD and FERC's Final Environmental Impact Statement for the UARP (FERC 2008).
- EDWPA's water rights application to store water for consumptive uses in SMUD's UARP reservoirs will not change SMUD's rate of diversion from the upper Rubicon River or South Fork Rubicon River. Therefore, modeling of UARP Settlement Agreement flows adequately describes the project's impact in the Watershed.
- GDPUD's Stumpy Meadows Reservoir Project historical diversions from Pilot Creek are included in the No-Action Alternative and Proposed Action model runs. Future Stumpy Meadows Project operations are not expected to differ from historical operations.
- FPUUD's Sugar Pine Dam Project historical diversions are incorporated in model runs for both the No-Action Alternative and Proposed Action. Future Sugar Pine Dam Project operations are not expected to differ from historical operations.
- PG&E's Drum-Spaulding Project historical operations (under the existing FERC license conditions) are included in the No-Action Alternative and Proposed Action model runs. The Drum-Spaulding Project is currently undergoing FERC relicensing, however, it is unknown at this time, or to what extent, the existing license conditions will change.
- PCWA's Pulp Mill Canal Diversion Dam Project is included in the No-Action Alternative and Proposed Action model runs. Future operations of the diversion are not expected to differ from historic operations.
- PCWA's American River Pump Station Project operations are included in the No-Action Alternative, Proposed Action – Existing Demand model run, and the Proposed Action – Future Demand model run.

Under the Proposed Action, new instream flow releases were developed in the bypass and peaking reaches to maintain and/or enhance fish and aquatic resources, geomorphic channel processes, riparian resources, and whitewater recreational opportunities (IFRM [PCWA 2011g; SD A]). These changes in MFP operations in combination with other projects/actions in the North and Middle Fork American River watersheds maintain or enhance hardhead, FYLF, and WPT.

The timing and magnitude of average monthly flow entering Folsom Reservoir under the Proposed Action, in combination with other projects/actions, is similar to the No-Action Alternative (BA/BE Figure 29). BA/BE Figure 29 compares model runs of average monthly inflow into Folsom Reservoir in different water years under the No-Action Alternative and Proposed Action – Future Demand. Unimpaired inflow into Folsom Reservoir is included in BA/BE Figure 29 for reference. Implementation of measures in the Proposed Action in combination with other projects/actions in the Watershed will have a negligible effect on flows entering Folsom Reservoir from current conditions. Overall, past development in the Watershed has substantially altered inflow below the confluence of the North Fork American River and Middle Fork American River (inflow into Folsom Reservoir, BA/BE Figure 29). In addition, if the Auburn Dam and Reservoir Project were constructed, the peaking reach would be inundated and Folsom Reservoir inflow would be substantially altered.

8.2.2 Water Quality (Temperature)

Overall, operations of the MFP substantially reduce summer instream temperatures in the Rubicon River, Middle Fork American River, and North Fork American River compared to pre-Project (unimpaired) conditions. Exhibit E – Section 7.5, Maps 7.5-3a–b illustrate August water temperature in these rivers prior to the construction of the MFP (unimpaired conditions) and under the Proposed Action.

Two projects, in addition to the MFP, have the potential to cumulatively affect water temperature in the Rubicon River. SMUD's UARP has the potential to affect temperature in the South Fork Rubicon River and, therefore, affect temperature in the Rubicon River below the confluence of the South Fork Rubicon River. GDPUD's Stumpy Meadows Project has the ability to affect temperature in Pilot Creek and, therefore, affect temperature in the Rubicon River below the confluence of Pilot Creek.

In developing new instream flow measures in the Proposed Action for the MFP, summer water temperatures in the Rubicon River, at several locations under the No-Action Alternative and the Proposed Action, were compared to evaluate potential cumulative impacts. PCWA considered the effects of the SMUD and GDPUD projects on flows and resulting water temperatures in the Rubicon River, with particular emphasis on rainbow trout, hardhead, and FYLF habitat. PCWA's water temperature model was used to identify potential cumulative effects on these resources and the instream flows were modified such that those included in the Proposed Action maintain water temperatures relative to these species. BA/BE Table 33b shows that during the drier water year types, when Project flows could have the largest effect on summer water temperature,

the Proposed Action maintains water temperatures similar to existing conditions (AQ 4 – TSR, Addendum 1, [PCWA 2011bb; SD B]).

In the North Fork American River, below the confluence of the Middle Fork American River, several projects/actions may affect water temperature into Folsom Reservoir. These include modified operation of the MFP under the Proposed Action, increases in water deliveries from the MFP to meet future demand, PCWA's Pulp Mill Diversion, PG&E's Drum-Spaulding Project, and operations of Sugar Pine Dam by FPUD. The water temperature model developed for the MFP in the North Fork American River incorporates accretion flows and current hydrologic and water temperature effects of other projects in the Action Area.

Mean monthly water temperature into Folsom Reservoir under the Proposed Action, in combination with other projects/actions in the North and Middle Fork American watersheds, are similar compared to the No-Action Alternative in wet years and slightly cooler in dry years (BA/BE Figure 30). BA/BE Figure 30 compares model runs of average monthly temperature into Folsom River in two different water year types (wet and dry) under the No-Action Alternative and Proposed Action – Future Demand. Results of the model demonstrate that water temperatures into Folsom Reservoir are maintained or slightly enhanced (cooler) under the Proposed Action and remain substantially cooler than water temperatures under unimpaired conditions.

8.3 CUMULATIVE EFFECTS ON AQUATIC RESOURCES

8.3.1 Hardhead and Foothill Yellow-legged Frog

Hardhead and FYLF distribution and abundance in the Rubicon River downstream of the confluence with the South Fork Rubicon River could be cumulatively affected by changes in instream flows considering the Proposed Action, SMUD's UARP, and GDPUD's Stumpy Meadows Project.

Instream flows included under the Proposed Action consider the effects of the UARP and Stumpy Meadows Projects on hydrology and are designed to maintain the current distribution of hardhead and FYLF in the Rubicon River. The distribution of water temperature in the Rubicon River will remain similar under the Proposed Action (Section 4.2); therefore, the distribution of hardhead and FYLF, as influenced by water temperature, will remain the same under the Proposed Action as compared to baseline conditions (No-Action Alternative). The Proposed Action will have no cumulative effect on hardhead and FYLF distributions.

Under the Proposed Action, higher MIFs in the Rubicon River are proposed in the winter and spring to enhance aquatic resources. In addition, higher MIFs are included in the wet and above normal years during the summer (years when water temperature modeling indicated that minimum flows would not alter temperature conditions due to high accretions). These instream flow recommendations for the MFP were developed and analyzed in Section 6.0 – Effects of the Proposed Action and Management Recommendations. The analysis included the incremental contribution of UARP higher

instream flow releases in the South Fork Rubicon River and the effects of Stumpy Meadows Project on Pilot Creek. The analysis shows that hardhead habitat in the Rubicon River is maintained, and FYLF are maintained with implementation of the instream flows included under the Proposed Action. In addition, the FPMP (PCWA 2011o; SD A) and FYLFMP (PCWA 2011p; SD A) include monitoring fish, including hardhead (e.g., fish species composition, abundance, condition factor, and population age class structure data), and FYLFs (e.g., abundance, distribution, and timing of initiation of breeding) in the bypass and peaking reach during the term of the new license. Overall, the cumulative effect of the Proposed Action, considering other projects/actions in the Watershed, maintains hardhead and FYLF.

8.3.2 Anadromous Fish

No anadromous species are currently present in bypass or peaking reaches associated with the MFP. Anadromous species were extirpated in the vicinity of the MFP as a result of the construction of impassable dams on the lower American River (Nimbus and Folsom dams were constructed by the USBR in approximately 1955 and 1956, respectively). Additionally, two new fish passage barriers (unrelated to the MFP) are present in the peaking reach including Tunnel Chute (RM22.9), which was created by miners in the 1880s and Ruck-a-Chucky rapids (RM10.8), which was created by a landslide in the 1940s.

Under the Proposed Action, the timing and magnitude of flows from the MFP into Folsom Reservoir are similar to the No-Action Alternative. In addition, the temperature of water inflow into Folsom Reservoir under the Proposed Action is similar to the No-Action Alternative. Therefore, operation of the MFP under the Proposed Action, in combination with other past, present, and reasonably foreseeable projects will not affect anadromous fish populations.

The NMFS's OCAP BiOP and Draft Recovery Plan describes future evaluation of potential passage at Nimbus and Folsom dams to restore CV steelhead to native habitat within the American River Basin, upstream of Folsom Reservoir. A number of actions would need to be completed prior to reintroduction of CV steelhead above Folsom Dam, including planning and scheduling, permitting, evaluations, and funding. These include, but are not limited to:

- Evaluation of potential habitat in all three forks of the American River above Folsom and Nimbus dams
- Development of fish passage pilot plan
- Development of a 3-year pilot program
- Implementation of the pilot program, including construction and collection of handling facilities, adult release sites above dams, trapping of juvenile downstream migrating fish, etc.
- Pilot Program Effectiveness Monitoring and Evaluation

However, to date, most of the actions associated with this evaluation have not been implemented. Elements of the potential reintroduction are “virtually untested” and “prototype” (pg. 666, NOAA 2009). The results of the pilot program will be used to determine the feasibility of long-term passage alternatives and evaluate whether comprehensive fish passage programs should be pursued. If a pilot program, is implemented in the upper American River, then CV steelhead introduced above Folsom Reservoir would likely be designated as an experimental population under ESA Section 10 [16 USC 1539] (a)(1)(j). PCWA is committed to collaborate with the NMFS regarding potential reintroductions into the American River Basin, including the Fish Passage Committee. PCWA acknowledges the potential need to reevaluate the new License Order if a viable population of CV steelhead is established in reaches of the North Fork American River or Middle Fork American River affected by MFP operations and the population is determined to be essential for the continued existence of CV steelhead.

8.4 CUMULATIVE EFFECTS ON TERRESTRIAL RESOURCES

The Proposed Action in combination with actions taken by ENF and TNF on USDA-FS lands, USBR in Auburn Project Lands (peaking reach), Lone Star Timber Harvesting, Sierra Pacific Industries, and other landowners on private lands could cumulatively affect federal listed species, candidates for listing, and FSS species or their habitats in the Watershed. Specifically, potential impacts on terrestrial species from implementation of land management activities and changes in recreation use are included. Cumulatively, the Proposed Action in combination with projects/actions that affect land management and recreation use, will have no effect on federal listed species, candidates for listing, and FSS species or their habitats. For ease of discussion, this analysis is separated into potential cumulative effects from land management activities and recreation use.

8.4.1 Land Management Activities

The USDA-FS manages lands in the Watershed for recreation, timber harvest, fuels and fire reduction, noxious weed control, resource protection, and grazing in accordance with the SNFPA, and the ENF and TNF LRMPs (USDA-FS 2004 and 1988). The EDF and TNF include approximately 603,701 acres and 829,204 acres, respectively, of which the MFP occupies approximately 1,305 acres within the ENF and 1,742 acres within the TNF. The SNFPA and LRMP include management directions for land management activities on USDA-FS lands to protect and enhance federal listed species, candidates for listing, and FSS species or their habitats. It is anticipated that the USDA-FS will continue to manage USDA-FS lands consistent with the management directions provided in the SNFPA and LRMPs in the future.

Lone Star Timber Harvesting, SPI, and other private landowners conduct timber harvest in the Watershed consistent with project-specific timber harvest plans (THPs). Project-specific THPs are approved by the California Department of Forestry and Fire Protection in accordance with the 1973 Forest Practices Act. This act regulates when, where, and how commercial timber harvests may be conducted to prevent adverse

effects to soils, riparian corridors, and plant and wildlife species and their habitat. Appropriate avoidance, protection, and mitigation measures are required in the THPs to protect federal listed species, candidates for listing, and FSS species or their habitats. Future timber harvest will continue to require project-specific THPs.

The Proposed Action will protect or enhance federally listed terrestrial species, candidates for listing and FSS species by:

- Enhancing vegetation communities and wildlife habitats
- Establishing buffers and limited operating periods to protect special-status species
- Reducing the potential risk of raptor electrocutions
- Establishing a noxious weed management program
- Providing ETP on protection of special-status species
- Requiring clearance surveys prior to implementation of construction activities
- Specifying periodic special-status species surveys and reporting
- Increasing consultation with resource agencies

Therefore, the Proposed Action in combination with other actions taken by the ENF, TNF, and private land owners will cumulatively protect, maintain, or enhance federally listed species, candidates for listing and FSS species and their habitats.

8.4.2 Recreation Use

8.4.2.1 Eldorado and Tahoe National Forests

The Proposed Action in combination with actions taken by USDA-FS has the potential to change recreation use in the Watershed on EDF and TNF. USDA-FS maintains recreation facilities and provides recreation opportunities on ENF and TNF, in accordance with the ENF LRMP (USDA-FS 1988) and the TNF LRMP (USDA-FS 1990). It is anticipated that the USDA-FS will continue to maintain or enhance the current level of recreational facility development and recreation opportunities within EDF and TNF in the future. The LRMP includes management directions for recreation on USDA-FS lands to protect and enhance federal listed species, candidates for listing, and FSS species or their habitats. The USDA-FS will continue to manage recreation consistent with the management directions provided in the LRMPs in the future.

Implementation of the Proposed Action as described in the Recreation Plan (PCWA 2011m; SD A) includes maintenance of Project recreation facilities and implementation of non-routine recreation activities to enhance recreation opportunities or experience in the EDF and TNF. The Proposed Action includes BMPs and avoidance and protection

measures to protect federal listed species, candidates for listing, and FSS species or their habitats. Although recreational opportunities and experience are enhanced under the Proposed Action, the level of recreation use is expected to be similar to the No-Action Alternative.

Therefore, the Proposed Action in combination with other actions taken by the ENF and TNF will have no effect on federal listed terrestrial species, candidates for listing, and FSS species or their habitats.

8.4.2.2 Auburn Project Lands (Peaking Reach)

The Proposed Action in combination with actions taken by USBR has the potential to affect recreation resources in the Middle Fork American River and North Fork American River downstream of Oxbow Powerhouse (peaking reach). The peaking reach bisects Auburn Project Lands, which consist of federal lands and private lands reserved for the Auburn Dam and Reservoir Project (totaling 41,000 acres) that was Congressionally authorized in 1965. Construction of the Auburn Dam and Reservoir Project, initiated by the USBR in 1967, was halted in the 1980s. In 2008, the State Water Board revoked the USBR's water rights permits for the Auburn Dam and Reservoir Project. However, the Auburn Dam and Reservoir Project remains a Congressionally authorized project.

The Auburn Project Lands include USBR fee title lands (26,000 acres), and other lands (15,000 acres) owned by the Bureau of Land Management, USDA-FS, United States Army Corps of Engineers, and private land owners (USBR 1992). Land use planning and resource management on all federal lands within Auburn Project Lands has been granted to the USBR in accordance with interagency agreements (Section 7.1, Description of the River Basin, Attachment A). The Auburn Project Lands boundary is shown on Exhibit E – Map 9.1.

In 1977, the USBR entered into an interim agreement with California State Parks to assume responsibility for management of public use on Auburn Project Lands. California State Parks continues management of public use on these lands at the direction and discretion of USBR. Funding to manage public use and provide recreational opportunities and service within the Auburn Project Lands is provided in part from USBR, State of California, and user fees. Funding by USBR and the State of California has declined in recent years.

In 1978, the USBR developed a General Plan for the Auburn Project Lands, which designated that the area be managed as a reservoir-based recreation area, following construction of the Auburn Dam and reservoir. In 1979, the State of California incorporated Auburn Project Lands into the state park system as ASRA (USBR 1992). Lands reserved for the Auburn Dam and Reservoir Project (Auburn Project Lands), as managed by California State Parks, are referred to in this document as ASRA.

In 1992, due to the delays in constructing Auburn Dam and Reservoir Project, the USBR developed an Interim Management Plan (IRMP), which was designed to guide use of ASRA, consistent with its "interim status" as a river-based recreation area. In

2006, USBR and California State Parks began collaborating on a joint Updated General Plan and Resource Management Plan for ASRA. However, in a letter dated May 11, 2010, California State Parks notified the stakeholders involved in the planning process that the “planning process to develop a new General Plan and Interim Resource Management Plan (GP/IRMP) for ASRA and the Auburn Dam Project Lands has been suspended indefinitely at the request of the U.S. Bureau of Reclamation (Reclamation).” California State Parks also stated in the letter that “Reclamation had indicated that it would not be prudent to proceed with the preparation of the GP/IRMP until the future management is resolved; therefore, the GP/IRMP process is suspended” (California Department of Pesticide Regulation 2010). Therefore, public use in ASRA is currently managed in accordance with the Interim Resource Management Plan (USBR 1992).

Implementation of the Proposed Action will maintain and enhance stream-based recreation opportunities and experience along the peaking reach and on Auburn Project Lands, as summarized in the following:

- The IFRM (PCWA 2011f; SD A) contains a provision that formalizes a release schedule that maintains existing whitewater boating in the Tunnel Chute Run in all water years and enhances recreational boating opportunities downstream on three additional runs in wet and above normal water years, as described in Exhibit E – Section 8.9, Recreation Resources Environmental Effects.
- The Proposed Action increases MIFs in the peaking reach compared to the No-Action Alternative in most water year types. In addition, the Proposed Action includes a reduction in the ramping rate of Oxbow Powerhouse flow releases, and during the driest water year types, a 900 cfs maximum release from Oxbow Powerhouse from Memorial Day weekend to Labor Day. Reducing the magnitude of flow fluctuations will improve food production for fish (aquatic macroinvertebrates), increase effective spawning habitat, reduce potential stranding, benefit young-of-the-year fish, and increase the abundance of fish in the peaking reach. The Proposed Action will enhance the fishery and, therefore, enhance the angling experience compared to the No-Action Alternative.
- The Proposed Action reduces the ramping rate of Oxbow Powerhouse compared to the No-Action Alternative. Reducing the ramping rate will enhance recreation in the peaking reach by slowing the rate at which flows change, thereby providing recreationists more time to modify their activities to changing flow conditions.
- The Recreation Plan (PCWA 2011m; SD A) contains measures to enhance recreation experience at the Indian Bar Rafting Access by relieving congestion in the unloading area and at the boat ramp, and by improving sanitation conditions.
- The Recreation Plan (PCWA 2011m; SD A) contains measures to (1) provide real-time flow information to the public from two stream gages on the peaking reach; and (2) provide the public with a matrix showing when recreation flows released from Oxbow Powerhouse will arrive at Fords Bar, Ruck-a-Chucky

Recreation Area, Mammoth Bar, Poverty Bar, the Confluence, Birdsall Access, and Oregon Bar Access Point.

- The Recreation Plan (PCWA 2011m; SD A) also includes commitments by PCWA to reimburse resource agency administrative oversight activities, and routine operation and maintenance activities at the Indian Bar Rafter Access.

In general for most recreational users in the peaking reach, the Proposed Action maintains existing stream-based recreation opportunities but enhances the overall recreational experience. Only early scheduled flow releases in wet and above normal water years (Saturdays only) between the first Saturday prior to Memorial Day and Labor Day increase recreational opportunities (recreational boating) in the lower portion of the peaking reach. They represent only a minor change in overall recreation use. Currently, the USBR has established a kiosk to collect an entry fee (user fee) from recreationists boating the lower portions of the peaking reach and taking out at Oregon Bar to offset administrative costs. The USBR manages overall public use on Auburn Project Lands, including the peaking reach. It is the responsibility of the USBR to manage recreation use along the peaking reach commensurate with available funding. Funding to manage public use and provide recreational opportunities and service within the Auburn Project Lands is provided in part from USBR, State of California, and user fees. It is solely the discretion of the USBR whether increased opportunities provided by the Proposed Action in the lower portions of the peaking reach are available to the public. Therefore, the Proposed Action in combination with other actions on Auburn Project Lands cumulatively have the potential to increase the recreational experience of existing users in the peaking reach as well as slightly increase recreational boating opportunities. However, if the Auburn Dam and Reservoir Project was constructed, the peaking reach would be inundated and future recreation in the area would be reservoir-based.

The Proposed Action in combination with other USBR actions on Auburn Project Lands will cumulatively result in only two minor changes in overall recreation use in the peaking reach. Minor changes in recreation will have no effect on federal listed terrestrial species, candidates for listing, and FSS species and their habitats in the peaking reach.

9.0 CONCLUSIONS AND DETERMINATIONS

9.1 EFFECTS DEFINITIONS

9.1.1 USFWS Effects Definitions

- No effect – Is the appropriate conclusion when the effects of the action will not affect any listed species or its critical habitat.
- Likely to benefit – Is the appropriate conclusion when an action is likely to directly or indirectly benefit a listed species or its critical habitat.
- May affect, not likely to adversely affect – Is the appropriate conclusion when the effects of an action on a species or its critical habitat are likely to be insignificant and discountable.
- May affect, likely to adversely affect – Is the appropriate conclusion when an action is likely to directly or indirectly have an adverse effect on a listed species or its critical habitat.

9.1.2 USDA-FS Effects Definitions

- No effect – Is the appropriate conclusion for a Forest Service Sensitive Species (FSS) when the effects of the action will not affect the species.
- May affect individuals, but is not likely result in a trend toward federal listing – Is the appropriate conclusion for a FSS when the effects of an action on a species will not lead to federal listing or loss of species viability.
- May affect individuals, and is likely to result in a trend toward federal listing – Is the appropriate conclusion for a FSS when the effects of an action on a species will lead to federal listing or loss of species viability.

9.2 CONCLUSIONS

9.2.1 Federally Listed Amphibians

- **California red-legged frog.** It is our determination that the Proposed Action will have no effect on CRLF or CRLF critical habitat for the following reasons:
 - Routine operations, routine maintenance, non-routine recreation facility maintenance, modification of existing facilities, and construction of new facilities will not impact areas identified by USFWS as potential aquatic breeding habitat or adjacent areas.
 - CRLF are not known to exist in the MFP.
 - No CRLF critical habitat is located in the vicinity of the MFP.

9.2.2 Federally Listed Mammals (Mesocarnivores)

- **Pacific fisher.** It is our determination that the Proposed Action will have no effect on Pacific fisher for the following reasons:
 - Rodenticide application methods will minimize the potential for secondary poisoning of mesocarnivores.
 - Routine vegetation removal (i.e., hazard tree removal or fuels reduction) is limited to that necessary for safe and efficient operation of the MFP, safe recreation, or reduction of fire risk, and will not impact forested habitats outside the perimeter of Project facilities and features.
 - Forested habitats will not be affected by modification of existing facilities or construction of new facilities.
 - Annual resource agency consultation, as well as implementation of the ETP, will further enhance forest-dwelling species.

9.2.3 Forest Service Sensitive Plants

- **Brandegge's clarkia.** Activities under the Proposed Action will not occur in rocky upland areas along the canyons of the bypass and peaking reaches. Therefore, it is our determination that the Proposed Action will have no effect on Brandegge's clarkia.
- **Butte County fritillary.** Activities under the Proposed Action will not occur in rocky upland areas along the canyons of the bypass and peaking reaches. Therefore, it is our determination that the Proposed Action will have no effect on Butte County fritillary.
- **Saw-toothed lewisia.** Activities under the Proposed Action will not occur in rocky upland areas along the canyons of the bypass and peaking reaches. Therefore, it is our determination that the Proposed Action will have no effect on saw-toothed lewisia.
- **Stebbin's phacelia.** It is our determination that the Proposed Action may affect Stebbins' phacelia individuals, but is not likely result in a trend toward federal listing for the following reasons:
 - Patterns of inundation of Stebbins' phacelia at Hell Hole Reservoir are similar to those under the No-Action Alternative where populations currently persist.
 - AP measures will reduce effects on Stebbins' phacelia by reducing the area and number of individuals affected by ongoing maintenance activities.
 - Periodic special-status plant inventory surveys, consultation with resource agencies, and the ETP implemented under the Proposed Action will further

protect and enhance Stebbins' phacelia or other upland special-status plants identified during the license term. They would include both existing and new populations that may be identified during the term of the license.

- Consulting with resource agencies, following site-specific engineering, to review the measures included in the TSMP (PCWA 2011l; SD A), Recreation Plan (PCWA 2011m; SD A), and associated with modification of existing or construction of new facilities (Exhibit E – Appendix A) to verify their adequacy and development of new measures, if appropriate, will protect any new populations of special-status plants that may be identified.

9.2.4 Forest Service Sensitive Fish

- **Hardhead.** It is our determination that the Proposed Action will have no effect on hardhead for the following reasons:
 - The Proposed Action will maintain approximately the same water temperatures and hardhead physical habitat in the lower portions of the Rubicon River and Middle Fork American River below Middle Fork Interbay, in the peaking reach, and in Ralston Afterbay as exists currently under the No-Action Alternative.
 - The FPMP (PCWA 2011o; SD A) includes tagging studies designed to understand the movements of hardhead in Ralston Afterbay. These studies will benefit the understanding of hardhead behavior and applicable hardhead management approaches.
 - Under the Proposed Action, the distribution and abundance of hardhead in the MFP will be maintained as compared to the No-Action Alternative.

9.2.5 Forest Service Sensitive Amphibians

- **Foothill yellow-legged frog.** It is our determination that the Proposed Action will have no effect on FYLF for the following reasons:
 - The Proposed Action will maintain approximately the same water temperatures and FYLF physical habitat in the Rubicon River, Middle Fork American River below Middle Fork Interbay, and peaking reach as exists currently under the No-Action Alternative.
 - Under the Proposed Action, the distribution and abundance of FYLF will be maintained (and monitored) as compared to the No-Action Alternative.
 - Down ramping of spill flows under the Proposed Action, as well as a reduction in the number of spill events below Hell Hole Reservoir, will benefit FYLF by reducing potential stranding of tadpoles.

- The FYLFMP (PCWA 2011p; SD A) will further benefit FYLF by characterization and reporting of distribution and abundance in the bypass and peaking reaches associated with the MFP over the term of the license. Based on the results of the FYLFMP monitoring and comments received during the results review process, PCWA and resource agencies may meet to discuss the results and/or modify the monitoring program.

9.2.6 Forest Service Sensitive Reptiles

- **Western pond turtle.** It is our determination that the Proposed Action will have no effect on WPT for the following reasons:
 - In the MFP reservoirs, the Proposed Action will maintain the reservoir physical habitat (WSEs, water quality, water temperature) similar to current conditions (No-Action Alternative). Therefore, the Proposed Action will maintain WPT potential habitat in reservoirs compared to the No-Action Alternative.
 - The WPTMP (PCWA 2011s; SD A) will further benefit WPT by periodically characterizing and reporting on WPT distribution and abundance in the bypass and peaking reaches and Project reservoirs associated with the MFP during the term of the new license. Based on the results of the WPTMP monitoring and comments received during the results review process, PCWA and resource agencies may meet to discuss the results and/or modify the monitoring program.

9.2.7 Forest Service Sensitive Birds

- **Northern goshawk.** It is our determination that the Proposed Action will have no effect on northern goshawk for the following reasons:
 - Retrofitting and replacement of existing power poles/powerlines or construction of new powerlines consistent with APLIC design configurations will minimize the risk of electrocution and thereby protect northern goshawks.
 - Rodenticide application methods will minimize the potential for secondary poisoning of northern goshawks.
 - Measures included in the TSMP and VIPMP will prevent disturbance of known California spotted owl nests by limiting the duration and extent of routine maintenance activities within 500 feet of known nests, as well as prohibiting trimming of vegetation from trees supporting nests and requiring application methods to avoid nests during pesticide applications.
 - Measures included in the SMP, the Recreation Plan, and the TSMP will prevent disturbance of nests during ground disturbing activities or use of heavy equipment.

- Other resource enhancements, including annual consultation with resource agencies to discuss the effectiveness of AP measures, as well as implementation of the ETP, will further protect northern goshawks.
- Consulting with resource agencies, following site-specific engineering, to review the measures included in the TSMP (PCWA 2011l; SD A), Recreation Plan (PCWA 2011m; SD A), and associated with modification of existing or construction of new facilities (Exhibit E – Appendix A) to verify their adequacy and development of new measures, if appropriate, will protect northern goshawk.
- **Bald eagle.** It is our determination that the Proposed Action will have no effect on bald eagles for the following reasons:
 - Rodenticide application methods will minimize the potential for secondary poisoning of bald eagles.
 - Retrofitting and replacement of existing power poles/powerlines or construction of new powerlines consistent with APLIC design configurations will further reduce the risk of electrocution and protect bald eagles.
 - Removal of the Upper Hell Hole Campground will reduce recreational use and potential disturbance in the vicinity of the Hell Hole Reservoir bald eagle nest.
 - Implementation of the Proposed Action will maintain or enhance the prey base for bald eagles in the bypass and peaking reaches and Project reservoirs.
 - AP measures for vegetation and noxious weed management and implementation of a Water Quality Management Program will protect water quality in aquatic habitats where bald eagles forage.
 - Periodic bald eagle wintering and nesting surveys, consultation with resource agencies, and the ETP implemented under the Proposed Action will further protect bald eagles at Hell Hole Reservoir or new nests and roosts identified during the license term.
 - Consulting with resource agencies, following site-specific engineering, to review the measures included in the BEMP (PCWA 2011k; SD A), TSMP (PCWA 2011l; SD A), Recreation Plan (PCWA 2011m; SD A), and associated with modification of existing or construction of new facilities (Exhibit E – Appendix A) to verify their adequacy and development of new measures, if appropriate, will protect any new nests or roosts identified within 0.25 mile of these activities.
- **California spotted owl.** It is our determination that the Proposed Action will have no effect on California spotted owl for the following reasons:

- Rodenticide application methods will minimize the potential for secondary poisoning of California spotted owls.
- Retrofitting and replacement of existing power poles/powerlines or construction of new powerlines consistent with APLIC design configurations will minimize the risk of electrocution and protect California spotted owls.
- Measures included in the TSMP and VIPMP will prevent disturbance of known California spotted owl nests by limiting the duration and extent of routine maintenance activities within 500 feet of known nests, as well as prohibiting trimming of vegetation from trees supporting nests and requiring application methods to avoid nests during pesticide applications.
- Measures included in the SMP, the Recreation Plan, and the TSMP will prevent disturbance of nests during ground disturbing activities or use of heavy equipment.
- Other resource enhancements, including annual consultation with resource agencies to discuss the effectiveness of AP measures, as well as implementation of the ETP, will further protect California spotted owls.
- Consulting with resource agencies, following site-specific engineering, to review the measures included in the TSMP (PCWA 2011l; SD A), Recreation Plan (PCWA 2011m; SD A), and associated with modification of existing or construction of new facilities (Exhibit E – Appendix A) to verify their adequacy and development of new measures, if appropriate, will protect California spotted owl.

9.2.8 Forest Service Sensitive Mammals

- **Pallid bat, Townsend's big-eared bat, and western red bat.** It is our determination that the Proposed Action may affect pallid bat Townsend's big-eared bat, and western red bat, but is not likely to result in a trend toward federal listing for the following reasons:
 - Changes in operation of the MFP under the Proposed Action will maintain or enhance the prey base for special-status bats foraging in aquatic habitats.
 - Diversion modifications will result in shallower diversion pools of similar size that are expected to maintain or enhance prey base.
 - Implementation of routine sediment management and modification of small diversions will minimize the need for sediment removal activities associated with the small diversions over the license term.
 - Annual resource agency consultation, as well as implementation of the ETP, will further enhance the protection special-status bats.

- **California wolverine and American (Sierra) marten.** It is our determination that the Proposed Action will have no effect on California wolverine and American (Sierra) marten for the following reasons:
 - Rodenticide application methods will minimize the potential for secondary poisoning of mesocarnivores.
 - Routine vegetation removal (i.e., hazard tree removal or fuels reduction) is limited to that necessary for safe and efficient operation of the MFP, safe recreation, or reduction of fire risk, and will not impact forested habitats outside the perimeter of Project facilities and features.
 - Forested habitats will not be affected by modification of existing facilities or construction of new facilities.
 - Annual resource agency consultation, as well as implementation of the ETP, will further enhance forest-dwelling species.

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TABLES

BA/BE Table 1. Special-status Plant Species in the Vicinity of the MFP.

Scientific Name	Common Name	Federal Status	State Status	CNPS List	Blooming Period/Fertile	Habitat	Occurrence Notes
Special-status Plants Known to Occur Within the MFP during the Term of the New License							
<i>Clarkia biloba ssp. brandegeeeae</i>	Brandegee's clarkia	FSS ²	–	1B.2	May–July	Chaparral, cismontane woodland, often roadcuts. From 950 to 3,200 feet in elevation.	Known to occur in the vicinity of the MFP. Documented by CNDDDB in rocky, upland areas along the MFAR river canyon.
<i>Fritillaria eastwoodiae</i>	Butte County fritillary	FSS ²	–	3.2	March–May	Chaparral, cismontane woodland, lower montane coniferous forest (openings), wet and dry slopes red clay or sandy loam. From 100 to 5,000 feet in elevation.	Known to occur in the vicinity of the MFP. Documented by CNDDDB in rocky, upland areas along the MFAR.
<i>Lewisia serrata</i>	Saw-toothed lewisia	FSS3	–	1B.1	May–June	Broad-leaved upland forest, lower montane coniferous forest, and riparian forest on mesic steep, nearly vertical cliffs and inner gorges. From 2,800 to 4,800 feet in elevation.	Known to occur in the vicinity of the MFP. Documented by USDA-FS and CNDDDB in rocky, upland areas along Long Canyon Creek.
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	FSS ³	–	1B.2	June–July	Cismontane woodland and lower montane coniferous forest, and meadows and seeps. Found on dry, open rocky sites (bedrock outcrops, rubble, or talus) on ledges and moderate or steep slopes as well as inner gorges and near seeps on ENF and TNF. From 2,000 to 7,050 feet in elevation.	Known to occur in the vicinity of the MFP. A total of 48 populations (112 acres) were documented during the TERR 2 – Special-Status Plants surveys (PCWA 2009) and subsequent surveys in the vicinity of new gaging stations to be added to the MFP. Known populations include: - Two small populations in the vicinity of Brushy Creek (approximately 200 individuals) - Four individuals in the vicinity of the Rubicon River at Ellicott Bridge 1 individual in the vicinity of French Meadows Reservoir 44 populations in the vicinity of Hell Hole Reservoir (approximately 2.4 to 4.7 million individuals) Additional populations are documented by USDA-FS and CNDDDB in rocky, upland areas along the Rubicon River, Long Canyon Creek, and Duncan Creek.
Special-status Plants Potentially Occurring Within the MFP during the Term of the New License							
<i>Allium tribracteatum</i>	Three-bracted onion	FSS ¹	–	1B.2	April–August	Chaparral, lower montane coniferous forest and upper montane coniferous forest. From 3,600 to 9,800 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Arctostaphylos nissenana</i>	Nissenan manzanita	FSS ¹	–	1B.2	February–March	Open, rocky ridges and acidic shale and slate soils in chaparral and closed-cone coniferous forests. Found in almost pure colonies on hard shale substrate primarily where other shrubs and trees are absent. From 1,450 to 3,600 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Astragalus webberi</i>	Webber's milk-vetch	FSS ²	–	1B.2	May–July	Lower montane coniferous forest. From 2,400 to 3,700 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Balsamorhiza macrolepis var. macrolepis</i>	Big-scale balsamroot	FSS1	–	1B.2	March–June	Chaparral, cismontane woodland, valley and foothill grassland, and vernaly moist meadows on sandstone, serpentine, or basalt outcrops. From 300 to 4,600 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

BA/BE Table 1. Special-status Plant Species in the Vicinity of the MFP (continued).

Scientific Name	Common Name	Federal Status	State Status	CNPS List	Blooming Period/Fertile	Habitat	Occurrence Notes
Special-Status Plants Potentially Occurring Within the MFP during the Term of the New License (continued)							
<i>Botrychium ascendens</i>	Upswept moonwort	FSS3	–	2.3	Fertile July–August	Lower montane coniferous forests near streams, grassy fields, meadows and seeps. From 4,800 to 7,300 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.
<i>Botrychium crenulatum</i>	Scalloped moonwort	FSS3	–	2.2	Fertile June–July	Lower and upper montane coniferous forests, bogs, fens, and moist meadows. From 4,900 to 10,800 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Botrychium lunaria</i>	Common moonwort	FSS3	–	2.3	August	Meadows and seeps, moist riparian areas, subalpine coniferous forest and upper montane coniferous forest. From 7,500 to 11,000 feet elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.
<i>Botrychium minganense</i>	Mingan moonwort	FSS3	–	2.2	July–September	Mesic areas in lower and upper montane coniferous forest, moist riparian areas, and meadows and seeps. From 4,000 to 6,700 feet in elevation	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.
<i>Botrychium montanum</i>	Mountain moonwort (western goblin)	FSS ³	–	2.1	July–September	Lower and upper montane coniferous forests, and meadows and seeps. From 4,500 to 7,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Bruchia bolanderi</i>	Bolander's bruchia	FSS ³	–	2.2	N/A	Lower and upper montane coniferous forest, meadows, seeps, and fens in damp soils. From 4,000 to 9,500 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Calochortus clavatus</i> var. <i>avius</i>	Pleasant Valley mariposa lily	FSS ³	–	1B.2	March–June	In openings, often south-facing slopes and ridgetops, of lower montane coniferous forests with Josephine silt loam and volcanic soils. From 1,000 to 6,300 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Cypripedium fasciculatum</i>	Clustered lady's-slipper	FSS ²	–	4.2	March–August	Lower montane coniferous forest, serpentine seeps and streambanks. From 500 to 7,200 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.
<i>Cypripedium montanum</i>	Mountain lady's-slipper	FSS ³	–	4.2	March–August	Broad-leaved upland and lower montane coniferous forests in moist areas or on dry shaded slopes with northern aspects and loam soils. From 600 to 7,500 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

BA/BE Table 1. Special-status Plant Species in the Vicinity of the MFP (continued).

Scientific Name	Common Name	Federal Status	State Status	CNPS List	Blooming Period/Fertile	Habitat	Occurrence Notes
Special-status Plants Potentially Occurring Within the MFP during the Term of the New License (continued)							
<i>Epilobium howellii</i>	Subalpine fireweed	FSS3	–	4.3	July–August	Mesic areas in subalpine coniferous forest, wet meadows, fens, and mossy seeps. From 6,000 to 9,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Erigeron miser</i>	Starved fleabane	FSS2	–	1B.3	June–October	Upper montane coniferous forest, rocky soils. From 6,000 to 8,600 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Eriogonum tripodum</i>	Tripod buckwheat	FSS1	–	4.2	May–July	Chaparral, cismontane woodlands, often on serpentine outcroppings. From 650 to 5,250 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Eriogonum umbellatum</i> var. <i>torreyanum</i>	Donner Pass buckwheat	FSS2	–	1B.2	July–September	Upper montane coniferous forests, chaparral, and meadows. Volcanic and rocky soils. From 6,000 to 8,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Fissidens aphelotaxifolius</i>	Brook pocket-moss	FSS2	–	2.2	N/A	Lower and upper montane coniferous forest, rock, stream channels and waterfalls. From 6,500 to 7,200 feet in elevation	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.
<i>Helodium blandowii</i>	Blandow’s bog-moss	FSS ³	–	2.3	N/A	Meadows, seeps, fens, and subalpine coniferous forest; damp soil. From 6,500 to 8,900 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Horkelia parryi</i>	Parry’s horkelia	FSS ¹	–	1B.2	April–June	Chaparral, cismontane woodland on stony, disturbed sites with slightly acidic soils. From 250 to 3,600 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Ivesia aperta</i> var. <i>aperta</i>	Sierra Valley mousetail	FSS ²	–	1B.2	June—September	Great Basin scrub, lower montane coniferous forest, meadows and seeps, pinyon and juniper woodland, vernal pools - vernal mesic, usually volcanic. From 4,500 to 7,500 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Ivesia aperta</i> var. <i>canina</i>	Dog Valley mousetail	FSS ²	–	1B.1	June–August	Openings in lower montane coniferous forests and in meadows and seeps. Volcanic and rocky soils. From 4,500 to 7,500 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Ivesia sericoleuca</i>	Plumas mousetail	FSS2	–	1B.2	May–September	Great Basin scrub, lower montane coniferous forest, meadows and seeps, and vernal pools. From 4,500 to 7,500 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

BA/BE Table 1. Special-status Plant Species in the Vicinity of the MFP (continued).

Scientific Name	Common Name	Federal Status	State Status	CNPS List	Blooming Period/Fertile	Habitat	Occurrence Notes
Special-status Plants Potentially Occurring Within the MFP during the Term of the New License (continued)							
<i>Ivesia webberi</i>	Webber's mousetail	FC FSS2		1B.1	May–July	Great Basin scrub, lower montane coniferous forest, in sandy or gravelly soils. From 4,500 to 7,500 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Lewisia cantelovii</i>	Cantelow's lewisia	FSS2	–	1B.2	May–October	Broadleaf upland, chaparral, cismontane woodlands, and lower montane coniferous forests. From 1,000 to 4,500 feet in elevation	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Lewisia kelloggii</i> ssp. <i>Hutchisonii</i>	Hutchison's lewisia (subspecies hutchisonii)	FSS3	–	3.3	July–August	Decomposed granite and slate soils (volcanic soils), at the north sides of passes and ridge-tops from 5,200 to 7,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Lewisia kelloggii</i> ssp. <i>Kelloggii</i>	Hutchison's lewisia (subspecies kelloggii)	FSS3	–	–	July–August	Upper montane coniferous forest, rocky open ridges and granitic and volcanic balds. From 5,000 to 9,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Lupinus dalesiae</i>	Quincy lupine	FSS2	–	4.2	May–August	Lower and upper montane coniferous forests. From 3,000 to 8,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Meesia triquetra</i>	Three-ranked hump moss	FSS ³	–	4.2	N/A	In acidic montane meadows. From 4,250 to 9,700 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Meesia uliginosa</i>	Broad-nerved hump moss	FSS ³	–	2.2	N/A	Bogs, fens, and rock fissures, upper montane and subalpine coniferous forests, meadows and seeps in damp soil. From 4,250 to 9,500 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Mielichhoferia elongata</i>	Elongate copper-moss	FSS ²		2.2	N/A	Cismontane woodland, rock with copper/heavy metals. From 1,500 and 4,250 feet in elevation	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Monardella folletti</i>	Follett's mountainbalm	FSS ²	–	1B.2	June–September	Lower montane coniferous forests in rocky, serpentine soils. From 1,650 to 6,550 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Navarretia prolifera</i> ssp. <i>lutea</i>	Yellow bur navarretia	FSS1	–	4.3	May–July	Chaparral, cismontane woodland. Dry rocky flats, often on Ledmount soils. Often on lava caps or other openings, rocky ridgelines, saddles, and eroding ephemeral drainages. From 2,300 to 5,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

BA/BE Table 1. Special-status Plant Species in the Vicinity of the MFP (continued).

Scientific Name	Common Name	Federal Status	State Status	CNPS List	Blooming Period/Fertile	Habitat	Occurrence Notes
Special-status Plants Potentially Occurring Within the MFP during the Term of the New License (continued)							
<i>Packera layneae</i> (<i>Senecio layneae</i>)	Layne's ragwort	FT FSS1	SR	1B.2	April–July	Chaparral and cismontane woodland on rocky, gabbroic, serpentine or ultramafic soils. From 650 to 3,400 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Peltigera hydrothyria</i> (<i>Hydrothyria venosa</i>)	Veined water lichen	FSS3	–	–	N/A	Aquatic, in spring-fed streams with clear, cold water. From 1,150 to 7,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Penstemon personatus</i>	Close-throated beardtongue	FSS2	–	1B.2	June–September	Chaparral and upper and lower montane coniferous forests. From 3,400 to 7,000 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Pyrrocoma lucida</i>	Sticky goldenweed	FSS2	–	1B.2	July–October	Great Basin scrub, lower montane coniferous forest, and meadows and seeps. May grow in alkaline clays. From 2,250 to 6,250 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Rorippa subumbellata</i>	Tahoe yellow cress	FC	SE	1B.1	May–September	Lower montane coniferous forests, meadows and seeps, sandy (granitic) lake margins. From 6,050 to 6,250 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
<i>Tauschia howelli</i>	Howell's tauschia	FSS2	–	1B.3	June–August	Subalpine /upper montane coniferous forest, granitic, gravelly soils. From 5,500 to 8,500 feet in elevation.	The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.
Special-status Plants Unlikely to Occur Within the MFP during the Term of the New License							
<i>Arabis rigidissima</i> var. <i>demota</i>	Trinity Mountain rockcress	FSS ²	–	1B.2	August	Broad-leaved upland forest, and upper montane coniferous forest in rocky soils. From 7,500 to 8,500 feet in elevation.	FERC Project boundaries are outside the known elevation range of this species.
<i>Draba asterophora</i> var. <i>asterophora</i>	Lake Tahoe draba	FSS ¹	–	1B.2	July–August	Subalpine coniferous forest and alpine boulder and rock fields in the high Sierra Nevada. From 8,000 to 11,500 feet in elevation.	FERC Project boundaries are outside the known elevation range of this species.
<i>Draba asterophora</i> var. <i>macrocarpa</i>	Cup Lake draba	FSS ¹	–	1B.1	July–August	Subalpine coniferous forests and rock crevices. From 8,000 to 9,000 feet in elevation.	FERC Project boundaries are outside the known elevation range of this species.
<i>Lewisia longipetala</i>	Long-petaled lewisia	FSS ³	–	1B.3	July–August	Alpine boulder and rock fields and subalpine coniferous forests, crevices in granitic rock. From 8,000 to 9,600 feet in elevation.	FERC Project boundaries are outside the known elevation range of this species.

BA/BE Table 1. Special-status Plant Species in the Vicinity of the MFP (continued).

LEGEND:

Federal Status

FT	=	Federal Threatened
FE	=	Federal Endangered
FC	=	Federal Candidate
FSS ¹	=	Forest Service Sensitive, Eldorado National Forest
FSS ²	=	Forest Service Sensitive, Tahoe National Forest
FSS ³	=	Forest Service Sensitive, Eldorado and Tahoe National Forests

State Status

SR	=	listed by California as Rare
ST	=	California Threatened
SE	=	California Endangered

CNPS Status (California Native Plant Society)

1B	=	rare, threatened or endangered in California and elsewhere.
2	=	rare in California but more common elsewhere.
3	=	need more information
4	=	plants of limited distribution; a watch list.
_.1	=	Seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat)
_.2	=	Fairly endangered in California (20-80% occurrences threatened)
_.3	=	Not very endangered in California (<20% of occurrences threatened or no current threats known)

BA/BE Table 2. Special-status Wildlife in the Vicinity of the MFP.

Scientific Name	Common Name	Federal Status	State Status	Habitat	Occurrence Notes
Special-status Wildlife Known to occur in the vicinity of the MFP					
<i>Mylopharodon conocephalus</i>	hardhead	FSS		Freshwater fish native to California, with a distribution limited to the Sacramento-San Joaquin river system and the Russian River system.	Known to occur in the vicinity of the MFP. Hardhead are patchily distributed in the MFP, with the majority found in Ralston Afterbay and the Middle Fork American and Rubicon rivers immediately upstream of Ralston Afterbay. Hardhead are also known from two isolated locations in the peaking reach downstream of Ralston Afterbay.
<i>Rana boylei</i>	foothill yellow-legged frog	FSS ³	CSC	Breeds in rocky streams with cool, clear water in a variety of habitats, including valley and foothill oak woodland, riparian forest, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadows; occurs at elevations ranging from 0 to 6,000 feet.	Known to occur in the vicinity of the MFP at the North Fork of the Middle Fork American River in the vicinity of the Ralston Picnic Area and at the Rubicon River in the vicinity of the Ralston Powerhouse and Switchyard.
<i>Accipiter gentilis</i>	northern goshawk	FSS ³	CSC	Prefers middle to high elevation, mature, dense conifer forests for foraging and nesting. Casual in foothills during winter, northern deserts in pinyon-juniper woodland, and low elevation riparian habitats.	Known to occur in the vicinity of the MFP. Detected at South Fork Long Canyon Diversion Dam. Northern goshawk nests and associated PACs intersect with FERC Project boundaries at the following locations: French Meadows Reservoir; Duncan Creek Diversion Dam; South Fork Long Canyon Diversion Dam; Brushy Canyon Adit and Access Road; Middle Fork-Ralston Tunnel
<i>Haliaeetus leucocephalus</i>	bald eagle	FD (7/10/08) FSS ³ BCC	SE CFP	Local winter migrant to various California lakes. Most of the breeding population is restricted to more northern counties. Regular winter migrants to the region. Usually not found at high elevations in the Sierra.	Known to occur in the vicinity of the MFP. Numerous bald eagle detections were made at Hell Hole Reservoir during TERR 5 bald eagle surveys, including one nest sight at the upper end of Hell Hole Reservoir. Also detected during TERR 5 surveys along the MFAR, the Rubicon River, and Ralston Afterbay. Records for this species include Hell Hole Reservoir; Ralston Afterbay; MFAR approximately 3 miles downstream of the Ralston Afterbay Dam; Gerle Creek Divide Reservoir; Rubicon River approximately 2 miles downstream of the confluence with the South Fork Rubicon River; Pilot Creek near its confluence with the Rubicon River; and Otter Creek near its confluence with the MFAR. In addition, a bald eagle was observed in the summer of 2006 at Hell Hole Reservoir (Ransom pers. comm., 2007)
<i>Strix occidentalis occidentalis</i>	California spotted owl	FSS ³ MIS BCC	CSC	Resides in dense, old growth, multi-layered mixed conifer, redwood, Douglas-fir, and oak woodland habitats, from sea level up to approximately 7,600 feet.	Known to occur in the vicinity of the MFP. California spotted owl nests and associated PACs intersect with FERC Project boundaries at the following locations: French Meadows Reservoir; North and South Fork Long Canyon Diversion Dams; Middle Fork Interbay; French Meadows- Hell Hole Tunnel; Hell Hole-Middle Fork Tunnel; Interbay Dam Road; Brushy Canyon Adit and Access Road; Middle Fork-Ralston Tunnel.
<i>Lasiurus blossevillei</i>	Western red bat	FSS3	CSC	Occurs from British Columbia to South America. In California, occurs from Shasta County to the Mexican border west of the Sierra crest. Roosts solitarily in foliage in forests and woodlands from sea level up through mixed coniferous forest. In California known to roost in cottonwood and willow.	Known to occur in the vicinity of the MFP. Detected during TERR 6 special-status bat surveys at French Meadows Dam and Outlet Works, Ralston Afterbay Dam, Middle Fork Interbay Dam, North and South Fork Long Canyon Diversion Dams, French Meadows Powerhouse and Penstock and Butterfly Valve House, and the upper end of Hell Hole Reservoir.
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	FSS3	CSC	Found in all but alpine and subalpine habitats; most abundant in mesic habitats. Requires caves, mines, tunnels, buildings, or other man-made structures for roosting. This species is extremely sensitive to disturbance and may abandon a roost if disturbed.	Known to occur in the vicinity of the MFP. Detected during TERR 6 special-status bat surveys at French Meadows Dam and Outlet Works, Ralston Afterbay Dam, North Fork Long Canyon Diversion Dam, French Meadows Powerhouse and Penstock and Butterfly Valve House, and the upper end of Hell Hole Reservoir.
<i>Antrozous pallidus</i>	pallid bat	FSS3	CSC	Inhabits grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. Typically roosts in caves, crevices, or mines. Requires open habitat for foraging.	Known to occur in the vicinity of the MFP. Detected during TERR 6 special-status bat surveys at French Meadows Dam and Outlet Works, Ralston Afterbay Dam, Middle Fork Interbay Dam, North Fork Long Canyon Diversion Dam, and French Meadows Powerhouse and Penstock and Butterfly Valve House. Data from W. Clevenger's 2003 study includes occurrences of this species in the vicinity of French Meadows Reservoir and on Duncan Creek upstream of the Duncan Creek Diversion (Clevenger 2005).

BA/BE Table 2. Special-status Wildlife in the Vicinity of the MFP (continued).

Scientific Name	Common Name	Federal Status	State Status	Habitat	Occurrence Notes
Special-Status Wildlife Potentially Occurring Within the Study Area					
<i>Rana aurora draytonii</i>	California red-legged frog	FT	CSC	Breeds in quiet streams and permanent, deep, cool ponds with overhanging and emergent vegetation below 4,000 feet elevation. Known to occur adjacent to breeding habitats in riparian areas and heavily vegetated streamside shorelines, and non-native grasslands. Sierran streams historically supported populations of red-legged frog; however, these populations have been eliminated.	May occur in appropriate habitat. Study area boundaries are within the known geographic and elevational range of this species. The closest records for this species are approximately 1.5 miles east of the Ralston Powerhouse and 2.5 miles NE of Ralston Afterbay Dam.
<i>Actinemys marmorata marmorata</i>	northwestern pond turtle	FSS3	CSC	Perennial wetlands and slow moving creeks and ponds with overhanging vegetation up to 6,000 feet; suitable basking sites such as logs and rocks above the waterline.	May occur in appropriate habitat. Study area boundaries are within the known geographic and elevational range of this species. Known to occur within the watershed on the Middle Fork American River just south of Ralston Afterbay Dam.
<i>Strix nebulosa</i>	great gray owl	FSS3	SE	Nests in old-growth coniferous forests and forages in montane meadows. Distribution includes high elevations of the Sierra Nevada and Cascade Ranges from 4,500 to 7,500 feet.	Potential migrant in appropriate habitat. However, great gray owls are not known to breed in the vicinity of study area boundaries. Breeding populations in California are concentrated in Del Norte, Humboldt, Siskiyou, and Modoc counties, with smaller, isolated breeding populations also occurring in the central Sierra Nevada. The nearest CNDDDB record is 30 miles south near Leoni Meadows in the ENF (CNDDDB 2007).
<i>Empidonax traillii (brewsteri)</i>	willow flycatcher	FSS3 BCC	SE	Wet meadow and montane riparian habitats from 2,000 to 8,000 feet. Most often occurs in broad, open river valleys or large mountain meadows with lush growth of shrubby willows.	Potential summer (breeding) resident in appropriate habitat. Study area boundaries are within the known geographic and elevational range of this species. However, USDA-FS has not identified appropriate habitat areas for willow flycatcher in the vicinity of the MFP.
<i>Martes americana (sierrae)</i>	American marten (Sierra marten)	FSS3 MIS	—	Optimal habitats are various mixed evergreen forests with more than 40% crown closure and large trees and snags for den sites. Most commonly found in red fir and lodgepole pine forests between 4,000 and 10,600 feet elevation.	May occur in appropriate habitat. Study area boundaries are within the known geographic and elevational range of this species. Known to occur within the watershed. A CNDDDB report (polygon) for this species includes portions of Duncan Creek Diversion Road.
<i>Martes pennanti (pacifica)</i>	Pacific fisher	FC FSS3	SCT CSC	Suitable habitat consists of large areas of mature, dense forest such as red fir, lodgepole pine, ponderosa pine, mixed conifer, and Jeffery pine forests with snags and greater than 50% canopy closure. Known from 4,000 to 8,000 ft elevations in the Sierra National Forest.	May occur in appropriate habitat. Study area boundaries are within the known geographic and elevational range of this species. Two recorded occurrences in the vicinity of French Meadows Reservoir, including one occurrence ~ 1 mile east of French Meadows Reservoir, near the Forest Service Station. However, this species is now thought to be absent from the central Sierra Nevada (Zielinski et al. 2005).
<i>Gulo gulo luteus</i>	California wolverine	FSS3	ST CFP	Mixed conifer, red fir, and lodgepole habitats, and probably sub-alpine conifer, alpine dwarf shrub, wet meadow, and montane riparian habitats. Occurs in the Sierra Nevada from 4,300 to 10,800 feet. Majority of recorded sightings are found above 8,000 feet elevation.	May occur in appropriate habitat. Study area boundaries are within the known geographic and elevational range of this species. However, this species is extremely rare in California.
Special-Status Wildlife Unlikely to Occur Within the Study Area					
<i>Helisoma newberryi</i>	Great Basin rams-horn (snail)	FSS ²		Larger lakes and slow rivers, including larger spring sources and spring fed creeks. In mountain streams and lakes south to Lake Tahoe; under stones.	Unlikely to occur. This is a relic species that is confined to large spring complexes on the periphery of the Great Basin. There are few remaining populations; one Lake Tahoe population is believed extant.
<i>Desmocerus californicus dimorphus</i>	valley elderberry longhorn beetle	FT FPD	—	Elderberry shrubs throughout the Central Valley and foothills below 3,000 feet elevation.	Unlikely to occur. Elderberry shrubs were not detected in recent surveys conducted below 3,000 feet in elevation
<i>Bufo canorus</i>	Yosemite toad	FC FSS1	CSC	Occurs in montane meadows and forest borders; breeds in shallow pools, at lake margins, or in pools of quiet streams at elevations ranging 6,400 to 11,300 feet.	Unlikely to occur. Study area boundaries are outside the known elevational range of this species.

BA/BE Table 2. Special-status Wildlife in the Vicinity of the MFP (continued).

Scientific Name	Common Name	Federal Status	State Status	Habitat	Occurrence Notes
Special-Status Wildlife Unlikely to Occur Within the Study Area (continued)					
<i>Rana muscosa</i>	mountain yellow-legged frog	FC FSS ³	CSC	Occurs in the Sierras at elevations ranging from 4,500 to 12,000 feet; associated with streams, lakes, and ponds in montane riparian, lodgepole pine, subalpine conifer, and wet meadow habitats; breeds in shallow water in low gradient perennial streams and lakes.	Unlikely to occur. Generally the densest populations occur above 10,000 ft msl in both the Tahoe and Eldorado National Forests, including populations in the headwaters and headwater tributaries of the Rubicon and South Fork American Rivers (USFWS 2009), approximately 17 miles from the MFP. Because the eastern boundary of the MFP is approximately 5000 ft msl and west of the known range, MYLF is unlikely to occur within Project boundaries.
<i>Rana pipiens</i>	northern leopard frog	FSS ¹	CSC	Native range is east of the Sierra crest only. Found near permanent or semi-permanent water in a variety of habitats. Highly aquatic species. Shoreline cover, submerged and emergent aquatic vegetation are important habitat characteristics. Elevation range extends from sea level to 7000 feet.	Unlikely to occur. Study area boundaries are outside the known geographic range of this species.
<i>Branta canadensis leucopareia</i>	Aleutian Canada goose	FD	—	(wintering) Winters on lakes and inland prairies. Forages on natural pasture or that cultivated to grain; loafes on lakes, reservoirs, ponds.	Unlikely to occur. Study area boundaries are outside the known geographic and elevational range of this species.
<i>Buteo swainsoni</i>	Swainson's hawk	FSS	ΣT	Uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and Mojave Desert. Riparian woodlands, juniper-sage flats, and oak woodlands for nesting. Grasslands and agricultural areas for foraging.	Unlikely to occur. Study area boundaries are outside the known geographic range of this species.
<i>Vulpes vulpes necator</i>	Sierra Nevada red fox	FSS3	ΣT	Occurs throughout the Sierra Nevada at elevations above 7,000 feet in forests interspersed with meadows or alpine forests. Open areas are used for hunting, and forested habitats are used for cover and reproduction. Known from the higher elevations of the Sierra National Forest.	Unlikely to occur. Study area boundaries are outside the known elevational range of this species.

LEGEND:

Federal Status:
FT = Federal Threatened
FE = Federal Endangered
FC = Federal Candidate
FPD = Federal Proposed for Delisting
FD = Delisted Species

FSS¹ = Forest Service Sensitive, Eldorado National Forest
FSS² = Forest Service Sensitive, Tahoe National Forest
FSS³ = Forest Service Sensitive, Eldorado and Tahoe National Forests
MIS = Management Indicator Species
BCC = USFWS Birds of Conservation Concern

State Status:
SR = California Rare
ST = California Threatened
SE = California Endangered
SCT = Candidate for listing as California Threatened
SCE = Candidate for listing as California Endangered
CFP = California Fully Protected
CSC = California Species of Special Concern

¹ At the time the TERR 4 – TSR (PCWA 2011kk; SD B) was developed in 2007, osprey were considered CSC by the CDFG. When CDFG revised the CSC bird list in 2008, osprey were no longer included. However, because osprey were included as a special-status species in the TERR 4 – TSR (PCWA 2011kk; SD B) in agreement with the FMP Terrestrial Working Group (TWG), they are regarded as such for the purposes of this report.

BA/BE Table 3. Middle Fork American River Project History.

Year	Development Activity
1963	The Federal Power Commission, predecessor of the current Federal Energy Regulatory Commission (FERC or Commission), issues a 50-year license (Project No. 2079) to Placer County Water Agency (PCWA) for the Middle Fork American River Project (MFP).
1963	Construction begins on the MFP.
1967	Completion of the MFP at a cost of \$115 million.
1975	Remediation of the Hell Hole – Middle Fork Tunnel.
1980	PCWA files a license amendment to construct a new powerhouse at the existing outlet of Hell Hole Dam on the Rubicon River.
1983	Hell Hole Powerhouse (725 KW) goes online.
2006	PCWA begins the relicensing of the MFP.
2007	Remediation of Duncan Canyon Creek Access Road.
2010	Initiate retrofit of French Meadows Spillway Probable Maximum Flood.
2012	French Meadows Spillway retrofit complete.
2013	Current FERC license for the MFP expires on February 28, 2013.

BA/BE Table 4. No-Action Alternative – Project Facilities and Features.

Dams, Reservoirs, and Diversion Pools	
Large Dams	
French Meadows Dam and Outlet Works	
Hell Hole Dam and Outlet Works	
Medium Dams	
Middle Fork Interbay Dam and Outlet Works	
Ralston Afterbay Dam and Outlet Works	
Small Dams	
Duncan Creek Diversion Dam	
North Fork Long Canyon Diversion Dam	
South Fork Long Canyon Diversion Dam	
Large Reservoirs	
French Meadows Reservoir	
Hell Hole Reservoir	
Medium Reservoirs	
Middle Fork Interbay	
Ralston Afterbay	
Small Diversion Pools	
Duncan Creek Diversion Pool	
North Fork Long Canyon Diversion Pool	
South Fork Long Canyon Diversion Pool	
Water Conveyance Systems	
Tunnels	
Duncan Creek – Middle Fork Tunnel	
French Meadows – Hell Hole Tunnel	
Hell Hole – Middle Fork Tunnel	
Middle Fork – Ralston Tunnel	
Ralston – Oxbow Tunnel	
Diversion Pipes and Drop Inlets	
North Fork Long Canyon Diversion Pipe and Drop Inlet	
South Fork Long Canyon Diversion Pipe and Drop Inlet	
Surge Shafts and Adits	
Brushy Canyon Adit	
Hell Hole – Middle Fork Tunnel Surge Shaft and Tank	
Middle Fork – Ralston Tunnel Surge Shaft and Tank	
Removable Sections and Portals	
Duncan Creek – Middle Fork Tunnel Portal	
French Meadows – Hell Hole Tunnel Removable Section	
Hell Hole – Middle Fork Tunnel Removable Section	
Middle Fork – Ralston Tunnel Removable Section	
North Fork Long Canyon Crossing Removable Section	
Intakes and Gatehouses	
Duncan Creek – Middle Fork Tunnel Intake	
French Meadows – Hell Hole Tunnel Gatehouse	
French Meadows – Hell Hole Tunnel Intake	
Hell Hole – Middle Fork Tunnel Gatehouse	
Hell Hole – Middle Fork Tunnel Intake	
Middle Fork – Ralston Tunnel Intake and Gatehouse	
Ralston – Oxbow Tunnel Intake	

**BA/BE Table 4. No-Action Alternative – Project Facilities and Features
(continued).**

Water Conveyance Systems (continued)	
Penstocks and Valve Houses	
French Meadows Powerhouse Penstock and Butterfly Valve House	
Middle Fork Powerhouse Penstock and Butterfly Valve House	
Ralston Powerhouse Penstock and Butterfly Valve House	
Powerhouses, Switchyards, and Substations	
French Meadows Powerhouse and Switchyard	
Hell Hole Powerhouse	
Hell Hole Substation	
Middle Fork Powerhouse and Upper and Lower Switchyards	
Ralston Powerhouse and Switchyard	
Oxbow Powerhouse and Switchyard	
Gaging Stations and Weirs	
Stream Gages and Weirs	
Duncan Creek near French Meadows (USGS Gage No. 11427700)	
Duncan Creek below Diversion Dam (USGS Gage No. 11427750)	
Middle Fork American River at French Meadows (USGS Gage No. 11427500)	
Rubicon River below Hell Hole Dam (USGS Gage No. 11428800)	
North Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433085)	
South Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433065)	
Middle Fork American River below Interbay Dam (USGS Gage No. 11427770)	
Middle Fork American River above Middle Fork Powerhouse (USGS Gage No. 11427760)	
Middle Fork American River near Foresthill (USGS Gage No. 11433300)	
Diversion Gages	
North Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433080)	
South Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433060)	
Reservoir Gages	
French Meadows Reservoir (USGS Gage No. 11427400)	
French Meadows Reservoir Staff Gage	
Hell Hole Reservoir (USGS Gage No. 11428700)	
Hell Hole Reservoir Staff Gage	
Middle Fork Interbay Reservoir	
Ralston Afterbay Reservoir	
Powerhouse Gages	
French Meadows Powerhouse (USGS Gage No. 11427200)	
Middle Fork Powerhouse (USGS Gage No. 11428600)	
Ralston Powerhouse (USGS Gage No. 11427765)	
Oxbow Powerhouse (USGS Gage No. 11433212)	
Leakage Weirs	
French Meadows Dam Leakage Weirs Nos. 1-6	
Hell Hole Dam Leakage Weir	

**BA/BE Table 4. No-Action Alternative – Project Facilities and Features
(continued).**

Project Communication Lines and Powerlines	
French Meadows Area	
French Meadows Dam Generator Building to French Meadows Dam Outlet Works Powerline	
French Meadows Dam Generator Building to French Meadows Dam Spillway Gates Powerline	
Hell Hole Area	
French Meadows Powerhouse to French Meadows Powerhouse Penstock and Butterfly Valve House	
French Meadows Powerhouse and Switchyard to Hell Hole – Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator's Cottages, and Hell Hole Powerhouse Communication Line/Powerline	
Dormitory and Cottages Water Supply Tank Powerline	
Hell Hole Powerhouse to Rubicon River Gage below Hell Hole Dam Communication Line/Powerline	
Middle Fork Interbay Area	
Middle Fork Powerhouse to Middle Fork Powerhouse Butterfly Valve House Communication	
Middle Fork Powerhouse Butterfly Valve House to Radio Repeater near Hell Hole – Middle Fork Tunnel Surge Tank (underground) Communication Line/Powerline	
Middle Fork Powerhouse to Middle Fork – Ralston Tunnel Intake and Gatehouse Communication	
Middle Fork Powerhouse to Middle Fork American River Gage above Middle Fork Powerhouse	
Ralston – Oxbow Area	
Ralston – Oxbow Tunnel Intake to Ralston Powerhouse Communication Line	
Ralston Powerhouse to Ralston Powerhouse Butterfly Valve House Communication Line/Powerline	
Ralston Afterbay Dam Generator Building to Ralston – Oxbow Tunnel Intake Communication	
Oxbow Powerhouse to Ralston Afterbay Dam Generator Building Communication Line/Powerline	
Photovoltaic Poles and Powerlines	
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows	
Photovoltaic Pole and Powerline at Duncan Creek Gage below Diversion Dam	
Photovoltaic Pole and Powerline at Middle Fork American River Gage at French Meadows	
Photovoltaic Pole and Powerline at Middle Fork American River Gage above Middle Fork Powerhouse	
Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam	
Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam	
Photovoltaic Pole and Powerline at Middle Fork American River Gage near Foresthill	
Microwave Reflectors and Radio Towers	
Passive Microwave Reflector Station above Middle Fork Interbay	
Radio Communications Tower near French Meadows – Hell Hole Tunnel Gatehouse	
Radio Communications Tower and Repeater near Hell Hole – Middle Fork Tunnel Surge Shaft and Tank	
Passive Microwave Reflector Station above Ralston Afterbay	
Disposal Areas	
Duncan Creek Diversion Sediment Disposal Area	
North Fork Long Canyon Crossing Sediment Disposal Area	
Middle Fork Interbay Sediment Disposal Area	
Ralston Ridge Sediment Disposal Area	

**BA/BE Table 4. No-Action Alternative – Project Facilities and Features
(continued).**

Ancillary Facilities	
French Meadows Dam Generator Building	
French Meadows Dam Staging Area	
Dormitory Facility	
Dormitory and Cottages Water Supply Tank	
Hell Hole Staging Areas	
Operator Cottages and Shop	
Ralston Afterbay Dam Generator Building	
Storage Building at Middle Fork – Ralston Tunnel Surge Shaft and Tank	
Ralston Afterbay Sediment Removal Access Point	
Project Fences	
Slope Fences	
French Meadows Powerhouse Penstock Rock Fence	
French Meadows Powerhouse Slope Fence	
Long Canyon Crossing Slope Fence	
Middle Fork Powerhouse Upper Switchyard Slope Fence	
Middle Fork Interbay Dam Slope Fence	
Ralston Powerhouse Penstock and Butterfly Valve House Slope Fences	
Ralston Powerhouse Slope Fence	
Oxbow Powerhouse Slope Fence	
Public Safety Fences	
Dormitory Facility Barrier Fence	
Hell Hole Dam General Parking Area Barrier Fence	
North Fork Long Canyon Crossing Removable Section Barrier Fence	
Project Roads	
Duncan Creek Area	
Duncan Creek Diversion Intake Road	
Duncan Creek Diversion Dam Road	
Duncan Creek Diversion Pool Road	
French Meadows Area	
Duncan Creek – Middle Fork Tunnel Portal Road	
French Meadows – Hell Hole Tunnel Gatehouse Road	
French Meadows Dam Outlet Works and South Leakage Weir Road	
French Meadows Dam Staging Area and Spillway West Access Road	
French Meadows Spillway East Access Road	
French Meadows Dam North Leakage Weir Road	
French Meadows Campground Water Supply Facility Access Road	
Hell Hole Area	
Hell Hole Dam and Powerhouse Road	
Rubicon River Gage below Hell Hole Dam Road	
Hell Hole Dam Leakage Weir Road	
Hell Hole Dam Spillway Northern Access Point Road	
French Meadows – Hell Hole Tunnel Portal Road	
French Meadows Powerhouse Road	
Hell Hole – Middle Fork Tunnel Gatehouse Road	
Dormitory Facility Road	
Operator Cottages and Shop Road	
Spur on North Side of Operator Cottages	
Spur on South Side of Operator Cottages	
Hell Hole Dam Spillway Discharge Channel Road Spur to Communication Line/Powerline	
Hell Hole Dam Spillway Discharge Channel Road	
Big Meadows Campground Water Supply Facility Access Road	

**BA/BE Table 4. No-Action Alternative – Project Facilities and Features
(continued).**

Project Roads (continued)
Long Canyon Area
North Fork Long Canyon Diversion North Road
North Fork Long Canyon Diversion South Road
North Fork Long Canyon Diversion Drop Inlet Road
South Fork Long Canyon Diversion and Drop Inlet Road
South Fork Long Canyon Diversion and Drop Inlet Cutoff Road
South Fork Long Canyon Diversion Drop Inlet Access Road
North Fork Long Canyon Crossing Removable Section North Road
North Fork Long Canyon Crossing Removable Section South Road
Middle Meadows Group Campground Water Supply Facility Access Road
Middle Fork Interbay Area
Middle Fork Interbay Dam Road
Middle Fork Interbay Dam to Powerhouse Road
Middle Fork Powerhouse Butterfly Valve House Road
Middle Fork Powerhouse Penstock and Butterfly Valve House Road
Middle Fork Powerhouse Upper Switchyard Road
Ralston – Oxbow Area
Brushy Canyon Adit Road
Ralston Powerhouse Butterfly Valve House Road
Ralston Afterbay Dam Access Road
Indian Bar Access Road
Oxbow Powerhouse Road
Ralston – Oxbow Tunnel Intake Road
Ralston Afterbay Private Boat Ramp Road
Ralston Afterbay Dam and Access Point Road
Project Trails
Duncan Creek Area
Duncan Creek Diversion Dam North Trail
Duncan Creek Diversion Dam South Trail
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows Trail
Duncan Creek Gage near French Meadows Trail
Duncan Creek Gage below Diversion Dam Trail
Middle Fork Interbay Area
Middle Fork American River Gage above Middle Fork Powerhouse Trail
Passive Microwave Reflector Station above Middle Fork Interbay Trail
Ralston Afterbay Area
Passive Microwave Reflector Station above Ralston Afterbay Trail

BA/BE Table 5. No-Action Alternative – Project Recreation Facilities and Features.

Project Recreation Facilities
French Meadows Area
Ahart Campground
Coyote Group Campground
Poppy Campground
French Meadows Campground
Gates Group Campground
Lewis Campground
French Meadows Picnic Area
French Meadows Boat Ramp
French Meadows Dump Station
McGuire Picnic Area and Beach
McGuire Boat Ramp and Associated Parking
Hell Hole Area
Big Meadows Campground
Hell Hole Campground
Upper Hell Hole Campground
Hell Hole Vista
Hell Hole Boat Ramp
Hell Hole General Parking Area and Hell Hole Boat Ramp Parking Area
Ralston Afterbay Area
Ralston Picnic Area
Ralston Picnic Area Cartop Boat Ramp
Indian Bar Rafting Access and General Parking
Long Canyon Area
Middle Meadows Group Campground
Project Recreation Facility Features
Project Recreation Facility Water Supplies
Dolly Creek Water Supply
French Meadows Campground Water Supply
Big Meadows Campground Water Supply
Middle Meadows Group Campground Water Supply

BA/BE Table 6. Project Facility Specifications.

Duncan Creek Diversion	
Dam	
Type	Gravity
Material	Concrete
Height of Dam Crest above Streambed	32 ft
Dam Crest Length	165 ft
Volume	1,750 cu yd
Elevation of Dam Crest	5,275 ft
Elevation of Streambed	5,243 ft
Elevation of Spillway Crest	5,265 ft
Stream Maintenance Pipe Capacity (10-in pipe)	8 cfs
Maximum Low-Level Outlet Capacity (60-in pipe)	310 cfs
Spillway	
Type	Uncontrolled Overflow
Width	100 ft
Capacity	7,200 cfs
Reservoir	
Gross Storage	20 ac-ft
Duncan Creek – Middle Fork Tunnel	
Nominal Size/Shape	9 ft x10 ft/Horseshoe
Length:	
Total	7,864 ft or 1.5 mi
Concrete Lined (Est.)	300 ft
Maximum Diversion Capacity	400 cfs
Invert Gradient	0.0029
French Meadows Dam (L L Anderson Dam) and Reservoir	
Dam	
Type	Composite
Material	Rock and Gravel Fill
Height of Dam Crest above Streambed	231 ft
Dam Crest Length	2,700 ft
Dam Crest Width	32 ft
Elevation of Dam Crest	5,273 ft
Elevation of Streambed	5,040 ft
Elevation of Spillway Crest	5,244.5 ft
Volume	3,510,000 cubic yards
Slopes – Upstream	2:1
Slopes - Downstream	1.8:1 and 2.0:1
Stream Maintenance Pipe Capacity	8 cfs
Maximum Low-Level Outlet Capacity at Water Surface 5,262 (full reservoir)	1,430 cfs

BA/BE Table 6. Project Facility Specifications (continued).

French Meadows Dam (L L Anderson Dam) and Reservoir (continued)	
Spillway	
Type	Gated Ogee Crest
Type of Gates	Radial
Number of Gates	2
Size of Gates	36.5 ft x 18.5 ft
Capacity (Res. Water Surface 5,271, 2 ft freeboard)	39,957 cfs
Reservoir	
Maximum Operating Water Surface	5,262.0 ft
Minimum Operating Water Surface	5,125 ft
Gross Storage	134,993 ac-ft
Dead Storage (as constructed), at Tunnel Intake Lip	7,635 ac-ft
Active Storage (as constructed)	127,358 ac-ft
Area at Maximum Operating Water Surface	1,408 acres
Area at Minimum Operating Water Surface	434 acres
Depth at Minimum Operating Water Surface	77 ft
Shoreline at Maximum Operating Water Surface	9 mi
French Meadows – Hell Hole Tunnel	
Nominal Size/Shape	12 ft 4 in/Horseshoe
Length:	
Total	13,694 ft or 2.6 mi
Concrete Lined (Est.)	1,617 ft
Steel Lined (Est.)	317 ft
Maximum Discharge	400 cfs ¹
Invert Gradient	0.0025
French Meadows Powerhouse	
Penstock	
Length	691 ft or 0.1 mi
Diameter	6 ft 3 in O.D.
Powerhouse	
Installed Capacity, Generator	15.3 MW
Type of Turbine	Francis
Maximum Tail Water Surface	4,630 ft
Minimum Tail Water Surface	4,608 ft
Maximum Static Head	654 ft
Minimum Static Head	517 ft
Elevation Runner	4,612 ft
Minimum Estimated Hydraulic Capacity	50 cfs
Maximum Estimated Hydraulic Capacity	400 cfs
R.P.M.	450

¹As constructed tunnel capacity is approximately 800 cfs, maximum discharge is limited to 400 cfs in French Meadows Powerhouse.

BA/BE Table 6. Project Facility Specifications (continued).

Hell Hole Dam and Reservoir	
Dam	
Type	Rock Fill
Height of Dam Crest above Streambed	410 ft
Dam Crest Length	1,570 ft
Dam Crest Width	35 ft
Elevation of Dam Crest	4,650 ft
Elevation of Streambed	4,240 ft
Volume	8,440,000 cu yd
Slopes - Upstream	2.5:1
Slopes - Downstream	1.4:1
Stream Maintenance Pipe Capacity	20 cfs
Maximum Low-Level Outlet Capacity at Water Surface 4,630 (full reservoir)	852 cfs
Spillway	
Type	Uncontrolled
Elevation of Spillway Crest	4,630 ft
Width at Lip	350 ft
Capacity (Water Surface 4,647, 2.8 ft freeboard)	89,500 cfs
Reservoir	
Maximum Operating Water Surface	4,630 ft
Minimum Operating Water Surface	4,340 ft
Gross Storage	207,590 ac-ft
Dead Storage (as constructed), at Tunnel Intake Lip	2,533 ac-ft
Active Storage (as constructed)	205,057 ac-ft
Area at Maximum Operating Water Surface	1,253 acres
Area at Minimum Operating Water Surface	185 acres
Depth at Minimum Operating Water Surface	88 ft
Shoreline at Maximum Operating Water Surface	11 mi
Hell Hole Powerhouse	
Installed Capacity, Generator	0.73 MW
Normal Operating Tail Water Surface	4,240 ft
Maximum Static Head	391 ft
Minimum Static Head	101 ft
Minimum Estimated Hydraulic Capacity	10 cfs
Maximum Estimated Hydraulic Capacity	35 cfs
R.P.M.	1,200
Hell Hole – Middle Fork Tunnel	
Nominal Size/Shape	13 ft 5 in/Horseshoe
Length:	
Total	55,006 ft or 10.4 mi
Concrete Lined (Est.)	6,780 ft
Steel Lined (Est.)	5,180 ft
Nominal Maximum Discharge, at full reservoir	920 cfs
Invert Gradient	0.0035 and 0.0077

BA/BE Table 6. Project Facility Specifications (continued).

North Fork Long Canyon Diversion	
Dam	
Type	Gravity
Material	Concrete
Height of Dam above Streambed	10 ft
Dam Crest Length	120 ft
Elevation of Dam Crest	4,720 ft
Elevation of Streambed	4,710 ft
Volume	636 cu yd
Stream Maintenance Pipe Capacity (12-in pipe)	2 cfs
Maximum Low-Level Outlet Capacity (36-in pipe)	100 cfs
Spillway	
Type	Uncontrolled Overflow
Elevation of Spillway Crest	4,716 ft
Width of Spillway Crest	95 ft
Capacity	3,000 cfs
Reservoir	
Gross Storage	<1 ac-ft
North Fork Long Canyon Diversion Pipe and Drop Inlet	
Pipe	
Diameter	36 in
Length	3,530 ft or 0.7 mi
Shaft	
Diameter	6 ft
Depth without 6 ft x 20 ft Standpipe	403 ft
Capacity	100 cfs
Invert Gradient	Vertical
South Fork Long Canyon Diversion	
Dam	
Type	Gravity
Material	Concrete
Height of Dam Crest above Streambed	27 ft
Dam Crest Length	145 ft
Elevation of Dam Crest	4,650 ft
Elevation of Streambed	4,623 ft
Volume	1,341 cu yd
Stream Maintenance Pipe Capacity (12-in pipe)	5 cfs
Maximum Low-Level Outlet Capacity (36-in pipe)	140 cfs
Spillway	
Type	Uncontrolled Overflow
Width of Spillway Crest	60 ft
Elevation of Spillway Crest	4,640 ft
Capacity	4,000 cfs

BA/BE Table 6. Project Facility Specifications (continued).

South Fork Long Canyon Diversion Pipe and Drop Inlet	
Reservoir	
Gross Storage	<1 ac-ft
Diameter	6 ft
Depth without 6 ft x 6 ft Standpipe	387 ft
Capacity	200 cfs
Invert Gradient	Vertical
Middle Fork Powerhouse (<i>L.J. Stephenson Powerhouse</i>)	
Penstock	
Length	3,653 ft or 0.7 mi
Diameter: Above Bifurcation	7 ft 6 in to 9 ft O.D.
Diameter: Below Bifurcation	5 ft 6 in O.D.
Powerhouse	
Number of Units	2
Generator Installed Capacity (Total)	122.4 MW
Type of Turbine	Impulse
Elevation Nozzles	2,536 ft
Elevation Normal Tail Water Surface	2,529 ft
Maximum Static Head	2,096 ft
Minimum Static Head	1,806 ft
Minimum Estimated Hydraulic Capacity	50 cfs
Maximum Estimated Hydraulic Capacity	940 cfs
R.P.M.	400
Middle Fork Interbay	
Dam	
Type	Gravity
Material	Concrete
Height of Dam Crest above Streambed	70.5 ft
Dam Crest Length	233 ft
Elevation of Dam Crest	2,536 ft
Elevation of Streambed	2,465 ft
Volume	14,360 cu yd
Stream Maintenance Pipe Capacity	23 cfs
Low-Level Outlet Capacity at Water Surface 2,530 (full reservoir)	890 cfs
Roadway Width, Curb to Curb	14 ft
Elevation of Roadway	2,538 ft
Spillway	
Type	Gated Ogee Crest
Capacity (Water Surface 2,534)	36,506 cfs
Width of Spillway	80 ft Gated, 60 ft Uncontrolled
Number of Gates	4
Type of Gates	Radial
Size of Gates	20 ft x 20 ft
Elevation of Top of Gates	2,530 ft
Elevation of Sill of Gates	2,510 ft

BA/BE Table 6. Project Facility Specifications (continued).

Middle Fork Interbay (continued)	
Reservoir	
Maximum Operating Water Surface	2,529 ft
Minimum Operating Water Surface	2,502 ft
Normal Operating Water Surface	2,527 ft
Gross Storage	175 ac-ft
Dead Storage (as constructed), at Tunnel Intake Lip	2 ac-ft
Active Storage (as constructed)	173 ac-ft
Area at Maximum Operating Water Surface	7 acres
Area at Minimum Operating Water Surface	3 acres
Depth at Minimum Operating Water Surface	37 ft
Middle Fork – Ralston Tunnel	
Nominal Size/Shape	13 ft 5 in/Horseshoe
Length:	
Total	35,397 ft or 6.7 mi
Concrete Lined (Est.)	8,245 ft
Steel Lined (Est.)	245 ft
Maximum Discharge	836 cfs
Invert Gradient	0.0054
Ralston Powerhouse	
Penstock	
Length	1,670 ft
Diameter	8 ft to 9 ft 6 in O.D.
Powerhouse	
Installed Capacity, Generator	79.2 MW
Type of Turbine	Impulse
Elevation Nozzles	1,186 ft
Static Head	1,344 ft
Minimum Estimated Hydraulic Capacity	75 cfs
Maximum Estimated Hydraulic Capacity	924 cfs
R.P.M.	240
Ralston Afterbay	
Dam	
Type	Gravity
Material	Concrete
Height of Dam Crest above Streambed	89 ft
Dam Crest Length	560 ft
Volume	76,300 cu yd
Elevation of Dam Crest	1,189 ft
Elevation of Streambed	1,100 ft
Streamflow Maintenance Pipe Capacity (30-in pipe)	155 cfs
Maximum Low-Level Outlet Capacity at water surface 1,179 (full reservoir) – calculated (72-in pipe)	1,132 cfs

BA/BE Table 6. Project Facility Specifications (continued).

Ralston Afterbay (continued)	
Dam (continued)	
Roadway Width, Curb to Curb	12 ft
Elevation of Roadway	1,188.42 ft
Spillway	
Type	Gated Ogee Crest
Capacity at Water Surface 1,186	171,200 cfs
Elevation of Top of Gates	1,179 ft
Elevation of Sill of Gates	1,149 ft
Crest Length	232 ft
Number of Gates	5
Type of Gates	Radial
Size of Gates	30 ft x 40 ft
Reservoir	
Gross Storage	2,782 ac-ft
Active Storage	1,804 ac-ft
Ralston – Oxbow Tunnel	
Nominal Size/Shape	13 ft 3 in/Horseshoe
Length:	
Total	403 ft or 0.08 mi
Concrete Lined	343 ft
Steel Lined	60 ft
Maximum Discharge	1,088 cfs
Invert Gradient	0.12035
Oxbow Powerhouse	
Penstock	
Length	5 ft
Diameter	9 ft I.D.
Powerhouse	
Installed Capacity, Generator	6.1 MW
Type of Turbine	Francis
Elevation Runner	1,098.5 ft
Static Head	90 ft
Normal Tail Water Surface	1,089 ft
Minimum Estimated Hydraulic Capacity	200 cfs
Maximum Estimated Hydraulic Capacity	1,025 cfs
R.P.M.	200

BA/BE Table 6. Project Facility Specifications (continued).

Summary	
Power and Energy Production	
Total Installed Capacity (at 0.9 power factor)	223.7 MW
Total Dependable Capacity (at 0.9 power factor)	223.7 MW
Average Annual Energy Production ¹	1,039,078 MWh
Maximum Total Static Head	4,162
Water Supply and Regulation	
Total Gross Storage	345,560 ac-ft
Project Features	
Earth and Rock Fill Dams	11,900,000 cu yd
Concrete Dams and Diversions	94,000 cu yd
Tunnels and Penstocks	23.2 mi
Project Completed – 1967	

¹Generation from French Meadows, Middle Fork, Ralston, and Oxbow powerhouses is averaged over a 40-year period of record (1967 to 2006). Hell Hole Powerhouse was constructed in 1983; therefore, generation from Hell Hole Powerhouse is averaged over the 24-year period that the facility has been in operation (1983 to 2006). The Average Annual Energy Production represents the sum of the average net generation for the five Project powerhouses based on their respective period of record. Refer to Table 18.

Notes:

ac-ft = acre-feet
cfs = cubic feet per second
cu yd = cubic yards
ft = feet
I.D. = inside diameter
in = inch
MW = megawatt
MWh = megawatt hours
mi = miles
O.D. = outside diameter

BA/BE Table 7. Description of Project Communication Lines and Powerlines.

Name	Start	End	Length (Approximate)	Voltage	Purpose
French Meadows Area					
French Meadows Dam Generator Building to French Meadows Dam Outlet Works Powerline	French Meadows Dam Generator Building	French Meadows Dam Outlet Works	0.23 mi.	208 V	Supplies power from the motor-generator
French Meadows Dam Generator Building to French Meadows Dam Spillway Gates Powerline	French Meadows Dam Generator Building	French Meadows Dam Spillway Gates	69 ft.	208 V	Operates the spillway control equipment
Hell Hole Area					
French Meadows Powerhouse to French Meadows Powerhouse Penstock and Butterfly Valve House Communication Line/Powerline	French Meadows Powerhouse and Switchyard	Butterfly Valve House at the top of French Meadows Powerhouse Penstock	0.1 mi.	2.4 kV	Power for lighting and equipment operation and communication to the valve house
French Meadows Powerhouse and Switchyard to Hell Hole – Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator Cottages and Hell Hole Powerhouse Communication Line/Powerline	French Meadows Powerhouse and Switchyard	Hell Hole – Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator Cottages and Hell Hole Powerhouse	2.35 mi.	12 kV	Power for facility operation and communication between facilities
Dormitory and Cottages Water Supply Tank Powerline	Water Supply Tank	Dormitory and Cottages	0.08 mi.	2.4 kV	Controls the water tank fill system
Hell Hole Powerhouse to Rubicon River Gage below Hell Hole Dam Communication Line/Powerline	Hell Hole Powerhouse	Rubicon River Gage below Hell Hole Dam	0.12 mi.	12 kV	Power and communication to the gaging station
Middle Fork Interbay Area					
Middle Fork Powerhouse to Middle Fork Powerhouse Butterfly Valve House Communication Line/Powerline	Middle Fork Powerhouse	Middle Fork Powerhouse Butterfly Valve House	0.62 mi.	2.4 kV	Power for equipment operation and communication between facilities

BA/BE Table 7. Description of Project Communication Lines and Powerlines (continued).

Name	Start	End	Length (Approximate)	Voltage	Purpose
Middle Fork Interbay Area (continued)					
Middle Fork Powerhouse Butterfly Valve House to Radio Repeater near Hell Hole – Middle Fork Tunnel Surge Tank (underground) Communication Line/Powerline	Middle Fork Powerhouse	Radio Repeater near Hell Hole – Middle Fork Tunnel Surge Tank	0.37 mi.	2.4 kV	Power and communication between facilities
Middle Fork Powerhouse to Middle Fork – Ralston Tunnel Intake and Gatehouse Communication Line/Powerline	Middle Fork Powerhouse	Middle Fork – Ralston Tunnel Intake and Gatehouse	0.36 mi.	2.4 kV	Power and communication to operate equipment at the tunnel intake and Middle Fork Interbay Dam
Middle Fork Powerhouse to Middle Fork American River Gage above Middle Fork Powerhouse Communication Line/Powerline	Middle Fork Powerhouse	Middle Fork American River Gage above Middle Fork Powerhouse	0.09 mi.	102 V	Power to the gaging station and communication to the Powerhouse
Ralston – Oxbow Area					
Ralston – Oxbow Tunnel Intake to Ralston Powerhouse Communication Line	Ralston – Oxbow Tunnel Intake	Ralston Powerhouse	1.51 mi.	2.4 kV	Communication between the tunnel intake and Ralston Powerhouse
Ralston Powerhouse to Ralston Powerhouse Butterfly Valve House Communication Line/Powerline	Ralston Powerhouse	Ralston Powerhouse Butterfly Valve House	0.22 mi.	4.16 kV	Communication and power to operate equipment at the butterfly valve house
Ralston Afterbay Dam Generator Building to Ralston – Oxbow Tunnel Intake Communication Line/Powerline	Ralston Afterbay Dam Generator Building	Ralston – Oxbow Tunnel Intake Gatehouse	0.14 mi.	2.16 kV	Communication and power to operate equipment at the tunnel intake
Oxbow Powerhouse to Ralston Afterbay Dam Generator Building Communication Line/Powerline	Oxbow Powerhouse	Ralston Afterbay Dam Generator Building	0.17 mi.	2.4 kV	Power and communication between facilities

BA/BE Table 8. Description of Project Roads and Trails.

PCWA Name	USDA-FS Number	Start	End	Length (miles)	Width (feet) 8-12 ft. = single lane 20 ft. = 1.5 lane 24 ft. = double lane	Surface Treatment	Overall Condition	Bridge Crossing Locations (road mile)
Project Roads								
Duncan Creek Area								
Duncan Creek Diversion Intake Road	96-52	FR 96	Duncan Creek – Middle Fork Tunnel Intake	2.1	10–12	Aggregate/Native	Good	1.91
Duncan Creek Diversion Dam Road	96-52-06	96-52	North End of Duncan Creek Diversion Dam	0.05	10	Native	Good	N/A
Duncan Creek Diversion Pool Road	96-52-07	96-52	North Side of Duncan Creek Diversion Pool	0.06	10	Native	Poor	N/A
French Meadows Area								
Duncan Creek – Middle Fork Tunnel Portal Road	96-69	FR 96	Duncan Creek – Middle Fork Tunnel Portal	0.44	10	Aggregate/Native	Poor ¹	N/A
French Meadows – Hell Hole Tunnel Gatehouse Road	96-76	FR 96	French Meadows – Hell Hole Tunnel Gatehouse	0.17	12	Native	Fair	N/A
French Meadows Dam Outlet Works and South Leakage Weir Road	22-02	FR 22	French Meadows Dam Outlet Works and Leakage Weirs	0.53	12	Aggregate	Good – Good/Fair	N/A
French Meadows Dam Staging Area and Spillway West Access Road	96-70-02	FR 96	French Meadows Spillway	0.17	10	Aggregate	Good	N/A
French Meadows Spillway East Access Road	96-68	FR 96	French Meadows Spillway	0.23	10	Native	Not surveyed	N/A
French Meadows Dam North Leakage Weir Road	96-68-05	96-68	French Meadows Dam North Leakage Weir	0.09	10	Native	Not surveyed	N/A
French Meadows Campground Water Supply Facility Access Road	96-77-05	96-77	French Meadows Campground Water Supply Tank	0.09	12	Native	Fair	N/A
Hell Hole Area								
Hell Hole Dam and Powerhouse Road	17N02M	Hell Hole Dam Boat Ramp	Hell Hole Powerhouse and Outlet Works	0.95	12–24	Aggregate/Native/Paved	Good/Fair	0.18 – 0.26 ²
Rubicon River Gage below Hell Hole Dam Road	17N02MB	17N02M	Rubicon River Gage and Weir below Hell Hole Dam	0.07	10	Aggregate	Fair	N/A
Hell Hole Dam Leakage Weir Road	17N02MA	17N02M	Hell Hole Dam Leakage Weir below Hell Hole Dam	0.05	12	Aggregate	Poor	N/A
Hell Hole Dam Spillway Northern Access Point Road	14N33A	Hell Hole Boat Ramp Road	Hell Hole Dam Spillway	0.02	10	Native	Poor	N/A
French Meadows - Hell Hole Tunnel Portal Road	17N02J	FR 2	French Meadows Powerhouse Penstock and Butterfly Valve House	0.61	12	Native	Good/Fair	N/A
French Meadows Powerhouse Road	17N02F	FR 2	French Meadows Powerhouse	1.28	24	Aggregate	Good	N/A
Hell Hole - Middle Fork Tunnel Gatehouse Road	17N02N	FR 2	Hell Hole – Middle Fork Tunnel Gatehouse	0.37	12	Native	Good/Fair	N/A
Dormitory Facility Road	17N02L	FR 2	Hell Hole Dormitory Facility	0.13	20	Aggregate	Good	N/A
Operator Cottages and Shop Road	17N02S	FR 2	Operator Cottages and Shop	0.06	12	Aggregate	Not surveyed	N/A
Spur on North Side of Operator Cottages	17N02V	FR 2	North side of Operators Cottage	0.07	12	Native	Not surveyed	N/A
Spur on South Side of Operator Cottages	17N02U	FR 2	South side of Operators Cottage	0.04	12	Native	Not surveyed	N/A

BA/BE Table 8. Description of Project Roads and Trails (continued).

PCWA Name	USDA-FS Number	Start	End	Length (miles)	Width (feet) 8-12 ft. = single lane 20 ft. = 1.5 lane 24 ft. = double lane	Surface Treatment	Overall Condition	Bridge Crossing Locations (road mile)
Hell Hole Area (continued)								
Hell Hole Dam Spillway Discharge Channel Road Spur to Communication/Powerline	17N02KA	17N02K	Communication Line/Powerline	0.03	8–10	Native	Poor	N/A
Hell Hole Dam Spillway Discharge Channel Road	17N02K	FR 2	Hell Hole Dam Spillway Discharge Channel below the Spillway and Dam	0.6	8–10	Native	Poor	N/A
Big Meadows Campground Water Supply Facility Access Road	14N43A	14N43	Big Meadows Campground Water Supply Tank	0.27	12	Native	Fair/Poor	N/A
Long Canyon Area								
North Fork Long Canyon Diversion North Road	14N42D	14N42	North Fork Long Canyon Diversion (north approach)	0.14	15	Native	Good – Good/Fair	N/A
North Fork Long Canyon Diversion South Road	17N02R	FR 2	North Fork Long Canyon Diversion (south approach)	0.62	12	Native	Good	N/A
North Fork Long Canyon Diversion Drop Inlet Road	17N02H	FR 2	North Fork Long Canyon Diversion Drop Inlet	0.08	10	Native	Good – Poor	N/A
South Fork Long Canyon Diversion and Drop Inlet Road	17N02P	FR 2	FR 2	0.11	20	Native	Good – Good/Fair	N/A
South Fork Long Canyon Diversion and Drop Inlet Cutoff Road	17N02PA	17N02P	17N02P	0.02	20	Native	Good – Good/Fair	N/A
South Fork Long Canyon Diversion Drop Inlet Access Road	–	17N02P	South Fork Long Canyon Diversion Drop Inlet	0.03	10	Native	Poor	N/A
North Fork Long Canyon Crossing Removable Section North Road	14N08N	FR 2	North Fork Long Canyon Crossing Removable Section and Parking Area	0.15	10	Native	Good/Fair – Fair	N/A
North Fork Long Canyon Crossing Removable Section South Road	14N16A	14N16A at ENF Boundary	North Fork Long Canyon Crossing Removable Section (southern access)	0.11	10	Native	Poor	N/A
Middle Meadows Group Campground Water Supply Facility Access Road	14N28A	14N28	Middle Meadows Group Campground Water Supply Tank	0.4	12	Native	Fair/Poor	N/A
Middle Fork Interbay Area								
Middle Fork Interbay Dam Road	96-17	FR 96	Middle Fork Interbay Dam	4.48	12–24	Paved/Aggregate	Good	N/A
Middle Fork Interbay Dam to Powerhouse Road	14N55	Middle Fork Interbay Dam	Middle Fork Powerhouse	0.38	12–24	Paved/Aggregate	Good	N/A
Middle Fork Powerhouse Butterfly Valve House Road	14N55	14N55 at ENF Boundary	Middle Fork Powerhouse Butterfly Valve House and Hell Hole – Middle Fork Tunnel Removable Section	0.74	20	Aggregate	Good	N/A
Middle Fork Powerhouse Penstock and Butterfly Valve House Road	14N55	Middle Fork Powerhouse	Middle Fork Powerhouse Butterfly Valve House and Hell Hole – Middle Fork Tunnel Removable Section	1.83	12	Paved/Chip seal/Aggregate/Native	Good/Fair – Fair	N/A
Middle Fork Powerhouse Upper Switchyard Road	14N55B	14N55	Middle Fork Powerhouse Upper Switchyard	0.12	12	Paved/Aggregate	Good/Fair	N/A
Ralston – Oxbow Area								
Brushy Canyon Adit Road	14N30	14N30 at ENF Boundary	Brush Canyon Adit (Middle Fork–Ralston Tunnel)	0.48	12	Native	Poor	N/A
Ralston Powerhouse Butterfly Valve House Road	14N25KA	FR 23	Ralston Powerhouse Butterfly Valve House and Middle Fork – Ralston Tunnel Removable Section	0.32	10	Native	Good	N/A
Ralston Afterbay Dam Access Road	23-02	FR 23	Ralston Afterbay Dam	0.59	16	Paved	Not surveyed	N/A
Ralston – Oxbow Tunnel Intake Road	23-02-04	23-02	Ralston – Oxbow Tunnel Intake	0.07	8–12	Aggregate	Good	N/A

BA/BE Table 8. Description of Project Roads and Trails (continued).

PCWA Name	USDA-FS Number	Start	End	Length (miles)	Width (feet) 8-12 ft. = single lane 20 ft. = 1.5 lane 24 ft. = double lane	Surface Treatment	Overall Condition	Bridge Crossing Locations (road mile)
Ralston – Oxbow Area (continued)								
Ralston Afterbay Private Boat Ramp Road	23-02-06	23-02	Ralston Afterbay Boat Ramp	0.04	8–12	Aggregate	Good	N/A
Ralston Afterbay Dam and Access Point Road	23-02-08	23-02	Ralston Afterbay Reservoir (south approach)	0.21	8–12	Native (crest across the dam improved)	Good	N/A
Oxbow Powerhouse Road	23-02-10	23-02	Oxbow Powerhouse	0.14	20	Paved	Good	N/A
Indian Bar Access Road	23-02-12	23-02	Indian Bar Designated Parking Area	0.16	12	Paved	Not surveyed	N/A
Project Trails								
Duncan Creek Area								
Duncan Creek Diversion Dam North Trail	13E38	96-52-06	Duncan Creek Diversion Dam (north end)	0.01	N/A	Native	Good	N/A
Duncan Creek Diversion Dam South Trail	13E39	96-52	Duncan Creek Diversion Dam (south end)	0.03	N/A	Native	Good	N/A
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows Trail	13E41	96-52	Duncan Creek Gage above the Diversion Dam	0.03	N/A	Native	Good	N/A
Duncan Creek Gage near French Meadows Trail	13E32	96-52	Duncan Creek Gage and Weir above Diversion Dam	0.02	N/A	Native	Good	N/A
Duncan Creek Gage below Diversion Dam Trail	13E33	96-52	Duncan Creek Gage and Weir below Diversion Dam	0.17	N/A	Native	Good	N/A
Middle Fork Interbay Area								
Middle Fork American River Gage above Middle Fork Powerhouse Trail	14N55A**	Middle Fork Powerhouse Penstock and Butterfly Valve House Road	Cable crossing of the Middle Fork American River	0.07	N/A	Native	Good	N/A
Passive Microwave Reflector Station above Middle Fork Interbay Trail	13E36	16–26	Passive Microwave Reflector Station above Middle Fork Interbay	0.08	N/A	Native	Good	N/A
Ralston Afterbay Area								
Passive Microwave Reflector Station above Ralston Afterbay Trail	–	FR 23	Passive Microwave Reflector Station above Ralston Afterbay	0.09	N/A	Native	Poor	N/A

N/A = Not applicable

FR = Forest Route

**USDA-FS (Paul Sanders) to convert from road # to trail #.

¹This road was upgraded in 2010 as part of the French Meadows Spillway Project. Therefore, the 2008 survey condition rating is no longer applicable.²Hell Hole Spillway

BA/BE Table 9. Description of Project Recreation Facilities.

Project Area	Single Camp Units ¹	Group Camp Units ²	Picnic Units	Handicap Accessible Units	Maximum PAOT ³ Capacity	Boat Launch	Flush Toilets	Vault Toilets	Pit Toilets	Potable Water	Parking Spaces/Spurs	Notes
French Meadows Area												
Ahart Campground	12	0	0	0	72	—	—	X	—	—	12	
Coyote Group Campground	0	4	0	0	125	—	X	X	—	X	43 ⁴	
Poppy Campground	12	0	0	0	72	—	—	—	X	—	—	Hike-in or boat-in access
French Meadows Campground	75	0	0	8	450	—	X	X	—	X	75	
Gates Group Campground	0	3	0	0	125	—	—	X	—	X	43 ⁴	
Lewis Campground	40	0	0	3	240	—	X	X	—	X	40	
French Meadows Picnic Area and Boat Ramp and Associated Parking Areas	—	—	4	0	24	X	X	X	—	X	46 ⁵	
McGuire Picnic Area and Beach	—	—	10	0	60	—	X	—	—	X	30 ⁵	
McGuire Boat Ramp and Associated Parking Areas (includes Poppy Trailhead Parking Area)	—	—	0	0	—	X	X	X	—	X	75 ⁵	
Hell Hole Area												
Big Meadows Campground	54	0	0	1	324	—	X	X	—	X	54	
Hell Hole Campground	10	0	0	0	60	—	—	X	—	X	15 ⁵	Walk in tent units only
Upper Hell Hole Campground	13	0	0	0	78	—	—	—	X	—	—	Hike-in or boat-in access
Hell Hole Vista	—	—	1	0	6	—	—	X	—	—	6 ⁵	
Hell Hole Boat Ramp and Associated Parking Areas	—	—	3	0	—	X	—	X	—	—	57 ⁴	
Ralston Afterbay Area												
Ralston Picnic Area and Cartop Boat Ramp	—	—	5	0	30	X	—	X	—	—	13 ⁵	
Indian Bar Rafting Access and General Parking	—	—	0	0	—	X	—	X	—	—	12 ⁵	
Long Canyon Area												
Middle Meadows Group Campground	0	2	0	2	75	—	X	X	—	X	15 ⁵	
Project Recreation Facility Water Supplies												
Dolly Creek Water Supply	—	—	—	—	—	—	—	—	—	X	—	Serves Lewis, Gates Group, and Coyote Group Campgrounds, McGuire Picnic Area and Boat Ramp, RV Dump Station, and the French Meadows Administrative Site
French Meadows Campground Water Supply	—	—	—	—	—	—	—	—	—	X	—	Serves French Meadows Campground, Boat Ramp, and Picnic Area
Big Meadows Campground Water Supply	—	—	—	—	—	—	—	—	—	X	—	Serves Big Meadows and Hell Hole Campgrounds
Middle Meadows Group Campground Water Supply	—	—	—	—	—	—	—	—	—	X	—	Serves Middle Meadows Group Campground

Source:
REC 1 – TSR (PCWA 2011b; SD B)

¹Single camp units typically include a parking spur, picnic table, campfire ring, pedestal cooking grill, and a bear-proof food storage locker.

²Group camp units typically include parking areas, picnic tables, serving tables, a group fire ring, benches, double pedestal cooking grills, bear-proof garbage containers, and bear-proof food storage lockers.

³PAOT = Persons At One Time (assumes 6 persons at one time for single camp and picnic units) and is based on number of units.

⁴Determined based on number of striped stalls.

⁵Estimated based on parking area dimensions.

— = Not applicable.

BA/BE Table 10. Description of Recreation Facility Water Supplies and Associated Maintenance Access Roads.

Name	Description	Facilities Serviced	Maintenance Access Roads
Dolly Creek Water Supply	- Well, pump house, and 10,000 gallon concrete water storage tank (fenced) - Underground water supply pipeline from water supply to campgrounds, picnic area, and boat ramp	- Ahart Campground - Coyote Group Campground - Gates Group Campground - Lewis Campground - McGuire Picnic Area and Boat Ramp	Maintenance access from Forest Route 68 and Forest Road 68.10
French Meadows Campground Water Supply	- Spring and 10,000 gallon concrete water storage tank 1,000-foot-long aboveground pipeline from the spring to the water storage tank - Underground water supply pipeline from water supply tank to campground, picnic area, and boat ramp	French Meadows Campground, Picnic Area, and Boat Ramp	French Meadows Campground Water Supply Facility Access Road (96-77-05)
Big Meadows Campground Water Supply	- Horizontal well and 5,000 gallon steel water storage tank 150-foot-long buried pipeline from well to water storage tank - Underground water supply pipeline from water supply to South Fork Long Canyon Creek - Aboveground water supply pipeline from creek to campgrounds	- Big Meadows Campground - Hell Hole Campground	Big Meadows Campground Water Supply Facility Access Road (14N43A)
Middle Meadows Group Campground Water Supply	- Spring and 10,000 gallon concrete water storage tank (fenced) - Underground water supply pipeline from water supply to campground	Middle Meadows Campground	Middle Meadows Group Campground Water Supply Facility Access Road (14N28A)

BA/BE Table 11. Description of Current Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features.

Project Facility or Feature	Inspections, Testing, and Maintenance Activities																
	Inspections and Maintenance		Vegetation Management			Pest Management		Sediment Management	Slope Stabilization (Falling Rock Control)		Debris Management					Road Maintenance	
	Tunnel and Powerhouse Inspection, Testing, & Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Physical Control (snap traps)	Over-the Counter Rodenticide Use	Physical Removal w/Equipment	Gunitite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms			Facility Painting	Pole Replacement/Retrofit
Dams, Reservoirs, and Diversion Pools																	
Large Dams																	
French Meadows Dam and Outlet Works		A	A														
Hell Hole Dam and Outlet Works	A ¹		A														
Medium Dams																	
Middle Fork Interbay Dam and Outlet Works		A	A														
Ralston Afterbay Dam and Outlet Works		A	A														
Small Dams																	
Duncan Creek Diversion Dam			A														
North Fork Long Canyon Diversion Dam			A														
South Fork Long Canyon Diversion Dam			A														
Large Reservoirs																	
French Meadows Reservoir													X				
Hell Hole Reservoir											I		X				
Medium Reservoir																	
Middle Fork Interbay								I			I	R	X				
Ralston Afterbay								I			I	R	X				
Small Diversion Pools																	
Duncan Creek Diversion Pool			A					I				R	X				
North Fork Long Canyon Diversion Pool			A					I				R					
South Fork Long Canyon Diversion Pool			A					I				R					
Water Conveyance Systems																	
Tunnels																	
Duncan Creek – Middle Fork Tunnel																	
French Meadows – Hell Hole Tunnel																	
Hell Hole – Middle Fork Tunnel																	
Middle Fork – Ralston Tunnel																	
Ralston – Oxbow Tunnel	A																
Diversion Pipes and Drop Inlets																	
North Fork Long Canyon Diversion Pipe and Drop Inlet			A														
South Fork Long Canyon Diversion Pipe and Drop Inlet			A														
Surge Shafts and Adits																	
Brushy Canyon Adit			A														
Hell Hole – Middle Fork Tunnel Surge Shaft and Tank			A											I			
Middle Fork – Ralston Tunnel Surge Shaft and Tank			A											I			
Removable Sections and Portals																	
Duncan Creek – Middle Fork Tunnel Portal			A											I			
French Meadows – Hell Hole Tunnel Removable Section			A											I			
Hell Hole – Middle Fork Tunnel Removable Section			A											1			
Middle Fork – Ralston Tunnel Removable Section			A											I			
North Fork Long Canvon Crossing Removable Section			A											I			

BA/BE Table 11. Description of Current Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature	Inspections, Testing, and Maintenance Activities																
	Inspections and Maintenance		Vegetation Management			Pest Management		Sediment Management	Slope Stabilization (Falling Rock Control)		Debris Management					Road Maintenance	
	Tunnel and Powerhouse Inspection, Testing, & Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Physical Control (snap traps)	Over-the-Counter Rodenticide Use	Physical Removal w/Equipment	Guniting (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms			Facility Painting	Pole Replacement/Retrolit
Water Conveyance Systems (continued)																	
Intakes and Gatehouses																	
Duncan Creek – Middle Fork Tunnel Intake			A														
French Meadows – Hell Hole Tunnel Gatehouse			A														
French Meadows – Hell Hole Tunnel Intake			A														
Hell Hole – Middle Fork Tunnel Gatehouse			A														
Hell Hole – Middle Fork Tunnel Intake			A														
Middle Fork – Ralston Tunnel Intake and Gatehouse			A														
Ralston – Oxbow Tunnel Intake			A														
Penstocks and Valve Houses																	
French Meadows Powerhouse Penstock and Butterfly Valve House			A											I			
Middle Fork Powerhouse Penstock and Butterfly Valve House			A						I					I			
Ralston Powerhouse Penstock and Butterfly Valve House			A											I			
Powerhouses, Switchyards, and Substations																	
French Meadows Powerhouse and Switchyard	A		A		A	X	X										
Hell Hole Powerhouse	A		A			X	X										
Hell Hole Substation			A			X	X										
Middle Fork Powerhouse and Upper and Lower Switchyards	A		A		A	X	X										
Ralston Powerhouse and Switchyard	A		A		A	X	X										
Oxbow Powerhouse and Switchyard	A		A		A	X	X										
Gaging Stations and Weirs																	
Stream Gages and Weirs																	
Duncan Creek near French Meadows (USGS Gage No. 11427700)			A														
Duncan Creek below Diversion Dam (USGS Gage No. 11427750)			A														
Middle Fork American River at French Meadows (USGS Gage No. 11427500)			A														
Rubicon River below Hell Hole Dam (USGS Gage No. 11428800)			A														
North Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433085)			A														
South Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433065)			A														
Middle Fork American River below Interbay Dam (USGS Gage No. 11427770)			A														
Middle Fork American River above Middle Fork Powerhouse (USGS Gage No. 11427760)			A														
Middle Fork American River near Foresthill (USGS Gage No. 11433300)			A														

BA/BE Table 11. Description of Current Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature	Inspections, Testing, and Maintenance Activities																
	Inspections and Maintenance		Vegetation Management			Pest Management		Sediment Management	Slope Stabilization (Falling Rock Control)		Debris Management					Road Maintenance	
	Tunnel and Powerhouse Inspection, Testing, & Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Physical Control (snap traps)	Over-the-Counter Rodenticide Use	Physical Removal w/Equipment	Gunite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms			Facility Painting	Pole Replacement/Retrofit
Gaging Stations and Weirs (continued)																	
Diversion Gages																	
North Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433080)																	
South Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433060)																	
Reservoir Gages																	
French Meadows Reservoir (USGS Gage No. 11427400)																	
French Meadows Reservoir Staff Gage																	
Hell Hole Reservoir (USGS Gage No. 11428700)																	
Hell Hole Reservoir Staff Gage																	
Middle Fork Interbay Reservoir																	
Ralston Afterbay Reservoir																	
Powerhouse Gages																	
French Meadows Powerhouse (USGS Gage No. 11427200)																	
Middle Fork Powerhouse (USGS Gage No. 11428600)																	
Ralston Powerhouse (USGS Gage No. 11427765)																	
Oxbow Powerhouse (USGS Gage No. 11433212)																	
Leakage Weirs																	
French Meadows Dam Leakage Weirs Nos. 1-6			A														
Hell Hole Dam Leakage Weir			A														
Project Communication Lines and Powerlines																	
French Meadows Area																	
French Meadows Dam Generator Building to French Meadows Dam Outlet Works Powerline			A												I		
French Meadows Dam Generator Building to French Meadows Dam Spillway Gates Powerline			A												I		
Hell Hole Area																	
French Meadows Powerhouse to French Meadows Powerhouse Penstock and Butterfly Valve House Communication Line/Powerline			A												I		
French Meadows Powerhouse and Switchyard to Hell Hole – Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator's Cottages, and Hell Hole Powerhouse Communication Line/Powerline			A												I		
Dormitory and Cottages Water Supply Tank Powerline			A												I		
Hell Hole Powerhouse to Rubicon River Gage below Hell Hole Dam Communication Line/Powerline			A												I		

BA/BE Table 11. Description of Current Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature	Inspections, Testing, and Maintenance Activities																
	Inspections and Maintenance		Vegetation Management			Pest Management		Sediment Management	Slope Stabilization (Falling Rock Control)		Debris Management					Road Maintenance	
	Tunnel and Powerhouse Inspection, Testing, & Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Physical Control (snap traps)	Over-the-Counter Rodenticide Use	Physical Removal w/Equipment	Guniting (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms			Facility Painting	Pole Replacement/Retrofit
Project Communication Lines and Powerlines (continued)																	
Middle Fork Interbay Area																	
Middle Fork Powerhouse to Middle Fork Powerhouse Butterfly Valve House Communication Line/Powerline			A												I		
Middle Fork Powerhouse Butterfly Valve House to Radio Repeater near Hell Hole – Middle Fork Tunnel Surge Tank (underground) Communication Line/Powerline			A												I		
Middle Fork Powerhouse to Middle Fork – Ralston Tunnel Intake and Gatehouse Communication Line/Powerline			A												I		
Middle Fork Powerhouse to Middle Fork American River Gage above Middle Fork Powerhouse Communication Line/Powerline			A												I		
Ralston – Oxbow Area																	
Ralston – Oxbow Tunnel Intake to Ralston Powerhouse Communication Line			A												I		
Ralston Powerhouse to Ralston Powerhouse Butterfly Valve House Communication Line/Powerline			A												I		
Ralston Afterbay Dam Generator Building to Ralston – Oxbow Tunnel Intake Communication Line/Powerline			A												I		
Oxbow Powerhouse to Ralston Afterbay Dam Generator Building Communication Line/Powerline			A												I		
Photovoltaic Poles and Powerlines																	
Photovoltaic Poles and Powerline to Duncan Creek Gage near French Meadows			A														
Photovoltaic Pole and Powerline at Duncan Creek Gage below Diversion Dam			A														
Photovoltaic Pole and Powerline at Middle Fork American River Gage at French Meadows			A														
Photovoltaic Pole and Powerline at Middle Fork American River Gage above Middle Fork Powerhouse			A														
Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam			A														
Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam			A														
Photovoltaic Pole and Powerline at Middle Fork American River Gage near Foresthill			A														
Microwave Reflectors and Radio Towers																	
Passive Microwave Reflector Station above Middle Fork Interbay			I														
Radio Communications Tower near French Meadows – Hell Hole Tunnel Gatehouse			I														
Radio Communications Tower and Repeater near Hell Hole – Middle Fork Tunnel Surge Shaft and Tank			I														
Passive Microwave Reflector Station above Ralston Afterbay			I														

BA/BE Table 11. Description of Current Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature	Inspections, Testing, and Maintenance Activities																
	Inspections and Maintenance		Vegetation Management			Pest Management		Sediment Management	Slope Stabilization (Falling Rock Control)		Debris Management					Road Maintenance	
	Tunnel and Powerhouse Inspection, Testing, & Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Physical Control (snap traps)	Over-the-Counter Rodenticide Use	Physical Removal w/Equipment	Gunite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms			Facility Painting	Pole Replacement/Retrofit
Project Communication Lines and Powerlines (continued)																	
Disposal Areas																	
Duncan Creek Diversion Sediment Disposal Area																	
North Fork Long Canyon Crossing Sediment Disposal Area																	
Middle Fork Interbay Sediment Disposal Area																	
Ralston Ridge Sediment Disposal Area																	
Ancillary Facilities																	
French Meadows Dam Generator Building			A			X	X							I			
French Meadows Dam Staging Area																	
Dormitory Facility			A			X	X							I			
Dormitory and Cottages Water Supply Tank			A			X	X							I			
Hell Hole Staging Areas																	
Operator Cottages and Shop			A			X	X							I			
Ralston Afterbay Dam Generator Building			A			X	X							I			
Storage Building at Middle Fork – Ralston Tunnel Surge Shaft and Tank			A														
Ralston Afterbay Sediment Removal Access Point			A	A													
Project Fences																	
Slope Fences																	
French Meadows Powerhouse Penstock Rock Fence										A							
French Meadows Powerhouse Slope Fence			I							A							
Long Canyon Crossing Slope Fence			I							A							
Middle Fork Powerhouse Upper Switchyard Slope Fence										A							
Middle Fork Interbay Dam Slope Fence										A							
Ralston Powerhouse Penstock and Butterfly Valve House Slope Fences										A							
Ralston Powerhouse Slope Fence										A							
Oxbow Powerhouse Slope Fence										A							
Public Safety Fences																	
Dormitory Facility Barrier Fence										A							
Hell Hole Dam General Parking Area Barrier Fence										A							
North Fork Long Canyon Crossing Removable Section Barrier Fence										A							

BA/BE Table 11. Description of Current Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature	Inspections, Testing, and Maintenance Activities																
	Inspections and Maintenance		Vegetation Management			Pest Management		Sediment Management	Slope Stabilization (Falling Rock Control)		Debris Management					Road Maintenance	
	Tunnel and Powerhouse Inspection, Testing, & Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Physical Control (snap traps)	Over-the-Counter Rodenticide Use	Physical Removal w/Equipment	Guniting (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms			Facility Painting	Pole Replacement/Retirofit
Project Roads																	
Duncan Creek Area																	
Duncan Creek Diversion Intake Road			A	A												X	X
Duncan Creek Diversion Dam Road			A	A												X	X
Duncan Creek Diversion Pool Road			A	A												X	X
French Meadows Area																	
Duncan Creek – Middle Fork Tunnel Portal Road			A	A												X	X
French Meadows – Hell Hole Tunnel Gatehouse Road			A	A												X	X
French Meadows Dam Outlet Works and South Leakage Weir Road			A	A												X	X
French Meadows Dam Staging Area and Spillway West Access Road			A	A												X	X
French Meadows Spillway East Access Road			A	A												X	X
French Meadows Dam North Leakage Weir Road			A	A												X	X
French Meadows Campground Water Supply Facility Access Road			A	A												X	X
Hell Hole Area																	
Hell Hole Dam and Powerhouse Road			A													X	X
Rubicon River Gage below Hell Hole Dam Road			A	A												X	X
Hell Hole Dam Leakage Weir Road			A	A												X	X
Hell Hole Dam Spillway Northern Access Point Road			A	A												X	X
French Meadows – Hell Hole Tunnel Portal Road			A	A												X	X
French Meadows Powerhouse Road			A	A												X	X
Hell Hole – Middle Fork Tunnel Gatehouse Road			A	A												X	X
Dormitory Facility Road			A	A												X	X
Operator Cottages and Shop Road			A	A												X	X
Spur on North Side of Operator Cottages			A	A												X	X
Spur on South Side of Operator Cottages			A	A												X	X
Hell Hole Dam Spillway Discharge Channel Road Spur to Communication Line/Powerline			A	A												X	X
Hell Hole Dam Spillway Discharge Channel Road			A	A												X	X
Big Meadows Campground Water Supply Facility Access Road			A	A												X	X
Long Canyon Area																	
North Fork Long Canyon Diversion North Road			A	A												X	X
North Fork Long Canyon Diversion South Road			A	A												X	X
North Fork Long Canyon Diversion Drop Inlet Road			A	A												X	X
South Fork Long Canyon Diversion and Drop Inlet Road			A	A												X	X
South Fork Long Canyon Diversion and Drop Inlet Cutoff Road			A	A												X	X
South Fork Long Canyon Diversion Drop Inlet Access Road			A	A												X	X
North Fork Long Canyon Crossing Removable Section North Road			A	A												X	X
North Fork Long Canyon Crossing Removable Section South Road			A	A												X	X
Middle Meadows Group Campground Water Supply Access Road			A	A												X	X

BA/BE Table 11. Description of Current Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature	Inspections, Testing, and Maintenance Activities																
	Inspections and Maintenance		Vegetation Management			Pest Management		Sediment Management	Slope Stabilization (Falling Rock Control)		Debris Management					Road Maintenance	
	Tunnel and Powerhouse Inspection, Testing, & Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Physical Control (snap traps)	Over-the-Counter Rodenticide Use	Physical Removal w/Equipment	Gulite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms			Facility Painting	Pole Replacement/Retrofit
Project Roads (continued)																	
Middle Fork Interbay Area																	
Middle Fork Interbay Dam Road			A	A												X	X
Middle Fork Interbay Dam to Powerhouse Road			A	A												X	X
Middle Fork Powerhouse Butterfly Valve House Road			A	A												X	X
Middle Fork Powerhouse Penstock and Butterfly Valve House Road			A	A												X	X
Middle Fork Powerhouse Upper Switchyard Road			A	A												X	X
Ralston – Oxbow Area																	
Brushy Canyon Adit Road			A	A												X	X
Ralston Powerhouse Butterfly Valve House Road			A	A												X	X
Ralston Afterbay Dam Access Road			A	A												X	X
Indian Bar Access Road			A	A												X	X
Oxbow Powerhouse Road			A	A												X	X
Ralston – Oxbow Tunnel Intake Road			A	A												X	X
Ralston Afterbay Private Boat Ramp Road			A	A												X	X
Ralston Afterbay Dam and Access Point Road			A	A												X	X
Project Trails																	
Duncan Creek Area																	
Duncan Creek Diversion Dam North Trail			A													X	X
Duncan Creek Diversion Dam South Trail			A													X	X
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows Trail			A													X	X
Duncan Creek Gage near French Meadows Trail			A													X	X
Duncan Creek Gage below Diversion Dam Trail			A													X	X
Middle Fork Interbay Area																	
Middle Fork American River Gage above Middle Fork Powerhouse Trail			A													X	X
Passive Microwave Reflector Station above Middle Fork Interbay Trail			A													X	X
Ralston Afterbay Area																	
Passive Microwave Reflector Station above Ralston Afterbay Trail			A													X	X

A = Activity occurs on an annual basis.

I = Activity occurs on an infrequent basis.

R = Completed as-needed during diversion season.

X = Activity occurs or ancillary facility is present.

¹Inspection of 1,000 feet of outlet conduit.

BA/BE Table 12. Description of Project Recreation Facilities Maintenance Activities.

Recreation Facility or Feature	Project Maintenance ¹			
	Annual Maintenance ²	Vegetation Management		Heavy Maintenance ³
		Trimming by Hand	Fungicide Use	
French Meadows Area				
Ahart Campground	X	A	I	X
Coyote Group Campground	X	A	I	X
Poppy Campground	X	A	I	X
French Meadows Campground	X	A	I	X
Gates Group Campground	X	A	I	X
Lewis Campground	X	A	I	X
French Meadows Picnic Area	X			X
French Meadows Boat Ramp	X			X
French Meadows Dump Station	X			X
McGuire Picnic Area and Beach	X			X
McGuire Boat Ramp and Associated Parking	X			X
Hell Hole Area				
Big Meadows Campground	X	A	I	X
Hell Hole Campground	X	A	I	X
Upper Hell Hole Campground	X	A	I	X
Hell Hole Vista	X	A	I	X
Hell Hole Boat Ramp	X	A		X
Hell Hole General Parking Area and Hell Hole Boat Ramp Parking Area	X	A		X
Ralston Afterbay Area				
Ralston Picnic Area	X	A		X
Ralston Picnic Area Cartop Boat Ramp	X	A		X
Indian Bar Rafting Access and General Parking	X	A		X
Long Canyon Area				
Middle Meadows Group Campground	X	A	I	X
Project Recreation Facility Water Supplies				
Dolly Creek Water Supply	X	I		X
French Meadows Campground Water Supply	X	I		X
Big Meadows Campground Water Supply	X	I		X
Middle Meadows Group Campground Water Supply	X	I		X

A = Activity occurs on an annual basis.

I = Activity occurs on an infrequent basis.

Sources:

PCWA Revised Recreation Plan (1989) and FERC Order Approving the Revised Recreation Plan (1992).

¹Maintenance of Project recreation facilities is completed by USDA-FS under collection agreements (No. 08-CO-11051700-009 and No. 08-CO-11050300-009).²Annual maintenance includes: site cleaning; basic repairs and maintenance of facility features; garbage clean-up; signing; toilet cleaning and restocking; toilet pumping; graffiti removal; removal of debris from boat ramps; basic maintenance of pathways; routine testing of water supplies; annual winterizing and opening activities; and hazard tree removal.³Heavy maintenance includes: repair and resurfacing of parking areas and spurs; repair or replacement of barrier structures and devices; repair and/or replacement of site/facility amenities; repair and replacement of signage, information boards, and fee tubes; repair, maintenance, and painting of bathroom structures; repair and maintenance of potable water supplies and distribution lines; repair and maintenance of septic systems; repair and sealing of boat ramps; repair or installation of retaining walls; site leveling and removal of obstacles; fuels reduction; and maintenance of pathways.

BA/BE Table 13. Summary of Historic Sediment Maintenance Activities at MFP Diversion Pools and Medium Reservoirs (through 2009).

Year	Month ¹	Loose, Uncompacted Volume of Sediment Removed (cubic yds)

Middle Fork Interbay (period of record 1987–2009)		
1987	Oct	25,000
1988	Oct	35,000
1997	Feb	16,000
2000	Oct	68,000
Total		144,000
Frequency of Sediment Removal Activities:		once every 5.8 years
Average Volume Removed per Maintenance Activity²		36,000 cubic yards

Ralston Afterbay (period of record 1969–2009)		
1969	-	Sediment removal occurred in this year, however, no information on the volume of sediment removed is available
1981	Oct	10,000
1984	Oct	13,000
1985	Oct	12,000
1986	Mar	45,000
1986	Oct	80,000
1989	Oct	35,000
1994	Sept	77,000
1997	Feb	65,000
2002	Oct	101,000 ²
Total		438,000
Frequency of Sediment Removal Activities:		once every 4.6 years
Average Volume Removed per Maintenance Activity²		48,667 cubic yards

North Fork Long Canyon Diversion Pool (period of record 1980–2009)		
1980	-	Sediment removal occurred in these years, however, no information on the volume of sediment removed is available
1982	-	
1986	-	
1988	-	
1990	-	
1992	-	
1995	-	
1997	-	1,600
2005	-	400
2006	-	1,370
Total		3,370
Frequency of Sediment Removal Activities:		once every 3 years
Average Volume Removed per Maintenance Activity²		1,123 cubic yards

BA/BE Table 13. Summary of Historic Sediment Maintenance Activities at MFP Diversion Pools and Medium Reservoirs (through 2009) (continued).

Year	Month¹	Loose, Uncompacted Volume of Sediment Removed (cubic yds)
South Fork Long Canyon Diversion Pool (period of record 1980–2009)		
1980	-	Sediment removal occurred in these years, however, no information on the volume of sediment removed is available
1982	-	
1986	-	
1988	-	
1995	-	
1997	-	2,500
2006	-	2,850
Total		5,350
Frequency of Sediment Removal Activities:		once every 4.3 years
Average Volume Removed per Maintenance Activity²		2,675 cubic yards
Duncan Creek Diversion Pool (period of record 1997–2009)		
1988	-	Sediment removal occurred in this year, however, no information on the volume of sediment removed is available
1998	Aug	
2007	Sept	1,570
Total		6,070
Frequency of Sediment Removal Activities:		once every 7.3 years
Volume Removed per Maintenance Activity²		3,035 cubic yards

¹Includes only the years with known sediment volumes.

²Volume equals 45,000 cubic yards compacted, in-place sediment at Indian Bar; and 29,000 cubic yards compacted, in-place sediment at Ralston Ridge.

BA/BE Table 14. Available Sediment Storage Capacities at Current MFP Sediment Disposal Areas.

Sediment Disposal Area	Total Storage Capacity (cubic yards)¹	Existing Sediment Stored (cubic yards)¹	Available Storage (cubic yards)¹
Duncan Creek Diversion Sediment Disposal Area	6,000	4,500	1,500
North Fork Long Canyon Crossing Sediment Disposal Area	20,000–30,000	10,000	10,000–20,000
Middle Fork Interbay Sediment Disposal Area	44,000	24,000	20,000
Ralston Ridge Sediment Disposal Area	49,000–54,000	29,000	20,000–25,000
TOTAL	164,000–179,000	53,000	66,500–81,500

¹Compacted, in-place volume.

BA/BE Table 15. Bypass and Peaking Reach Average Width and Average Annual Flow.

Reach	Average Width (ft)	Average Annual Flow (cfs)
Duncan Creek	29	14
Long Canyon Creek	32	31
South Fork Long Canyon Creek	24	18
North Fork Long Canyon Creek	16	5
Rubicon River		
Rubicon River R25.7	46	42
Rubicon River R3.5	73	322
Middle Fork American River – Bypass Reach		
Middle Fork American River below French Meadows Dam	9	20
Middle Fork American River below Middle Fork Interbay	45	70
Middle Fork American River – Peaking Reach		
Middle Fork American River – Peaking Reach	150	1168

Note:

Average channel widths were calculated for the calculated average annual flow at the top or bottom of the MFP reach, as appropriate. Average channel width is the average of the surveyed channel transects at the AQ 1 – TSR study sites (PCWA 2011y; SD B). Peaking reach average channel widths are based on average annual flow at MF14.1 and channel widths of selected transects at MF14.1 (AQ 1 – TSR 2D modeling study site [PCWA 2011y; SD B]).

BA/BE Table 16. Minimum Pool and Minimum Instream Flow Requirements.

Facility	License Requirement		
Minimum Pool Requirements			
French Meadows Reservoir			Minimum Pool (ac-ft)
	<u>Forecast/Folsom Reservoir</u> ¹	<u>June-Sept</u>	<u>Oct-May</u>
	>2,000,000 ac-ft	60,000	50,000
	1,200,000–2,000,000 ac-ft	60,000	25,000
	<1,200,000 ac-ft	28,000	8,700
The spillway gates (tainter gates) must remain open from Nov. 15 to April 1 of each year.			
Hell Hole Reservoir			Minimum Pool (ac-ft)
	<u>Forecast/Folsom Reservoir</u> ¹	<u>June-Sept</u>	<u>Oct-May</u>
	>2,000,000 ac-ft	70,000	50,000
	1,200,000–2,000,000 ac-ft	70,000	25,000
	<1,200,000 ac-ft	26,000	5,500
Duncan Creek Diversion Pool	Maintain water surface elevation at 5,259 feet elevation.		
Minimum Stream Maintenance Flow			
Duncan Creek Diversion Dam	<u>Forecast/Folsom Reservoir</u> ¹	<u>Release (cfs)</u>	
	>1,000,000 ac-ft	lesser of 8 or natural flow	
	<1,000,000 ac-ft	lesser of 4 or natural flow	
French Meadows Dam	Beginning of operations to March 17,1981:		
	<u>Forecast/Folsom Reservoir</u> ¹	<u>Release (cfs)</u>	
	>1,000,000 ac-ft	8 at all times	
	Except that total releases shall not exceed 5,800 ac-ft		
	<1,000,000 ac-ft	4 at all times	
	Except that total releases shall not exceed 2,900 ac-ft		
March 18, 1981, and thereafter – no limitation of total release.			

BA/BE Table 16. Minimum Pool and Minimum Instream Flow Requirements (continued).

Facility	License Requirement
Minimum Stream Maintenance Flow (continued)	
Hell Hole Dam	Beginning of operations to March 17, 1981:
	<u>Forecast/Folsom Reservoir¹</u> <u>Release (cfs)</u>
	>1,000,000 ac-ft 20 June 1 – July 25
	15 July 26 – Aug 5
	10 Aug 6 – Oct 31
	14 Nov 1 – Jan 31
	20 Feb 1 – May 31
	Except that total releases shall not exceed 11,000 ac-ft.
	<1,000,000 ac-ft 8 June 1 – Dec 1
	6 Jan 1 – March 25
	8 March 26 – May 31
	Except that total releases shall not exceed 5,500 ac-ft.
	March 18, 1981, and thereafter:
	<u>Forecast/Folsom Reservoir¹</u> <u>Release (cfs)</u>
	>1,000,000 ac-ft 20 May 15 – Dec 14
	10 Dec 15 – May 14
	No limitation of total release.
	<1,000,000 ac-ft 10 June 1 – Oct 14
	6 Oct 15 – May 31
	No limitation of total release.
South Fork Long Canyon Diversion Dam	<u>Forecast/Folsom Reservoir¹</u> <u>Release (cfs)</u>
	>1,000,000 ac-ft lesser of 5 or natural flow
	<1,000,000 ac-ft lesser of 2.5 or natural flow
North Fork Long Canyon Diversion Dam	Releases to maintain streamflow of 2 cfs or the natural flow, whichever is less, shall be made at all times.
Middle Fork Interbay	<u>Forecast/Folsom Reservoir</u> <u>Release (cfs)</u>
	>1,000,000 ac-ft lesser of 23 or natural flow
	<1,000,000 ac-ft lesser of 12 or natural flow
Oxbow Powerhouse	Releases at Oxbow Powerhouse shall be 75 cfs at all times as measured downstream of the confluence with the North Fork of the Middle Fork. Such releases shall not cause vertical fluctuations (measured in representative section) greater than 3 feet per hour.

¹Forecast/Folsom Reservoir = CDWR current year forecast of unimpeded run-off of the American River to Folsom Reservoir.

BA/BE Table 17. Summary of Water Rights Permits.

Permit/ License No.	Type of Use	Source	Direct Diversion		Off-Stream Storage	
13855	Power/ Incidental Recreation	Duncan Creek to French Meadows Reservoir	150 cfs	Jan 1–Dec 31	25,000 ac-ft 400 cfs max	Nov 1–Jul 1
		Middle Fork American at French Meadows Reservoir	290 cfs	Jan 1–Dec 31	95,000 ac-ft	Nov 1–Jul 1
		Rubicon River at Hell Hole Reservoir	657 cfs	Jan 1–Dec 31	129,000 ac-ft	Nov 1–Jul 1
		South Fork Long Canyon to Hell Hole Reservoir or Middle Fork Powerhouse	400 cfs	Jan 1–Dec 31		
		North Fork Long Canyon to Hell Hole Reservoir or Middle Fork Powerhouse	100 cfs	Jan 1–Dec 31		
		Middle Fork American River at Middle Fork Interbay	1,000 cfs	Jan 1–Dec 31		
		Middle Fork American River at Ralston Afterbay	1,225 cfs	Jan 1–Dec 31		
13856	Irrigation, and Incidental Domestic, Recreational, Municipal and Industrial	Duncan Creek to French Meadows Reservoir			25,000 ac-ft 400 cfs max	Nov 1–Jul 1
		Middle Fork American River to French Meadows Reservoir			95,000 ac-ft	Nov 1–Jul 1
		Rubicon River to Hell Hole Reservoir	657 cfs	Jan 1–Dec 31	129,000 ac-ft	Nov 1–Jul 1
13857	Power/ Incidental Recreation	Duncan Creek	50 cfs	Jan 1–Dec 31		
		Middle Fork American River to French Meadows Reservoir	110 cfs	Jan 1–Dec 31	10,000 ac-ft	Nov 1–Jul 1
		Rubicon River at Hell Hole Reservoir	155 cfs	Jan 1–Dec 31	36,000 ac-ft	Nov 1–Jul 1
		South Fork Long Canyon to Hell Hole Reservoir			13,000 ac-ft 830 cfs max	Nov 1–Jul 1
		North Fork Long Canyon to Hell Hole Reservoir			7,000 ac-ft 830 cfs max	Nov 1–Jul 1
		Middle Fork American River to Ralston Afterbay	705 cfs	Jan 1–Dec 31		

BA/BE Table 17. Summary of Water Rights Permits (continued).

Permit/ License No.	Type of Use	Source	Direct Diversion		Off-Stream Storage	
13858	Irrigation, and Incidental Domestic, Recreational, Municipal and Industrial	North Fork American River	800 cfs	Nov 1–Jul 1		
		Middle Fork American River to French Meadows Dam			10,000 ac-ft	Nov 1–Jul 1
		Rubicon River at Hell Hole Reservoir			36,000 ac-ft	Nov 1–Jul 1
		South Fork Long Canyon to Hell Hole Reservoir			13,000 ac-ft 830 cfs max	Nov 1–Jul 1
		North Fork Long Canyon to Hell Hole Reservoir			7,000 ac-ft 830 cfs max	Nov 1–Jul 1
13855-13858	Power/ Incidental Recreation Irrigation, and Incidental Domestic, Recreational, Municipal and Industrial	To French Meadows Reservoir			Maximum 133,700 ac-ft	
		To Hell Hole Reservoir			Maximum 208,400 ac-ft	
20754 ¹ 12644 ²	Power/ Incidental Recreation	Hell Hole Reservoir	40 cfs ²	All Year		
		Hell Hole Reservoir	40 cfs ²	All Year		
		Hell Hole Reservoir	Maximum 17,640 ac-ft/yr.			

Source:

(a) California State Water Rights Board (now the California State Water Resources Control Board [State Water Board]). Decision D-1104. Decision Approving Applications in the Matter of Application 18084, 18085, 18086, and 18087. November 21, 1962.

State Water Board. Permit Number 20754 issued August 18, 1994.

Notes:

¹Also known as Permit 20750.

²Permit 20754 and License 12644 are additive.

BA/BE Table 18. Summary of MFP Generation (1967–2006).

Year	Net Generation (MWh)					
	Powerhouse					Project Total
	French Meadows	Middle Fork	Ralston	Oxbow	Hell Hole ¹	
1967	103,000	845,000	552,000	40,000	-	1,540,000
1968	42,000	368,000	283,000	25,000	-	718,000
1969	101,000	872,000	616,000	45,000	-	1,634,000
1970	76,000	656,000	477,000	37,000	-	1,246,000
1971	68,000	529,000	399,000	35,000	-	1,031,000
1972	50,000	458,000	354,000	31,000	-	893,000
1973	78,000	528,000	425,000	34,000	-	1,065,000
1974	93,000	752,000	573,000	40,000	-	1,458,000
1975	52,000	451,000	364,000	32,000	-	899,000
1976	34,000	295,000	209,000	14,000	-	552,000
1977	8,000	113,000	85,000	5,000	-	211,000
1978	57,000	565,000	441,000	34,000	-	1,097,000
1979	83,000	557,000	414,000	36,000	-	1,090,000
1980	93,000	799,000	554,000	39,000	-	1,485,000
1981	35,000	285,000	221,000	18,000	-	559,000
1982	126,000	995,000	677,000	47,000	-	1,845,000
1983	125,000	970,000	669,000	48,000	1,500	1,813,500
1984	91,000	814,000	562,000	41,000	3,292	1,511,292
1985	38,000	306,000	231,000	20,000	2,943	597,943
1986	85,000	714,000	444,000	34,000	4,209	1,281,209
1987	25,000	192,000	139,000	11,000	2,960	369,960
1988	26,000	198,000	148,000	11,000	1,684	384,684
1989	76,000	630,000	460,000	34,000	3,188	1,203,188
1990	43,000	332,000	236,000	19,000	2,923	632,923
1991	36,000	318,000	236,000	19,000	2,492	611,492
1992	20,000	165,000	126,000	11,000	2,288	324,288
1993	86,000	655,000	499,000	38,000	2,770	1,280,770
1994	30,000	236,000	173,000	13,000	1,859	453,859
1995	112,000	851,000	600,000	42,000	4,128	1,609,128
1996	94,000	759,000	558,000	41,000	3,372	1,455,372
1997	86,000	757,000	420,000	36,000	4,057	1,303,057
1998	89,000	696,000	534,000	40,000	3,240	1,362,240
1999	40,000	632,000	502,000	37,000	3,116	1,214,116
2000	68,000	543,000	402,000	32,000	3,141	1,048,141
2001	30,000	301,000	231,000	18,000	1,843	581,843
2002	45,000	306,000	258,000	23,000	2,737	634,737
2003	68,000	540,000	405,000	33,000	3,256	1,049,256
2004	47,000	507,000	363,000	29,000	3,214	949,214
2005	70,000	543,000	426,000	35,000	3,615	1,077,615
2006	93,000	793,000	518,000	33,000	4,837	1,441,837
Average²	65,550	545,650	394,600	30,250	3,028	1,039,078

¹Hell Hole Powerhouse was constructed in 1983.

²Generation from French Meadows, Middle Fork, Ralston, and Oxbow powerhouses is averaged over a 40-year period of record (1967–2006) and Hell Hole Powerhouse is averaged over a 24-year period of record (1983–2006). The Project Total represents the sum of the average net generation for the five Project powerhouses based on their respective period of record.

Note: Average net generation for the 24-year period when all five Project powerhouses were in operation (1983–2006) is 1,007,986 MWh.

BA/BE Table 19. Proposed Action – Project Facilities and Features.

Dams, Reservoirs, and Diversion Pools	
Large Dams	
French Meadows Dam and Outlet Works (modified)	
Hell Hole Dam and Outlet Works (modified)	
Medium Dams	
Middle Fork Interbay Dam and Outlet Works (modified)	
Ralston Afterbay Dam and Outlet Works	
Small Dams	
Duncan Creek Diversion Dam (modified)	
North Fork Long Canyon Diversion Dam (modified)	
South Fork Long Canyon Diversion Dam (modified)	
Large Reservoirs	
French Meadows Reservoir	
Hell Hole Reservoir	
Medium Reservoirs	
Middle Fork Interbay	
Ralston Afterbay	
Small Diversion Pools	
Duncan Creek Diversion Pool (modified)	
North Fork Long Canyon Diversion Pool (modified)	
South Fork Long Canyon Diversion Pool (modified)	
Water Conveyance Systems	
Tunnels	
Duncan Creek - Middle Fork Tunnel	
French Meadows - Hell Hole Tunnel	
Hell Hole - Middle Fork Tunnel	
Middle Fork - Ralston Tunnel	
Ralston - Oxbow Tunnel	
Diversion Pipes and Drop Inlets	
North Fork Long Canyon Diversion Pipe and Drop Inlet	
South Fork Long Canyon Diversion Pipe and Drop Inlet	
Surge Shafts and Adits	
Brushy Canyon Adit	
Hell Hole - Middle Fork Tunnel Surge Shaft and Tank	
Middle Fork - Ralston Tunnel Surge Shaft and Tank	
Removable Sections and Portals	
Duncan Creek - Middle Fork Tunnel Portal	
French Meadows - Hell Hole Tunnel Removable Section	
Hell Hole - Middle Fork Tunnel Removable Section	
Middle Fork - Ralston Tunnel Removable Section	
North Fork Long Canyon Crossing Removable Section	
Intakes and Gatehouses	
Duncan Creek - Middle Fork Tunnel Intake	
French Meadows - Hell Hole Tunnel Gatehouse	
French Meadows - Hell Hole Tunnel Intake	
Hell Hole - Middle Fork Tunnel Gatehouse	
Hell Hole - Middle Fork Tunnel Intake	
Middle Fork - Ralston Tunnel Intake and Gatehouse	
Ralston - Oxbow Tunnel Intake	

BA/BE Table 19. Proposed Action – Project Facilities and Features (continued).

Water Conveyance Systems (continued)	
Penstocks and Valve Houses	
French Meadows Powerhouse Penstock and Butterfly Valve House	
Middle Fork Powerhouse Penstock and Butterfly Valve House	
Ralston Powerhouse Penstock and Butterfly Valve House	
Powerhouses, Switchyards, and Substations	
French Meadows Powerhouse and Switchyard	
Hell Hole Powerhouse	
Hell Hole Substation	
Middle Fork Powerhouse and Upper and Lower Switchyards	
Ralston Powerhouse and Switchyard	
Oxbow Powerhouse and Switchyard	
Gaging Stations and Weirs	
Stream Gages and Weirs	
Duncan Creek near French Meadows (USGS Gage No. 11427700) (interim) ¹	
Duncan Creek below Diversion Dam (USGS Gage No. 11427750)	
Middle Fork American River at French Meadows (USGS Gage No. 11427500)	
Middle Fork American River at French Meadows Dam (new) ²	
Rubicon River at Hell Hole Dam Spillway (HHDS) (new) ²	
Rubicon River below Hell Hole Dam (USGS Gage No. 11428800) (interim) ¹	
Rubicon River at Hell Hole Dam (new) ²	
North Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433085) (interim) ¹	
North Fork Long Canyon Creek below Diversion Dam (NFLCC) (new) ²	
South Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433065) (interim) ¹	
South Fork Long Canyon Creek below Diversion Dam (SFLCC) (new) ²	
Middle Fork American River below Interbay Dam (USGS Gage No. 11427770) (interim) ¹	
Middle Fork American River above Middle Fork Powerhouse (USGS Gage No. 11427760)	
Middle Fork American River below Interbay Dam (MFARIB) (new) ²	
Middle Fork American River near Foresthill (USGS Gage No. 11433300)	
Middle Fork American River at Ralston Afterbay Dam (new) ²	
Rubicon River above Ralston Powerhouse (RRRP) (existing, added to MFP) ³	
North Fork American River above American River Pump Station (NFARPS) (new) ²	
Rubicon River above Ellicott Bridge (RREB) (existing, added to MFP) ³	
Diversion Gages	
Duncan Creek Diversion Tunnel (DCDT) (new) ²	
North Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433080) (modified)	
South Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433060) (modified)	
Reservoir Gages	
French Meadows Reservoir (USGS Gage No. 11427400)	
French Meadows Reservoir Staff Gage	
Hell Hole Reservoir (USGS Gage No. 11428700)	
Hell Hole Reservoir Staff Gage	
Middle Fork Interbay Reservoir	
Ralston Afterbay Reservoir	
Powerhouse Gages	
French Meadows Powerhouse (USGS Gage No. 11427200)	
Middle Fork Powerhouse (USGS Gage No. 11428600)	
Ralston Powerhouse (USGS Gage No. 11427765)	
Oxbow Powerhouse (USGS Gage No. 11433212)	
Oxbow Powerhouse Penstock (OXBPP) (new) ²	

BA/BE Table 19. Proposed Action – Project Facilities and Features (continued).

Gaging Stations and Weirs (continued)	
Leakage Weirs	
French Meadows Dam Leakage Weirs Nos. 1-6	
Hell Hole Dam Leakage Weir	
Project Communication Lines and Powerlines	
French Meadows Area	
French Meadows Dam Generator Building to French Meadows Dam Outlet Works Powerline	
French Meadows Dam Generator Building to French Meadows Dam Spillway Gates Powerline	
Hell Hole Area	
French Meadows Powerhouse to French Meadows Powerhouse Penstock and Butterfly Valve House Communication Line/Powerline	
French Meadows Powerhouse and Switchyard to Hell Hole - Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator's Cottages, and Hell Hole Powerhouse Communication Line/Powerline	
Dormitory and Cottages Water Supply Tank Powerline	
Hell Hole Powerhouse to Rubicon River Gage below Hell Hole Dam Communication Line/Powerline	
Hell Hole Dam Spillway Crest Gates Control Building Communication Line/Powerline (new)²	
Middle Fork Interbay Area	
Middle Fork Powerhouse to Middle Fork Powerhouse Butterfly Valve House Communication Line/Powerline	
Middle Fork Powerhouse Butterfly Valve House to Radio Repeater near Hell Hole - Middle Fork Tunnel Surge Tank (underground) Communication Line/Powerline	
Middle Fork Powerhouse to Middle Fork - Ralston Tunnel Intake and Gatehouse Communication Line/Powerline	
Middle Fork Powerhouse to Middle Fork American River Gage above Middle Fork Powerhouse Communication Line/Powerline	
Ralston - Oxbow Area	
Ralston - Oxbow Tunnel Intake to Ralston Powerhouse Communication Line	
Ralston Powerhouse to Ralston Powerhouse Butterfly Valve House Communication Line/Powerline	
Ralston Afterbay Dam Generator Building to Ralston - Oxbow Tunnel Intake Communication Line/Powerline	
Oxbow Powerhouse to Ralston Afterbay Dam Generator Building Communication Line/Powerline	
Photovoltaic Poles and Powerlines	
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows	
Photovoltaic Pole and Powerline at Duncan Creek Gage below Diversion Dam	
Photovoltaic Pole and Powerline at Duncan Creek Gage at Diversion Tunnel (new)²	
Photovoltaic Pole and Powerline at Middle Fork American River Gage at French Meadows	
Photovoltaic Pole and Powerline at Middle Fork American River Gage above Middle Fork Powerhouse	
Photovoltaic Pole and Powerline at Middle Fork American River Gage below Interbay Dam (new)²	
Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam	
Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam (new)²	
Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam	
Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam (new)²	
Photovoltaic Pole and Powerline at Rubicon River Gage above Ralston Powerhouse (existing, added to MFP)⁴	
Photovoltaic Pole and Powerline at Middle Fork American River Gage near Foresthill	
Photovoltaic Pole and Powerline at North Fork American River Gage above American River Pump Station (new)²	
Photovoltaic Pole and Powerline at Rubicon River Gage above Ellicott Bridge (existing, added to MFP)⁴	
Microwave Reflectors and Radio Towers	
Passive Microwave Reflector Station above Middle Fork Interbay	
Radio Communications Tower near French Meadows - Hell Hole Tunnel Gatehouse	
Radio Communications Tower and Repeater near Hell Hole - Middle Fork Tunnel Surge Shaft and Tank	
Passive Microwave Reflector Station above Ralston Afterbay	
Disposal Areas	
Duncan Creek Diversion Sediment Disposal Area	
North Fork Long Canyon Crossing Sediment Disposal Area	
Middle Fork Interbay Sediment Disposal Area	

BA/BE Table 19. Proposed Action – Project Facilities and Features (continued).

Disposal Areas (continued)
Ralston Ridge Sediment Disposal Area
Sediment Augmentation Areas
Middle Fork Interbay Augmentation Areas (new)
Junction Bar Augmentation Area (new)
Indian Bar Augmentation Area (existing, added to MFP) ⁴
Ancillary Facilities
French Meadows Dam Generator Building
French Meadows Dam Staging Area
Dormitory Facility
Dormitory and Cottages Water Supply Tank
Hell Hole Staging Areas
Operator Cottages and Shop
Hell Hole Dam Spillway Crest Gates Control Building (new) ²
Ralston Afterbay Dam Generator Building
Storage Building at Middle Fork - Ralston Tunnel Surge Shaft and Tank
~~Ralston Afterbay Sediment Removal Access Point (converted)⁵~~
Project Fences
Slope Fences
French Meadows Powerhouse Penstock Rock Fence
French Meadows Powerhouse Slope Fence
Long Canyon Crossing Slope Fence
Middle Fork Powerhouse Upper Switchyard Slope Fence
Middle Fork Interbay Dam Slope Fence
Ralston Powerhouse Penstock and Butterfly Valve House Slope Fences
Ralston Powerhouse Slope Fence
Oxbow Powerhouse Slope Fence
Public Safety Fences
Dormitory Facility Barrier Fence
Hell Hole Dam General Parking Area Barrier Fence
North Fork Long Canyon Crossing Removable Section Barrier Fence
Project Roads
Duncan Creek Area
Duncan Creek Diversion Intake Road
Duncan Creek Diversion Dam Road
Duncan Creek Diversion Pool Road
French Meadows Area
Duncan Creek - Middle Fork Tunnel Portal Road
French Meadows - Hell Hole Tunnel Gatehouse Road
French Meadows Dam Outlet Works and South Leakage Weir Road
French Meadows Dam Staging Area and Spillway West Access Road
French Meadows Spillway East Access Road
French Meadows Dam North Leakage Weir Road
French Meadows Campground Water Supply Facility Access Road
Hell Hole Area
Hell Hole Dam and Powerhouse Road
Rubicon River Gage below Hell Hole Dam Road
Hell Hole Dam Leakage Weir Road
Hell Hole Dam Spillway Northern Access Point Road
French Meadows - Hell Hole Tunnel Portal Road
French Meadows Powerhouse Road

BA/BE Table 19. Proposed Action – Project Facilities and Features (continued).

Project Roads (continued)
Hell Hole Area (continued)
Hell Hole - Middle Fork Tunnel Gatehouse Road
Dormitory Facility Road
Operator Cottages and Shop Road
Spur on North Side of Operator Cottages
Spur on South Side of Operator Cottages
Hell Hole Dam Spillway Discharge Channel Road Spur to Communication Line/Powerline
Hell Hole Dam Spillway Discharge Channel Road
Big Meadows Campground Water Supply Facility Access Road
Hell Hole Dam Spillway Gates Road (new)²
Long Canyon Area
North Fork Long Canyon Diversion North Road
North Fork Long Canyon Diversion South Road
North Fork Long Canyon Diversion Drop Inlet Road
South Fork Long Canyon Diversion and Drop Inlet Road
South Fork Long Canyon Diversion and Drop Inlet Cutoff Road
South Fork Long Canyon Diversion Drop Inlet Access Road
North Fork Long Canyon Crossing Removable Section North Road
North Fork Long Canyon Crossing Removable Section South Road
Middle Meadows Group Campground Water Supply Facility Access Road
Middle Fork Interbay Area
Middle Fork Interbay Dam Road
Middle Fork Interbay Dam to Powerhouse Road
Middle Fork Powerhouse Butterfly Valve House Road
Middle Fork Powerhouse Penstock and Butterfly Valve House Road
Middle Fork Powerhouse Upper Switchyard Road
Ralston - Oxbow Area
Brushy Canyon Adit Road
Ralston Powerhouse Butterfly Valve House Road
Ralston Afterbay Dam Access Road
Indian Bar Access Road
Oxbow Powerhouse Road
Ralston - Oxbow Tunnel Intake Road
Ralston Afterbay Private Boat Ramp Road
Ralston Afterbay Dam and Access Point Road
Project Trails
Duncan Creek Area
Duncan Creek Diversion Dam North Trail
Duncan Creek Diversion Dam South Trail
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows Trail
Duncan Creek Gage near French Meadows Trail
Duncan Creek Gage below Diversion Dam Trail
Long Canyon Area
North Fork Long Canyon Creek Gage below Diversion Dam Trail (new)²
South Fork Long Canyon Creek Gage below Diversion Dam Trail (new)²
Middle Fork Interbay Area
Middle Fork American River Gage above Middle Fork Powerhouse Trail
Passive Microwave Reflector Station above Middle Fork Interbay Trail
Middle Fork American River Gage below Interbay Dam Trail (new)²

BA/BE Table 19. Proposed Action – Project Facilities and Features (continued).

Project Trails (continued)
Ralston Afterbay Area
Passive Microwave Reflector Station above Ralston Afterbay Trail
Rubicon River Gage above Ralston Powerhouse Trail (existing, added to MFP) ³
North Fork American River Gage above American River Pump Station Trail (new) ²

¹Existing gage to remain in place until infrastructure modification is complete.

²This facility or feature will be constructed under the Proposed Action.

³Existing gage or trail now required for Project operation and maintenance.

⁴Existing facility that has been added to the Project.

⁵Converted to Ralston Afterbay Sediment Removal Access Point Boat Ramp.

BA/BE Table 20. Proposed Action – Project Recreation Facilities and Features.

Duncan Area
Duncan Creek Diversion Primitive Recreation Site (new)
French Meadows Area
Ahart Campground (enhanced)
Coyote Group Campground
Poppy Campground (reduced)
French Meadows Campground
Gates Group Campground
Lewis Campground
French Meadows Picnic Area
French Meadows Boat Ramp (enhanced)
French Meadows Dump Station
~~McGuire Picnic Area and Beach (converted)¹~~
McGuire Group Campground (new)
McGuire Boat Ramp and Associated Parking (modified)
Hell Hole Area
Big Meadows Campground
Hell Hole Campground (reduced)
~~Upper Hell Hole Campground (removed)~~
Hell Hole Vista
Hell Hole Boat Ramp (enhanced)
Hell Hole General Parking Area and Hell Hole Boat Ramp Parking Area
Ralston Afterbay Area
Ralston Picnic Area (reduced)
Ralston Picnic Area Cartop Boat Ramp
Ralston Afterbay Sediment Removal Access Point Boat Ramp (new) ²
Indian Bar Rafting Access and General Parking (enhanced)
Long Canyon Area
Middle Meadows Group Campground
Project Recreation Facility Water Supplies
Dolly Creek Water Supply
French Meadows Campground Water Supply
Big Meadows Campground Water Supply
Middle Meadows Group Campground Water Supply

¹This facility will be converted to the McGuire Group Campground.²This facility replaces the Ralston Afterbay Sediment Removal Access Point.

BA/BE Table 21. Project Gaging Stations and Weirs.

	MIF	Pulse Flow	Down Ramp of Spill Flows	Operations of Oxbow Powerhouse (ramping rate/max flow)	Recreation Flow Releases	Reservoir Minimum Pool	Real-Time ¹	Gage Type
Gaging Stations and Weirs								
Stream Gages and Weirs								
Duncan Creek near French Meadows (USGS Gage No. 11427700) <i>(interim)</i> ²	X							Gage/Weir
Duncan Creek below Diversion Dam (USGS Gage No. 11427750)	X	X					X	Gage/Weir
Middle Fork American River at French Meadows (USGS Gage No. 11427500)	X ³	X	X				X	Gage/Weir
Middle Fork American River at French Meadows Dam (new) ⁴	X	X	X					TBD ⁶
Rubicon River at Hell Hole Dam Spillway (HHDS) (new) ⁴		X	X					Gage/Weir
Rubicon River below Hell Hole Dam (USGS Gage No. 11428800) <i>(interim)</i> ²	X							Gage/Weir
Rubicon River at Hell Hole Dam (new) ⁴	X	X	X					TBD ⁶
North Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433085) <i>(interim)</i> ²	X							Gage/Weir
North Fork Long Canyon Creek below Diversion Dam (NFLCC) (new) ⁴	X	X					X	Gage
South Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433065) <i>(interim)</i> ²	X							Gage/Weir
South Fork Long Canyon Creek below Diversion Dam (SFLCC) (new) ⁴	X	X					X	Gage
Middle Fork American River below Interbay Dam (USGS Gage No. 11427770) <i>(interim)</i> ²	X							TBD ⁶
Middle Fork American River above Middle Fork Powerhouse (USGS Gage No. 11427760)							X	Gage
Middle Fork American River below Interbay Dam (MFARIB) (new) ⁴	X	X					X	Gage
Middle Fork American River near Foresthill (USGS Gage No. 11433300)	X			X	X		X	Gage
Middle Fork American River at Ralston Afterbay Dam (new) ⁴	X							TBD ⁶
Rubicon River above Ralston Powerhouse (RRRP) (existing, added to MFP) ⁵							X	Gage
North Fork American River above American River Pump Station (NFARPS) (new) ⁴					X		X	Gage
Rubicon River above Ellicott Bridge (RREB) (existing, added to MFP) ⁵							X	Gage
Diversion Gages								
Duncan Creek Diversion Tunnel (DCDT) (new) ⁴	X	X						Sonar
North Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433080) <i>(modified)</i>	X							Sonar
South Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433060) <i>(modified)</i>	X							Sonar
Reservoir Gages								
French Meadows Reservoir (USGS Gage No. 11427400)						X	X	Storage Recorder
French Meadows Reservoir Staff Gage								Staff Gage
Hell Hole Reservoir (USGS Gage No. 11428700)						X	X	Storage Recorder
Hell Hole Reservoir Staff Gage								Staff Gage
Middle Fork Interbay Reservoir								Storage Recorder
Ralston Afterbay Reservoir								Storage Recorder
Powerhouse Gages								
French Meadows Powerhouse (USGS Gage No. 11427200)								Electrical
Middle Fork Powerhouse (USGS Gage No. 11428600)								Electrical
Ralston Powerhouse (USGS Gage No. 11427765)								Electrical
Oxbow Powerhouse (USGS Gage No. 11433212)								Electrical
Oxbow Powerhouse Penstock (OXBPP) (new) ⁴				X				TBD ⁶

BA/BE Table 21. Project Gaging Stations and Weirs (continued).

	MIF	Pulse Flow	Down Ramp of Spill Flows	Operations of Oxbow Powerhouse (ramping rate/max flow)	Recreation Flow Releases	Reservoir Minimum Pool	Real-Time ¹	Gage Type
Gaging Stations and Weirs								
Leakage Weirs								
French Meadows Dam Leakage Weirs Nos. 1-6								Weir
Hell Hole Dam Leakage Weir								Weir

Notes:

¹Real-time flows from stream gages are measures at 15-minute intervals and flows at reservoir gages are measured daily.

²Existing gage to remain in place until infrastructure modification is completed.

³Interim gage to be replaced with Middle Fork American River Gages at French Meadows Dam Outlet Works for MIF only. This gage will be maintained as part of the MFP to monitor pulse flows, down ramp of spill flows, and collect real-time flow data.

⁴This facility or feature will be constructed under the Proposed Action.

⁵Existing gage, now required for Project operations.

⁶Type of gage installed to be determined during final design.

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features.

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																					
	Inspections & Maintenance		Vegetation Management		Pest Management				Sediment Management						Slope Stabilization (Falling Rock Control)		Debris Management					
									Small Diversions			Medium Reservoirs										
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms	Facility Painting	Pole Replacement/Retrofit
Dams, Reservoirs, and Diversion Pools																						
Large Dams																						
French Meadows Dam and Outlet Works (modified)		A	A		A	X			X													
Hell Hole Dam and Outlet Works (modified)	A ²	A	A		A	X			X													
Medium Dams																						
Middle Fork Interbay Dam and Outlet Works (modified)		A	A						X													
Ralston Afterbay Dam and Outlet Works		A	A						X													
Small Dams																						
Duncan Creek Diversion Dam (modified)			A																			
North Fork Long Canyon Diversion Dam (modified)			A			X																
South Fork Long Canyon Diversion Dam (modified)			A																			
Large Reservoirs																						
French Meadows Reservoir																				X		
Hell Hole Reservoir																	I			X		
Medium Reservoir																						
Middle Fork Interbay													I			I ³		I	R	X		
Ralston Afterbay													I			I ³		I	R	X		

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management		Pest Management				Sediment Management				Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit		
									Small Diversions		Medium Reservoirs										
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management [†]	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair			Large Woody Debris	Cleaning Trash Racks
Dams, Reservoirs, and Diversion Pools (continued)																					
Small Diversion Pools																					
Duncan Creek Diversion Pool																					
Pre-modification of diversion dam			A							+	I							R	*		
Post modification of diversion dam			A									I									
North Fork Long Canyon Diversion Pool																					
Pre-modification of diversion dam			A			X				+	I							R			
Post modification of diversion dam			A			X						I									
South Fork Long Canyon Diversion Pool																					
Pre-modification of diversion dam			A			X				+	I							R			
Post modification of diversion dam			A			X						I									
Water Conveyance Systems																					
Tunnels																					
Duncan Creek - Middle Fork Tunnel																					
French Meadows - Hell Hole Tunnel																					
Hell Hole - Middle Fork Tunnel																					
Middle Fork - Ralston Tunnel																					
Ralston - Oxbow Tunnel	A																				
Diversion Pipes and Drop Inlets																					
North Fork Long Canyon Diversion Pipe and Drop Inlet			A																		
South Fork Long Canyon Diversion Pipe and Drop Inlet			A																		

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management			Pest Management			Sediment Management						Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit
									Small Diversions			Medium Reservoirs									
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks		
Water Conveyance Systems (continued)																					
Surge Shafts and Adits																					
Brushy Canyon Adit			A			X															
Hell Hole - Middle Fork Tunnel Surge Shaft and Tank			A																	I	
Middle Fork - Ralston Tunnel Surge Shaft and Tank			A			X														I	
Removable Sections and Portals																					
Duncan Creek - Middle Fork Tunnel Portal			A																	I	
French Meadows - Hell Hole Tunnel Removable Section			A																	I	
Hell Hole - Middle Fork Tunnel Removable Section			A			X														I	
Middle Fork - Ralston Tunnel Removable Section			A																	I	
North Fork Long Canyon Crossing Removable Section			A			X														I	
Intakes and Gatehouses																					
Duncan Creek - Middle Fork Tunnel Intake			A																		
French Meadows - Hell Hole Tunnel Gatehouse			A																		
French Meadows - Hell Hole Tunnel Intake			A																		
Hell Hole - Middle Fork Tunnel Gatehouse			A																		
Hell Hole - Middle Fork Tunnel Intake			A																		
Middle Fork - Ralston Tunnel Intake and Gatehouse			A			X															
Ralston - Oxbow Tunnel Intake			A			X															

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																																					
	Inspections & Maintenance		Vegetation Management		Pest Management				Sediment Management						Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit																	
									Small Diversions			Medium Reservoirs																										
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks			Log Booms																
Water Conveyance Systems (continued)																																						
Penstocks and Valve Houses																																						
French Meadows Powerhouse Penstock and Butterfly Valve House			A		A																I																	
Middle Fork Powerhouse Penstock and Butterfly Valve House			A		A	X									I						I																	
Ralston Powerhouse Penstock and Butterfly Valve House			A		A																I																	
Powerhouses, Switchyards, and Substations																																						
French Meadows Powerhouse and Switchyard	A		A		A	X	X	X																														
Hell Hole Powerhouse	A		A			X	X	X																														
Hell Hole Substation			A			X	X	X																														
Middle Fork Powerhouse and Upper and Lower Switchyards	A		A		A	X	X	X																														
Ralston Powerhouse and Switchyard	A		A		A	X	X	X																														
Oxbow Powerhouse and Switchyard	A		A		A	X	X	X																														
Gaging Stations and Weirs																																						
Stream Gages and Weirs																																						
Duncan Creek near French Meadows (USGS Gage No. 11427700) (interim) ⁴			A																																			
Duncan Creek below Diversion Dam (USGS Gage No. 11427750)			A																																			
Middle Fork American River at French Meadows (USGS Gage No. 11427500)			A																																			

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management			Pest Management			Sediment Management			Slope Stabilization (Falling Rock Control)		Debris Management							
									Small Diversions		Medium Reservoirs										
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)			Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks
Facility Painting	Pole Replacement/Retrofit																				
Gaging Stations and Weirs (continued)																					
Stream Gages and Weirs (continued)																					
Middle Fork American River at French Meadows Dam (new) ⁵																					
Rubicon River at Hell Hole Dam Spillway (HHDS) (new) ⁵																					
Rubicon River below Hell Hole Dam (USGS Gage No. 11428800) (interim) ⁴			A																		
Rubicon River at Hell Hole Dam (new) ⁵																					
North Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433085) (interim) ⁴			A																		
North Fork Long Canyon Creek below Diversion Dam (NFLCC) (new) ⁵			A																		
South Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433065) (interim) ⁴			A																		
South Fork Long Canyon Creek below Diversion Dam (SFLCC) (new) ⁵			A																		
Middle Fork American River below Interbay Dam (USGS Gage No. 11427770) (interim) ⁴			A																		
Middle Fork American River above Middle Fork Powerhouse (USGS Gage No. 11427760)			A																		

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management		Pest Management				Sediment Management			Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit			
									Small Diversions		Medium Reservoirs										
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)			Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks
Gaging Stations and Weirs (continued)																					
Stream Gages and Weirs (continued)																					
Middle Fork American River below Interbay Dam (MFARIB) (new) ⁵			A																		
Middle Fork American River near Foresthill (USGS Gage No. 11433300)			A																		
Middle Fork American River at Ralston Afterbay Dam (new) ⁵																					
Rubicon River above Ralston Powerhouse (RRRP) (existing, added to MFP) ⁶			A																		
North Fork American River above American River Pump Station (NFARPS) (new) ⁵			A																		
Rubicon River above Ellicott Bridge (RREB) (existing, added to MFP) ⁶			A																		
Diversion Gages																					
Duncan Creek Diversion Tunnel (DCDT) (new) ⁵																					
North Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433080) (modified)																					
South Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433060) (modified)																					
Reservoir Gages																					
French Meadows Reservoir (USGS Gage No. 11427400)																					

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																					
	Inspections & Maintenance		Vegetation Management			Pest Management				Sediment Management						Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit
										Small Diversions			Medium Reservoirs									
Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks	Log Booms			
Gaging Stations and Weirs (continued)																						
Reservoir Gages (continued)																						
French Meadows Reservoir Staff Gage																						
Hell Hole Reservoir (USGS Gage No. 11428700)																						
Hell Hole Reservoir Staff Gage																						
Middle Fork Interbay Reservoir																						
Ralston Afterbay Reservoir																						
Powerhouse Gages																						
French Meadows Powerhouse (USGS Gage No. 11427200)																						
Middle Fork Powerhouse (USGS Gage No. 11428600)																						
Ralston Powerhouse (USGS Gage No. 11427765)																						
Oxbow Powerhouse (USGS Gage No. 11433212)																						
Oxbow Powerhouse Penstock (OXBPP) (new) ⁵																						
Leakage Weirs																						
French Meadows Dam Leakage Weirs Nos. 1-6			A																			
Hell Hole Dam Leakage Weir			A			X																

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management		Pest Management				Sediment Management			Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit			
									Small Diversions										Medium Reservoirs		
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)			Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks
Project Communication Lines and Powerlines																					
French Meadows Area																					
French Meadows Dam Generator Building to French Meadows Dam Outlet Works Powerline			A			X															S
French Meadows Dam Generator Building to French Meadows Dam Spillway Gates Powerline			A																		S
Hell Hole Area																					
French Meadows Powerhouse to French Meadows Powerhouse Penstock and Butterfly Valve House Communication Line/Powerline			A		A																S
French Meadows Powerhouse and Switchyard to Hell Hole - Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator's Cottages, and Hell Hole Powerhouse Communication Line/Powerline			A																		S
Dormitory and Cottages Water Supply Tank Powerline			A																		S
Hell Hole Powerhouse to Rubicon River Gage below Hell Hole Dam Communication Line/Powerline			A																		S
Hell Hole Dam Spillway Crest Gates Control Building Communication Line/Powerline (new) ⁵																					
Middle Fork Interbay Area																					
Middle Fork Powerhouse to Middle Fork Powerhouse Butterfly Valve House Communication Line/Powerline			A		A																S

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management		Pest Management				Sediment Management				Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit		
									Small Diversions		Medium Reservoirs										
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair			Large Woody Debris	Cleaning Trash Racks
Project Communication Lines and Powerlines (continued)																					
Middle Fork Interbay Area (continued)																					
Middle Fork Powerhouse Butterfly Valve House to Radio Repeater near Hell Hole - Middle Fork Tunnel Surge Tank (underground) Communication Line/Powerline			A			X															S
Middle Fork Powerhouse to Middle Fork - Ralston Tunnel Intake and Gatehouse Communication Line/Powerline			A			X															S
Middle Fork Powerhouse to Middle Fork American River Gage above Middle Fork Powerhouse Communication Line/Powerline			A			X															S
Ralston - Oxbow Area																					
Ralston - Oxbow Tunnel Intake to Ralston Powerhouse Communication Line			A			X															S
Ralston Powerhouse to Ralston Powerhouse Butterfly Valve House Communication Line/Powerline			A		A	X															S
Ralston Afterbay Dam Generator Building to Ralston - Oxbow Tunnel Intake Communication Line/Powerline			A			X															S
Oxbow Powerhouse to Ralston Afterbay Dam Generator Building Communication Line/Powerline			A			X															S
Photovoltaic Poles and Powerlines																					
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows			A																		

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management			Pest Management				Sediment Management			Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit		
										Small Diversions		Medium Reservoirs									
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair			Large Woody Debris	Cleaning Trash Racks
Project Communication Lines and Powerlines (continued)																					
Photovoltaic Poles and Powerlines (continued)																					
Photovoltaic Pole and Powerline at Duncan Creek Gage below Diversion Dam			A																		
Photovoltaic Pole and Powerline at Duncan Creek Gage at Diversion Tunnel (new) ⁵			A																		
Photovoltaic Pole and Powerline at Middle Fork American River Gage at French Meadows			A																		
Photovoltaic Pole and Powerline at Middle Fork American River Gage above Middle Fork Powerhouse			A																		
Photovoltaic Pole and Powerline at Middle Fork American River Gage below Interbay Dam (new) ⁵			A																		
Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam			A																		
Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam (new) ⁵			A																		
Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam			A																		
Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam (new) ⁵			A																		
Photovoltaic Pole and Powerline at Rubicon River Gage above Ralston Powerhouse (existing, added to MFP) ⁷			A																		

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management			Pest Management				Sediment Management			Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit		
										Small Diversions		Medium Reservoirs									
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair			Large Woody Debris	Cleaning Trash Racks
Project Communication Lines and Powerlines (continued)																					
Photovoltaic Poles and Powerlines (continued)																					
Photovoltaic Pole and Powerline at Middle Fork American River Gage near Foresthill			A																		
Photovoltaic Pole and Powerline at North Fork American River Gage above American River Pump Station (new) ⁵			A																		
Photovoltaic Pole and Powerline at Rubicon River Gage above Ellicott Bridge (existing, added to MFP) ⁷			A																		
Microwave Reflectors and Radio Towers																					
Passive Microwave Reflector Station above Middle Fork Interbay			I																		
Radio Communications Tower near French Meadows - Hell Hole Tunnel Gatehouse			I																		
Radio Communications Tower and Repeater near Hell Hole - Middle Fork Tunnel Surge Shaft and Tank			I																		
Passive Microwave Reflector Station above Ralston Afterbay			I			X															
Disposal Areas																					
Duncan Creek Diversion Sediment Disposal Area																					
North Fork Long Canyon Crossing Sediment Disposal Area						X															
Middle Fork Interbay Sediment Disposal Area						X															
Ralston Ridge Sediment Disposal Area						X															

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management			Pest Management				Sediment Management					Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit
										Small Diversions			Medium Reservoirs								
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)	Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks		
Sediment Augmentation Areas																					
Middle Fork Interbay Augmentation Areas (new)														I ³							
Junction Bar Augmentation Area (new)			A			X								I ³							
Indian Bar Augmentation Area (existing, added to MFP) ⁷			A			X								I ³							
Ancillary Facilities																					
French Meadows Dam Generator Building			A		A		X	X												I	
French Meadows Dam Staging Area					I	X															
Dormitory Facility			A		A		X	X												I	
Dormitory and Cottages Water Supply Tank			A		I		X	X												I	
Hell Hole Staging Areas					A																
Operator Cottages and Shop			A		A	X	X	X												I	
Hell Hole Dam Spillway Crest Gates Control Building (new) ⁵			A				X	X													
Ralston Afterbay Dam Generator Building			A		A	X	X	X												I	
Storage Building at Middle Fork - Ralston Tunnel Surge Shaft and Tank			A		A	X															
~~Ralston Afterbay Sediment Removal Access Point (converted)⁹~~																					
Project Fences																					
Slope Fences																					
French Meadows Powerhouse Penstock Rock Fence																A					
French Meadows Powerhouse Slope Fence			I			X										A					

BA/BE Table 22. Proposed Action – Description of Routine Facility Inspections, Testing, and Maintenance Activities at Project Facilities and Features (continued).

Project Facility or Feature [Items in red represent a change from the No-Action Alternative]	Inspections, Testing, and Maintenance Activities																				
	Inspections & Maintenance		Vegetation Management		Pest Management				Sediment Management			Slope Stabilization (Falling Rock Control)		Debris Management			Facility Painting	Pole Replacement/Retrofit			
									Small Diversions		Medium Reservoirs										
	Tunnel and Powerhouse Inspection, Testing, and Maintenance	Spillway & Tainter Gate Testing	Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Gunite (erosion control)			Rock Removal/Fence Repair	Large Woody Debris	Cleaning Trash Racks
Project Fences																					
Slope Fences																					
Long Canyon Crossing Slope Fence			I													A					
Middle Fork Powerhouse Upper Switchyard Slope Fence					I	X										A					
Middle Fork Interbay Dam Slope Fence																A					
Ralston Powerhouse Penstock and Butterfly Valve House Slope Fences					I	X										A					
Ralston Powerhouse Slope Fence					I	X										A					
Oxbow Powerhouse Slope Fence					I	X										A					
Public Safety Fences																					
Dormitory Facility Barrier Fence																A					
Hell Hole Dam General Parking Area Barrier Fence						X										A					
North Fork Long Canyon Crossing Removable Section Barrier Fence						X										A					

A = Activity occurs on an annual basis.

I = Activity occurs on an infrequent basis.

R = Completed as-needed during diversion season.

S = Scheduled retrofit or replacement.

X = Activity occurs or ancillary facility is present.

¹Indicates areas where manual and chemical treatment of target noxious weed populations will be implemented. Manual and chemical treatments may be completed at other locations during the term of the license if new target noxious weed populations are identified during inventory surveys.²Inspection of 1,000 feet of outlet conduit.³Sediment augmentation will be implemented at Middle Fork Interbay Augmentation Areas, Junction Bar Augmentation Area, and Indian Bar Augmentation Area; and sediment disposal will occur at Project sediment disposal areas or other agency-approved disposal areas.⁴Existing gage to remain in place until infrastructure modification is complete.⁵This facility or feature will be constructed under the Proposed Action.⁶Existing gage or trail now required for Project operation and maintenance.⁷Existing facility that has been added to the Project.⁸Material excavated from medium reservoirs will be placed at this sediment augmentation area.⁹Converted to Ralston Afterbay Sediment Removal Access Point Boat Ramp.

BA/BE Table 23. Proposed Action – Description of Routine Maintenance at Project Roads and Trails.

Project Road or Trail [Items in red represent a change from the No-Action Alternative]	Annual Road and Trail Maintenance ¹	Vegetation Management			Pest Mgmt	Periodic Road and Trail Maintenance ³
		Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ²	
Project Roads						
Duncan Creek Area						
Duncan Creek Diversion Intake Road	X	A	A			X
Duncan Creek Diversion Dam Road	X	A	A			X
Duncan Creek Diversion Pool Road	X	A	A			X
French Meadows Area						
Duncan Creek - Middle Fork Tunnel Portal Road	X	A	A		X	X
French Meadows - Hell Hole Tunnel Gatehouse Road	X	A	A	I		X
French Meadows Dam Outlet Works and South Leakage Weir Road	X	A	A	A	X	X
French Meadows Dam Staging Area and Spillway West Access Road	X	A	A		X	X
French Meadows Spillway East Access Road	X	A	A			X
French Meadows Dam North Leakage Weir Road	X	A	A		X	X
French Meadows Campground Water Supply Facility Access Road	X	A	A			X
Hell Hole Area						
Hell Hole Dam and Powerhouse Road	X	A		A	X	X
Rubicon River Gage below Hell Hole Dam Road	X	A	A		X	X
Hell Hole Dam Leakage Weir Road	X	A	A		X	X
Hell Hole Dam Spillway and Northern Access Point Road	X	A	A		X	X
French Meadows - Hell Hole Tunnel Portal Road	X	A	A			X
French Meadows Powerhouse Road	X	A	A		X	X
Hell Hole - Middle Fork Tunnel Gatehouse Road	X	A	A			X
Dormitory Facility Road	X	A	A			X
Operator Cottages and Shop Road	X	A	A			X
Spur on North Side of Operator Cottages	X	A	A			X
Spur on South Side of Operator Cottages	X	A	A			X
Hell Hole Dam Spillway Discharge Channel Road Spur to Communication Line/Powerline	X	A	A			X
Hell Hole Dam Spillway Discharge Channel Road	X	A	A			X
Big Meadows Campground Water Supply Facility Access Road	X	A	A			X
Hell Hole Dam Spillway Gates Road (new) ⁴	X					X

BA/BE Table 23. Proposed Action – Description of Routine Maintenance at Project Roads and Trails (continued).

Project Road or Trail [Items in red represent a change from the No-Action Alternative]	Annual Road and Trail Maintenance ¹	Vegetation Management			Pest Mgmt	Periodic Road and Trail Maintenance ³
		Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ²	
Project Roads (continued)						
Long Canyon Area						
North Fork Long Canyon Diversion North Road	X	A	A			X
North Fork Long Canyon Diversion South Road	X	A	A			X
North Fork Long Canyon Diversion Drop Inlet Road	X	A	A			X
South Fork Long Canyon Diversion and Drop Inlet Road	X	A	A			X
South Fork Long Canyon Diversion and Drop Inlet Cutoff Road	X	A	A			X
South Fork Long Canyon Diversion Drop Inlet Access Road	X	A	A			X
North Fork Long Canyon Crossing Removable Section North Road	X	A	A		X	X
North Fork Long Canyon Crossing Removable Section South Road	X	A	A		X	X
Middle Meadows Group Campground Water Supply Facility Access Road	X	A	A			X
Middle Fork Interbay Area						
Middle Fork Interbay Dam Road					X	
Middle Fork Interbay Dam to Powerhouse Road	X	A	A		X	X
Middle Fork Powerhouse Butterfly Valve House Road	X	A	A			X
Middle Fork Powerhouse Penstock and Butterfly Valve House Road	X	A	A	A	X	X
Middle Fork Powerhouse Upper Switchyard Road	X	A	A		X	X
Ralston - Oxbow Area						
Brushy Canyon Adit Road	X	A	A		X	X
Ralston Powerhouse Butterfly Valve House Road	X	A	A	A	X	X
Ralston Afterbay Dam Access Road	X	A	A		X	X
Indian Bar Access Road	X	A	A		X	X
Oxbow Powerhouse Road	X	A	A		X	X
Ralston - Oxbow Tunnel Intake Road	X	A	A		X	X
Ralston Afterbay Private Boat Ramp Road	X	A	A			X
Ralston Afterbay Dam and Access Point Road	X	A	A		X	X

BA/BE Table 23. Proposed Action – Description of Routine Maintenance at Project Roads and Trails (continued).

Project Road or Trail [Items in red represent a change from the No-Action Alternative]	Annual Road and Trail Maintenance ¹	Vegetation Management			Pest Mgmt	Periodic Road and Trail Maintenance ³
		Trimming by Hand	Trimming w/Equipment	Herbicide Use	Noxious Weed Management ²	
Project Trails						
Duncan Creek Area						
Duncan Creek Diversion Dam North Trail	X	A				X
Duncan Creek Diversion Dam South Trail	X	A				X
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows Trail	X	A				X
Duncan Creek Gage near French Meadows Trail	X	A				X
Duncan Creek Gage below Diversion Dam Trail	X	A		I		X
Long Canyon Area						
North Fork Long Canyon Creek Gage below Diversion Dam Trail (new) ⁴	X	A				X
South Fork Long Canyon Creek Gage below Diversion Dam Trail (new) ⁴	X	A				X
Middle Fork Interbay Area						
Middle Fork American River Gage above Middle Fork Powerhouse Trail	X	A			X	X
Passive Microwave Reflector Station above Middle Fork Interbay Trail	X	A				X
Middle Fork American River Gage below Interbay Dam Trail (new) ⁴	X	A				X
Ralston Afterbay Area						
Passive Microwave Reflector Station above Ralston Afterbay Trail	X	A			X	X
Rubicon River Gage above Ralston Powerhouse Trail (existing, added to MFP) ⁵	X	A				X
North Fork American River Gage above American River Pump Station Trail (new) ⁴	X	A				X

A = Activity occurs on an annual basis.

I = Activity occurs on an infrequent basis.

X = Activity occurs or ancillary facility is present.

¹Annual maintenance generally includes, but is not limited to, the following types of activities: debris removal; vegetation management; noxious weed control; basic repairs, including filling of potholes; maintenance of erosion control features such as culverts, drains, ditches, and water bars; repair, replacement, or installation of access control structures such as posts, cables, rails, gates, and barrier rock; repair and replacement of signage; and snow removal and sanding.

²Indicates areas where manual and chemical treatment of target noxious weed populations will be implemented. Manual and chemical treatments may be completed at other locations during the term of the license if new target noxious weed populations are identified during inventory surveys.

³Periodic maintenance generally includes, but is not limited to, the following types of activities: placement or replacement of culverts and other drainage features; bridge deck or ford replacement; major road repairs; grading; sealing; resurfacing; road replacement; and hazard tree removal.

⁴This facility or feature will be constructed under the Proposed Action.

⁵Existing gage or trail now required for Project operation and maintenance.

BA/BE Table 24. Proposed Action – Description of Routine Maintenance at Project Recreation Facilities and Features.¹

Recreation Facility or Feature [Items in red represent a change from the No-Action Alternative]	Recreation Facility Annual Maintenance ²	Vegetation Management		Pest Mgmt	Recreation Facility Heavy Maintenance ⁴
		Trimming by Hand	Fungicide Use	Noxious Weed Management ³	
Duncan Area					
Duncan Creek Diversion Primitive Recreation Site (new)	X	A			X
French Meadows Area					
Ahart Campground (enhanced)	X	A	I		X
Coyote Group Campground	X	A	I		X
Poppy Campground (reduced)	X	A	I		X
French Meadows Campground	X	A	I		X
Gates Group Campground	X	A	I		X
Lewis Campground	X	A	I		X
French Meadows Picnic Area	X	A	I		X
French Meadows Boat Ramp (enhanced)	X	A	I	X	X
French Meadows Dump Station	X				X
McGuire Picnic Area and Beach (converted) ⁵	X				X
McGuire Group Campground (new)	X	A	I		X
McGuire Boat Ramp and Associated Parking (modified)	X	A	I		X
Hell Hole Area					
Big Meadows Campground	X	A	I	X	X
Hell Hole Campground (reduced)	X	A	I		X
Upper Hell Hole Campground (removed)	X	A	I		X
Hell Hole Vista	X	A	I		X
Hell Hole Boat Ramp (enhanced)	X	A		X	X
Hell Hole General Parking Area and Hell Hole Boat Ramp Parking Area	X	A		X	X
Ralston Afterbay Area					
Ralston Picnic Area (reduced)	X	A		X	X
Ralston Picnic Area Cartop Boat Ramp	X	A		X	X
Ralston Afterbay Sediment Removal Access Point Boat Ramp (new) ⁶	X	A		X	X
Indian Bar Rafting Access and General Parking (enhanced)	X	A		X	X
Long Canyon Area					
Middle Meadows Group Campground	X	A	I	X	X
Project Recreation Facility Water Supplies and Associated Maintenance Trails					
Dolly Creek Water Supply	X	I			X
French Meadows Campground Water Supply	X	I			X
Big Meadows Campground Water Supply	X	I			X
Middle Meadows Group Campground Water Supply	X	I			X

A = Activity implemented annually throughout the year.

I = Activity implemented on an infrequent basis.

X = Activity is implemented.

¹Project recreation facility and feature maintenance includes maintenance of recreation facility access roads at Project recreation facilities.²Annual maintenance includes: site cleaning; basic repairs and maintenance of facility features; garbage clean-up; signing; toilet cleaning and restocking; toilet pumping; graffiti removal; removal of debris from boat ramps; basic maintenance of pathways; routine testing of water supplies; annual winterizing and opening activities; and hazard tree³Indicates areas where manual and chemical treatment of target noxious weed populations will be implemented. Manual and chemical treatments may be completed at other locations during the term of the license in new target noxious weed populations are identified during inventory surveys.⁴Heavy maintenance includes: repair and resurfacing of parking areas and spurs; repair or replacement of barrier structures and devices; repair and/or replacement of site/facility amenities; repair and replacement of signage, information boards, and fee tubes; repair, maintenance, and painting of bathroom structures; repair and maintenance of potable water supplies and distribution lines; repair and maintenance of septic systems; repair and sealing of boat ramps; repair or installation of retaining walls; site leveling and removal of obstacles; fuels reduction; and maintenance of pathways.⁵This facility will be converted to the McGuire Group Campground.⁶This facility replaces the Ralston Afterbay Sediment Removal Access Point.

BA/BE Table 25. Stebbins' Phacelia in the Vicinity of the MFP.

Scientific Name	Common Name	Polygon Identification Number ¹	Area ²		Number of Individuals (estimated) ³
			Square Feet	Acres	
Brushy Canyon Area					
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	BC01	11,236	0.26	150
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	BC02	26,703	0.61	40
Ellicott Bridge Area					
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	EB01	—	—	3
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	EB02	—	—	1
French Meadows Area					
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	FM01	—	—	1
Hell Hole Area					
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH01	25	—	2
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH02	250	—	5
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH03	600	0.012	25
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH04	4	—	5
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH05	25	—	5
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH06	50	—	5
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH07	35,038	0.80	17,500–35,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH08	65,082	1.5	33,000–65,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH09	126,886	2.9	63,000–127,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH10	304,335	7.0	152,000–304,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH14	93,831	2.2	47,000–94,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH15	49,849	1.1	25,000–50,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH17	3,902	0.09	2,000–4,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH18	1,813	0.04	1,000–2,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH19	21,313	0.49	11,000–21,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH21	14,375	0.33	7,000–14,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH22	62,334	1.4	31,000–62,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH23	23,824	0.55	12,000–24,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH24	244,131	5.6	122,000–244,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH25	19,457	0.45	10,000–19,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH26	71,357	1.6	36,000–71,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH27	93,382	2.1	47,000–93,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH28	167,013	3.8	83,000–167,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH29	423,790	9.7	212,000–424,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH30	358,404	8.2	179,000–358,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH31	246,920	5.7	123,000–247,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH32	82,348	1.9	41,000–82,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH33	50,889	1.2	25,000–51,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH34	399,123	9.2	200,000–399,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH35	439,293	10	220,000–439,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH36	11,224	0.26	6,000–11,000

BA/BE Table 25. Stebbins' Phacelia in the Vicinity of the MFP (continued).

Scientific Name	Common Name	Polygon Identification Number ¹	Area ²		Number of Individuals (estimated) ³
			Square Feet	Acres	
Hell Hole Area (continued)					
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH37	1,413	0.03	500–1,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH38	160,315	3.7	80,000–160,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH39	17,919	0.41	9,000–18,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH40	27,979	0.64	14,000–28,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH41	891,483	20	446,000–891,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH42	36,557	0.84	18,000–37,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH43	17,561	0.40	9,000–18,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH44	89,308	2.1	45,000–89,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH45	48,850	1.1	24,000–49,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH46	36,949	0.85	18,000–37,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH47	95,286	2.2	48,000–95,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH51	7,348	0.17	4,000–7,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH52	11,585	0.27	6,000–12,000
Totals:		49 populations	4,891,359	111.7	2,427,000–4,849,000

¹Refer to (TERR 2 – TSR [PCWA 2011a; SD BJ]) Maps TERR 2-2a–e for the location of each population within the study area. Only those populations associated with Project facilities and features are included.

²If the population extended beyond the survey area, the entire extent of the population is included.

³Number of individuals for polygons HH8 through HH52 was estimated assuming a density of 0.5 to 1.0 individuals per square foot. Numbers are rounded to the nearest thousand.

BA/BE Table 26. Routine Maintenance Activities at Project Facilities and Features and Project Recreation Facilities where Stebbins' Phacelia is Present.

Project Facilities and Features / Project Recreation Facilities and Features Located Adjacent to Stebbins' Phacelia Populations	Vegetation Management				Pest Management				Sediment Management						Transportation System Management		Recreation Facility Maintenance	
	Small Diversions			Medium Reservoirs														
	Trimming by Hand	Trimming w/ Equipment	Herbicide Use	Fungicide Use	Noxious Weed Management ¹	Physical Rodent Control (snap traps)	Over-the-Counter Rodenticide Use	Rodenticide Use - Fumigants	Physical Removal w/Equipment	Interim Sediment Mgmt.	Contingency Sediment Mgmt.	Physical Removal w/Equipment	Sediment Augmentation	Sediment Disposal	Annual Maintenance	Periodic Maintenance	Annual Maintenance	Heavy Maintenance
Dams, Reservoirs, and Diversion Pools																		
Large Dams																		
2 populations (10,000 to 19,000 individuals) at Hell Hole Dam and Outlet Works (modified)	A		A		X			X										
Large Reservoirs																		
1 population (1 individual) at French Meadows Reservoir	No Activities Implemented																	
33 populations (XX individuals) at Hell Hole Reservoir	No Activities Implemented																	
Water Conveyance Systems																		
Removalble Sections and Portals																		
1 population (1 individual) at Duncan Creek - Middle Fork Tunnel Portal	A																	
Intakes and Gatehouses																		
1 population (33,000 to 65,000 individuals) at Hell Hole - Middle Fork Tunnel Gatehouse	A																	
Project Communication Lines and Powerlines																		
4 populations (221,000 to 440,000 individuals) at French Meadows Powerhouse and Switchyard to Hell Hole - Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator's Cottages, and Hell Hole Powerhouse Communication Line/Powerline	A																	
Project Roads																		
2 populations (3,000 to 6,000 individuals) at French Meadows - Hell Hole Tunnel Portal Road	A	A													X	X		
3 populations (188,000 to 375,000 individuals) at French Meadows Powerhouse Road	A	A			X										X	X		
6 populations (47 individuals) at Hell Hole Dam Spillway Discharge Channel Road	A	A													X	X		
Project Recreation Facilities																		
1 population (63,000 to 127,000 individuals) at Hell Hole Campground (reduced)	A			I													X	X
1 population (86,500 to 172,000 individuals) at Upper Hell Hole Campground (removed)																	X	X
1 population (47,000 to 94,000 individuals) at Hell Hole Vista	A			I													X	X
1 population (17,500 to 35,000 individuals) at Hell Hole Boat Ramp (enhanced)	A				X													
1 population (17,500 to 35,000 individuals) at Hell Hole General Parking Area and Hell Hole Boat Ramp Parking Area	A				X												X	X

¹Indicates areas where manual and chemical treatment of target noxious weeds populations will be implemented. Manual and chemical treatments may be completed at other locations during the term of the license if new target noxious weeds populations are identified during inventory surveys.

BA/BE Table 27. Location of Stebbin's Phacelia Populations in the Vicinity of Hell Hole Reservoir.**Area 1**

Includes those portions of special-status plant populations occurring at or below the current maximum normal operating WSE of 4,630 feet msl down to approximately 4,605 feet msl

Species		Population Number ¹	Area ²		Number of Individuals ³
Scientific Name	Common Name		Square Feet	Acres	
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH39	17,910	0.41	9,000 – 18,000
Total:			17,910	0.41	9,000 – 18,000

Area 2a

Includes those portions of special-status plant populations occurring from the maximum normal operating WSE (4,630 feet msl) to 4,636 feet msl

Species		Population Number ¹	Area ²		Number of Individuals ³
Scientific Name	Common Name		Square Feet	Acres	
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH08	17	–	8 – 17
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH10	3,404	0.08	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH15	393	0.01	200 – 400
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH19	737	0.02	350 – 700
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH21	922	0.02	450 – 900
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH22	1,921	0.04	1,000 – 2,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH23	356	0.01	200 – 400
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH24	9,139	0.21	4,500 – 9,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH25	9,476	0.22	4,500 – 9,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH26	1,780	0.04	1,000 – 2,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH27	208	0.00	100 – 200
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH28	2,630	0.06	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH29	70	–	35 – 70
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH30	3,117	0.07	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH31	3,257	0.07	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH32	3,708	0.09	2,000 – 4,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH33	441	0.01	200 – 400
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH34	150	–	100 – 200
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH35	788	0.02	400 – 800
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH36	4,822	0.11	2,500 – 5,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH37	1,129	0.03	500 – 1,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH38	2,049	0.05	1,000 – 2,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH39	9	–	4 – 9
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH40	412	0.01	200 – 400
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH41	3,574	0.08	2,000 – 4,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH42	13,417	0.31	6,500 – 13,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH43	5,275	0.12	2,500 – 5,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH45	10,251	0.24	5,000 – 10,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH46	14,225	0.33	7,000 – 14,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH47	10,049	0.23	5,000 – 10,000
Total:			107,727	2.0	53,000 – 106,000

BA/BE Table 27. Location of Stebbin's Phacelia Populations in the Vicinity of Hell Hole Reservoir (continued).**Area 2b**

Includes those portions of special-status plant populations occurring from
4,636 feet msl to the maximum flood pool elevation at 4,640 feet msl

Species		Population Number ¹	Area ²		Number of Individuals ³
Scientific Name	Common Name		Square Feet	Acres	
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH08	4,909	0.11	2,500 – 5,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH10	8,552	0.20	4,500 – 9,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH15	4,878	0.11	2,500 – 5,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH19	4,206	0.10	2,000 – 4,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH21	3,723	0.09	2,000 – 4,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH22	6,264	0.14	3,000 – 6,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH23	4,012	0.09	2,000 – 4,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH24	26,984	0.62	13,500 – 27,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH25	9,972	0.23	5,000 – 10,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH26	9,967	0.23	5,000 – 10,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH27	6,002	0.14	3,000 – 6,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH28	3,737	0.09	2,000 – 4,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH29	1,081	0.02	500 – 1,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH30	12,509	0.29	6,500 – 13,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH31	6,734	0.15	3,500 – 7,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH32	8,806	0.20	4,500 – 9,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH33	2,924	0.07	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH34	3,265	0.07	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH35	3,690	0.08	18,500 – 37,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH36	2,943	0.07	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH37	279	0.01	150 – 300
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH38	1,829	0.04	1,000 – 2,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH40	1,576	0.04	1,000 – 2,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH41	11,247	0.26	5,500 – 11,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH42	9,671	0.22	5,000 – 10,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH43	5,816	0.13	3,000 – 6,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH45	9,872	0.23	5,000 – 10,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH46	10,567	0.24	5,500 – 11,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH47	12,272	0.28	6,000 – 12,000
Total:			198,290	5.0	117,000 – 234,000

BA/BE Table 27. Location of Stebbins' Phacelia Populations in the Vicinity of Hell Hole Reservoir (continued).**Area 3**

Includes those portions of special-status plant populations occurring from the maximum flood pool elevation (4,640 feet msl) to the upper limit of the study area

Species		Population Number ¹	Area ²		Number of Individuals ³
Scientific Name	Common Name		Square Feet	Acres	
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH08	60,155	1.38	30,000 – 60,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH10	157,092	3.61	78,500 – 157,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH15	36,009	0.83	18,000 – 36,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH19	16,370	0.38	8,000 – 16,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH21	9,693	0.22	5,000 – 10,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH22	53,958	1.24	27,000 – 54,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH23	19,372	0.44	9,500 – 19,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH24	133,628	3.07	67,000 – 134,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH25	9	0.00	5 – 9
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH26	58,783	1.35	29,500 – 59,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH27	86,712	1.99	43,500 – 87,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH28	81,216	1.86	40,500 – 81,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH29	104,403	2.40	52,000 – 104,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH30	157,382	3.61	78,500 – 157,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH31	184,850	4.24	92,500 – 185,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH32	64,727	1.49	32,500 – 65,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH33	45,630	1.05	23,000 – 46,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH34	206,916	4.75	103,500 – 207,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH35	135,118	3.10	67,500 – 135,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH36	3,388	0.08	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH38	37,041	0.85	18,500 – 37,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH40	25,917	0.59	13,000 – 26,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH41	169,159	3.88	84,500 – 169,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH42	13,468	0.31	6,500 – 13,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH43	6,470	0.15	3,000 – 6,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH44	7,269	0.17	3,500 – 7,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH45	25,295	0.58	12,500 – 25,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH46	12,157	0.28	6,000 – 12,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH47	67,556	1.55	34,000 – 68,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH51	5,672	0.13	2,800 – 5,600
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH52	8,848	0.20	4,500 – 9,000
Total:			1,994,262	45.78	997,000 – 1,994,000

BA/BE Table 27. Location of Stebbin's Phacelia Populations in the Vicinity of Hell Hole Reservoir (continued).**Area 4**

Includes those portions of the special-status plant populations intersecting Areas 1, 2, and/or 3 that extend beyond Area 3.

Species		Population Number ¹	Area ²		Number of Individuals ³
Scientific Name	Common Name		Square Feet	Acres	
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH10	135,286	3.1	67,500 – 135,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH15	8,569	0.2	4,500 – 9,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH21	37	0.00	18 – 37
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH22	191	0.00	95 – 191
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH24	74,379	1.71	37,000 – 74,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH23	84	0.00	42 – 84
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH26	826	0.02	413 – 826
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH27	460	0.01	230 – 460
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH28	79,429	1.82	40,000 – 80,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH29	318,235	7.31	159,000 – 318,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH41	707,499	16.24	354,000 – 707,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH40	74	0.00	37 – 74
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH30	185,394	4.26	92,500 – 185,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH31	52,078	1.20	26,000 – 52,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH32	5,108	0.12	2,500 – 5,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH33	1,895	0.04	1,000 – 2,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH35	299,696	6.88	150,000 – 300,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH34	188,789	4.33	94,000 – 188,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH38	119,396	2.74	59,500 – 119,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH44	82,039	1.88	41,000 – 82,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH45	3,432	0.08	1,500 – 3,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH47	5,409	0.12	2,500 – 5,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH51	1,676	0.04	1,000 – 2,000
<i>Phacelia stebbinsii</i>	Stebbins' phacelia	HH52	2,737	0.06	1,500 – 3,000
Total:			2,272,717	52.17	1,136,500 – 2,273,000

¹Refer to Maps 6d–e for the location of each population within the study area. Only those populations associated with Project facilities and features are included.

²Includes only the portion of the population that falls between the specified elevations.

³Numbers of individuals for polygons HH7 through HH52 were estimated assuming a density of 0.5 to 1.0 individuals per square foot. Numbers are rounded to the nearest thousand.

BA/BE Table 28a. Middle Fork American River below Middle Fork Interbay Water Temperature Profiles (July–August) and the Corresponding River Mile at which the Water Temperature Reaches 17°C and 20°C.

Modeled Temperature Profile	River Mile	
	17°C	20°C
Critical		
No-Action Alternative (12 cfs)	22.84	20.73
Dry		
No-Action Alternative (23 cfs or Natural Inflow) (Typically about 18 cfs)	22.07	NA ¹
Below Normal		
No-Action Alternative (23 cfs)	21.16	NA ¹

¹ Not applicable because the temperature doesn't reach 20°C.

BA/BE Table 28b. Rubicon River Water Temperature Profiles (July–August) and the Corresponding River Mile at which the Water Temperature Reaches 17°C and 20°C.

Modeled Temperature Profile	River Mile	
	17°C	20°C
Critical		
No-Action Alternative (10 cfs)	22.68	19.42
Dry		
No-Action Alternative (20 cfs)	21.33	16.25
Below Normal		
No-Action Alternative (20 cfs)	21.33	16.25

BA/BE Table 29. Species and Life Stage Periodicities.

Species	Month											
Life Stage	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Rainbow Trout												
Spawning												
Incubation												
Fry												
Juvenile												
Adult												
Brown Trout												
Spawning												
Incubation												
Fry												
Juvenile												
Adult												
Sacramento Pikeminnow												
Spawning												
Incubation												
Fry												
Juvenile												
Adult												
Hardhead												
Spawning												
Fry												
Juvenile												
Adult												
California Roach												
Spawning												
Incubation												
Fry												
Juvenile												
Adult												
Sacramento Sucker												
Spawning												
Incubation												
Fry												
Juvenile												
Adult												
Foothill Yellow-Legged Frog												
Breeding												
Incubation												
Tadpoles												
Juvenile												
Adult												

**Biologically sensitive time periods, based on AQ 2 - TSR (PCWA 2011z; SD B) surveys, are denoted with hatch marks.

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features.

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Dams, Reservoirs, and Diversion Pools									
Large Dams									
French Meadows Dam and Outlet Works (modified)									
Hell Hole Dam and Outlet Works (modified)									
Medium Dams									
Middle Fork Interbay Dam and Outlet Works (modified)									
Ralston Afterbay Dam and Outlet Works									
Small Dams									
Duncan Creek Diversion Dam (modified)							X	X	
North Fork Long Canyon Diversion Dam (modified)									
South Fork Long Canyon Diversion Dam (modified)						X		X	
Large Reservoirs									
French Meadows Reservoir			X						
Hell Hole Reservoir	X	X	X						
Medium Reservoirs									
Middle Fork Interbay									
Ralston Afterbay									
Small Diversion Pools									
Duncan Creek Diversion Pool (modified)								X	
North Fork Long Canyon Diversion Pool (modified)									
South Fork Long Canyon Diversion Pool (modified)						X		X	

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Water Conveyance Systems									
Tunnels									
Duncan Creek - Middle Fork Tunnel									
French Meadows - Hell Hole Tunnel									
Hell Hole - Middle Fork Tunnel									
Middle Fork - Ralston Tunnel									
Ralston – Oxbow Tunnel									
Diversion Pipes and Drop Inlets									
North Fork Long Canyon Diversion Pipe and Drop Inlet						X			
South Fork Long Canyon Diversion Pipe and Drop Inlet						X		X	
Surge Shafts and Adits									
Brushy Canyon Adit						X		X	
Hell Hole - Middle Fork Tunnel Surge Shaft and Tank						X			
Middle Fork - Ralston Tunnel Surge Shaft and Tank									
Removable Sections and Portals									
Duncan Creek - Middle Fork Tunnel Portal			X						
French Meadows - Hell Hole Tunnel Removable Section									
Hell Hole - Middle Fork Tunnel Removable Section									
Middle Fork - Ralston Tunnel Removable Section									
North Fork Long Canyon Crossing Removable Section									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Water Conveyance Systems (continued)									
Intakes and Gatehouses									
Duncan Creek - Middle Fork Tunnel Intake							X	X	
French Meadows - Hell Hole Tunnel Gatehouse			X						
French Meadows - Hell Hole Tunnel Intake									
Hell Hole - Middle Fork Tunnel Gatehouse									X
Hell Hole - Middle Fork Tunnel Intake									
Middle Fork - Ralston Tunnel Intake and Gatehouse									
Ralston - Oxbow Tunnel Intake									
Penstocks and Valve Houses									
French Meadows Powerhouse Penstock and Butterfly Valve House									
Middle Fork Powerhouse Penstock and Butterfly Valve House									
Ralston Powerhouse Penstock and Butterfly Valve House									
Powerhouses, Switchyards, and Substations									
French Meadows Powerhouse and Switchyard									
Hell Hole Powerhouse									
Hell Hole Substation									
Middle Fork Powerhouse and Upper and Lower Switchyards									
Ralston Powerhouse and Switchyard									
Oxbow Powerhouse and Switchyard									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Gaging Stations and Weirs									
Stream Gages and Weirs									
Duncan Creek near French Meadows (USGS Gage No. 11427700) (interim) ⁷							X	X	
Duncan Creek below Diversion Dam (USGS Gage No. 11427750)							X		
Middle Fork American River at French Meadows (USGS Gage No. 11427500)									
Middle Fork American River at French Meadows Dam (new) ⁸									
Rubicon River at Hell Hole Dam Spillway (HHDS) (new) ^{8, 2}									
Rubicon River below Hell Hole Dam (USGS Gage No. 11428800) (interim) ⁷									
Rubicon River at Hell Hole Dam (new) ⁸									
North Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433085) (interim) ⁷									
North Fork Long Canyon Creek below Diversion Dam (NFLCC) (new) ⁸									
South Fork Long Canyon Creek below Diversion Dam (USGS Gage No. 11433065) (interim) ⁷						X		X	
South Fork Long Canyon Creek below Diversion Dam (SFLCC) (new) ⁸						X	X	X	
Middle Fork American River below Interbay Dam (USGS Gage No. 11427770) (interim) ⁷									
Middle Fork American River above Middle Fork Powerhouse (USGS Gage No. 11427760)									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Gaging Stations and Weirs (continued)									
Stream Gages and Weirs (continued)									
Middle Fork American River below Interbay Dam (MFARIB) (new) ⁸									
Middle Fork American River near Foresthill (USGS Gage No. 11433300)									
Middle Fork American River at Ralston Afterbay Dam (new) ⁸									
Rubicon River above Ralston Powerhouse (RRRP) (existing, added to MFP) ⁹									
North Fork American River above American River Pump Station (NFARPS) (new) ⁸									
Rubicon River above Ellicott Bridge (RREB) (existing, added to MFP) ⁹									
Diversion Gages									
Duncan Creek Diversion Tunnel (DCDT) (new) ⁸							X	X	
North Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433080) (modified)									
South Fork Long Canyon Creek Diversion Tunnel (USGS Gage No. 11433060) (modified)						X		X	
Reservoir Gages									
French Meadows Reservoir (USGS Gage No. 11427400)									
French Meadows Reservoir Staff Gage									
Hell Hole Reservoir (USGS Gage No. 11428700)									
Hell Hole Reservoir Staff Gage									
Middle Fork Interbay Reservoir									
Ralston Afterbay Reservoir									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Gaging Stations and Weirs (continued)									
Powerhouse Gages									
French Meadows Powerhouse (USGS Gage No. 11427200)									
Middle Fork Powerhouse (USGS Gage No. 11428600)									
Ralston Powerhouse (USGS Gage No. 11427765)									
Oxbow Powerhouse (USGS Gage No. 11433212)									
Oxbow Powerhouse Penstock (OXBPP) (new) ⁸									
Leakage Weirs									
French Meadows Dam Leakage Weirs Nos. 1–6									
Hell Hole Dam Leakage Weir									
Project Communication Lines and Powerlines									
French Meadows Area									
French Meadows Dam Generator Building to French Meadows Dam Outlet Works Powerline									
French Meadows Dam Generator Building to French Meadows Dam Spillway Gates Powerline									
Hell Hole Area									
French Meadows Powerhouse to French Meadows Powerhouse Penstock and Butterfly Valve House Communication Line/Powerline									
French Meadows Powerhouse and Switchyard to Hell Hole - Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator's Cottages, and Hell Hole Powerhouse Communication Line/Powerline									X
Dormitory and Cottages Water Supply Tank Powerline									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Project Communication Lines and Powerlines (continued)									
Hell Hole Area (continued)									
Hell Hole Powerhouse to Rubicon River Gage below Hell Hole Dam Communication Line/Powerline									
Hell Hole Dam Spillway Crest Gates Control Building Communication Line/Powerline (new) ⁸									
Middle Fork Interbay Area									
Middle Fork Powerhouse to Middle Fork Powerhouse Butterfly Valve House Communication Line/Powerline									
Middle Fork Powerhouse Butterfly Valve House to Radio Repeater near Hell Hole - Middle Fork Tunnel Surge Tank (underground) Communication Line/Powerline						X			
Middle Fork Powerhouse to Middle Fork - Ralston Tunnel Intake and Gatehouse Communication Line/Powerline									
Middle Fork Powerhouse to Middle Fork American River Gage above Middle Fork Powerhouse Communication Line/Powerline							X		
Ralston – Oxbow Area									
Ralston - Oxbow Tunnel Intake to Ralston Powerhouse Communication Line									
Ralston Powerhouse to Ralston Powerhouse Butterfly Valve House Communication Line/Powerline									
Ralston Afterbay Dam Generator Building to Ralston - Oxbow Tunnel Intake Communication Line/Powerline									
Oxbow Powerhouse to Ralston Afterbay Dam Generator Building Communication Line/Powerline									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Photovoltaic Poles and Powerlines									
Photovoltaic Poles and Powerline at Duncan Creek Gage near French Meadows							X	X	
Photovoltaic Pole and Powerline at Duncan Creek Gage below Diversion Dam							X		
Photovoltaic Pole and Powerline at Duncan Creek Gage at Diversion Tunnel (new) ⁸							X	X	
Photovoltaic Pole and Powerline at Middle Fork American River Gage at French Meadows									
Photovoltaic Pole and Powerline at Middle Fork American River Gage above Middle Fork Powerhouse									
Photovoltaic Pole and Powerline at Middle Fork American River Gage below Interbay Dam (new) ⁸									
Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam									
Photovoltaic Pole and Powerline at North Fork Long Canyon Creek Gage below Diversion Dam (new) ⁸									
Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam						X		X	
Photovoltaic Pole and Powerline at South Fork Long Canyon Creek Gage below Diversion Dam (new) ⁸						X	X	X	
Photovoltaic Pole and Powerline at Rubicon River Gage above Ralston Powerhouse (existing, added to MFP) ¹⁰									
Photovoltaic Pole and Powerline at Middle Fork American River Gage near Foresthill									
Photovoltaic Pole and Powerline at North Fork American River Gage above American River Pump Station (new) ⁸									
Photovoltaic Pole and Powerline at Rubicon River Gage above Ellicott Bridge (existing, added to MFP) ¹⁰									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Microwave Reflectors and Radio Towers									
Passive Microwave Reflector Station above Middle Fork Interbay									
Radio Communications Tower near French Meadows - Hell Hole Tunnel Gatehouse			X						
Radio Communications Tower and Repeater near Hell Hole - Middle Fork Tunnel Surge Shaft and Tank						X			
Passive Microwave Reflector Station above Ralston Afterbay									
Disposal Areas									
Duncan Diversion Dam Sediment Disposal Area							X	X	
North Fork Long Canyon Crossing Sediment Disposal Area						X			
Middle Fork Interbay Sediment Disposal Area									
Ralston Ridge Sediment Disposal Area									
Sediment Augmentation Areas									
Middle Fork Interbay Augmentation Areas (new)									
Junction Bar Augmentation Area (new)									
Indian Bar Augmentation Area (existing, added to MFP) ¹⁰									
Ancillary Facilities									
French Meadows Dam Generator Building									
French Meadows Dam Staging Area									
Dormitory Facility									
Dormitory and Cottages Water Supply Tank									
Hell Hole Staging Areas									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Ancillary Facilities (continued)									
Operator Cottages and Shop									
Hell Hole Dam Spillway Crest Gates Control Building (new) ⁸									
Ralston Afterbay Dam Generator Building									
Storage Building at Middle Fork - Ralston Tunnel Surge Shaft and Tank									
Ralston Afterbay Sediment Removal Access Point (converted) ¹¹									
Project Fences									
Slope Fences									
French Meadows Powerhouse Penstock Rock Fence									
French Meadows Powerhouse Slope Fence									
Long Canyon Crossing Slope Fence									
Middle Fork Powerhouse Upper Switchyard Slope Fence									
Middle Fork Interbay Dam Slope Fence									
Ralston Powerhouse Penstock and Butterfly Valve House Slope Fences									
Ralston Powerhouse Slope Fence									
Oxbow Powerhouse Slope Fence									
Public Safety Fences									
Dormitory Facility Barrier Fence									
Hell Hole Dam General Parking Area Barrier Fence									
North Fork Long Canyon Crossing Removable Section Barrier Fence									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Project Roads									
Duncan Creek Area									
Duncan Creek Diversion Intake Road							X	X	
Duncan Creek Diversion Dam Road							X	X	
Duncan Creek Diversion Pool Road							X	X	
French Meadows Area									
Duncan Creek - Middle Fork Tunnel Portal Road			X						
French Meadows - Hell Hole Tunnel Gatehouse Road			X				X		
French Meadows Dam Outlet Works and South Leakage Weir Road									
French Meadows Dam Staging Area and Spillway West Access Road									
French Meadows Spillway East Access Road									
French Meadows Dam North Leakage Weir Road									
French Meadows Campground Water Supply Facility Access Road							X		X
Hell Hole Area									
Hell Hole Dam and Powerhouse Road									
Rubicon River Gage below Hell Hole Dam Road									
Hell Hole Dam Leakage Weir Road									
Hell Hole Dam Spillway Northern Access Point Road									
French Meadows - Hell Hole Tunnel Portal Road									X
French Meadows Powerhouse Road			X						X
Hell Hole - Middle Fork Tunnel Gatehouse Road									X
Dormitory Facility Road									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Project Roads (continued)									
Hell Hole Area (continued)									
Operator Cottages and Shop Road									
Spur on North Side of Operator Cottages									
Spur on South Side of Operator Cottages									
Hell Hole Dam Spillway Discharge Channel Road Spur to Communication Line/Powerline									
Hell Hole Dam Spillway Discharge Channel Road									
Big Meadows Campground Water Supply Facility Access Road						X			X
Hell Hole Dam Spillway Gates Road (new) ⁸									
Long Canyon Area									
North Fork Long Canyon Diversion North Road									
North Fork Long Canyon Diversion South Road									
North Fork Long Canyon Diversion Drop Inlet Road									
South Fork Long Canyon Diversion and Drop Inlet Road						X	X	X	
South Fork Long Canyon Diversion and Drop Inlet Cutoff Road						X	X	X	
South Fork Long Canyon Diversion Drop Inlet Access Road						X	X	X	
North Fork Long Canyon Crossing Removable Section North Road									
North Fork Long Canyon Crossing Removable Section South Road									
Middle Meadows Group Campground Water Supply Facility Access Road						X	X	X	

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Project Roads (continued)									
Middle Fork Interbay Area									
Middle Fork Interbay Dam Road				X			X		
Middle Fork Interbay Dam to Powerhouse Road									
Middle Fork Powerhouse Butterfly Valve House Road									X
Middle Fork Powerhouse Penstock and Butterfly Valve House Road							X		
Middle Fork Powerhouse Upper Switchyard Road									
Ralston-Oxbow Area									
Brushy Canyon Adit Road						X			
Ralston Powerhouse Butterfly Valve House Road									
Ralston Afterbay Dam and Access Road									
Indian Bar Access Road									
Oxbow Powerhouse Road									
Ralston - Oxbow Tunnel Intake Road									
Ralston Afterbay Private Boat Ramp Road									
Ralston Afterbay Dam and Access Point Road									
Ralston Afterbay Sediment Removal Access Point (converted) ¹¹									
Project Trails									
Duncan Creek Area									
Duncan Creek Diversion Dam North Trail							X	X	
Duncan Creek Diversion Dam South Trail								X	
Photovoltaic Poles and Powerline to Duncan Creek Gage near French Meadows Trail							X	X	

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Project Trails (continued)									
Duncan Creek Area (continued)									
Duncan Creek Gage near French Meadows Trail							X	X	
Duncan Creek Gage below Diversion Dam Trail							X		
Long Canyon Area									
North Fork Long Canyon Creek Gage below Diversion Dam Trail (new) ⁸									
South Fork Long Canyon Creek Gage below Diversion Dam Trail (new) ⁸						X	X	X	
Middle Fork Interbay Area									
Middle Fork American River Gage above Middle Fork Powerhouse Trail							X		
Passive Microwave Reflector Station above Middle Fork Interbay Trail									
Middle Fork American River Gage below Interbay Dam Trail (new) ⁸									
Ralston Afterbay Area									
Passive Microwave Reflector Station above Ralston Afterbay Trail									
Rubicon River Gage above Ralston Powerhouse Trail (existing, added to MFP) ⁹									
North Fork American River Gage above American River Pump Station Trail (new) ⁸									
Project Recreation Facilities and Features									
Duncan Creek Area									
Duncan Creek Diversion Primitive Recreation Site (new)							X	X	
French Meadows Area									
Ahart Campground (enhanced)									X
Coyote Group Campground									X
Poppy Campground (reduced)						X	X		X
French Meadows Campground									X

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Project Recreation Facilities and Features (continued)									
French Meadows Area (continued)									
Gates Group Campground									X
Lewis Campground								X	X
French Meadows Picnic Area									
French Meadows Boat Ramp (enhanced)									
French Meadows Dump Station						X			X
McGuire Picnic Area and Beach (converted) ¹²									
McGuire Group Campground (new)									X
McGuire Boat Ramp and Associated Parking (modified)									X
Hell Hole Area									
Big Meadows Campground						X			X
Hell Hole Campground (reduced)									X
Upper Hell Hole Campground (removed)									
Hell Hole Vista									X
Hell Hole Boat Ramp (enhanced)									
Hell Hole General Parking Area and Hell Hole Boat Ramp Parking Area									
Ralston Afterbay Area									
Ralston Picnic Area (reduced)									
Ralston Picnic Area Cartop Boat Ramp									
Ralston Afterbay Sediment Removal Access Point Boat Ramp (new) ¹³									
Indian Bar Rafting Access and General Parking (enhanced)									

BA/BE Table 30. Raptor Nests and Roosts and USDA-FS Land Allocations and Important Habitat in Relation to Project Facilities and Features and Recreation Facilities and Features (continued).

Project Facilities and Features	Raptor Nests and Roosts					USDA-FS Land Allocations and Important Habitats			
	Bald Eagle Nest ¹	Bald Eagle Night Roost ¹	Osprey Nest ²	CSO Nest ³	NOGO Nest ³	CSO PAC ⁴	CSO HRCA ⁵	NOGO PAC ⁴	Important Mule Deer Habitat ⁶
Project Recreation Facilities and Features (continued)									
Long Canyon Area									
Middle Meadows Group Campground						X	X	X	
Project Recreation Facility Water Supplies									
Dolly Creek Water Supply						X		X	X
French Meadows Campground Water Supply							X		X
Big Meadows Campground Water Supply						X			X
Middle Meadows Group Campground Water Supply						X	X	X	

¹Within ¼ mile of bald eagle nests or night roosts.²Within 500 feet of osprey nests.³Within 500 feet of a California spotted owl or northern goshawk nest.⁴Within an established California spotted owl or northern goshawk protected activity center (PAC).⁵Within an established California spotted owl home range core area (HRCA).⁶Within a mule deer important habitat (fawning area, holding areas, and winter and summer critical ranges).⁷Existing gage to remain in place until infrastructure modification is complete.⁸This facility or feature will be constructed under the Proposed Action.⁹Existing gage or trail now required for Project operation or maintenance.¹⁰Existing facility that has been added to the Project.¹¹Converted to Ralston Afterbay Sediment Removal Access Point Boat Ramp.¹²This facility will be converted to the McGuire Group Campground.¹³This facility replaces the Ralston Afterbay Sediment Removal Access Point.

BA/BE Table 31. Comparison of the Frequency and Duration of Inundation of Hell Hole Reservoir Areas 2a and 2b at Various Reservoir Elevation Levels.**Inundation Frequency and Duration of Area 2a¹.**

Alternatives	Water Year Type	Number of Years	Minimum Number of Day	Maximum Number of Day	Average Number of Days
Proposed Action Existing Demand	Wet (n=10)	7	16	80	46
	Above Normal (n=6)	3	28	39	33
	Below Normal (n=6)	4	10	19	15
	Dry (n=5)	0	0	0	0
	Critical ³ (n=6)	0	0	0	0
Proposed Action Future Demand	Wet (n=10)	7	16	80	46
	Above Normal (n=6)	2	33	39	36
	Below Normal (n=6)	3	10	19	16
	Dry (n=5)	0	0	0	0
	Critical ³ (n=6)	0	0	0	0
No-Action Alternative Existing License Conditions	Wet (n=10)	7	27	72	43
	Above Normal (n=6)	3	5	27	14
	Below Normal (n=6)	1	7	7	7
	Dry (n=5)	0	0	0	0
	Critical ³ (n=6)	0	0	0	0

Inundation Frequency and Duration of Area 2b².

Alternatives	Water Year Type	Number of Years	Minimum Number of Day	Maximum Number of Day	Average Number of Days
Proposed Action Existing Demand	Wet (n=10)	6	1	40	22
	Above Normal (n=6)	1	15	15	15
	Below Normal (n=6)	0	0	0	0
	Dry (n=5)	0	0	0	0
	Critical ³ (n=6)	0	0	0	0
Proposed Action Future Demand	Wet (n=10)	6	1	40	21
	Above Normal (n=6)	1	15	15	15
	Below Normal (n=6)	0	0	0	0
	Dry (n=5)	0	0	0	0
	Critical ³ (n=6)	0	0	0	0
No-Action Alternative Existing License Conditions	Wet (n=10)	0	0	0	0
	Above Normal (n=6)	0	0	0	0
	Below Normal (n=6)	0	0	0	0
	Dry (n=5)	0	0	0	0
	Critical ³ (n=6)	0	0	0	0

¹Area 2a: 4,630-4,636 ft msl.²Area 2b: 4,636-4,640 ft msl.³Includes 1977 extreme critical year.

BA/BE Table 32. Number of Days, Years and Average Number of Days May Pulse Flows Occur by Water Year Type under the Proposed Action and No-Action Alternative.

Site / Release Location	Pulse Flow Threshold (cfs)	WYT	Proposed Action				No Action			
			Total Number of Days	Average Number of Days ¹	Average Number of Days in Event Years ²	Number of Years ³	Total Number of Days	Average Number of Days ¹	Average Number of Days in Event Years ²	Number of Years ³
Small Streams										
Duncan Creek	149	Wet	54	5	8	7 / 10	29	3	6	5 / 10
		Abv Normal	24	4	5	5 / 6	12	2	6	2 / 6
		Blw Normal	0	0	0	0 / 6	0	0	0	0 / 6
		Dry	0	0	0	0 / 5	0	0	0	0 / 5
		Critical	0	0	0	0 / 6	0	0	0	0 / 6
		Total	78	---	---	12/33	41	---	---	7/33
North Fork Long Canyon	29	Wet	57	6	11	6 / 10	89	9	18	5 / 10
		Abv Normal	25	4	4	6 / 6	0	0	0	0 / 6
		Blw Normal	0	0	0	0 / 6	0	0	0	0 / 6
		Dry	0	0	0	0 / 5	0	0	0	0 / 5
		Critical	0	0	0	0 / 6	0	0	0	0 / 6
		Total	82	---	---	12/33	89	---	---	5/33
South Fork Long Canyon	40	Wet	74	7	9	8 / 10	107	11	21	5 / 10
		Abv Normal	30	5	5	6 / 6	0	0	0	0 / 6
		Blw Normal	0	0	0	0 / 6	0	0	0	0 / 6
		Dry	0	0	0	0 / 5	0	0	0	0 / 5
		Critical	0	0	0	0 / 6	0	0	0	0 / 6
		Total	104	---	---	12/33	107	---	---	5/33
Middle Fork American River										
Middle Fork American River below French Meadows	343	Wet	90	9	9	10 / 10	47	5	9	5 / 10
		Abv Normal	24	4	4	6 / 6	22	4	11	2 / 6
		Blw Normal	3	1	2	2 / 6	0	0	0	0 / 6
		Dry	0	0	0	0 / 5	0	0	0	0 / 5
		Critical	0	0	0	0 / 6	0	0	0	0 / 6
		Total	117	---	---	18/33	69	---	---	7/33
Middle Fork American River below Middle Fork Interbay	450	Wet	146	15	14	10 / 10	81	8	14	6 / 10
		Abv Normal	28	5	5	6 / 6	7	1	7	1 / 6
		Blw Normal	1	0	1	1 / 6	0	0	0	0 / 6
		Dry	0	0	0	0 / 5	0	0	0	0 / 5
		Critical	0	0	0	0 / 6	0	0	0	0 / 6
		Total	175	---	---	17/33	88	---	---	7/33
Rubicon River below Hell Hole Dam										
Rubicon River below Hell Hole Dam	200	Wet	65	31	22	10 / 10	59	6	20	3 / 10
		Abv Normal	6	19	6	6 / 6	6	2	6	1 / 6
		Blw Normal	0	0	0	0 / 6	0	0	0	0 / 6
		Dry	0	0	0	0 / 5	0	0	0	0 / 5
		Critical	0	0	0	0 / 6	0	0	0	0 / 6
		Total	71	---	---	16/33	65	---	---	7/33

¹Total number of pulse flow days / number of years in water year type.

²Number of pulse flow events / number of years that pulse flows occurred in water year type.

³Number of years pulse flows occurred / number of years in water year type.

BA/BE Table 33a. Middle Fork American River below Middle Fork Interbay Water Temperature Profiles (July–August) and the Corresponding River Mile at which the Water Temperature Reaches 17°C and 20°C.

Modeled Temperature Profile	17°C		20°C	
	River Mile	% Difference (mi)	River Mile	% Difference (mi)
Critical				
No-Action Alternative (12 cfs)	22.84	-	20.73	-
Proposed Action (12 cfs)	22.84	0% (0.0)	20.73	0% (0.0)
Dry				
No-Action Alternative (23 cfs or Natural Inflow) (Typically about 18 cfs)	22.07	-	NA ¹	-
Proposed Action (18 cfs)	22.07	0% (0.0)	18.92	-
Below Normal				
No-Action Alternative (23 cfs)	21.16	-	NA ¹	-
Proposed Action (24 cfs)	21.06	0.5% (0.1)	NA ¹	-

¹Not applicable because the temperature doesn't reach 20°C.

BA/BE Table 33b. Rubicon River Water Temperature Profiles (July–August) and the Corresponding River Mile at which the Water Temperature Reaches 17°C and 20°C.

Modeled Temperature Profile	17°C		20°C	
	River Mile	% Difference (mi)	River Mile	% Difference (mi)
Critical				
No-Action Alternative (10 cfs)	22.68	-	19.42	-
Proposed Action (15 cfs)	21.66	4.5% (1.02)	17.52	9.8% (1.9)
Dry				
No-Action Alternative (20 cfs)	21.33	-	16.25	-
Proposed Action (20 cfs)	21.28	0.2% (0.05)	14.89	8.4% (1.36)
Below Normal				
No-Action Alternative (20 cfs)	21.33	-	16.25	-
Proposed Action (20 cfs)	21.33	0% (0.0)	13.67	15.9% (2.58)

BA/BE Table 34. Small Streams Wetted Perimeter Time Series Summary Comparing the 50% Exceedance Wetted Perimeter of the Proposed Action to the Existing License Condition and No-Action Wetted Perimeter.

Instream Flow Study Reaches / Sites	Top / Bottom Reach by Site	Water Year Type	Proposed Action 50% Habitat Exceedance					
			Summer/Fall Wetted Perimeter		Winter Wetted Perimeter		Spring Wetted Perimeter	
			% of ELC	% of No Action	% of ELC	% of No Action	% of ELC	% of No Action
Duncan Creek								
Duncan Creek below Diversion	D6.3 Top	All Years	100%	101%	97%	98%	113%	109%
		Wet	100%	101%	100%	95%	120%	112%
		Ab Norm	100%	100%	90%	90%	120%	110%
		Bl Norm	100%	101%	100%	100%	114%	110%
		Dry	100%	100%	100%	100%	108%	106%
	D6.3 Bottom	Critical	100%	100%	100%	101%	107%	109%
		All Years	100%	100%	100%	99%	104%	103%
		Wet	100%	100%	100%	99%	105%	103%
		Ab Norm	100%	100%	100%	99%	104%	101%
		Bl Norm	100%	100%	100%	99%	103%	102%
		Dry	100%	100%	100%	101%	103%	102%
		Critical	100%	101%	100%	100%	103%	104%
North Fork Long Canyon Creek								
North Fork Long Canyon Creek below Diversion	NFLC1.9	All Years	100%	100%	100%	102%	119%	118%
		Wet	100%	100%	100%	93%	127%	117%
		Ab Norm	100%	100%	100%	98%	127%	126%
		Bl Norm	100%	100%	100%	102%	125%	125%
		Dry	100%	100%	100%	100%	116%	116%
Critical	100%	100%	100%	100%	103%	110%		
South Fork Long Canyon Creek								
South Fork Long Canyon Creek below Diversion	SFLC2.3	All Years	100%	100%	99%	101%	111%	111%
		Wet	100%	100%	100%	99%	113%	113%
		Ab Norm	100%	100%	95%	93%	113%	113%
		Bl Norm	100%	100%	100%	102%	111%	113%
		Dry	100%	100%	100%	100%	106%	107%
Critical	100%	100%	100%	100%	102%	104%		
Long Canyon Creek								
Long Canyon Creek below North and South Fork Long Canyon Creek	LC9.0 Top	All Years	100%	100%	100%	99%	110%	109%
		Wet	100%	100%	100%	96%	106%	101%
		Ab Norm	100%	100%	100%	96%	106%	105%
		Bl Norm	100%	100%	100%	100%	110%	110%
		Dry	100%	100%	100%	100%	110%	110%
	LC9.0 Bottom	Critical	100%	100%	100%	100%	108%	108%
		All Years	100%	100%	100%	99%	102%	102%
		Wet	100%	100%	100%	99%	102%	101%
		Ab Norm	100%	100%	100%	98%	102%	102%
		Bl Norm	100%	100%	100%	100%	102%	102%
		Dry	100%	100%	100%	99%	103%	103%
		Critical	100%	100%	100%	100%	103%	104%

Values greater than 5%.

Values less than 5%.

BA/BE Table 35. Middle Fork American River Peaking Reach Percent Change in Wetted Bed Area Based on the Existing License Condition Minimum Flows versus Proposed Action Minimum Flows.

Instream Flow Study Reaches / Sites	Water Year Type	Proposed Action			
		Summer Wetted Perimeter	Outage Wetted Perimeter	Winter Wetted Perimeter	Spring Wetted Perimeter
		% of No Action and ELC	% of No Action and ELC	% of No Action and ELC	% of No Action and ELC
Middle Fork American River					
Middle Fork American River below Ralston Afterbay	All Years	108%	103%	104%	112%
	Wet	113%	106%	108%	118%
	Ab Norm	111%	106%	106%	116%
	Bl Norm	108%	104%	104%	113%
	Dry	106%	100%	102%	109%
	Critical	103%	100%	100%	104%
Values greater than 5.					
Values less than 5%.					

BA/BE Table 36. Small Streams Habitat Summary Table Comparing the 50% Habitat Exceedance of the Proposed Action Habitat to the Existing License Conditions and No-Action Alternative Habitat Values.

Instream Flow Study Reaches / Sites	Top / Bottom Reach by Site	Biological Reach Management Species	Water Year Type	Proposed Action 50% Exceedance							
				Rainbow Trout Spawning		Rainbow Trout Spawning Depth Sensitivity		Rainbow Trout Adult		Rainbow Trout Juvenile	
				% of ELC	% of No Action	% of ELC	% of No Action	% of ELC	% of No Action	% of ELC	% of No Action
Duncan Creek											
Duncan Creek below Diversion	D6.3 Top	Rainbow Trout	All Years	136%	118%	156%	125%	100%	100%	100%	100%
			Wet	142%	117%	187%	142%	100%	103%	100%	102%
			Ab Norm	144%	110%	187%	129%	100%	100%	100%	100%
			Bl Norm	144%	119%	161%	128%	100%	100%	100%	100%
			Dry	130%	114%	139%	119%	100%	100%	100%	100%
			Critical	126%	130%	132%	136%	100%	102%	100%	101%
	D6.3 Bottom	Rainbow Trout	All Years	95%	99%	102%	101%	100%	101%	100%	100%
			Wet	93%	96%	105%	103%	100%	101%	100%	101%
			Ab Norm	92%	96%	104%	102%	100%	100%	100%	100%
			Bl Norm	96%	98%	102%	101%	100%	100%	100%	100%
			Dry	98%	100%	102%	102%	100%	100%	100%	100%
			Critical	102%	103%	106%	107%	100%	100%	100%	100%
North Fork Long Canyon Creek											
North Fork Long Canyon Creek below Diversion	NFLC1.9	Rainbow Trout	All Years	232%	212%	236%	216%	100%	100%	100%	100%
			Wet	287%	128%	297%	130%	100%	100%	100%	100%
			Ab Norm	287%	248%	297%	256%	100%	100%	100%	100%
			Bl Norm	271%	264%	278%	271%	100%	100%	100%	100%
			Dry	202%	190%	205%	193%	100%	100%	100%	100%
			Critical	120%	133%	120%	133%	100%	100%	100%	100%
South Fork Long Canyon Creek											
South Fork Long Canyon Creek below Diversion	SFLC2.3	Rainbow Trout	All Years	159%	159%	161%	161%	100%	100%	100%	100%
			Wet	169%	152%	172%	149%	100%	100%	100%	100%
			Ab Norm	169%	164%	172%	167%	100%	100%	100%	100%
			Bl Norm	159%	167%	161%	170%	100%	100%	100%	100%
			Dry	135%	135%	136%	136%	100%	100%	100%	100%
			Critical	111%	127%	111%	128%	100%	100%	100%	100%
Long Canyon Creek											
Long Canyon Creek below North and South Fork Long Canyon Creek	LC9.0 Top	Rainbow Trout	All Years	106%	108%	109%	110%	100%	100%	100%	100%
			Wet	103%	109%	105%	108%	100%	100%	100%	100%
			Ab Norm	103%	102%	106%	104%	100%	100%	100%	100%
			Bl Norm	108%	107%	112%	110%	100%	100%	100%	100%
			Dry	107%	107%	110%	109%	100%	100%	100%	100%
			Critical	111%	115%	112%	116%	100%	100%	100%	100%
	LC9.0 Bottom	Rainbow Trout	All Years	94%	96%	100%	100%	100%	100%	100%	100%
			Wet	96%	102%	96%	102%	100%	100%	100%	100%
			Ab Norm	96%	97%	96%	97%	100%	100%	100%	100%
			Bl Norm	92%	93%	101%	101%	100%	100%	100%	100%
			Dry	100%	101%	102%	102%	100%	100%	100%	100%
			Critical	104%	104%	106%	106%	100%	100%	100%	100%

Values greater than 5%

Values less than 5%

Values greater than 5% in reaches where rainbow trout are not the primary target species

Values less than 5% in reaches where rainbow trout are not the primary target species

BA/BE Table 37. Rubicon River Habitat Summary Table Comparing the 50% Habitat Exceedance of the Proposed Action Habitat to the Existing License Conditions and No-Action Habitat Values.

Instream Flow Study Reaches / Sites	Top / Bottom Reach by Site	Biological Reach Management Species	Water Year Type	Proposed Action 50% Exceedance											
				Rainbow Trout Spawning		Rainbow Trout Spawning Depth Sensitivity		Rainbow Trout Adult		Rainbow Trout Juvenile		Hardhead Juvenile		Hardhead Adult	
				% of ELC	% of No Action	% of ELC	% of No Action	% of ELC	% of No Action	% of ELC	% of No Action	% of ELC	% of No Action	% of ELC	% of No Action
Rubicon River															
Rubicon River below Hell Hole Reservoir	R25.7 Top	Rainbow Trout	All Years	212%	177%	259%	204%	115%	115%	105%	105%	NA	NA		
			Wet	251%	163%	307%	181%	128%	124%	108%	107%				
			Ab Norm	251%	222%	307%	254%	128%	128%	108%	108%				
			Bl Norm	230%	216%	259%	242%	100%	100%	100%	100%				
			Dry	212%	161%	233%	174%	100%	100%	100%	100%				
			Critical	212%	187%	233%	205%	157%	100%	122%	100%				
	R25.7 Bottom	Rainbow Trout	All Years	128%	121%	150%	141%	116%	114%	105%	104%	NA	NA		
			Wet	107%	98%	123%	116%	124%	122%	106%	106%				
			Ab Norm	112%	109%	143%	138%	124%	122%	106%	106%				
			Bl Norm	133%	127%	149%	141%	100%	98%	100%	99%				
			Dry	143%	131%	156%	141%	100%	98%	100%	100%				
			Critical	156%	145%	169%	157%	151%	101%	119%	100%				
Rubicon River Near Ellicott Bridge	R20.9 Top	Rainbow Trout	All Years	103%	102%	113%	112%	108%	106%	101%	101%	99%	100%	103%	102%
			Wet	90%	90%	105%	105%	109%	107%	102%	101%	99%	99%	103%	103%
			Ab Norm	88%	88%	108%	108%	109%	108%	102%	102%	99%	99%	103%	103%
			Bl Norm	103%	102%	111%	110%	101%	99%	100%	100%	100%	100%	100%	100%
			Dry	106%	104%	120%	115%	100%	99%	100%	100%	100%	100%	100%	99%
			Critical	115%	115%	129%	128%	104%	102%	101%	101%	101%	100%	102%	101%
	R20.9 Bottom	Hardhead	All Years	88%	88%	102%	102%	105%	104%	101%	101%	100%	100%	102%	101%
			Wet	81%	75%	102%	103%	104%	103%	101%	101%	100%	100%	102%	101%
			Ab Norm	81%	82%	101%	101%	105%	104%	101%	101%	100%	100%	101%	101%
			Bl Norm	94%	95%	102%	102%	101%	98%	100%	100%	100%	100%	100%	99%
			Dry	99%	99%	104%	104%	100%	99%	100%	100%	100%	100%	100%	99%
			Critical	102%	102%	113%	112%	102%	100%	101%	100%	100%	100%	101%	100%
Rubicon River Near Ralston Afterbay	R3.5 Top	Hardhead	All Years	76%	76%	101%	101%	105%	104%	100%	100%	100%	100%	103%	102%
			Wet	85%	89%	97%	98%	104%	103%	101%	101%	99%	100%	102%	102%
			Ab Norm	73%	76%	96%	96%	104%	104%	101%	101%	99%	99%	102%	102%
			Bl Norm	82%	82%	101%	101%	101%	96%	100%	99%	100%	100%	100%	98%
			Dry	90%	91%	102%	102%	100%	99%	100%	100%	100%	100%	100%	100%
			Critical	93%	94%	105%	105%	102%	97%	101%	99%	100%	100%	101%	99%
	R3.5 Bottom	Hardhead	All Years	77%	76%	101%	101%	105%	103%	100%	100%	100%	100%	103%	102%
			Wet	85%	88%	97%	98%	104%	103%	101%	101%	99%	100%	102%	102%
			Ab Norm	75%	77%	96%	96%	104%	104%	101%	101%	99%	99%	102%	102%
			Bl Norm	82%	82%	101%	101%	101%	96%	100%	99%	100%	100%	100%	98%
			Dry	89%	90%	102%	101%	100%	99%	100%	100%	100%	100%	100%	100%
			Critical	93%	94%	105%	105%	102%	97%	101%	99%	100%	100%	101%	99%

Values greater than 5%

Values less than 5%

Values greater than 5% in reaches where rainbow trout are not the primary target species

Values less than 5% in reaches where rainbow trout are not the primary target species

BA/BE Table 38. Summary of Management Objectives that Apply to Aquatic Resources.

Management Objective
California Wild Trout Program
In 1971, the CDFG established the California Wild Trout Program (Program) to protect and enhance wild trout fisheries. The primary purpose of the Program is to preserve stream trout fisheries, which are naturally sustained by wild strains of trout. The general management objectives of the Program are summarized as follows: • Maintain wild trout population levels necessary to provide satisfactory recreational angling opportunities for wild trout. • Maintain and enhance, where possible, the habitat required for optimum wild trout production. • Preserve the natural character and aesthetic beauty of the streamside environment. The Rubicon River was included in this Program following the recommendations of the Eldorado National Forest (ENF). The designated wild trout section of the river extends from Hell Hole Dam to Ralston Afterbay. In 1979, the CDFG Inland Fisheries Branch published the Rubicon River Wild Trout Management Plan (RRWTMP) as required by the California Wild Trout Program (CDFG 1979).
Eldorado National Forest Land and Resources Management Plan
The Eldorado National Forest Land and Resource Management Plan (ENF-LRMP), was developed by the United States Department of Agriculture-Forest Service (USDA-FS) to the direct management of the ENF (USDA-FS 1988). The ENF-LRMP formally recommended that the United States Congress designate three segments of the Rubicon River between Hell Hole Dam and Ralston Afterbay under the Wild and Scenic Rivers System (Section 7.9 – Recreation Resources Affected Environment). However, Congress has not yet acted to officially designate the river. Regardless, the ENF manages the Rubicon River, and a 0.25 mile corridor, to protect the “outstandingly remarkable values” (ORV) identified in their Wild and Scenic River Eligibility Study.
Tahoe National Forest Land and Resources Management Plan
Similarly, the TNF-LRMP was developed by the USDA-FS to direct management of the TNF (USDA-FS 1990). This plan includes a “water program” designed to address management direction for water resources and development. The purpose of the water program is described as follows: “To afford optimum protection to the water resources compatible with other program practices, including timber, wildlife, fisheries, range, recreation, engineering, and mining. Where opportunities arise, watershed improvement measures will be implemented and water quantities and timing of flow will be improved. The water program on the TNF has primarily served as a support function for other resource activities. The various types of support include planning, inventories, analyzing project proposals, monitoring, and administration.”
National Park Service – Nationwide Rivers Inventory
The National Park Service has compiled and maintains a Nationwide Rivers Inventory (NRI), a register of river segments that potentially qualify as national wild, scenic or recreational river areas (NPS 2006). The NRI is considered relevant because it identifies the Rubicon River as a candidate for Wild and Scenic River status. Of the three eligible segments of the Rubicon River (between Hell Hole Dam and Ralston Afterbay), none are located within the existing MFP boundary with the exception of a small segment below the Hell Hole Dam (0.48 mile) and a small section above Ralston Afterbay (0.12 mile). While not formally designated, state and federal resource agencies are required to manage the river and the area within 0.25 mile of the river to protect the ORVs that cause it to be considered eligible (Section 6.0 – Statutory and Regulatory Requirements).

BA/BE Table 38. Summary of Management Objectives that Apply to Aquatic Resources within the Middle Fork Project (continued).

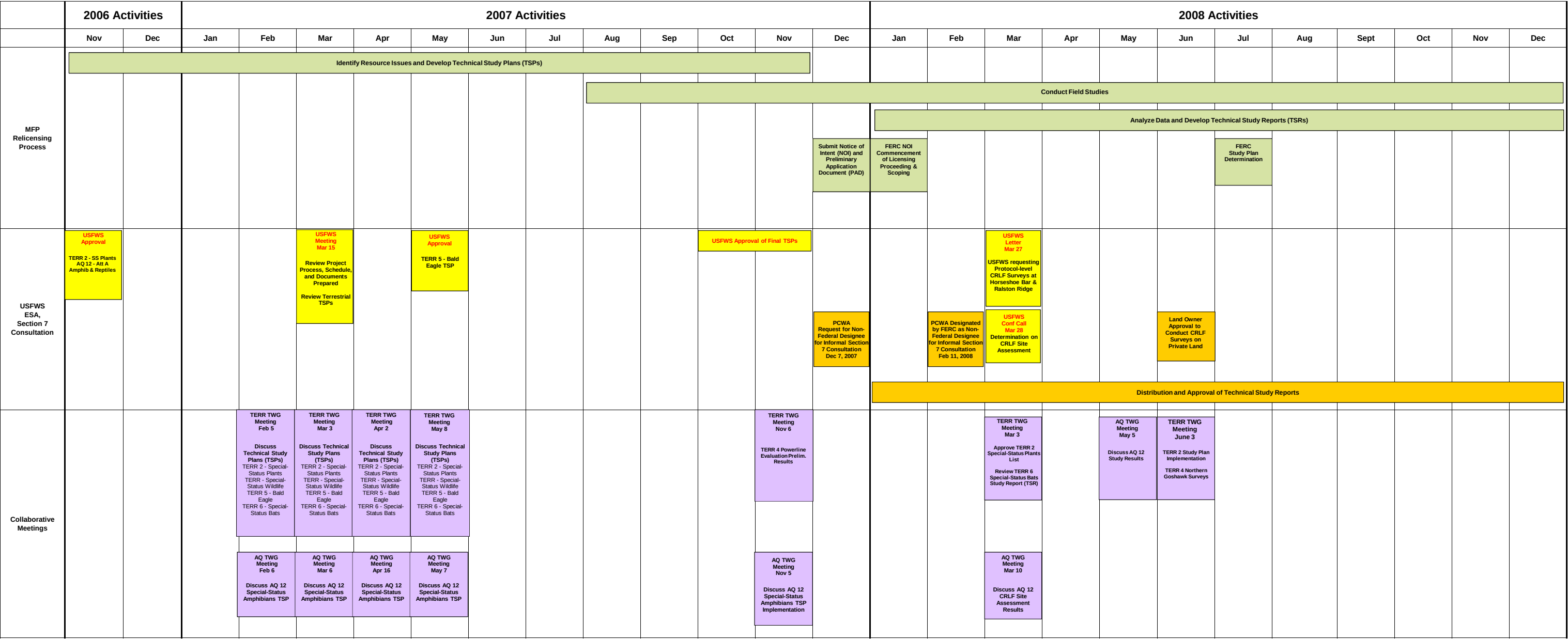
Management Objective
United States Bureau of Reclamation (USBR) – American River Water Resources Investigation: Wild and Scenic River Eligibility Study and Preliminary Classification
In January 1993 the USBR published the report entitled, “American River Water Resources Investigation, Wild and Scenic Rivers Eligibility and Preliminary Classification” (USBR 1993). The investigation is relevant to the MFP because it discusses a portion of the Middle Fork American River and North Fork American River within the peaking reach downstream of Oxbow Powerhouse. The investigation was conducted as part of a larger land and water resource planning effort known as the American River Water Resources Investigation (also known as the Auburn Dam Project). In this study, three river segments were found “Eligible” for Wild and Scenic designation under the Wild and Scenic Rivers Act (WSRA). Two of these segments are located downstream of the MFP and are described in the USBR report as follows: • Middle Fork American River: From Oxbow Dam to the confluence with the North Fork American River (approximately 23 miles). • North Fork American River: The North Fork, from North Fork Debris Dam to the intake of the Auburn Dam Diversion Tunnel (approximately 5 miles). The summary statement in the 1993 study indicated that the next step in the process would be a suitability study to determine if the eligible river segments are suitable for designation to the National Wild and Scenic River System. According to the USBR, a suitability study has not been conducted and there are no plans to conduct a suitability study at this time (R. Schroeder, pers. comm. 2010). Although not formally designated, state and federal resource agencies are required to manage the river and the area within 0.25 mile of the river to protect the ORVs that cause it to be considered eligible.
Water Quality Control Plan (Basin Plan) – Central Valley Region, the Sacramento River Basin and San Joaquin River Basin
For stream reaches, the applicable management objectives of the Central Valley Water Quality Control Board (CRWQCB) Basin Plan (CRWQCB 1998, Fourth Edition revised February 2007) include the following beneficial uses related to aquatic resources: • Warm Freshwater Habitat (WARM) – Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. • Cold Freshwater Habitat (COLD) – Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

BA/BE Table 39. Qualitative Assessment of Spill Events With Potential to Impact Foothill-Yellow Legged Frog Tadpoles and Egg masses.

Rubicon River					
Water Year Type	Year	Proposed Action		No-Action Alternative	
		High Risk	Low Risk	High Risk	Low Risk
Wet	1983	X	-	X	-
Wet	1984	-	-	-	-
Wet	1986	-	-	X	-
Dry	1990	-	-	-	-
Wet	1995	X	-	X	-
Wet	1996	-	-	-	-
Wet	1998	X	-	X	-
Below Normal	2003	-	-	X	-
Above Normal	2005	X	-	X	-
Wet	2006	-	X	-	X
Total		4	1	6	1
Middle Fork American River below Middle Fork Interbay					
Water Year Type	Year	Proposed Action		No-Action Alternative	
		High Risk	Low Risk	High Risk	Low Risk
Wet	1982	-	X	X	-
Wet	1983	X	-	X	-
Wet	1986	-	-	X	-
Dry	1990	-	-	-	-
Above Normal	1993	X	-	-	-
Wet	1995	X	-	X	-
Wet	1996	-	-	-	X
Wet	1998	X	-	X	-
Below Normal	2003	X	-	-	-
Above Normal	2005	X	-	X	-
Wet	2006	X	-	X	-
Total		7	1	7	1

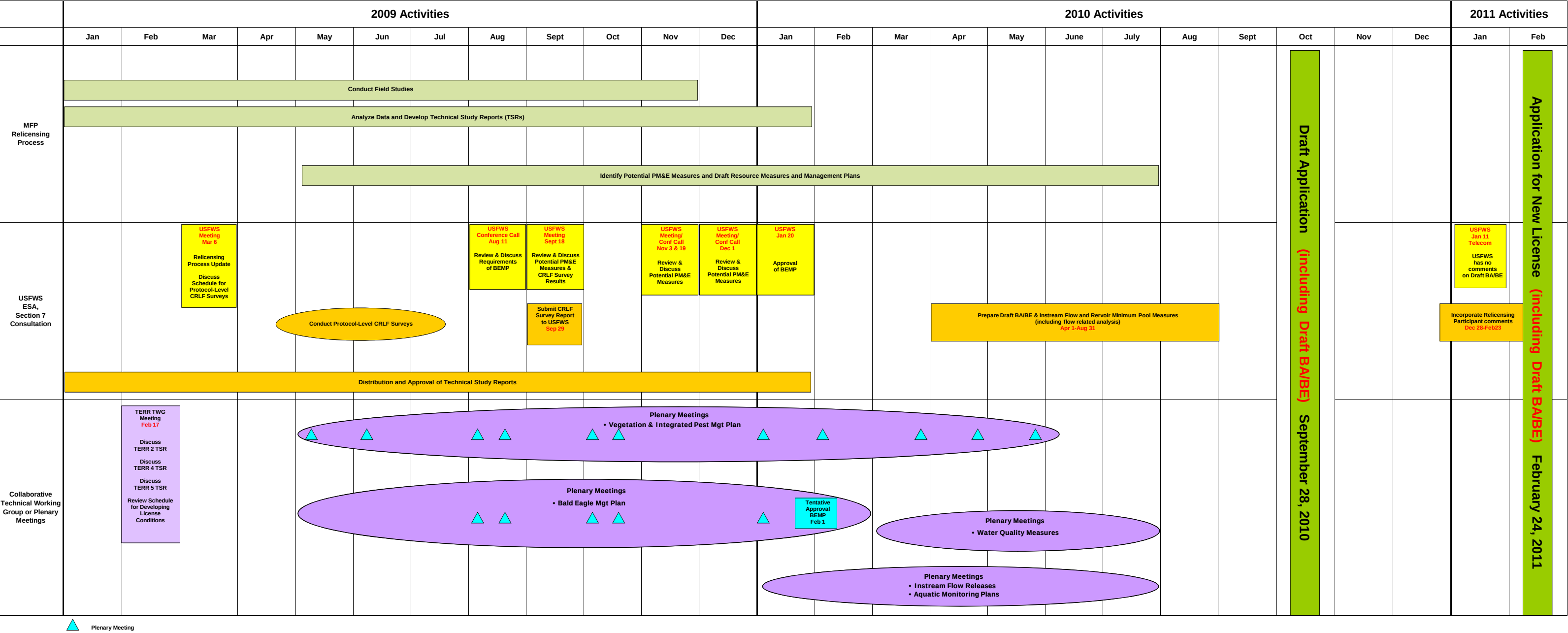
FIGURES

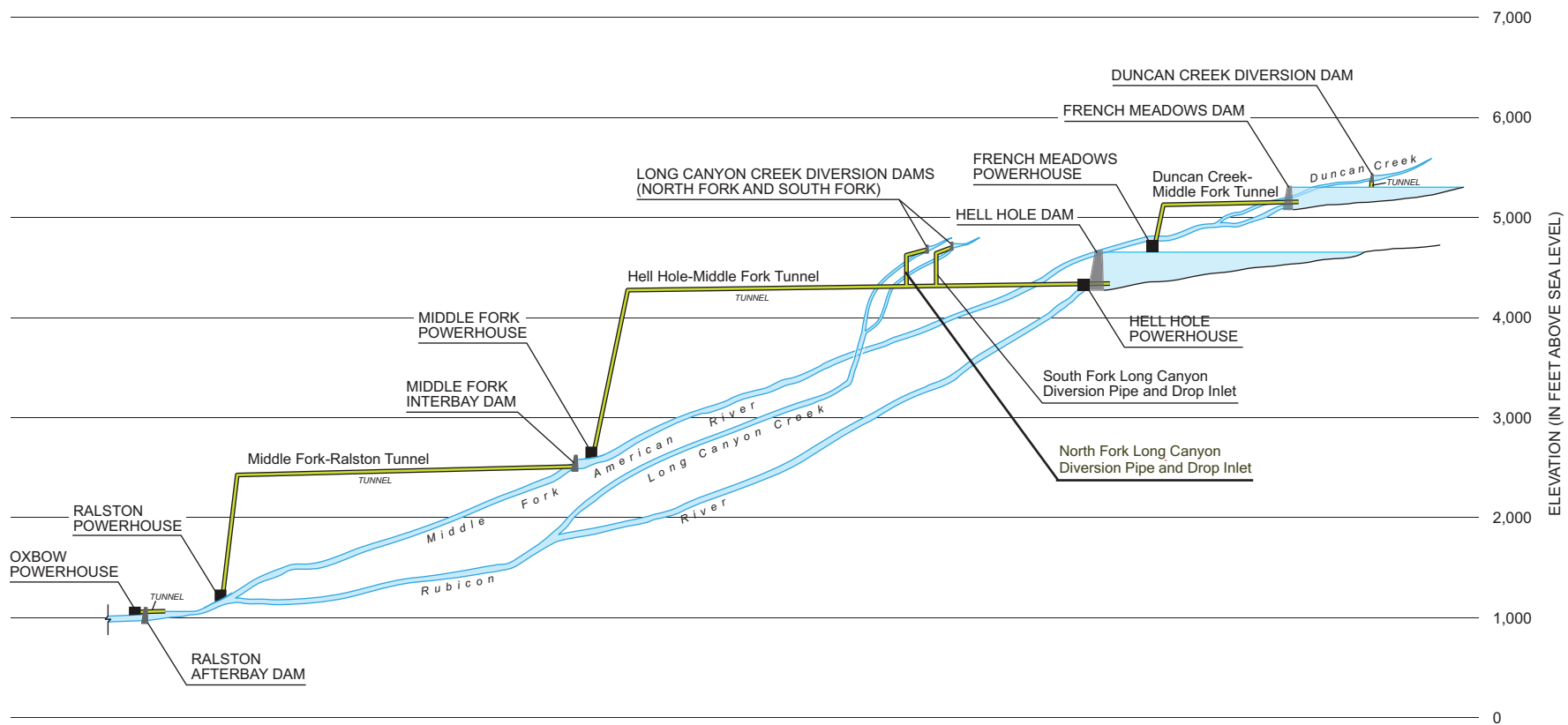
BA/BE Figure 1. PCWA's Endangered Species Act (ESA) Section 7 Consultation Process and Related Activities for the MFP Relicensing.



 Plenary Meeting

BA/BE Figure 1. PCWA's Endangered Species Act (ESA) Section 7 Consultation Process and Related Activities for the MFP Relicensing (continued).





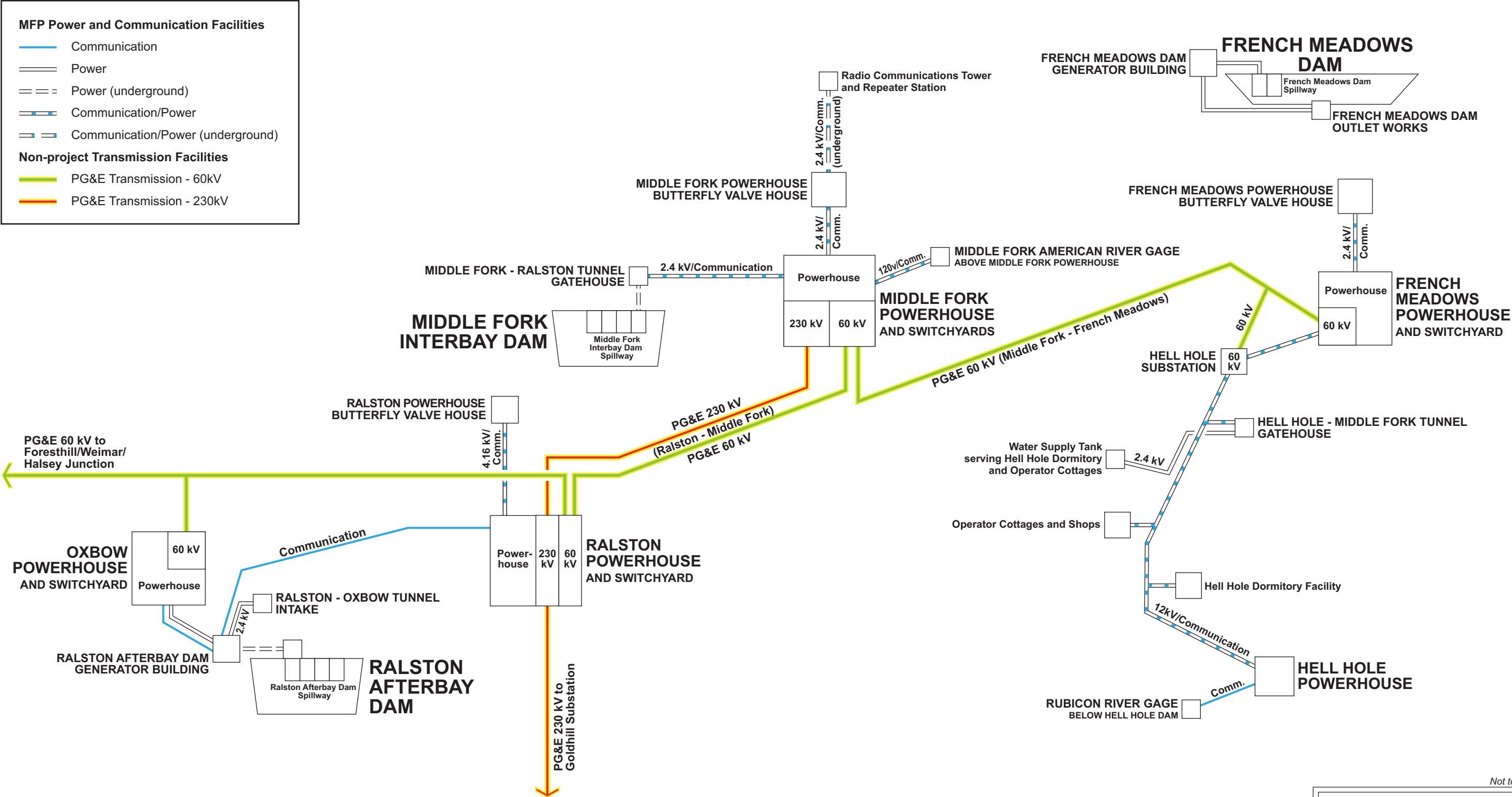
Horizontal dimension and size of facilities not to scale



Placer County Water Agency
Middle Fork American River Project

BA/BE Figure 2

MFP Facilities
Elevation Profile



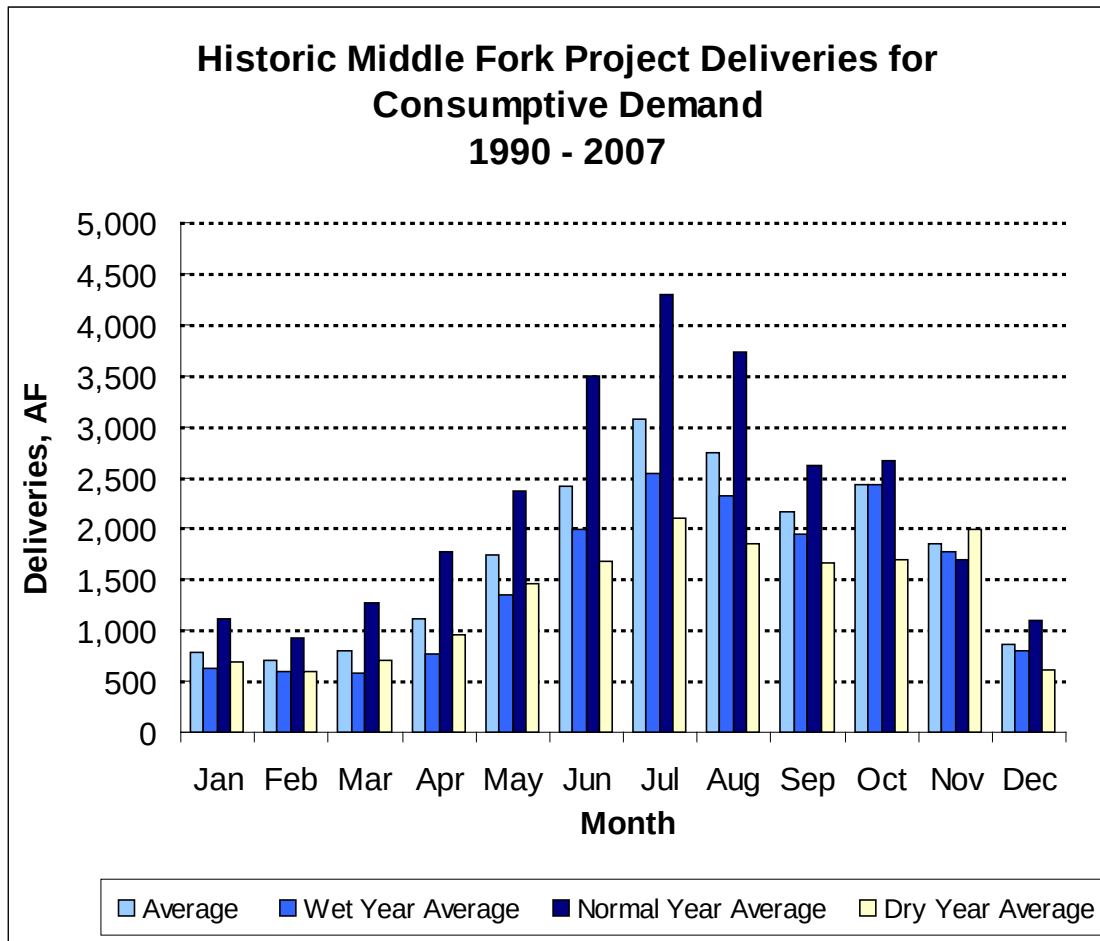
Not to scale



Placer County Water Agency
Middle Fork American River Project

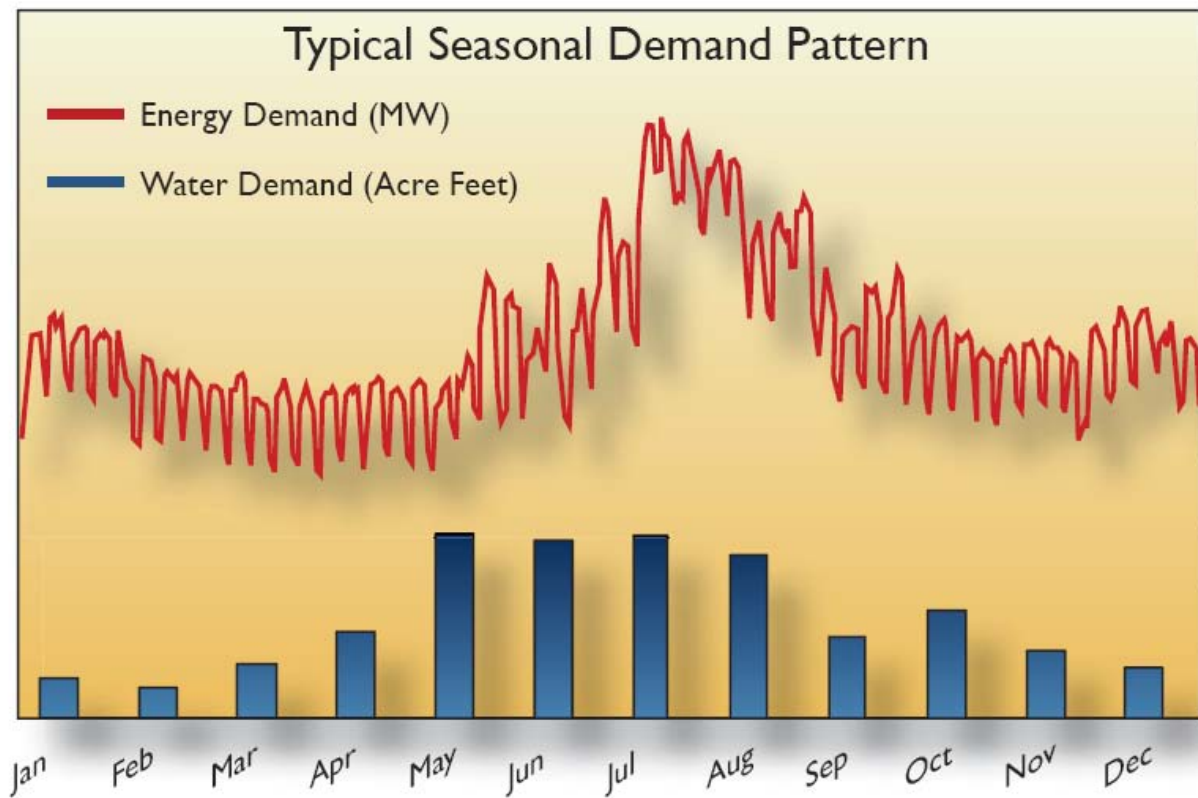
BA/BE Figure 3

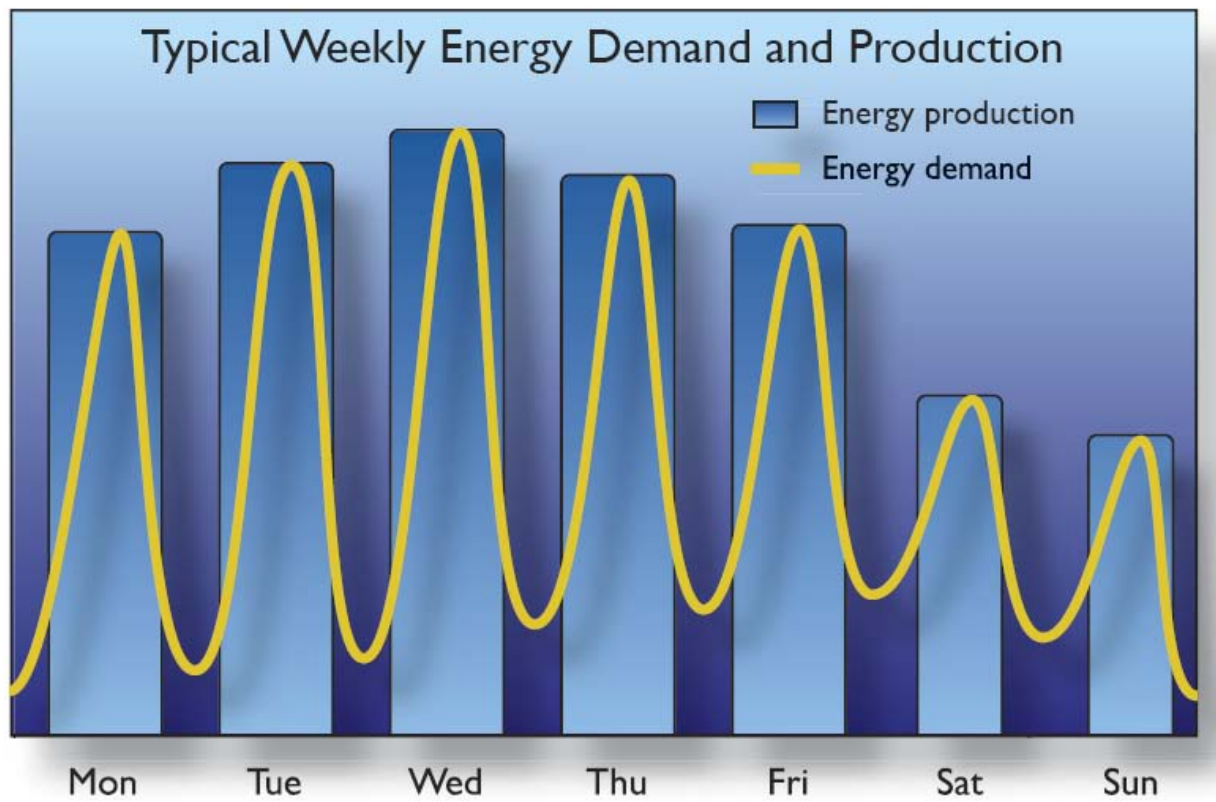
MFP
Transmission, Power, and
Communications Schematic

BA/BE Figure 4. PCWA Deliveries for Consumptive Demand (1990–2007).

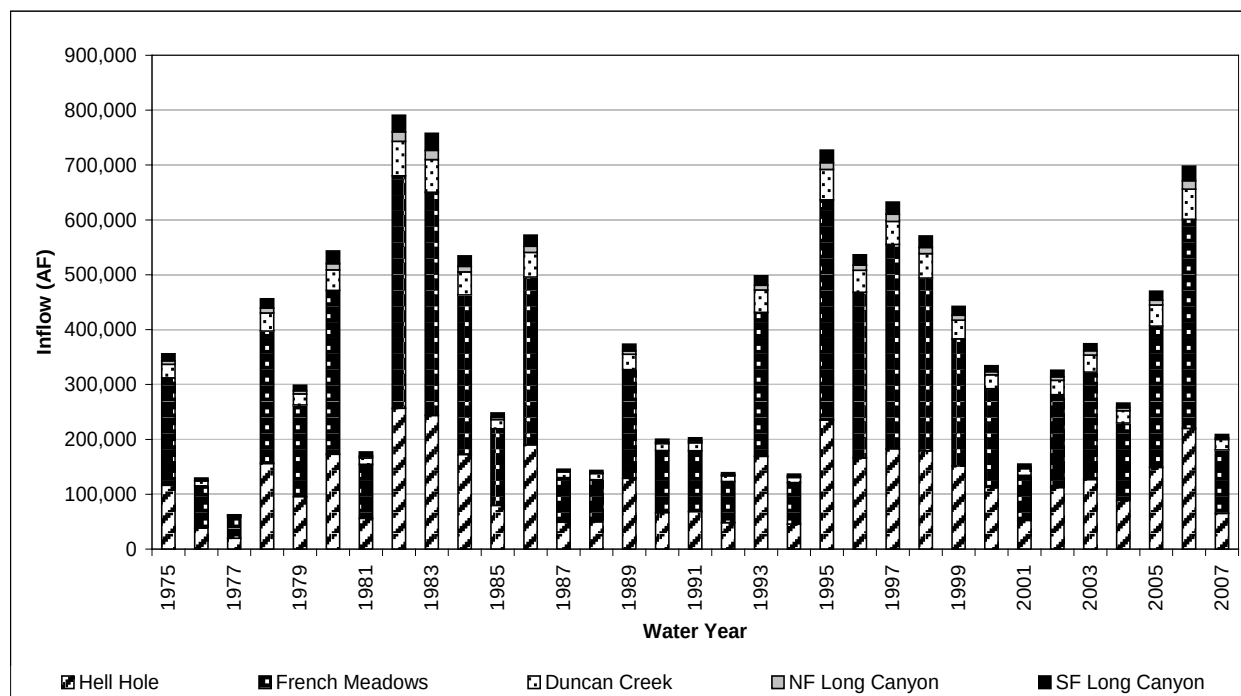
Water year designation are based on the April forecasted inflow to Folsom Reservoir. Wet: >2,000,000 AF (10 years); Normal: 2,000,000–1,200,000 AF (4 years); and Dry: <1,200,000 AF (4 years).

Totals do not include out-of-county sales.

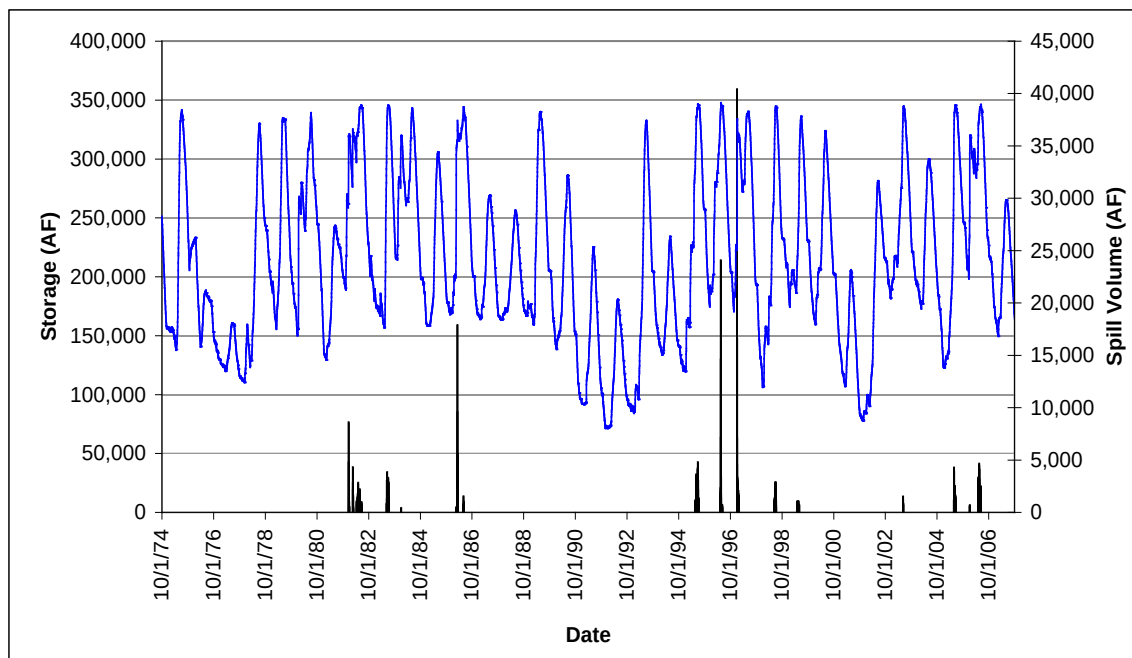
BA/BE Figure 5. Typical Seasonal Demand Pattern.

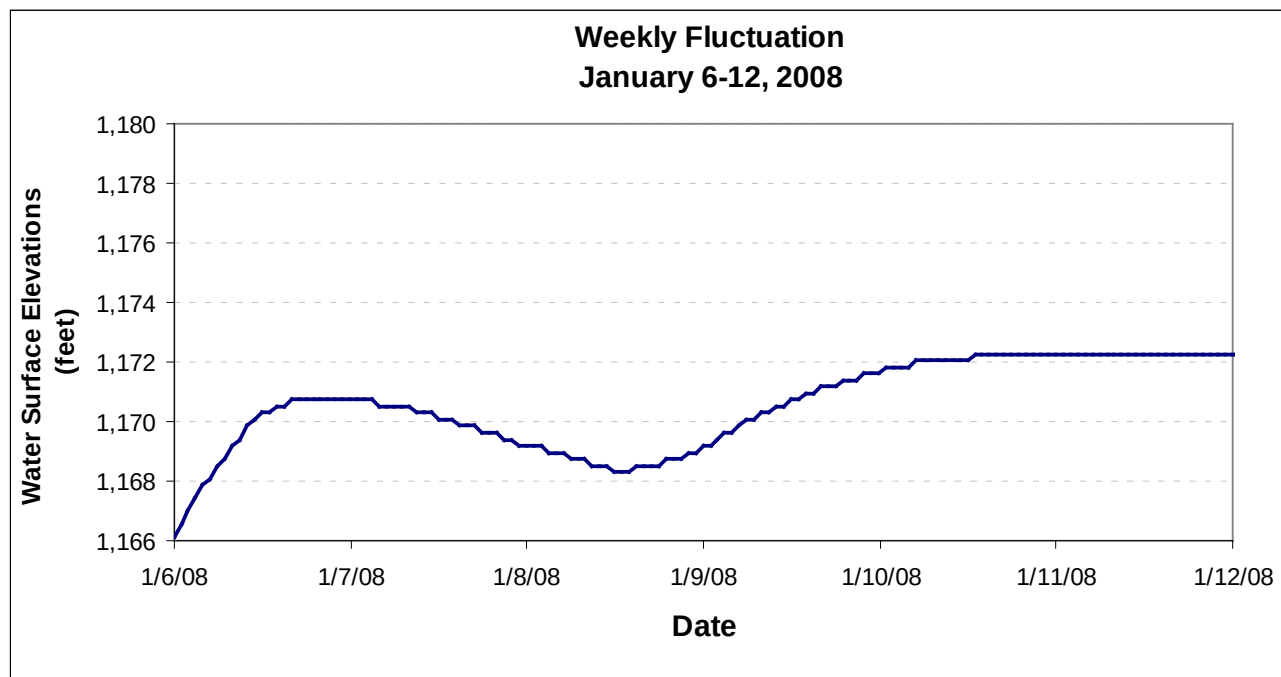
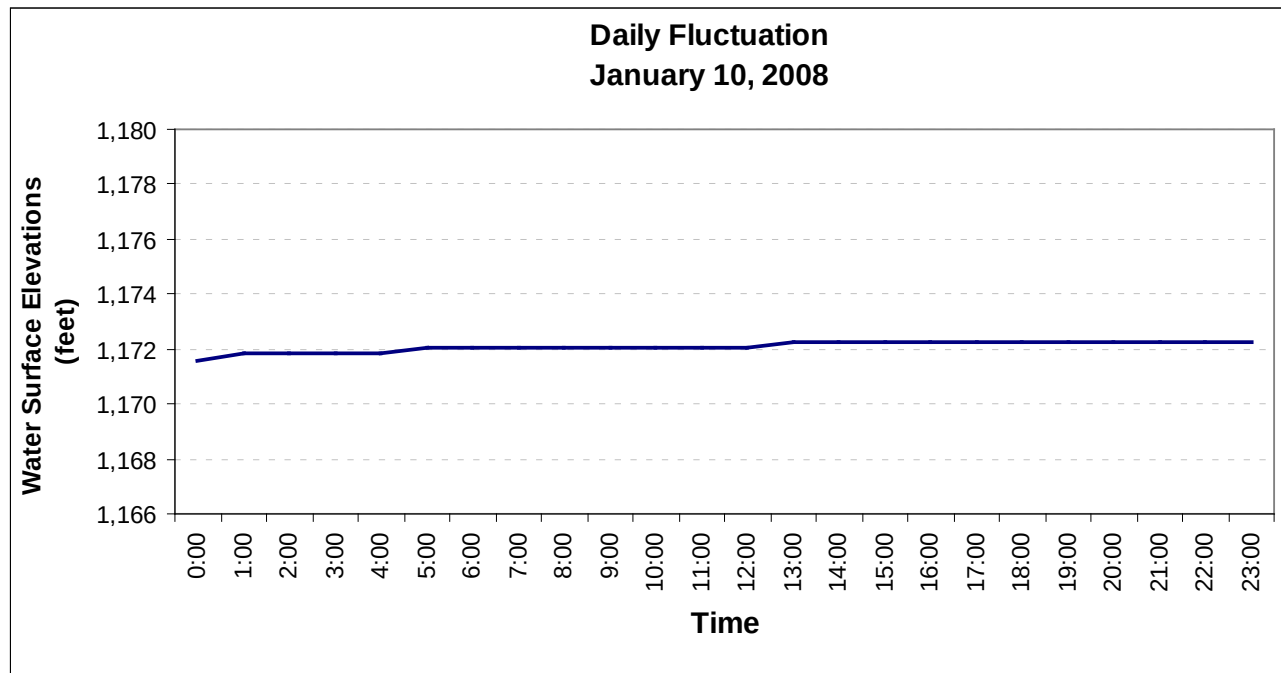
BA/BE Figure 6. Typical Weekly Energy Demand and Production.

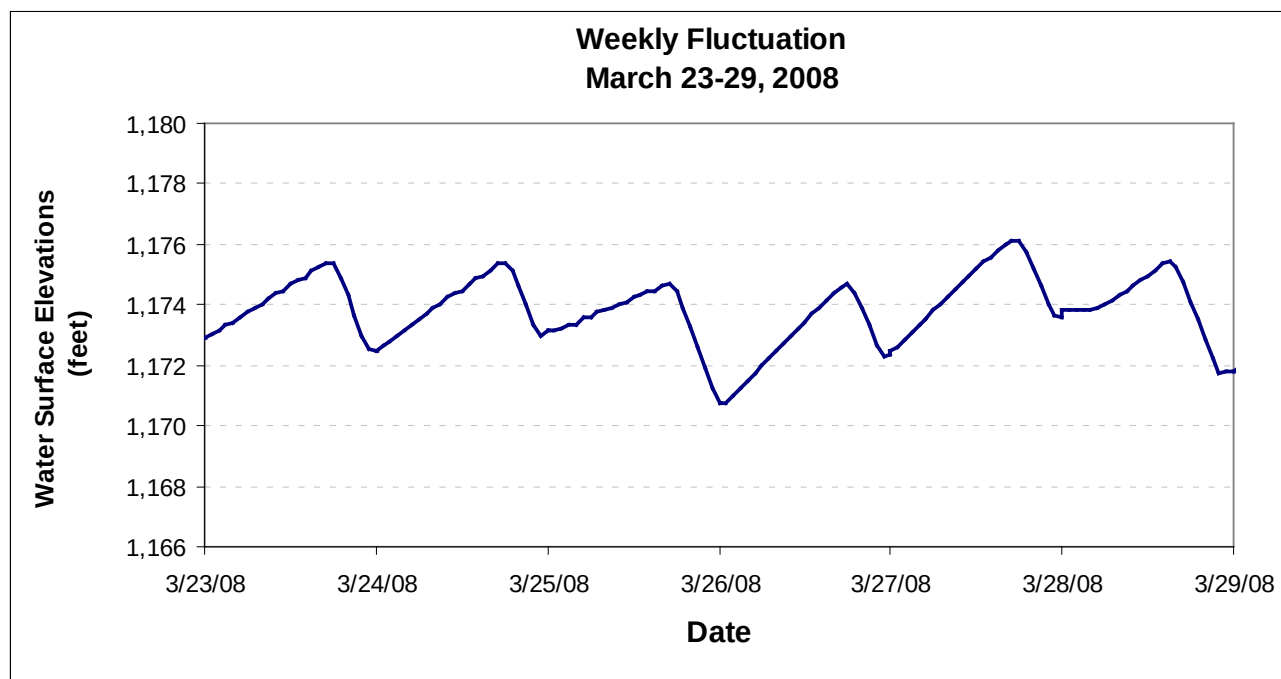
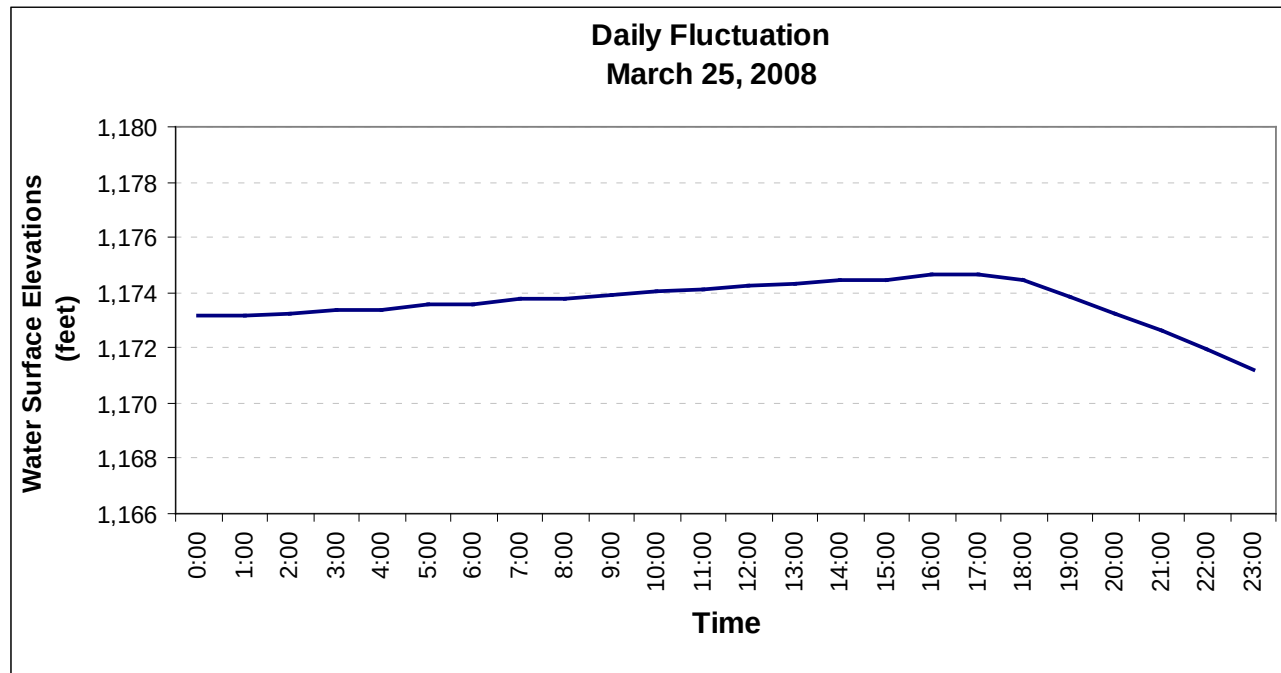
BA/BE Figure 7. Total MFP Inflow (Combined Flows from Duncan Creek, Middle Fork American River, Rubicon River, and Long Canyon Creek) from 1975–2007.

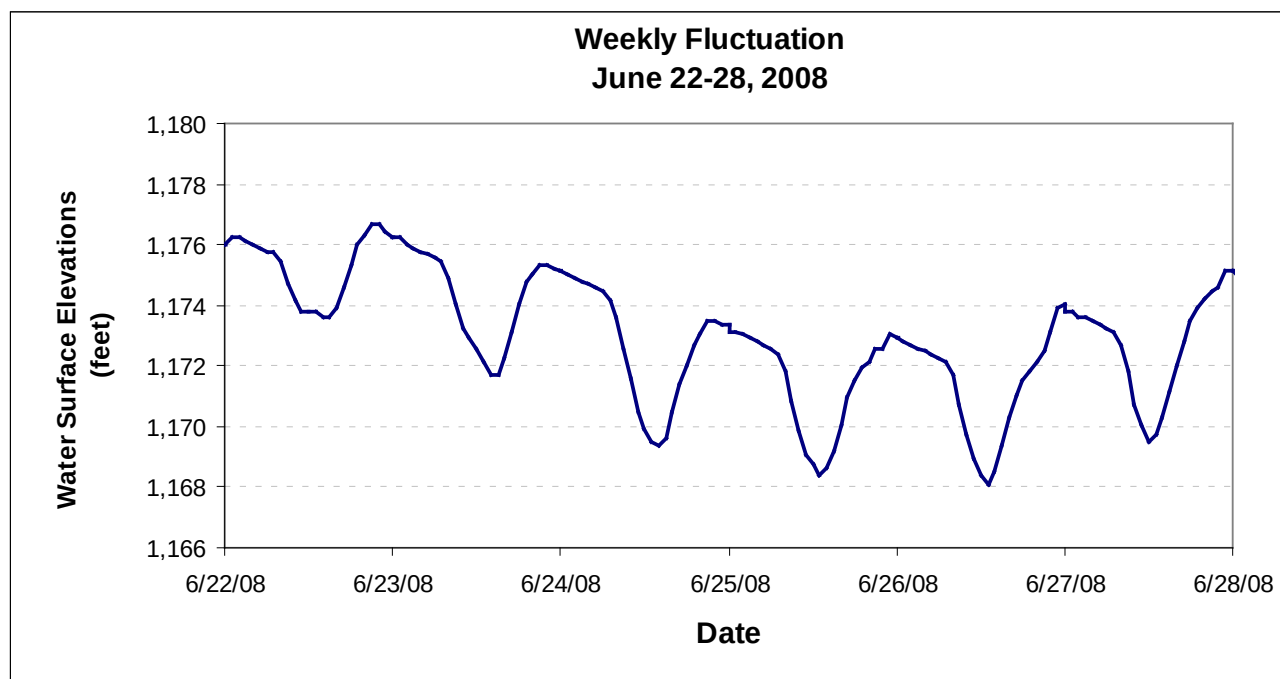
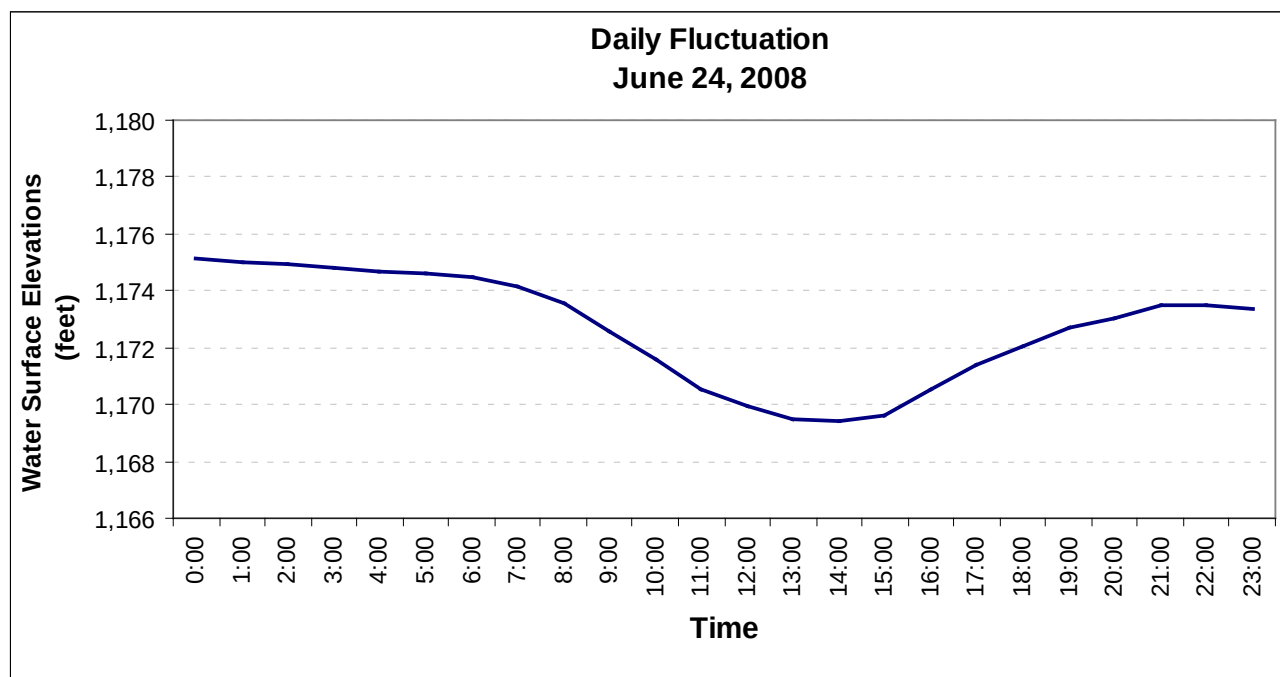


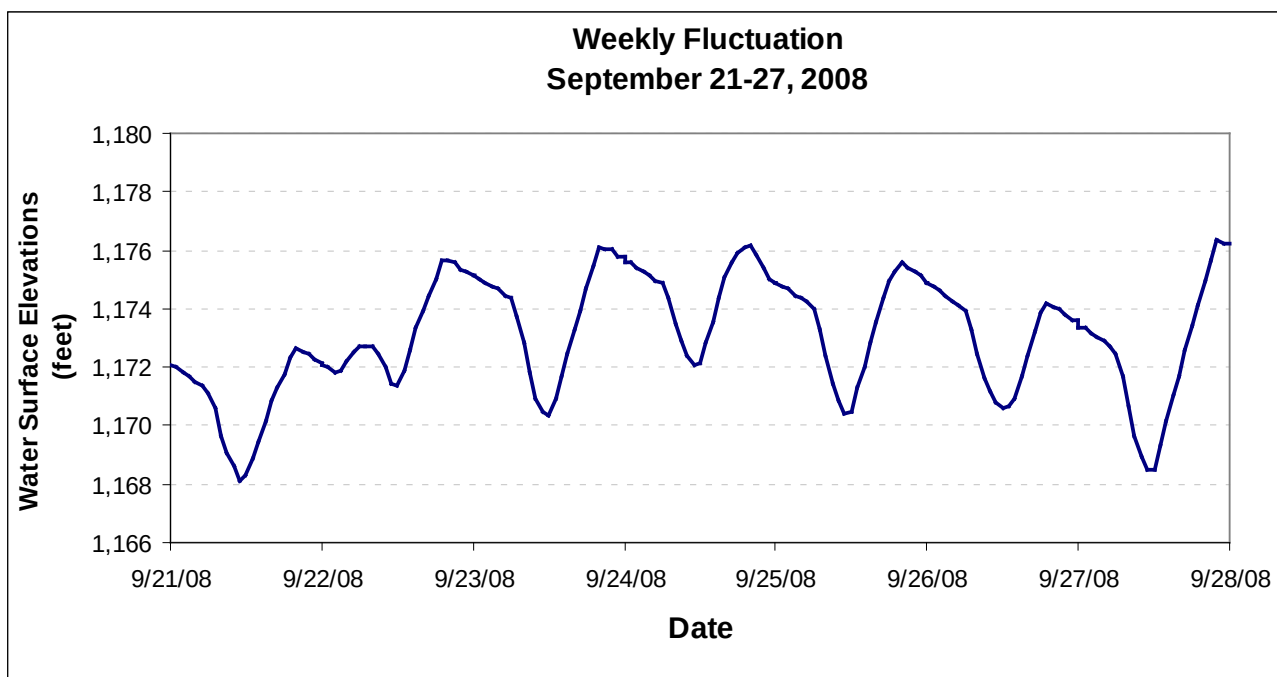
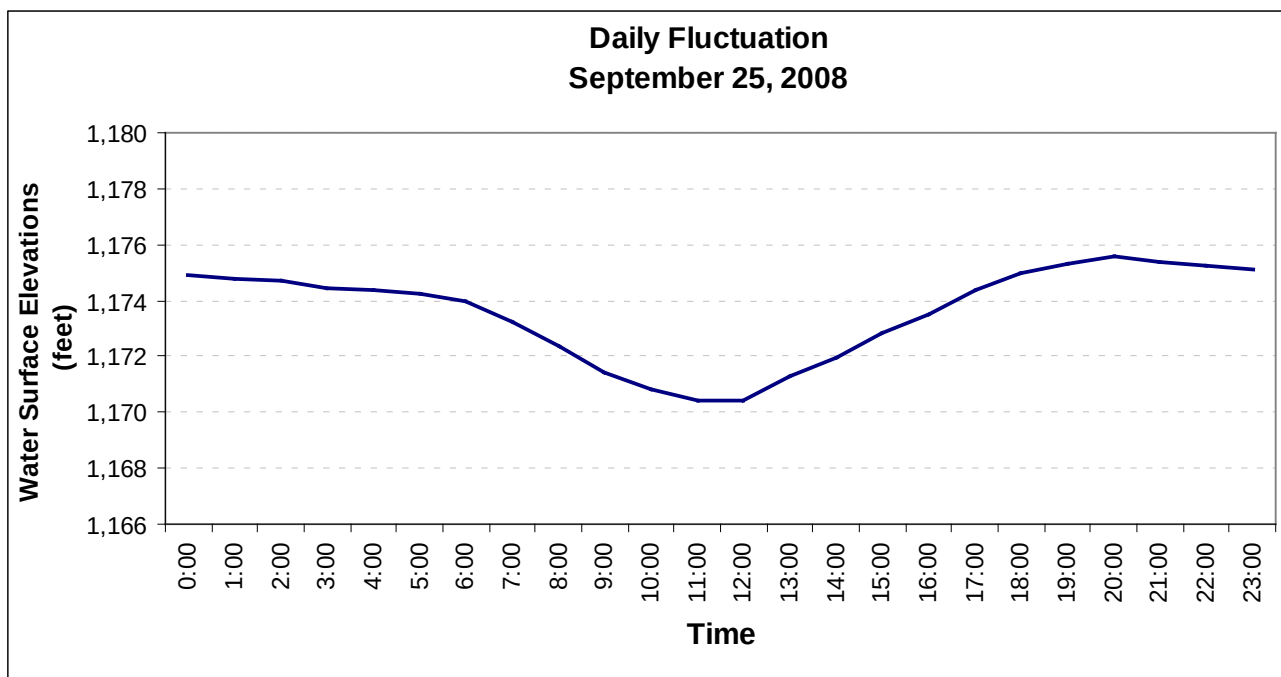
BA/BE Figure 8. Combined Reservoir Storage Levels (French Meadows and Hell Hole) and Spills from 1974 through 2007.

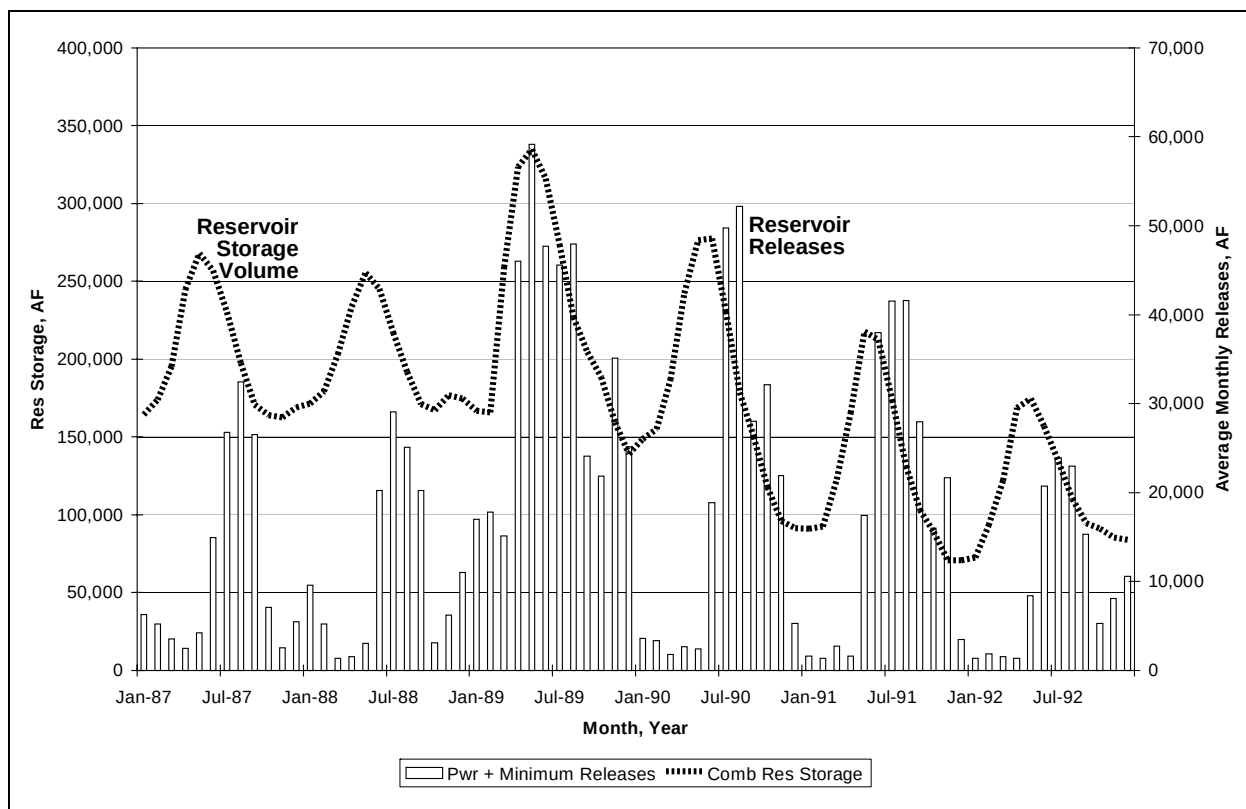


BA/BE Figure 9. Water Surface Elevations at Ralston Afterbay – Winter.

BA/BE Figure 10. Water Surface Elevations at Ralston Afterbay – Spring.

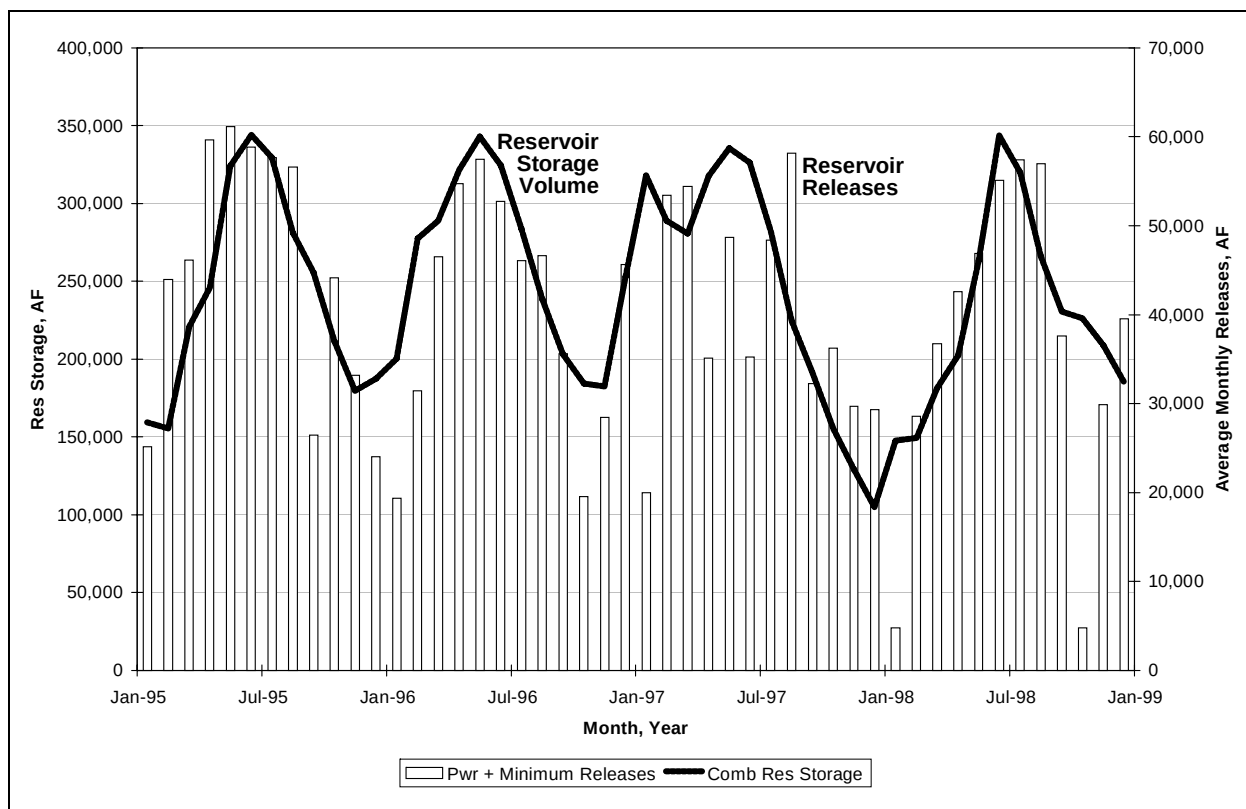
BA/BE Figure 11. Water Surface Elevations at Ralston Afterbay – Summer.

BA/BE Figure 12. Water Surface Elevations at Ralston Afterbay – Fall.

BA/BE Figure 13. Releases vs. Reservoir Storage, Drier Period (1987–1992).

Res Storage = Combined Hell Hole Reservoir and French Meadows Reservoir Storage

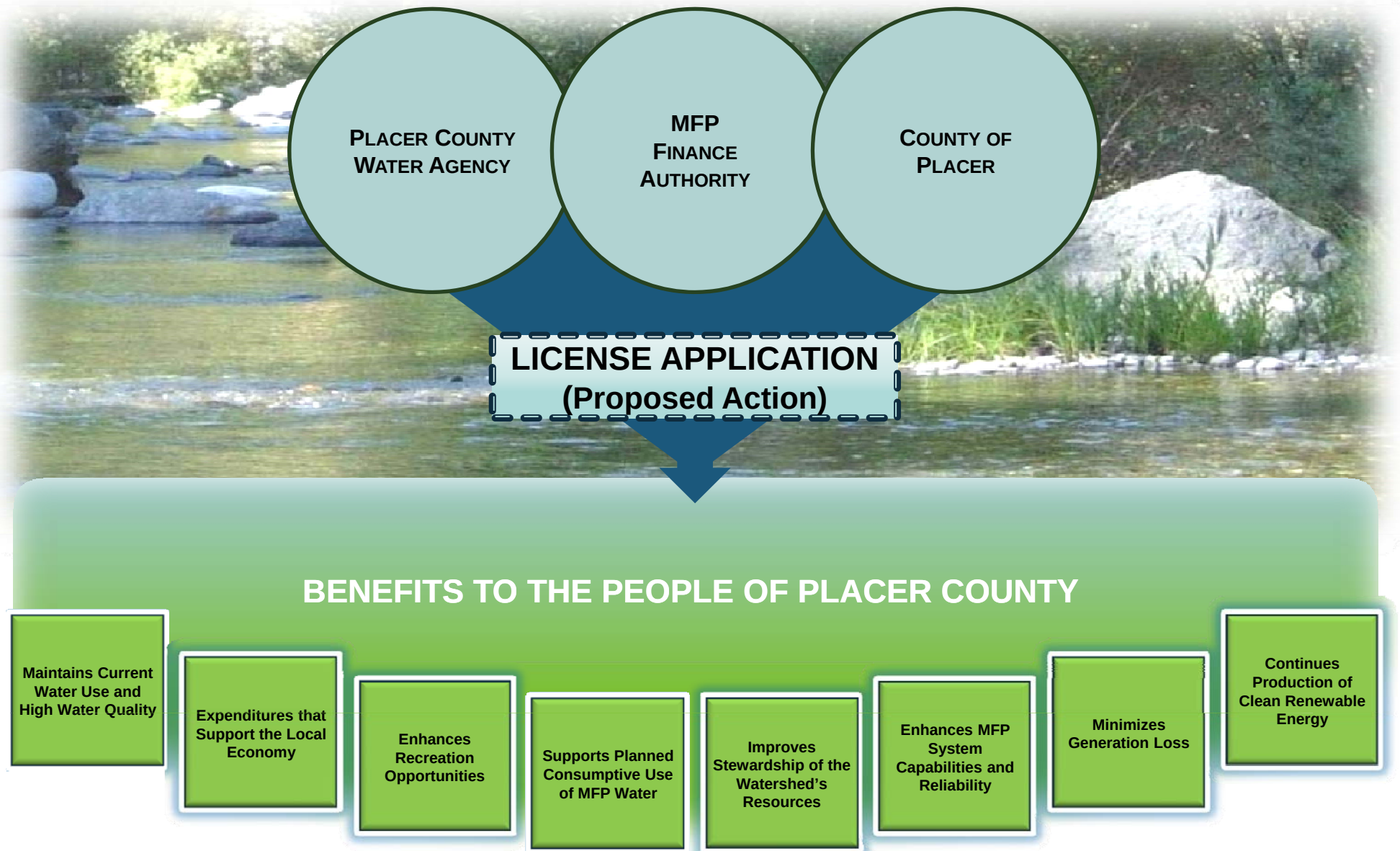
Average Monthly Releases = Releases through Middle Fork Powerhouse

BA/BE Figure 14. Releases vs. Reservoir Storage, Wetter Period (1995–1998).

Res Storage = Combined Hell Hole Reservoir and French Meadows Reservoir Storage

Average Monthly Releases = Releases through Middle Fork Powerhouse

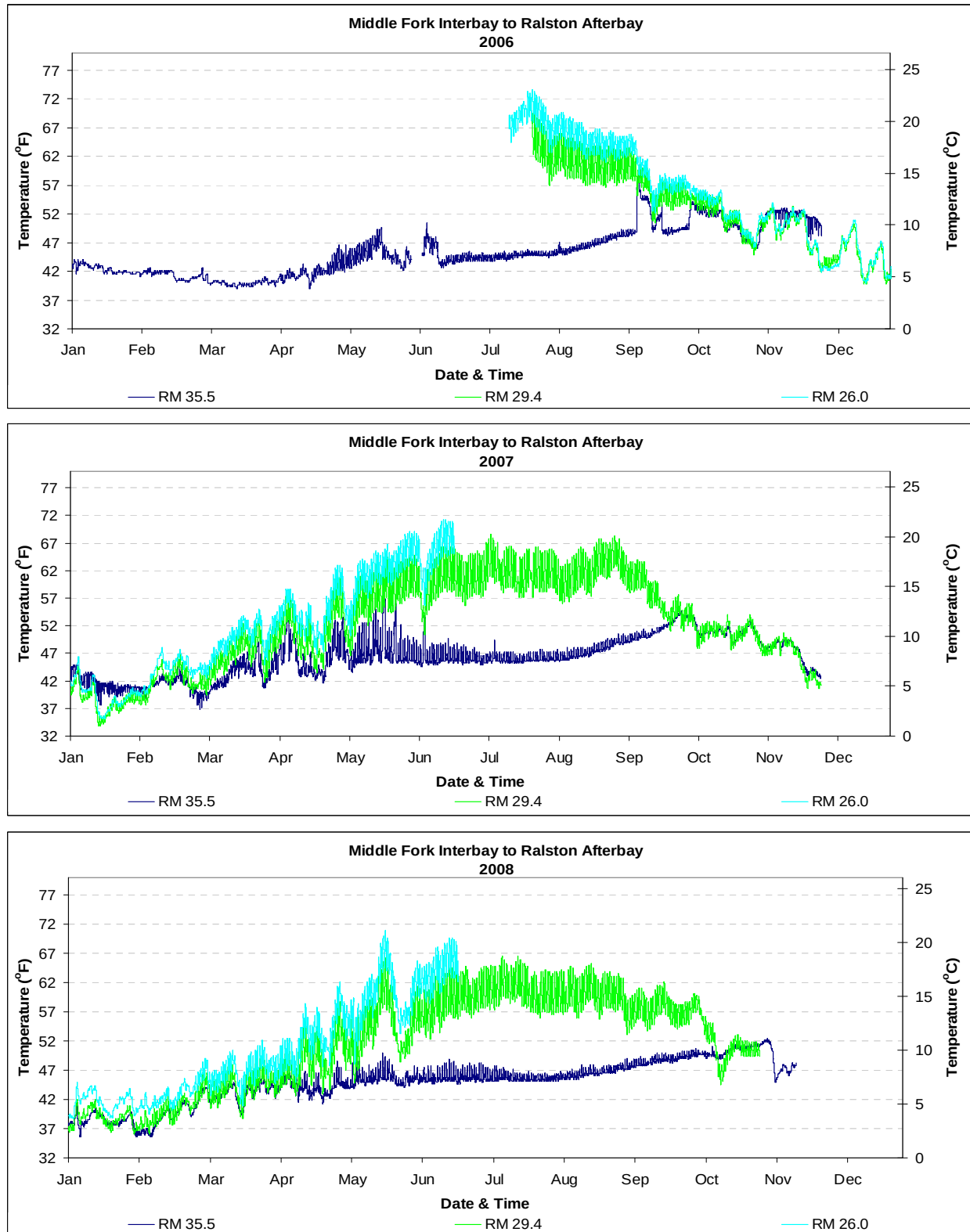
BA/BE Figure 15. Benefits of the Proposed Action.



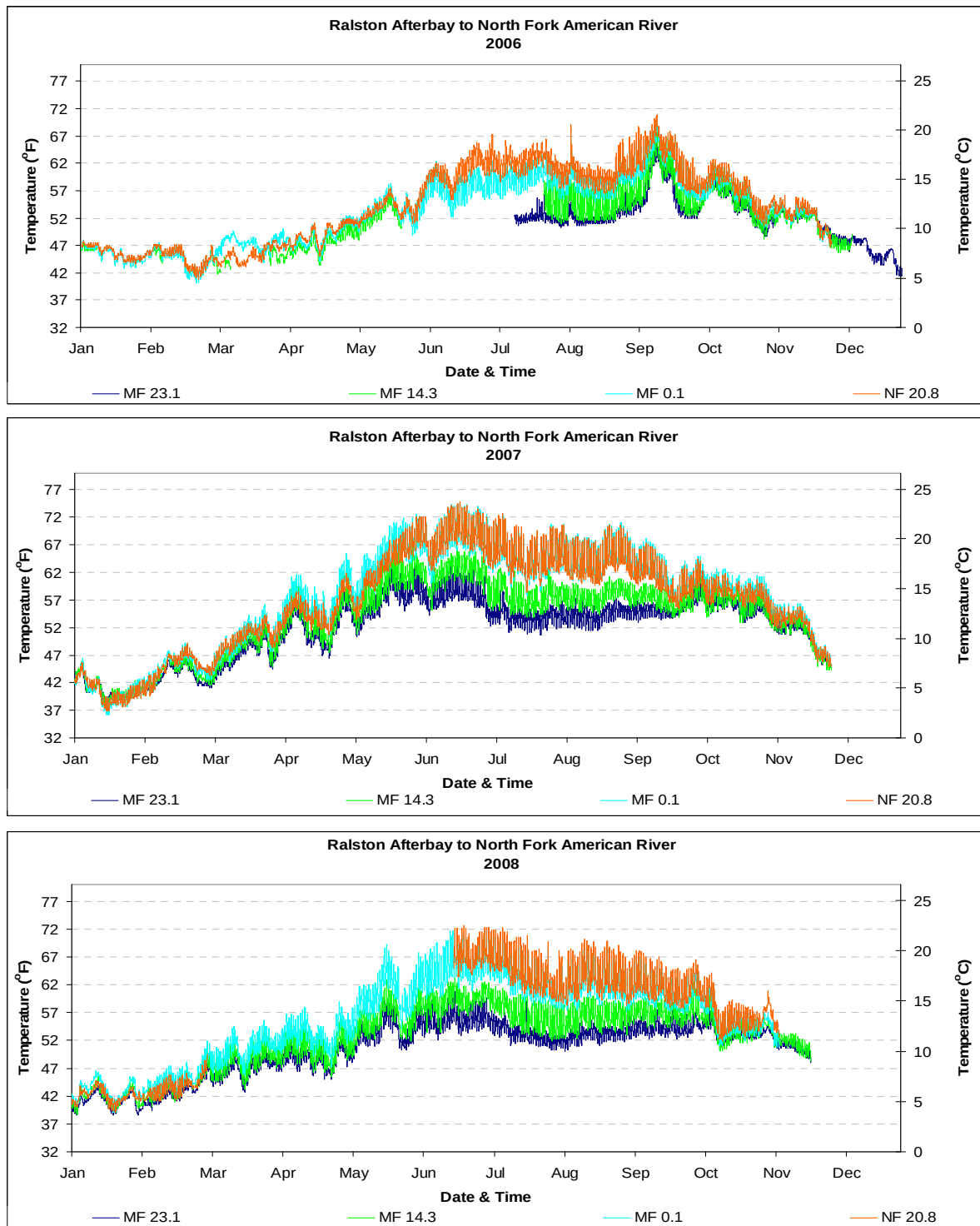
BA/BE Figure 16. Resource Stewardship Provided by the Proposed Action.



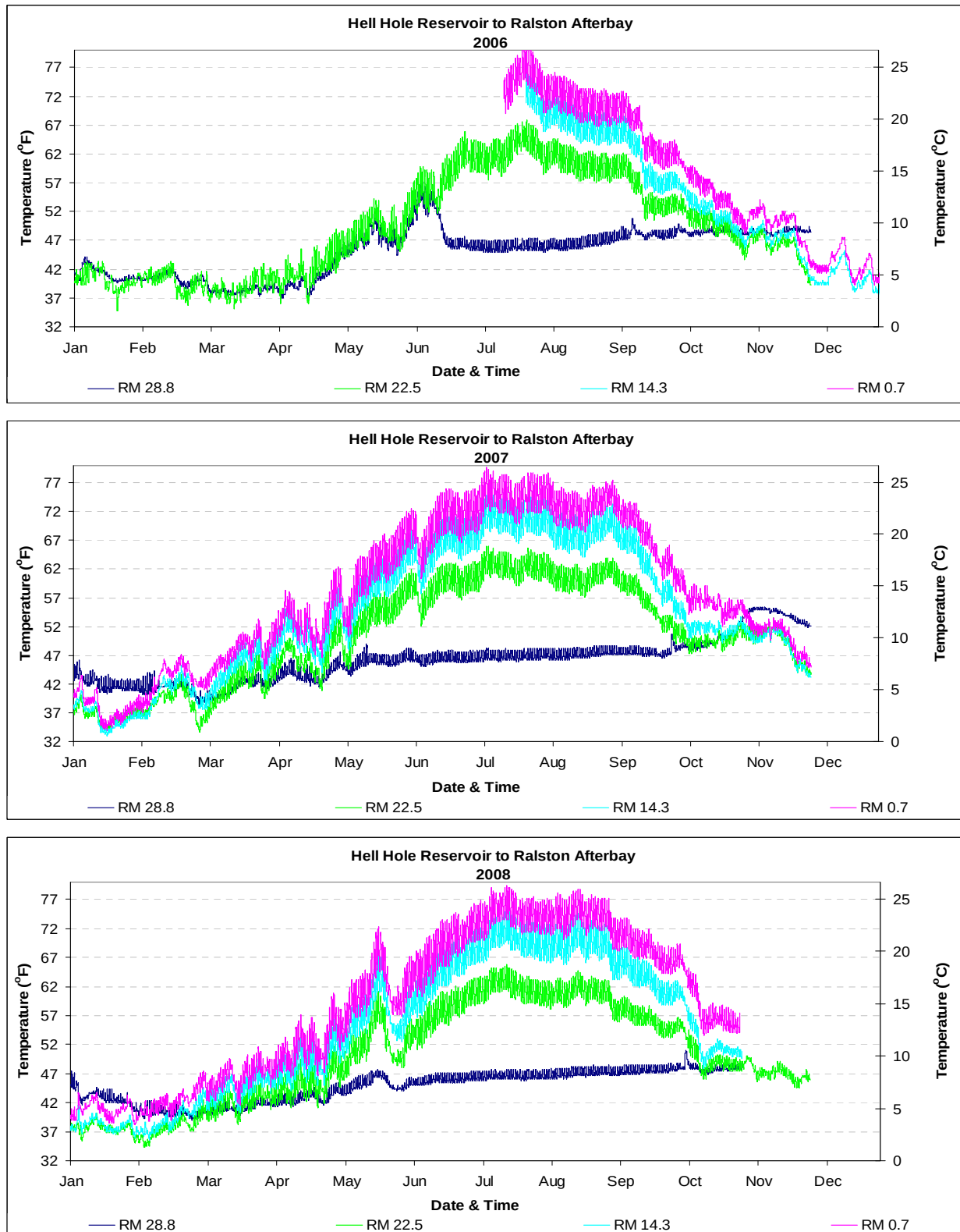
BA/BE Figure 17. Water Temperature Measured at Three Locations in the Middle Fork American River between Middle Fork Interbay and Ralston Afterbay (River Mile 35.5, 29.4, and 26.0) in 2006, 2007, and 2008.

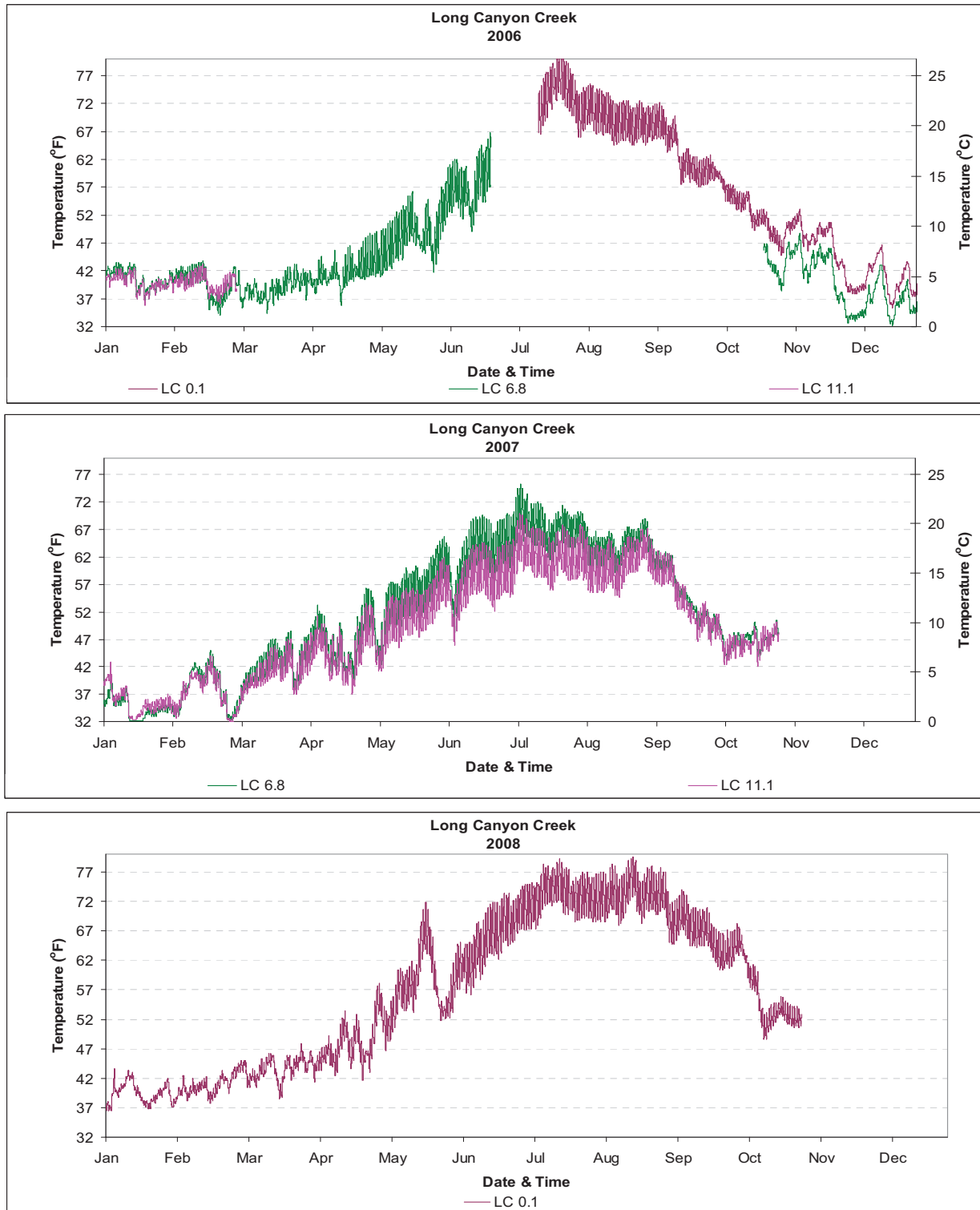


BA/BE Figure 18. Water Temperature Measured at Three Locations in the Middle Fork American River between Ralston Afterbay and the Confluence with the North Fork American River (River Mile 23.1, 14.3, and 0.1) and One Location in the North Fork American River below the Confluence (River Mile 20.8) in 2006, 2007, and 2008.



BA/BE Figure 19. Water Temperature Measured at Four Locations in the Rubicon River between Hell Hole Reservoir and Ralston Afterbay (River Mile 28.8, 22.5, 14.3, and 0.7) in 2006, 2007, and 2008.



BA/BE Figure 20. Water Temperature Measured in Long Canyon Creek at Three Locations (River Mile 0.1, 6.8, and 11.1) in 2006, 2007, and 2008.

BA/BE Figure 21. Timing of Bald Eagle Reproductive Activities and Associated Sensitivity Levels.

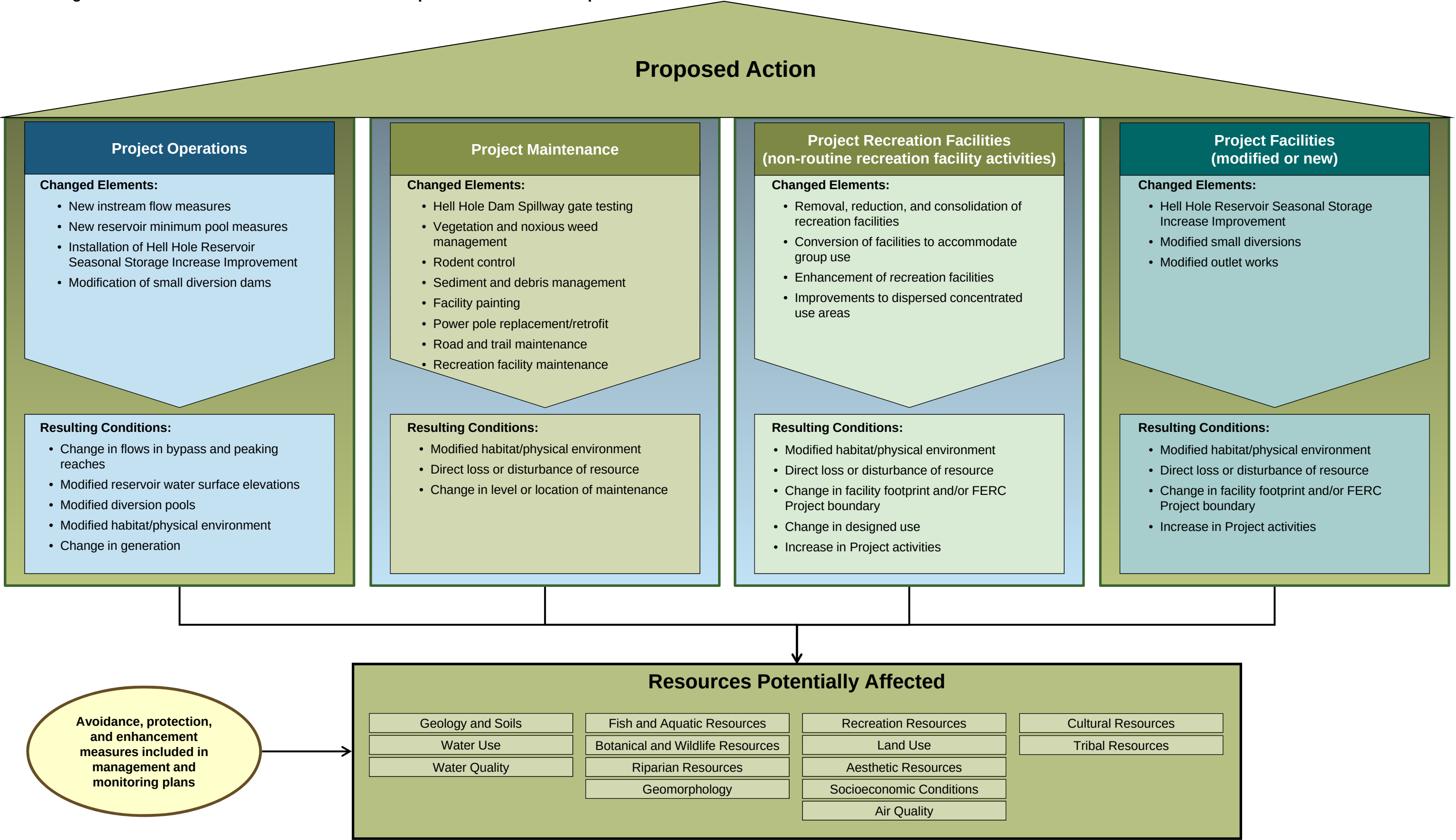
Activity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Timing of Bald Eagle Reproductive Activities and Sensitivity to Human Activities (Pacific Region) ¹												
Nest Building												
Egg Laying / Incubation												
Hatching /Rearing Young												
Fledging Young												

¹National Bald Eagle Management Guidelines, USFWS 2007

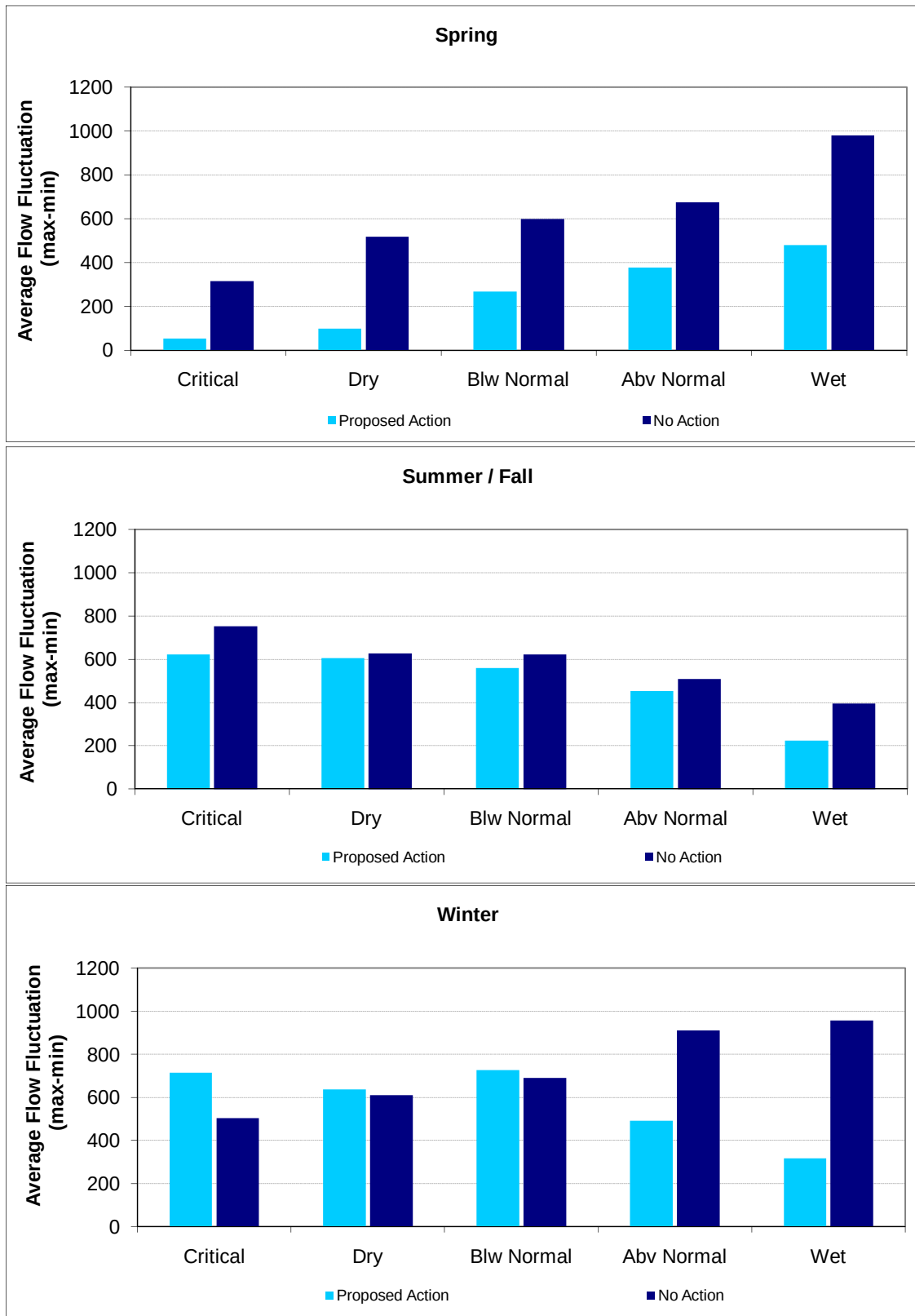
Sensitivity to Human Activity

- = Most sensitive period: likely to respond negatively
- = Very sensitive
- = Moderately sensitive

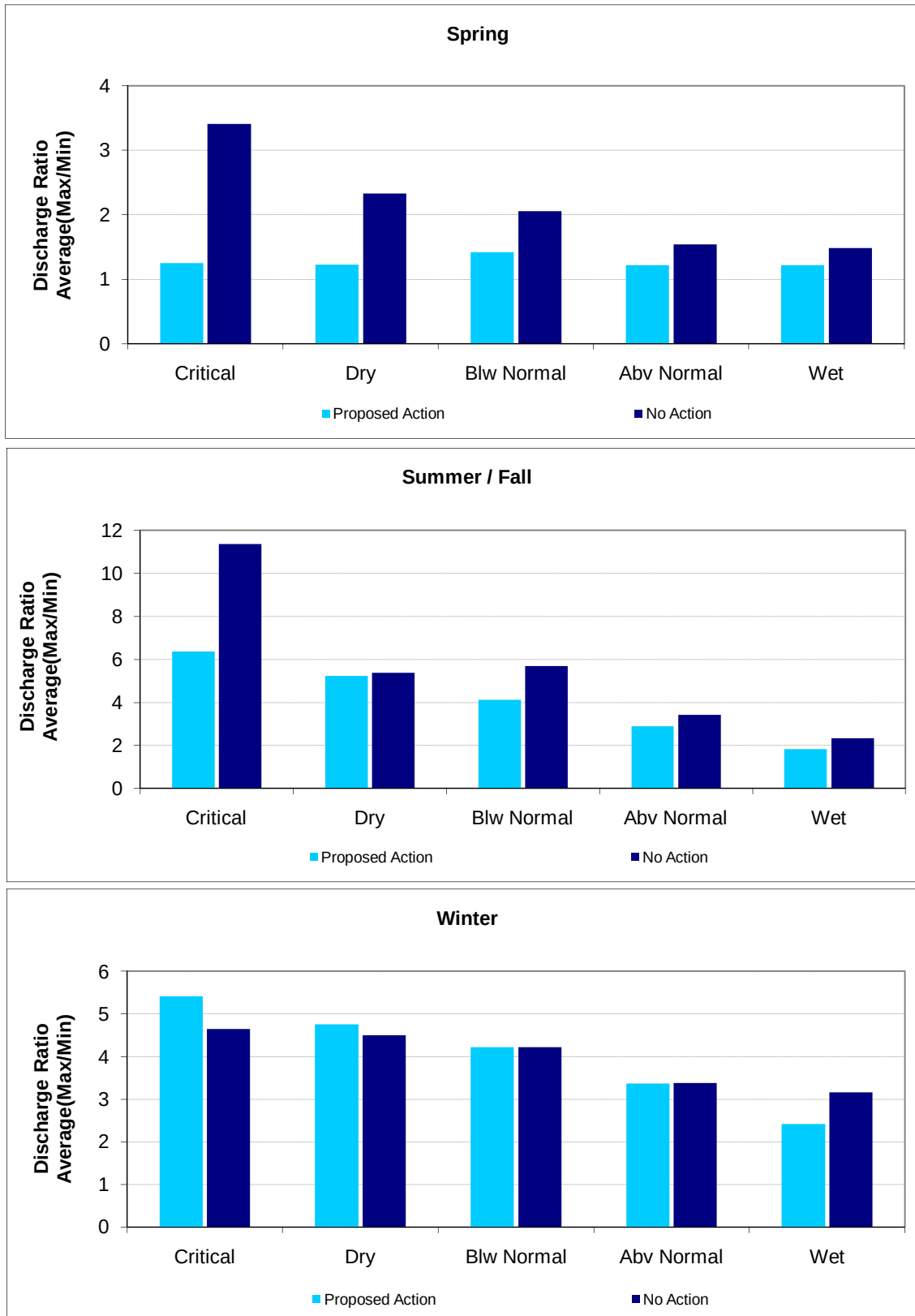
BA/BE Figure 22. Potential Effects on Resources from Implementation of the Proposed Action.



BA/BE Figure 23. Average Flow Fluctuations in the Peaking Reach for the Proposed Action and No-Action Alternatives in Summer/Fall (Jun-Oct), Winter (Nov-Feb), and Spring (Mar-May).



BA/BE Figure 24. Average Ratio of Flow Fluctuations in the Peaking Reach for the Proposed Action and No-Action Alternatives in Spring (Mar-May), Summer/Fall (Jun-Oct), and Winter (Nov-Feb).



BA/BE Figure 25. South and North Fork Long Canyon Creek Resulting Effects.

Key Considerations	Winter			Spring				Summer/Fall					Winter	
	Jan	Feb	Mar	Mar	Apr	May	Jun	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Channel/Riparian Maintenance Flow														
Initiation of Motion	Maintain					Maintain/Schedule							Maintain	
Scouring/Resetting Flow	Maintain												Maintain	
Riparian														
Recruitment (seed setting)						Enhance/Schedule								
Rainbow Trout														
Distribution	Maintain													
Spawn				Enhance										
Incubation				Enhance										
Adult	Maintain						Enhance	Maintain						
Juvenile							Maintain							
Productivity (algae and benthos)	Maintain													
Recreation														
Angling	Enhance													
Hydrograph (shape)				Enhance										
Water Temperature									Enhance	Maintain				

BA/BE Figure 26. Middle Fork American River below Middle Fork Interbay Resulting Effects.

Key Considerations	Key Driver	Winter			Spring				Summer/Fall					Winter	
		Jan	Feb	Mar	Mar	Apr	May	Jun	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Channel/Riparian Maintenance Flow															
Initiation of Motion		Maintain				Maintain/Schedule								Maintain	
Scouring/Resetting Flow		Maintain												Maintain	
Riparian															
Recruitment (seed setting)							Enhance/Schedule								
Rainbow Trout	Upper Reach														
Distribution								Maintain							
Spawn								Enhance							
Incubation								Enhance							
Adult		Maintain								Enhance				Maintain	
Juvenile								Maintain							
Hardhead	Lower Reach (0.6 mile)														
Distribution								Maintain							
Adult								Maintain							
Juvenile								Maintain							
Other Fish Species								Maintain							
Productivity (algae and benthos)								Maintain							
FYLF	Lower Reach (3 miles)														
Distribution								Maintain							
Breeding								Maintain							
Tadpoles										Maintain					
Recreation															
Middle Fork Interbay Reservoir								Maintain							
Angling								Enhance							
Hydrograph (shape)					Enhance										
Water Temperature										Maintain					

Middle Fork Interbay

Key Considerations	Key Driver	Winter			Spring				Summer/Fall					Winter	
		Jan	Feb	Mar	Mar	Apr	May	Jun	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Physical Habitat								Maintain							
Fish Species								Maintain							

BA/BE Figure 27. Rubicon River below Hell Hole Reservoir Resulting Effects.

Rubicon River																
Key Considerations	Key Driver	Winter			Spring				Summer/Fall					Winter		
		Jan	Feb	Mar	Mar	Apr	May	Jun	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Channel/Riparian Maintenance Flow																
Initiation of Motion		Maintain				Maintain/Schedule								Maintain		
Scouring/Resetting Flow		Maintain												Maintain		
Riparian																
Recruitment (seed setting)							Enhance/Schedule	Maintain								
Rainbow Trout																
Distribution	Upper Reach	Maintain						Maintain								
Spawn					Enhance											
Incubation					Enhance											
Adult		Maintain						Enhance					Maintain			
Juvenile		Maintain						Maintain								
Hardhead																
Distribution	Lower Reach	Maintain						Maintain								
Adult		Maintain						Maintain								
Juvenile		Maintain						Maintain								
Other Fish Species		Maintain						Maintain								
Productivity (algae and benthos)	Upper Reach	Enhance						Enhance								
FYLF																
Distribution	Lower Reach	Maintain						Maintain								
Breeding							Maintain									
Tadpoles								Maintain								
Recreation																
Angling		Enhance						Enhance								
Hydrograph (shape)		Enhance						Enhance								
Water Temperature									Maintain							

Hell Hole Reservoir															
Key Considerations	Key Driver	Winter			Spring				Summer/Fall					Winter	
		Jan	Feb	Mar	Mar	Apr	May	Jun	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Physical Habitat		Maintain						Maintain							
Fish Species		Maintain													

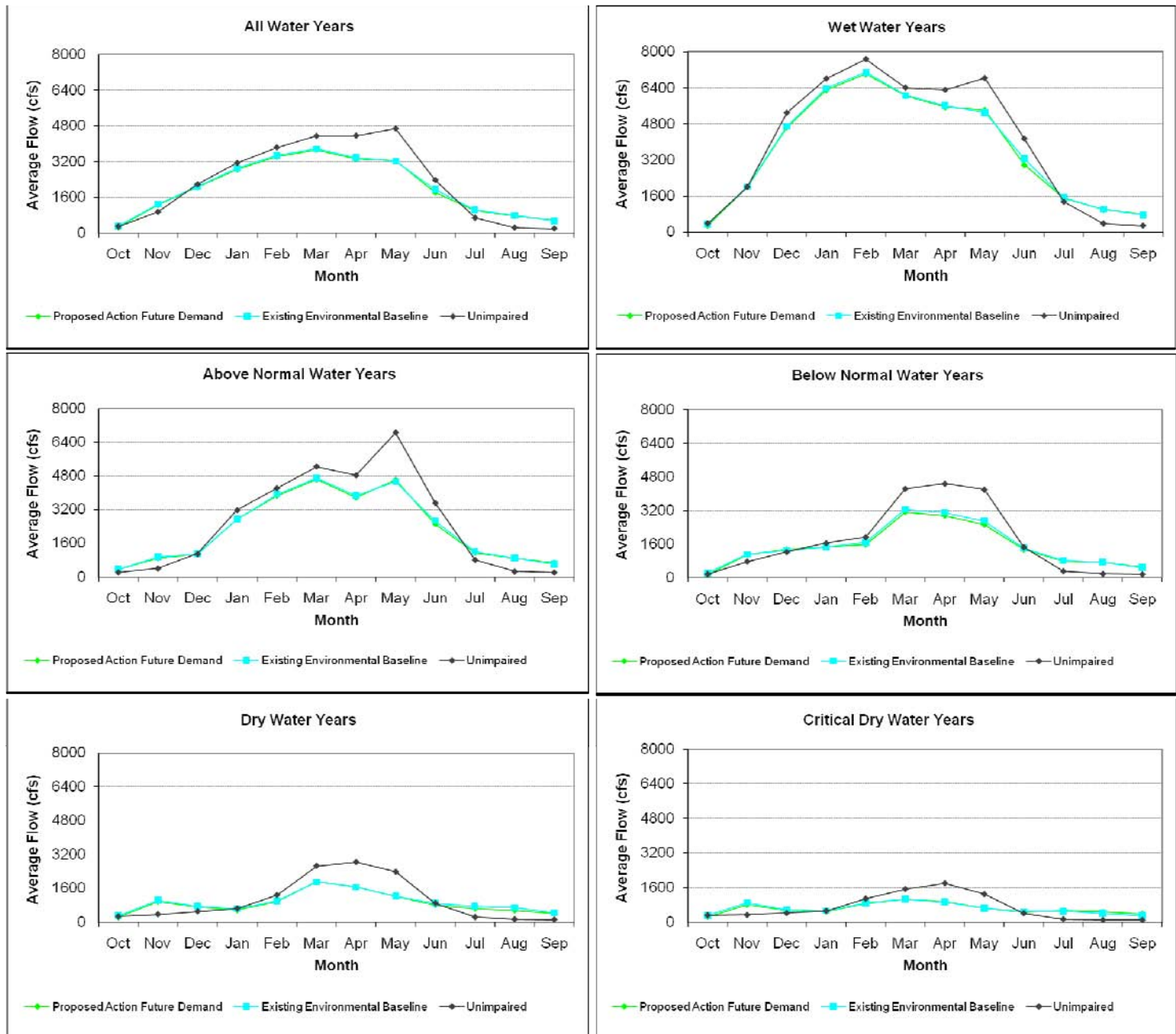
BA/BE Figure 28. Middle Fork American River below Ralston Afterbay (Peaking Reach) Resulting Effects.

Key Considerations	Winter			Spring				Summer/Fall					Winter	
	Jan	Feb	Mar	Mar	Apr	May	Jun	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Channel/Riparian Maintenance Flow														
Initiation of Motion				Maintain									Maintain	
Scouring/Resetting Flow				Maintain									Maintain	
Riparian														
Recruitment (seed setting)						Maintain								
Rainbow Trout														
Distribution							Maintain							
Spawn				Enhance										
Incubation					Enhance									
Adult							Maintain							
Juvenile							Maintain							
Fry							Enhance							
Hardhead/Pikeminnow														
Distribution							Maintain							
Adult							Maintain							
Juvenile							Maintain							
Other Fish Species							Maintain							
Productivity (algae and benthos)							Enhance							
FYLF														
Distribution							Maintain							
Breeding						Maintain								
Tadpoles							Maintain							
Recreation														
Angling							Enhance							
Ramping Rate							Enhance							
Hydrograph														
Fluctuations (reduced)							Enhance							
Seasonal Shape							Maintain							
Water Temperature								Maintain						

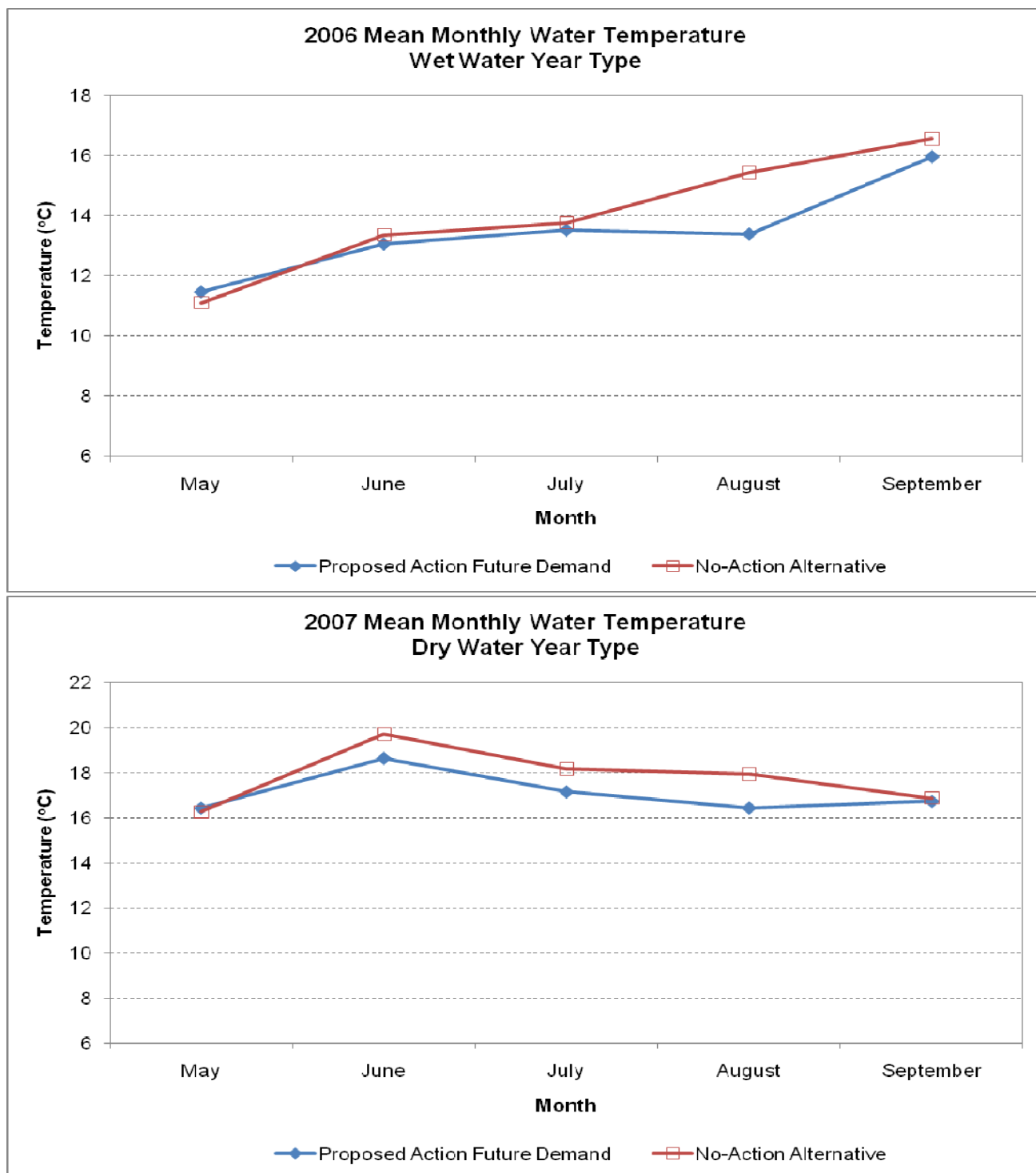
Ralston Afterbay

Key Considerations	Winter			Spring				Summer/Fall					Winter	
	Jan	Feb	Mar	Mar	Apr	May	Jun	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Physical Habitat							Maintain							
Fish Species							Maintain							

BA/BE Figure 29. Average Monthly Flow Into Folsom Reservoir Under the Proposed Action - Future Demand, No-Action Alternative, and Unimpaired Hydrology by Water Year Type.



BA/BE Figure 30. North Fork American River Modeled Mean Monthly Water Temperature at the Folsom Reservoir High Water Mark in a Wet Water Year Type (2006) and Dry Water Year Type (2007) Under the Proposed Action - Future Demand and No-Action Alternative.



MAPS

CONFIDENTIAL

MAPS

**“BA/BE Map 5. Location of Special-Status Plant Populations
in the Vicinity of the MFP”**

**“BA/BE Maps 6a-f. Location of Stebbins’ Phacelia
at MFP Facilities and Features and Recreation Facilities and Features”**

(from Draft Biological Assessment/Biological Evaluation [BA/BE])

These Maps have been removed from this document because they contain the location(s) of special-status biological resources and are considered “confidential” information. Confidential special-status biological resources information is located in Volume 4 which may not be made available to the public pursuant to the Federal Energy Regulatory Commission’s (FERC’s) regulated contained in 36 CFR 385.1112. This information is not maintained in FERC’s Public Reference Room or on the Commission’s electronic library except as an indexed item.

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MAP

“BA/BE Map 14. Bald Eagle Nests and Night Roosts in the Vicinity of the MFP”

(from Draft Biological Assessment/Biological Evaluation [BA/BE])

This Map has been removed from this document because it contains the location(s) of special-status biological resources and is considered “confidential” information. Confidential special-status biological resources information is located in Volume 4 which may not be made available to the public pursuant to the Federal Energy Regulatory Commission’s (FERC’s) regulated contained in 36 CFR 385.1112. This information is not maintained in FERC’s Public Reference Room or on the Commission’s electronic library except as an indexed item.

APPENDIX A

United States Fish and Wildlife Service Species List

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office

**Federal Endangered and Threatened Species that Occur in
or may be Affected by Projects in the Counties and/or
U.S.G.S. 7 1/2 Minute Quads you requested**

Document Number: 110216064500

Database Last Updated: April 29, 2010

Quad Lists

Listed Species

Invertebrates

- Branchinecta conservatio*
Conservancy fairy shrimp (E)
- Branchinecta lynchi*
vernal pool fairy shrimp (T)
- Desmocerus californicus dimorphus*
valley elderberry longhorn beetle (T)
- Lepidurus packardii*
vernal pool tadpole shrimp (E)

Fish

- Hypomesus transpacificus*
delta smelt (T)
- Oncorhynchus (=Salmo) clarki henshawi*
Lahontan cutthroat trout (T)
- Oncorhynchus mykiss*
Central Valley steelhead (T) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)
- Oncorhynchus tshawytscha*
Central Valley spring-run chinook salmon (T) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- Ambystoma californiense*
California tiger salamander, central population (T)
- Rana draytonii*
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Reptiles

- Thamnophis gigas*
giant garter snake (T)

Plants

- Calystegia stebbinsii*
Stebbins's morning-glory (E)
- Ceanothus roderickii*
Pine Hill ceanothus (E)
- Fremontodendron californicum ssp. decumbens*
Pine Hill flannelbush (E)
- Galium californicum ssp. sierrae*
El Dorado bedstraw (E)

Orcuttia viscida

Critical habitat, Sacramento Orcutt grass (X)

Sacramento Orcutt grass (E)

Senecio layneae

Layne's butterweed (=ragwort) (T)

Proposed Species**Amphibians***Rana draytonii*

Critical habitat, California red-legged frog (PX)

Candidate Species**Amphibians***Bufo canorus*

Yosemite toad (C)

Rana muscosa

mountain yellow-legged frog (C)

Mammals*Martes pennanti*

fisher (C)

Plants*Rorippa subumbellata*

Tahoe yellow-cress (C)

Quads Containing Listed, Proposed or Candidate Species:

CLARKSVILLE (511A)

FOLSOM (511B)

ROCKBOUND VALLEY (523B)

PYRAMID PEAK (523C)

LOON LAKE (524A)

ROBBS PEAK (524B)

DEVIL PEAK (525A)

TUNNEL HILL (525B)

GEORGETOWN (526A)

GREENWOOD (526B)

AUBURN (527A)

ROCKLIN (527C)

PILOT HILL (527D)

TAHOE CITY (538B)

HOMEWOOD (538C)

GRANITE CHIEF (539A)

ROYAL GORGE (539B)

BUNKER HILL (539C)

WENTWORTH SPRINGS (539D)

DUNCAN PEAK (540A)

WESTVILLE (540B)

MICHIGAN BLUFF (540C)

GREEK STORE (540D)

DUTCH FLAT (541A)

CHICAGO PARK (541B)

COLFAX (541C)

FORESTHILL (541D)

SODA SPRINGS (555C)

NORDEN (555D)

BLUE CANYON (556C)

CISCO GROVE (556D)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](http://www.fws.gov/sacramento/es/spp_lists/auto_list.cfm). Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern.

However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts.

[More info](#)

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be May 17, 2011.

APPENDIX B

Species Descriptions for Special-Status Species Known to Occur or Potentially Occurring in the Vicinity of the MFP

THREE-BRACTED ONION (*ALLIUM TRIBRACTEATUM*; FSS)

This plant grows in chaparral, lower montane coniferous forest and upper montane coniferous forest from 3,600 to 9,800 feet msl. The MFP is within the known geographic and elevation range of this species however it was not observed during the TERR 2 special-status plant surveys.

NISSENAN MANZANITA (*ARCTOSTAPHYLOS NISSENANA*; FSS)

This plant grows in open, rocky ridges and acidic shale and slate soils in chaparral and closed-cone coniferous forests. It is found in almost pure colonies on hard shale substrate primarily where other shrubs and trees are absent, from 1,450 to 3,600 feet msl. The MFP is within the known geographic and elevation range of this species, but it was not observed during the TERR 2 special-status plant surveys.

WEBBER'S MILK-VETCH (*ASTRAGALUS WEBBERI*; FSS)

Webber's milk-vetch occurs in lower montane coniferous forest, from 2,400 to 3,700 feet in elevation. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys.

BIG-SCALE BALSAMROOT (*BALSAMORHIZA MACROLEPIS* VAR. *MACROLEPIS*; FSS)

This plant grows in chaparral, cismontane woodland, valley and foothill grassland, and vernal moist meadows on sandstone, serpentine, or basalt outcrops at elevations ranging from 300 to 4,600 feet. The MFP is within the known geographic and elevation range of this species, though this species was not observed during the TERR 2 special-status plant surveys.

UPSWEPT MOONWORT (*BOTRYCHIUM ASCENDENS*; FSS)

Upswept moonwort occurs in lower montane coniferous forests near streams, grassy fields, meadows and seeps from 4,800 to 7,300 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.

SCALLOPED MOONWORT (*BOTRYCHIUM CRENULATUM*; FSS)

It grows in lower and upper montane coniferous forests, bogs, fens, and moist meadows from 4,900 to 10,800 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

COMMON MOONWORT (*BOTRYCHIUM LUNARIA*; FSS)

Common moonwort occurs in meadows and seeps, moist riparian areas, subalpine coniferous forest and upper montane coniferous forest from 7,500 to 11,000 feet msl.

The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.

MINGAN MOONWORT (*BOTRYCHIUM MINGANENSE*; FSS)

Mingan moonwort occurs in mesic areas in lower and upper montane coniferous forest, moist riparian areas, and meadows and seeps from 4,000 to 6,700 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.

MOUNTAIN MOONWORT (*WESTERN GOBLIN*) (*BOTRYCHIUM MONTANUM*; FSS)

Mountain moonwort occurs in lower and upper montane coniferous forests and meadows and seeps from 4,500 to 7,000 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

BRANDEGEE'S CLARKIA (*CLARKIA BILOBA* SSP. *BRANDEGEEAE*; FSS)

This species' habitat is chaparral, cismontane woodland, and it often occurs in roadcuts. It grows from 950 to 3,200 feet msl. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys. This species is known to occur in the vicinity of the MFP, although it was not observed in the TERR 2 special-status plant study area. It has been documented by CNDDB in rocky, upland areas along the MFAR river canyon.

BOLANDER'S BRUCHIA (*BRUCHIA BOLANDERI*; FSS)

Bolander's bruchia is an ephemeral moss of alpine or high montane meadows (Norris 2001). This species is endemic to meadows of the Sierra Nevada (Clines 2001). It occurs in mixed coniferous forests on vertical banks of streams, meadows, seeps, and fens in damp soils from 5,000 to 7,500 feet msl (Clines 2001). The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys.

PLEASANT VALLEY MARIPOSA LILY (*CALOCHORTUS CLAVATUS* VAR. *AVIUS*; FSS)

Pleasant Valley mariposa lily occurs in openings, often south-facing slopes and ridgetops, of lower montane coniferous forests with Josephine silt loam and volcanic soils from 1,000 to 6,300 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

CLUSTERED LADY'S-SLIPPER (*CYPRIPEDIUM FASCICULATUM*; FSS)

The clustered lady's-slipper grows in lower montane coniferous forest, serpentine seeps and streambanks, ranging from 500 to 7,200 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, it may occur along Project streams and bypass reaches.

MOUNTAIN LADY'S-SLIPPER (*CYPRIPEDIUM MONTANUM*; FSS)

Mountain lady's-slipper occurs in broad-leaved upland and lower montane coniferous forests in moist areas or on dry shaded slopes with northern aspects and loam soils from 600 to 7,500 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

SUBALPINE FIREWEED (*EPILOBIUM HOWELLII*; FSS)

Subalpine fireweed is a stoloniferous perennial herb found in the evening primrose family. It occurs in mesic areas in subalpine coniferous forest, wet meadows, fens, and mossy seeps from 6,000 to 9,000 feet msl and blooms from July to August. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys.

STARVED FLEABANE (*ERIGERON MISER*; FSS)

This plant occurs in upper montane coniferous forest, rocky soils, from 6,000 to 8,600 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

TRIPOD BUCKWHEAT (*ERIOGONUM TRIPODUM*; FSS)

This species prefers chaparral, cismontane woodlands, often on serpentine outcroppings and grows from 650 to 5,250 feet msl. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys.

DONNER PASS BUCKWHEAT (*ERIOGONUM UMBELLATUM* VAR. *TORREYANUM*; FSS)

Donner Pass buckwheat grows in upper montane coniferous forests, chaparral, and meadows, in volcanic and rocky soils, at elevations ranging from 6,000 to 8,000 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

BROOK POCKET-MOSS (*FISSIDENS APHELOTAXIFOLIUS*; FSS)

Brook pocket-moss grows in lower and upper montane coniferous forest, rock, stream channels and waterfalls from 6,500 to 7,200 feet msl. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches.

BUTTE COUNTY FRITILLARY (*FRITILLARIA EASTWOODIAE*; FSS)

The habitat of this plant is chaparral, cismontane woodland, lower montane coniferous forest (openings), wet and dry slopes red clay or sandy loam, ranging from 100 to 5,000 feet msl. The MFP is within the known geographic and elevation range of this species, but it was not observed during the TERR 2 special-status plant surveys. This species is known to occur in the vicinity of the MFP, although it was not observed in the TERR 2 special-status plant study area. It has been documented by CNDDDB in rocky, upland areas along the MFAR river canyon.

BLANDOW'S BOG-MOSS (*HELODIUM BLANDOWII*; FSS)

Blandow's bog-moss occurs in meadows, seeps, fens, and subalpine coniferous forest; damp soil from 6,500 to 8,900 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

PARRY'S HORKELIA (*HORKELIA PARRYI*; FSS)

This plant prefers habitat of chaparral, cismontane woodland on stony, disturbed sites with slightly acidic soils from 250 to 3,600 feet msl. The MFP is within the known geographic and elevation range of this species, but it was not observed during the TERR 2 special-status plant surveys.

SIERRA VALLEY MOUSETAIL (*IVESIA APERTA* VAR. *APERTA*; FSS)

This plant occurs in Great Basin scrub, lower montane coniferous forest, meadows and seeps, pinyon and juniper woodland, and mesic, usually volcanic vernal pools. It occurs from 4,500 to 7,500 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

DOG VALLEY MOUSETAIL (*IVESIA APERTA* VAR. *CANINA*; FSS)

This plant's habitat is openings in lower montane coniferous forests and in meadows and seeps. It prefers volcanic and rocky soils and grows from 4,500 to 7,500 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

PLUMAS MOUSETAIL (*IVESIA SERICOLEUCA*; FSS)

This plant occurs in Great Basin scrub, lower montane coniferous forest, meadows and seeps, and vernal pools from 4,500 to 7,500 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

WEBBER'S MOUSETAIL (*IVESIA WEBBERI*; FC, TNF, FSS)

This species' habitat includes Great Basin scrub, lower montane coniferous forest, and sandy or gravelly soils from 4,500 to 7,500 feet msl. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys.

CANTELOW'S LEWISIA (*LEWISIA CANTELOVII*; FSS)

Growing in broadleaf upland, chaparral, cismontane woodlands, and lower montane coniferous forests, this plant's elevation range is from 1,000 to 4,500 feet msl. The MFP is within the known geographic and elevation range of this species, but it was not observed during the TERR 2 special-status plant surveys.

HUTCHISON'S LEWISIA (*SUBSPECIES HUTCHISONII*) (*LEWISIA KELLOGGII* SSP. *HUTCHISONII*; FSS)

This plant occurs in decomposed granite and slate soils (volcanic soils), at the north sides of passes and ridge-tops from 5,200 to 7,000 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

HUTCHISON'S LEWISIA (*SUBSPECIES KELLOGGII*) (*LEWISIA KELLOGGII* SSP. *KELLOGGII*; FSS)

This species occurs in upper montane coniferous forest, rocky open ridges and granitic and volcanic balds from 5,000 to 9,000 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

SAW-TOOTHED LEWISIA (*LEWISIA SERRATA*; FSS)

Saw-toothed lewisia's habitat is broad-leaved upland forest, lower montane coniferous forest, and riparian forest on mesic steep, nearly vertical cliffs and inner gorges from 2,800 to 4,800 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys. However, this species may occur along Project streams and bypass reaches. This species is known to occur in the vicinity of the MFP, although it was not observed in the TERR 2 special-status plant study area. It has been documented by USDA-FS and CNDDDB in rocky, upland areas along Long Canyon Creek.

QUINCY LUPINE (*LUPINUS DALESIAE*; FSS)

Quincy lupine grows in lower and upper montane coniferous forests from 3,000 to 8,000 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

THREE-RANKED HUMP MOSS (*MEESIA TRIQUETRA*; FSS)

This moss species occurs in acidic montane meadows in coniferous forest, especially in meadows with peat moss, from 6,000 to 8,000 feet msl (Clines 2001) from 4,250 to 9,700 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

BROAD-NERVED HUMP MOSS (*MEESIA ULIGINOSA*; FSS)

This moss species occurs in saturated meadows in mixed coniferous forest and red fir/lodgepole pine forests between 7,500 to 9,000 feet msl (Clines 2001). It likes bogs, fens, and rock fissures, upper montane and subalpine coniferous forests, meadows and seeps in damp soil from 4,250 to 9,500 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

ELONGATE COPPER-MOSS (*MIELICHHOFERIA ELONGATE*; FSS)

This plant occurs in montane woodland, rock with copper/heavy metals from 1,500 and 4,250 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

FOLLETT'S MOUNTAINBALM (*MONARDELLA FOLLETTI*; FSS)

Follett's mountainbalm is found in lower montane coniferous forests in rocky, serpentine soils at elevations ranging from 1,650 to 6,550 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

YELLOW BUR NAVARRETIA (*NAVARRETIA PROLIFERA* SSP. *LUTEA*; FSS)

The yellow bur navarretia grows in chaparral, cismontane woodland; dry rocky flats, often on Ledmount soils; on lava caps or other openings, rocky ridgelines, saddles, and eroding ephemeral drainages. It's elevation range is 2,300 to 5,000 feet msl. The MFP is within the known geographic and elevation range of this species, but it was not observed during the TERR 2 special-status plant surveys.

LAYNE'S RAGWORT (*PACKERA LAYNEAE* [*SENECIO LAYNEAE*]; FT, FSS)

Layne's ragwort is a plant in the Aster family that grows in chaparral and cismontane woodland on rocky, gabbroic, serpentine or ultramafic soils from 650 to 3,400 feet msl. It has yellow flowers that bloom between April and July. The MFP is within the known geographic and elevation range of this species, but it was not observed during the TERR 2 special-status plant surveys.

VEINED WATER LICHEN (*PELTIGERA HYDROTHYRIA* [*HYDROTHYRIA VENOSA*]; FSS)

Veined water lichen is medium-sized gelatinous lichen with cyanobacteria present throughout the thallus (i.e., the vegetative body). It is lead-colored to brownish or blackish, with irregularly cut, fan-shaped lobes. It is the only gelatinous lichen with distinct veins and it appears in dark, ruffled masses (Derr, Date Unknown). It occurs in cold, clear, unpolluted streams in mixed coniferous forests from 4,000 to 8,000 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

CLOSE-THROATED BEARDTONGUE (*PENSTEMON PERSONATUS*; FSS)

This species grows in chaparral and upper and lower montane coniferous forests from 3,400 to 7,000 feet msl. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys.

STEBBINS' PHACELIA (*PHACELIA STEBBINSII*; FSS)

Stebbins' phacelia occurs in cismontane woodland and lower montane coniferous forest, and meadows and seeps. It is found on dry, open rocky sites (bedrock outcrops, rubble, or talus) on ledges and moderate or steep slopes as well as inner gorges and near seeps on and TNF. It grows from 2,000 to 7,050 feet msl and is known to occur within the MFP. A total of 49 populations (112 acres) were documented during the TERR 2 – Special-Status Plants surveys (PCWA 2009) and subsequent surveys at new gaging stations to be added to the MFP. Known populations include:

- Two small populations in the vicinity of Brushy Creek (approximately 200 individuals)
- Four individuals in the vicinity of the Rubicon River at Ellicott Bridge
- 1 individual in the vicinity of French Meadows Reservoir 44 populations in the vicinity of Hell Hole Reservoir (approximately 2.4 to 4.7 million individuals)

Additional populations are documented by USDA-FS and CNDDDB in rocky, upland areas along the Rubicon River, Long Canyon Creek, and Duncan Creek.

STICKY GOLDENWEED (*PYRROCOMA LUCIDA*; FSS)

This plant occurs in Great Basin scrub, lower montane coniferous forest, and meadows and seeps. It may grow in alkaline clays. Its elevation range is from 2,250 to 6,250 feet msl. The MFP is within the known geographic and elevation range of this species. This species was not observed during the TERR 2 special-status plant surveys.

TAHOE YELLOW CRESS (*RORIPPA SUBUMBELLATA*; FC)

This species grows in lower montane coniferous forests, meadows and seeps, sandy (granitic) lake margins at elevations ranging from 6,050 to 6,250 feet msl. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys.

HOWELL'S TAUSCHIA (*TAUSCHIA HOWELLI*; FSS)

This species occurs in subalpine /upper montane coniferous forest, granitic, gravelly soils. It grows at 5,500 to 8,500 feet msl. The MFP is within the known geographic and elevation range of this species, though it was not observed during the TERR 2 special-status plant surveys.

SPECIAL-STATUS WILDLIFE**FISH****HARDHEAD (*MYLOPHARADON CONOCEPHALUS*; FSS)**

The hardhead range extends from the Pit River (south of the Goose Lake drainage), Modoc County, in the north to the Kern River, Kern County in the south. They are also present in the Russian River, however they are absent from San Francisco Bay streams except for the Napa River. Hardhead are extensively distributed in the Sacramento-San Joaquin drainage. In the Sacramento drainage the hardhead is present in the Sacramento River as well as in the majority of large tributary streams. The species is absent from valley reaches of the San Joaquin River in the San Joaquin drainage.

Hardhead are typically found in undisturbed areas of larger low- to mid-elevation streams, however they are also found in the Sacramento River at low elevations and in its tributaries to about 1,500 meters. Optimal temperatures for hardhead appear to be 24-28°C, and most streams in which they occur have summer temperatures warmer than 20 °C. They prefer clear, deep (>80 cm) pools and runs with slow velocities and sand-gravel-boulder substrates. Hardhead are always found in connection with Sacramento pikeminnow and usually with Sacramento sucker.

Hardhead are most active in the early morning and evening when feeding. They are omnivores that forage for aquatic plant material on the bottom and benthic invertebrates but also eat drifting algae and insects. Hardhead generally reach 6-8 cm by the end of their first growing season, 10-12 cm in their second, and 16-17 in their third. In the American River they reach 30 cm in 4 years. They mature in their third year and mainly

spawn in April and May, however in some foothill streams spawning may extend into August.

AMPHIBIANS

YOSEMITE TOAD (*BUFO CANORUS*; FC, FSS, CSC)

Yosemite toad associates with montane meadows, streams, ponds, and lakes in lodgepole pine forests in the Sierra Nevada from 6,400 to 11,300 feet (Camp 1916; Mullally 1956; Sherman and Morton 1993). Along the western slope of the Sierra Nevada, the northernmost limit of this species is Heather Lake in El Dorado County, and the southernmost limit is approximately five miles south of Kaiser Pass in Fresno County (Karlstrom 1962). This species co-exists with its close relative, the western toad (*Bufo boreas*), near Upper Blue Lake in Alpine County (Karlstrom 1962). Excluding this location, both species are thought to be separated by several thousand feet msl throughout the remainder of its distribution (Karlstrom 1962). In Fresno County, Yosemite toad at Kaiser Peak Meadow (8,000 feet in elevation) and western toads at Huntington Lake (7,000 feet msl) are separated by approximately 1,000 feet msl. Much of the information on the natural history of this toad is the result of studies conducted at Tioga Pass, Mono County and at Kaiser Peak Meadow, Fresno County.

The preferred habitat of Yosemite toad is high elevation montane meadows, although individuals do associate with slow flowing, low-gradient stream habitats, such as pools and flatwater, near or adjacent to meadows. Individuals are rarely, if ever, seen in swiftly flowing habitats like cascades or exposed habitats like bedrock sheets. The substrate in streams that meander through montane meadows is predominantly composed of fines occasionally interspersed with sand. Coarse material is rare and probably holds little value for the Yosemite toad, which breeds in shallow pools in meadows during spring and primarily uses stream habitats during the drier portions of the year. Because Yosemite toad have a high association with low gradient streams adjacent to meadows, cover types more typical to those habitats were considered to have higher importance in providing refuge sites. Specifically, aquatic and terrestrial vegetation, woody debris, and undercut banks would be more common in meadow-stream complexes and would provide crucial protection from predators.

Adults emerge from winter hibernation in rodent burrows or beneath rocks and willows and move to recently formed snowmelt ponds in late spring (Kagarise Sherman 1980, cited in Davidson 1994). Adults are diurnal and prefer to associate with open areas. Like other amphibians, Yosemite toad rely primarily on basking in open, sunny areas to elevate their internal body temperature and increase their general activity level. At sunset, they retreat to subterranean rodent burrows (Mullally 1953). Adults are active on the surface for approximately four months.

Breeding occurs from May to mid-August in shallow snowmelt ponds or pools in slow moving streams (Mullally 1953; Karlstrom 1962; Kagarise Sherman 1980, cited in Davidson 1994). In late summer, tadpoles are found on the muddy bottoms of shallow, warm pools, or in small muddy depressions in meadows. Tadpoles exhibit a daily

activity pattern similar to that of adults. During daYosemite toadime, tadpoles associate with the shallow margins of small pools (presumably where water temperature is warmer), but retreat to deeper water at night and remain quiescent on the benthos (Mullally 1953). Metamorphosis generally occurs in early fall, but some tadpoles at higher elevations probably overwinter (Mullally 1956).

There are no occurrences of Yosemite toad in the MFP. As stated previously, the current geographic range for Yosemite toad extends generally from Inyo to Mono counties within the Sierra Nevada (USFWS 2010), from approximately 6,400 to 11,300 feet msl. The nearest known populations are along southeast corner of the where it borders the Stanislaus National Forest (USFWS 2009), approximately 43 miles south of the MFP. Because the MFP is north of its known range, the Yosemite toad is unlikely to occur within Project boundaries.

Mating and egg laying occurs from March to July. Habitat association and activity patterns of tadpoles in lakes and streams have not been investigated. Tadpoles overwinter for two to three years at high elevation sites before metamorphosis is complete (Wright and Wright 1949). In summary, relatively little information is known about the habitat associations of the different life history stages of this high elevation species.

FOOTHILL YELLOW-LEGGED FROG (*RANA BOYLI*, FSS, CSC)

The foothill yellow-legged frog (FYLF) is a stream-dwelling frog native to California and Oregon (Storer 1925, 1955). As a stream obligate species, adult and juvenile FYLF primarily associate with pool and riffle habitats with gently to moderately flowing water. Tadpoles are often found in shallow near-shore habitats such as eddies, backwaters, and other low velocity areas. In eastern California it ranges from the Sierra Nevada foothills to approximately 4,500 feet. Few studies have investigated the natural history of the FYLF. Jennings and Hayes (1985) quantified the habitat associations of this species in the Sierra Nevada. In a survey of 29 streams in the Sierra Nevada, the FYLF was found to be primarily associated with similar habitat, substrate, and canopy as reported for populations in streams and rivers of the Coast Range. However, they are also found in other stream habitats ranging from small, rocky, high gradient streams no more than 1.5 feet wide, to areas where small tributaries connect with large rivers in the Sierra Nevada (Van Wagner 1996).

The FYLF generally associates with low gradient streams with moderate streamflow over coarse substrates. In the Sierra Nevada, individuals have also been observed in steep gradient reaches in habitats such as cascades and bedrock waterfalls. Although such habitats are not optimal for breeding, they may be used in spring while adults migrate downstream to reach breeding habitat near the confluence with larger streams. Coarse material such as cobbles, boulders, and large woody debris provide suitable sites for oviposition. Larger substrates typically remain stable in spring when streamflow is high as the winter snowpack melts. During the summer foraging season when flows are low, coarse material protruding above the channel bed provides optimal sites for basking and feeding. Although individuals have been found associated with finer

substrates, such as sand and silt near main channel pools or around side channel pools, this association appears to be relatively low compared to coarse substrates. The canopy in streams that support this species is usually semi-open with riparian vegetation creating dappled shade, thus providing cool cover during the hottest part of the day as well as open areas for basking (Van Wagner 1996). Fitch (1938) suggested that this species may be limited by dense canopy and Moyle (1973) reported that individuals were not found at sites with > 90 percent canopy.

Although usually found in perennial streams, adults will inhabit isolated pools when water flow declines in summer (Fitch 1938, cited in Hayes and Jennings 1989). The movements of juveniles can be quite extensive in summer and late fall, as foraging individuals into diverse habitats (Van Wagner 1996). Therefore, the stream habitat used by FYLF throughout their life cycle is complex. Breeding occurs in early spring near tributary confluences in larger river systems in the Coast Range (Kupferberg 1996) and in shallow, low velocity areas in small streams in the Sierra Nevada (Van Wagner 1996). Mating occurs from March to July and egg laying occurs from April to July. Egg masses are attached to cobbles, boulders, and other instream structures at a depth of 4 to 24 inches and in slow to moderately flowing water as low as 9.8° C (Storer 1925, Zweifel 1955, Lind et al. 1996, Lind unpublished data). Hatching occurs five days to 3 weeks after the eggs are laid depending on water temperature. Tadpole stage occurs from May through September.

CALIFORNIA RED-LEGGED FROG (*RANA AURORA* DRAYTONII; FT, CSC)

USFWS listing of the California red-legged frog (CRLF) as a threatened species under the ESA was effective on June 24, 1996. On March 13, 2001, a designation of critical habitat was made for the CRLF (USFWS 2001). A recovery plan for CRLF was issued by USFWS in February 2002 (USFWS 2002). The objective of the recovery plan is to reduce threats and improve the population status of CRLF sufficiently to warrant delisting. CRLF critical habitat was revised between 2004 and 2010, with the Final Rule for the Revised Designation of Critical Habitat for California Red-Legged Frog being issued on March 17, 2010. The primary constituent elements of critical habitat for CRLF are aquatic and upland areas where suitable breeding and non-breeding habitat is interspersed throughout the landscape and is interconnected by unfragmented dispersal habitat. To be considered critical habitat, an area must include two (or more) suitable breeding locations, a permanent water source, associated uplands surrounding these water bodies up to 300 feet from the water's edge, all within 1.25 miles of one another and connected by a barrier free dispersal habitat that is at least 300 feet wide. Breeding locations consist of quiet streams and permanent, deep, cool ponds with overhanging and emergent vegetation below 4,000 feet above mean sea level (msl). CRLF is known to occur adjacent to breeding habitats in riparian areas and heavily vegetated streamside shorelines, and non-native grasslands.

Sierran streams historically supported populations of red-legged frog; however, these populations have been eliminated. The CRLF is threatened by a variety of human activities. These include destruction or degradation of habitat by urbanization, agriculture, construction of reservoirs, mining, livestock grazing, timber harvesting, and

off-road vehicle use. Predation by introduced species such as bullfrogs (*Rana catesbeiana*), African clawed frog (*Xenopus laevis*), red swamp crayfish (*Procambarus clarkii*), signal crayfish (*Pacifasticus leniusculus*), catfishes (*Ictalurus* spp.), and mosquitofish (*Gambusia affinis*) (Jennings and Hayes 1994). Natural threats to the CRLF are predation by raccoons (*Procyon lotor*), and garter snakes, (*Thamnophis* spp.), and diseases.

CRLF may occur in appropriate habitat within the vicinity of the MFP. Study area boundaries are within the known geographic and elevational range of this species. There is only one known CRLF record within 1 mile of the study area. This record is a single adult CRLF that was observed on the western end of Ralston Ridge in the right-of-way below a PG&E transmission line. No individuals have been observed at this location since 2001. This site was burned in the Ralston Ridge wildfire of 2006. The closest known population outside the MFP is located on private land more than a mile north of the MFP at Michigan Bluff.

There is no critical habitat for CRLF in the vicinity of the MFP. Based on the 2010 designation, the closest critical habitat units are the ELD-1 unit, located in El Dorado County approximately 30 miles south of the MFP, and the NEV-1 unit, located in Nevada County approximately 40 miles to the northwest of the MFP (USFWS 2010). Based on a CRLF site assessment conducted for the MFP (BA/BE Appendix C), potential aquatic breeding habitat for CRLF is present at three off-channel ponds at Horseshoe Bar. However, no CRLF individuals were identified during protocol-level surveys conducted for the MFP (BA/BE Appendix D).

MOUNTAIN YELLOW-LEGGED FROG (*RANA MUSCOSA*; FC, FSS)

The mountain yellow-legged frog (MYLF) is endemic to the Sierra Nevada and Transverse ranges in California (Storer 1925). This species is highly aquatic and is closely associated with low-gradient streams, meadows, ponds, and lakes from 4,500 to 12,000 feet msl in the Sierra Nevada. Adults are most active during the daytime and often bask in open areas (Bradford 1984). The MYLF is most often found in lakes and streams with gently sloping banks that are moderately rocky and interspersed with sedges (*Carex* spp.), grasses, and low clumps of willows (*Salix* spp.) (Mullally and Cunningham 1956). The MYLF is a pond-breeding species that associates primarily with lakes and ponds throughout its southern range and with streams throughout its northern range (J. Wild pers. com.). Due to harsh winters and high spring runoff in the higher elevations of the MYLF's range, only large pools and ponds that maintain the low velocities required through metamorphosis are used for breeding. Tadpoles may transform after their second summer, thus the tadpoles require still, deep-water with fine sediments for overwintering. Adults are commonly observed basking at the edge of pools and along shallow sloped stream margins. Like other pond-breeding frogs and toads, the MYLF is not well adapted to swift flowing water. However, individuals have been noted basking on open, sunny cobbles adjacent to gently flowing riffles during dispersal season.

In the southern Sierra Nevada, adults initially move to breeding sites at thawing lakes and ponds in late spring, and use streams for dispersal to other available aquatic habitats by mid-summer. Population density is greatest at fish-less lakes that are deeper than 3 feet (important for overwintering) and have warm water habitat along the shore (Pope and Matthews 2001). Adults exhibit a seasonal substrate preference at lakes. Matthews and Pope (1999) reported that adults associate more often with a combination of rock and silt substrates, but associated almost exclusively with rocky habitats in the fall. Other references identify stream segments with rock substrates as preferred (Mullally and Cunningham 1956).

In the northern Sierra Nevada, streams are the preferred habitat for breeding and foraging and are also important for dispersal. However, this species tends to avoid small creeks, perhaps because they are not deep enough to provide adequate habitat for breeding, foraging, and overwintering for adults and tadpoles. In late summer when streams are intermittent, adults often congregate in isolated pools. Stream segments where the bank was less than approximately 8 inches in vertical height harbored the most dense population of adults (Mullally and Cunningham 1956). The MYLF often basks in areas with little to moderate canopy to raise their body temperature and elevate their general activity level. Open, sunny reaches with large exposed cobbles, boulders, or bedrock provide ideal basking sites. Due to lower average temperatures at high elevation, reaches with little to no canopy are preferred. Habitats with moderate canopy allow limited sunlight to reach the stream surface, whereas dense canopies virtually block sun penetration.

There are no occurrences of MYLF in the MFP. The current geographic range for MYLF includes high elevation lakes and streams (e.g., above 10,000 feet msl) in both the Tahoe and Eldorado National Forests, including populations in the headwaters and headwater tributaries of the Rubicon and South Fork American rivers (USFWS 2009), approximately 17 miles east of the MFP. Because the MFP does not include high-elevation lakes and streams, and because the MFP is located west of the known range, MYLF is unlikely to occur within Project boundaries.

REPTILES

NORTHWESTERN POND TURTLE (*ACTINEMYS MARMORATA MARMORATA*; FSS, CSC)

The Northwestern pond turtle is a subspecies of the western pond turtle (WPT), which ranges from Baja California to Washington and inland into western Nevada. In the Sierra Nevada, it historically occurred in most of the major drainages along the western slope. Its elevational distribution is from sea level to approximately 6,000 feet, but most populations occur below 4,000 feet (Holland 1991a). Populations found between 4,500 and 6,000 are expected to be transplants (Jennings and Hayes 1994). This turtle occurs in marshes, perennial and intermittent streams, rivers, canals, ponds, vernal pools, and reservoirs, but also can be found nesting or overwintering in adjacent upland habitats (Storer 1930, Holland 1991a, Reese and Welsh 1997). The presence of WPT in aquatic habitat is dependent upon several factors, including distance to the nearest

natural water source with a turtle population, structure of the habitat, degree of habitat disturbance, and the presence of suitable basking sites and refugia (Holland 1991a).

The WPT is almost exclusively found in pool and backwater habitats. Their life history strategy focuses entirely on still water and low velocity conditions, and individuals are not well adapted to swiftly flowing currents. In low gradient stream systems, the WPT is more often observed basking on sediments composed of fines than atop coarse materials. The presence of potential basking sites, such as large woody debris in particular, adjacent to or in deep pools with aquatic vegetation can be used to predict the presence of WPT. As with amphibians, basking is a frequent activity, and adjacent deep pools with underwater cover sites provide protection from predators. Basking is an important behavioral adaptation among reptiles that allows them to raise their body temperature to increase their general activity level. As with other reptiles, the WPT often basks in open, sunny areas. This species occurs in intermittent and perennial streams, but permanent streams support larger populations (Holland 1991a). In California's Trinity River, favorable habitat for the WPT is characterized by warm, deep, slow flowing pools with underwater cover and basking sites (Reese and Welsh 1998). Holland (1991a) reported that this species is often found in quiet backwater habitats in streams. Such habitats provide shelter from predators and offer basking sites for thermoregulation. The WPT is uncommon in high gradient streams perhaps because water temperature, current velocity, food resources, or any combination may limit their local distribution (Holland 1991a).

Perennial wetlands and slow moving creeks and ponds with overhanging vegetation up to 6,000 feet; suitable basking sites such as logs and rocks above the waterline. May occur in appropriate habitat. Study area boundaries are within the known geographic and elevational range of this species. Known to occur within the watershed on the Middle Fork American River just south of Ralston Afterbay Dam.

BIRDS

NORTHERN GOSHAWK (*ACCIPITER GENTILI*; FSS)

The northern goshawk inhabits middle to high elevation mature, dense coniferous forests throughout the east and west sides of the Sierra. It occurs in the foothills during winter, in northern deserts in pinyon-juniper woodland, and in low elevation riparian habitats. Optimal habitat contains trees for nesting, a closed canopy (>50%) for protection and thermal cover, and open spaces allowing maneuverability. In the Sierra Nevada, nesting occurs from 2,500 feet in ponderosa pine/mixed-conifer habitat to 10,000 feet in red pine and lodgepole pine habitat (USFS 2001). Nest areas, often in trees along drainages, are characterized by dense stands of large diameter trees with interconnected canopies. Nests are usually on north slopes near water in the densest parts of stands, but close to openings and are placed in live trees, but sometimes snags (USFS 2001). Nests in live trees are usually placed at or just below the lower portion of the canopy in a crotch (USFS 2001). Nesting season begins in March. It feeds mostly on birds, using snags and dead treetops as observation platforms.

Northern goshawks are known to occur in the MFP. One adult and two juvenile northern goshawks were observed by biologists during MFP relicensing studies in the vicinity of the South Fork Long Canyon Diversion Pool. However, there are no northern goshawk nests within 500 feet of any Project facilities and features or Project recreation facilities and features.

BALD EAGLE (*HALIAEETUS LEUCOCEPHALUS*; FEDERAL DELISTED [FD])

Bald eagle (*Haliaeetus leucocephalus*; Federal Delisted [FD] as of August 9, 2007, Forest Service Sensitive [FSS], United States Fish and Wildlife Service [USFWS] Bird of Conservation Concern [BCC], State of California Endangered [SE], California Species of Concern [CSC]).

The breeding range of bald eagles formerly included most of the North American Continent, but bald eagles now nest mainly in Alaska, Canada, the Pacific Northwest states, the Great Lake states, Florida, and Chesapeake Bay. The winter range of the bald eagle is similar to the breeding range, but extends mainly from southern Alaska and southern Canada southward (USFWS 1986). Bald eagles are permanent residents and uncommon winter migrants throughout the state of California. They breed primarily in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties (California Department of Fish and Game [CDFG] 2002B). The breeding range is primarily in mountainous habitats next to reservoirs, in the Central Coast Range, and on Santa Catalina Island. About half of the wintering population is found in the Klamath Basin (CDFG 2002B). Bald eagles forage near large aquatic ecosystems such as lakes, reservoirs, or free flowing rivers. Bald eagle nests are usually located in uneven-aged stands with old-growth components (USFWS 1986). Nesting usually occurs in large trees along shorelines in relatively remote areas. Breeding occurs February through July, with peak activity occurring in March through June. Average clutch size is two. Incubation lasts approximately 35 days and fledging takes place at 11 to 12 weeks of age. Parental care may extend to 11 weeks after fledging. Bald eagles become sexually mature at four to five years of age.

Bald eagle populations have been on the rise over the past 25 years. There was a ten-fold increase in population from 1963 to 1999. The number of occupied breeding areas in North America increased by 462 percent from 1974 to 1994 (USFWS 1999a). In California, CDFG has coordinated annual statewide breeding surveys of bald eagles which have shown a long term increase in the population and range since surveys began in 1973. The breeding range increased from eight counties in 1981 to 27 counties currently (CDFG 2002B).

In 1940, the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668) was passed. This act led to a partial recovery of the species. In the late 1940's, the species population plummeted due to reproductive failure from the widespread use of DDT, loss of habitat, and disturbances related to human activities. In response to this, bald eagles in the lower 48 states were listed as endangered under the Endangered Species Protection Act of 1966 (16 U.S.C. 668aa-668cc). Populations continued to decline and in 1978 bald eagles were listed as endangered under the Endangered Species Act

(ESA) (16 U.S.C. 1531-1544) (USFWS 1978). The USFWS released a recovery plan in 1986 (USFWS 1986). Because of the increase in the bald eagle population and range, the species was downlisted to threatened status in July of 1995 (50 CFR Part 17) (USFWS 1995). A proposed rule to remove the species from listing status was made in July of 1999 (50 CFR Part 17) (USFWS 1999a). Bald eagles were delisted on August 9, 2007. Following the delisting of bald eagles by USFWS on August 9, 2007, USFWS issued the National Bald Eagle Management Guidelines (USFWS 2007) to provide recommendations for protection of bald eagles on private and public lands. The Guidelines recommend that certain activities be restricted within 660 feet of bald eagle nests, and also provide general guidelines for modifying activities in the vicinity of bald eagle roosts. The bald eagle is also protected under the Migratory Bird Treaty Act of 1918 (16 U.S.C. Sections 703-712) and the Eagle Act.

Bald eagles are known to occur within the study area. Numerous bald eagle detections were made at Hell Hole Reservoir during TERR 5 bald eagle surveys, including one nest sight at the upper end of Hell Hole Reservoir. Bald eagles were also detected during TERR 5 surveys along the MFAR, the Rubicon River, and Ralston Afterbay. Records for this species include Hell Hole Reservoir; Ralston Afterbay; MFAR approximately 3 miles downstream of the Ralston Afterbay Dam; Gerle Creek Divide Reservoir; Rubicon River approximately 2 miles downstream of the confluence with the South Fork Rubicon River; Pilot Creek near its confluence with the Rubicon River; and Otter Creek near its confluence with the MFAR. In addition, a bald eagle was observed in the summer of 2006 at Hell Hole Reservoir (Ransom pers. comm., 2007).

GREAT GRAY OWL (*STRIX NEBULOSA*; FSS)

Great gray owls nest in montane mixed conifer and red fir forests, and forage in nearby montane wet meadows, from 4,500-7,500 feet msl (Beck and Winter 2000). Their distribution includes the Sierra Nevada, Cascade Range, and Modoc Plateau in California, but they are rare throughout California and only isolated populations are known to occur (Beck and Winter 2000). Nesting habitat of the great gray owl consists of mid- or late- succession conifer forests containing large, broken-top snags in sufficient numbers to provide nest sites and areas with 60 to 100 percent multi-storied canopy, situated within 300 yards of montane meadows or grass/forb forage types (Beck and Winter 2000). Foraging habitat requires meadows or openings that have sufficient herbaceous cover to support pocket gophers and microtine rodents and that are at least 10 acres in size (Beck and Winter 2000). Foraging habitat includes meadows and meadow complexes consisting of small “stringer” meadows that total at least 10 acres when meadows occur within ½ mile of one another (Beck and Winter 2000). In the Sierra Nevada of California, nesting chronology is dependent upon elevation, generally occurring from February to June in low elevations, March to July in middle elevations, and April to August in high elevations. The courtship and incubation periods are approximately 30 days each. Great gray owls typically lay only two to three eggs per clutch, with usually only one to two chicks successfully fledging. Fledglings leave the nest 26 to 28 days after hatching (Beck and Winter 2000).

Great gray owls are not known to breed in the vicinity of study area boundaries, though they are potential migrants to areas with appropriate habitat. Breeding populations in California are concentrated in Del Norte, Humboldt, Siskiyou, and Modoc counties, with smaller, isolated breeding populations also occurring in the central Sierra Nevada. The nearest CNDDDB record is 30 miles south near Leoni Meadows in the (CNDDDB 2007).

CALIFORNIA SPOTTED OWL (*STRIX OCCIDENTALIS OCCIDENTALIS*; FSS, MIS, BCC)

The California spotted owl occurs in dense, old growth, multi-layered mixed conifer, redwood, Douglas fir, and oak woodland habitats, from sea level up to approximately 7,600 feet. In the Sierra National Forest, this species uses foothill riparian/hardwood, ponderosa pine/hardwood, mixed-conifer forest, red fir forest, and east side pine forest (USFS 2001). It prefers large trees and high canopy cover for nesting and foraging areas. Foraging is most common in intermediate to late successional forests with greater than 40 percent canopy cover and a mixture of tree sizes, some larger than 24 inches in dbh (USFS 2001). Nesting habitat contains a dense canopy cover (>70%) with medium to large trees and a multi-storied structure. This species prefers stands with significantly greater canopy cover, total live tree basal (base) area, basal area of hardwoods and conifers, and snag basal area for nesting and roosting (USFS 2001). Nests are located in cavities or broken treetops. Nesting season occurs from February to September.

California spotted owls are known to occur in the MFP. One California spotted owl nest occurs within 500 feet of a Project road, the Middle Fork Interbay Dam Road.

WILLOW FLYCATCHER (*EMPIDONAX TRAILLII* [BREWSTERI]; FSS, BCC)

The willow flycatcher is a rare to locally uncommon summer resident in wet meadow and foothill and montane riparian habitats from 2,000 to 8,000 feet in the Sierra Nevada and Cascade Range. This species is most abundant in broad, open river valleys or large mountain meadows with extensive thickets of low, dense willows, which are required for nesting and roosting. It may still nest elsewhere in lowland California, as in San Diego County. It is a common spring (mid-May to early June) and fall (mid-August to early September) migrant at lower elevations, primarily in riparian habitats throughout the state exclusive of the North Coast. An open cup nest is placed in an upright fork of a willow or other shrub, or occasionally on a horizontal limb, at a height of 1.5 to 10 feet. The species is monogamous. Peak egg laying occurs in June, incubation lasts 12 to 13 days, and clutch size averages 3 to 4 eggs. It is probably single-brooded. Both sexes care for artificial young. Fledging age is 13 to 14 days.

Willow flycatchers are a potential summer (breeding) resident in appropriate habitat within the MFP. USDA-FS specifically defines willow flycatcher habitat (i.e., willow flycatcher planning areas) as wet or moist meadows supporting woody vegetation, particularly willows (USDA-FS 2004), with meadows 15 acres in size or greater given management emphasis. One area of habitat meeting this definition has been identified, just outside the vicinity of the MFP, located approximately 3.5 miles to northeast of Hell Hole Reservoir.

MAMMALS

PALLID BAT (*ANTROZOUS PALLIDUS*; FSS)

This bat is a year-round resident in arid desert areas, grasslands and oak savanna, coastal forested areas, and coniferous forests of the mountain regions of California. Roost sites are typically rock outcroppings, caves, hollow trees, mines, buildings, and bridges (Hermanson and O'Shea 1983). Pallid bats make use of similar structures for night roosting and will use more open sites such as eaves, awnings, and open areas under bridges for feeding roosts. Pallid bats are largely inactive in the winter months, and there is evidence for both hibernation and migration. Hibernation aggregations tend to be much smaller than summer aggregations. Pallid bats have been observed foraging during the winter when prey is available (Hermanson and O'Shea 1983). Copulation occurs in the fall, usually October through December, although in coastal California copulation has been observed as late as February. Females store the sperm, and ovulation occurs the following spring. Parturition timing is determined by local climate, and embryonic development usually takes about nine weeks with birth occurring in May or June. Twins are the norm in northern California, but in other areas the pallid bat is known to have triplets. Maternity colonies range from 20 to 200 individual adult bats. Males roost in much smaller groupings (Hermanson and O'Shea 1983). The pallid bat requires open habitat for foraging and feeds on large insects (1 to 3 inches in length). Prey is most often caught on the ground. Jerusalem crickets, scorpions, and beetles make up most of the diet of pallid bat in central California.

There are no pallid bat roosts located in Project facilities and features. Potential roosting habitat in the MFP includes cliffs, caves, and rock crevices. Pallid bats were documented foraging over water at Project reservoirs and diversion pools during MFP relicensing studies, including French Meadows Reservoir, Middle Fork Interbay, Ralston Afterbay, and at North Fork Long Canyon Creek Diversion Pool. In addition, data from Clevenger's 2003 study includes occurrences of this species in the vicinity of French Meadows Reservoir and on Duncan Creek upstream of the Duncan Creek Diversion (Clevenger 2005).

TOWNSEND'S BIG-EARED BAT; (*CORYNORHINUS TOWNSENDII*; FSS)

Townsend's big-eared bat is a year-round resident in California, occurring from lowdesert to mid-elevation montane habitats. It is found primarily in rural settings, from inland deserts to coastal redwoods, oak woodland of the inner Coast Ranges and Sierra Nevada foothills, and low to mid-elevation mixed coniferous-deciduous forests. Found in all but alpine and subalpine habitats; most abundant in mesic habitats. It typically roosts during the day in caves and mines, but can roost in buildings that offer suitable conditions (Kunz and Martin 1982). Night roosts are in more open settings and include bridges. It hibernates in mixed sex aggregations of a few to several hundred individuals. This species is extremely sensitive to disturbance and may abandon a roost if disturbed. Hibernation occurs for prolonged periods in colder areas and intermittently in non-freezing areas. Townsend's big-eared bat arouses periodically and

moves to alternative roosts, and actively forages and drinks throughout the winter. A single young is born per year between May and July. Females form maternity colonies of 35 to 200 individuals, while males roost individually (Kunz and Martin 1982). Townsend's big-eared bat feeds primarily on small moths that are gleaned from vegetation.

There are no Townsend's western big-eared bat roosts located in Project facilities and features. Potential roosting habitat in the MFP includes man-made structures such as mines and buildings. Townsend's western big-eared bats were detected foraging over water during MFP relicensing studies at French Meadows Reservoir, Hell Hole Reservoir, Ralston Afterbay, and North Fork Long Canyon Creek Diversion Pool. Townsend's western big-eared bats are a year-round resident throughout their range. However, this species typically hibernates from October through April.

WESTERN RED BAT (*LASIURUS BLOSSEVILLII*; FSS)

Very little research has been done on the western red bat and little is known about this species. Much of the natural history is inferred from what is known about the eastern red bat, although the degree of similarity of the biology of these two species is currently unknown. The western red bat is a solitary, foliage-roosting bat. The western red bat is in the genus *Lasiurus*, the hairy-tailed bats. These bats are adapted for exposed roosting behavior with their hairy tail membrane and small ears. In California, this species is known to roost in cottonwood trees and willows, but is commonly detected in a variety of habitats, including chaparral. Roost heights range from 10 to 50 feet (Pierson and Heady 1997). The range of the western red bat is from British Columbia to Central and South America. Migration occurs throughout its range and bats of Canada move into the coastal lowlands of California, and the California population is thought to winter in Central America (Nagorsen and Brigham 1993). In California, occurs from Shasta County to the Mexican border west of the Sierra crest. Roosts solitarily in foliage in forests and woodlands from sea level up through mixed coniferous forest. Mating takes place in late summer and fall, sperm is stored over winter, and fertilization occurs in early spring.

Gestation period is 80 to 90 days, and one to four young are born in late May to early July. The young are born small, naked, and underdeveloped (Nowak 1994). Females leave the young at the roosting site while foraging, but will carry them when moving to a new roosting site. Young are capable of sustained flight at six weeks. Large moths are the primary prey of the western red bat. This bat is a fast flyer, foraging in straight flights or large circles (Nagorsen and Brigham 1993). The echolocation calls are highly variable depending on the terrain. Though variable, these calls are very distinct.

There are no western red bat roosts located in Project facilities and features. Potential roosting habitat is present in forested areas throughout the MFP. During MFP relicensing studies, western red bats were documented foraging over water at French Meadows Reservoir, Hell Hole Reservoir, Middle Fork Interbay, Ralston Afterbay, and North and South Fork Long Canyon Creek diversion pools.

CALIFORNIA WOLVERINE (*GULO GULO LUTEUS*; FSS)

The California wolverine occurs in a variety of habitat types, mixed conifer, red fir, and lodgepole habitats, and probably sub-alpine conifer, alpine dwarf shrub, wet meadow, and montane riparian habitats. Wolverine denning is restricted to rocky areas free of human disturbance (USDA-FS 2001b). It occurs in the Sierra Nevada from 4,300 to 10,800 feet, but most recorded sightings are above 8,000 feet. Scarce sightings range from Del Norte and Trinity counties, east through Siskiyou and Shasta counties, and south through Tulare County. The wolverine feeds primarily on small mammals and carrion. Dens are located in caves, cliffs, hollow logs, cavities in the ground, under rocks, under snow, or in old beaver lodges. Denning occurs from late winter through early spring. The breeding period lasts from January to July.

The MFP is within the historic range of California wolverine. However, this species is extremely rare, and is believed to be extinct in California. A single individual has been documented in the Tahoe National Forest since 2008. However, genetic tests have shown this individual is not of the subspecies *luteus*, but is related to wolverine populations in the western Rocky Mountains (Moriarty et al. 2009).

AMERICAN MARTEN (SIERRA MARTEN) (*MARTES AMERICANA [SIERRAE]*; FSS, MIS)

The Sierra marten is most commonly found in red fir and lodgepole pine forests between 4,000 and 10,600 feet msl. Martens prefer coniferous forest with large diameter trees and snags, large downed logs, moderate-to-high canopy closure, and an interspersed of riparian areas and meadows (USDA-FS 2001b). Optimal habitats are various mixed evergreen forests with more than 40 percent crown closure and large trees and snags for den sites. USDA-FS (2001b) provides the following specific habitat components for westside suitable habitat in the marten core elevation range (5,500 to 10,000 feet):

- canopy cover of ≥ 40 percent for traveling and foraging and of ≥ 70 percent for denning and resting;
- $\geq$ six largest live conifers of 24 " dbh per acre for traveling and foraging and $\geq$ nine for denning and resting;
- live tree basal area of ≥ 350 sq ft/acre;
- average of 2.5 largest snags of ≥ 24 " dbh per acre for traveling and foraging and 5 per acre for denning and resting; and
- coarse woody debris of large logs (≥ 15 ft long) for 5-10 tons/acre in Decay Classes 1-3 for traveling and foraging and in Decay Classes 1-2 for denning and resting.

Denning occurs from late winter through early spring. Dens are located in cavities and are lined with leaves, grass, moss, or other vegetation. Young are born in March and leave their mothers in the fall.

This species may occur in appropriate habitat within the study area. Study area boundaries are within the known geographic and elevational range of this species. There are known occurrences of this species within the MFAR watershed. A CNDDDB report for this species includes portions of Duncan Creek Diversion Road.

PACIFIC FISHER (*MARTES PENNANTI* [*PACIFICA*]; FC, FSS)

The Pacific fisher has been a candidate for federal listing since April 2004. It is among the most habitat-specific mammals in North America (USDA-FS 2001b). Forest type is not as important as vegetative and structural habitat aspects. Suitable habitat consists of large areas of mature, dense forest such as red fir, lodgepole pine, ponderosa pine, mixed conifer, and Jeffery pine forests with snags and greater than 50% canopy closure. It is known from 4,000 to 8,000 feet msl in the Sierra National Forest. The Pacific fisher dens in cavities and broken treetops and snags from winter to May and requires standing dead trees, downed logs, and rocky areas for denning sites. USDA-FS (2001b) lists the following key habitat features for Pacific fisher resting and denning sites in the southern Sierra:

- mean den tree dbh of 49" conifer and 27" oak,
- mean rest site tree dbh of 44" conifer and 26" oak,
- mean rest site basal area of 273 sq ft/acre,
- mean den canopy closure of 94%, and
- mean rest site canopy closure of 93%.

The Pacific fisher may occur in appropriate habitat in the proposed project area. Study area boundaries are within the known geographic and elevational range of this species. There are two recorded occurrences in the vicinity of French Meadows Reservoir, including one occurrence approximately 1 mile east of French Meadows Reservoir, near the Forest Service Station. However, this species is now thought to be absent from the central Sierra Nevada (Zielinski et al. 2005).

APPENDIX C

Modified or New Facilities Construction Activities and Concept Designs

CONSTRUCTION ACTIVITIES AND CONCEPT DESIGNS

Under the Proposed Action, several construction projects will be implemented to improve operations and maintenance of the Project, enhance environmental resources, and/or meet the requirements specified in new environmental programs and measures. The construction projects include modifications to existing and construction of new Project facilities and features, including:

- Hell Hole Reservoir Seasonal Storage Increase Improvement;
- Small Diversion Dam Modifications; and
- Outlet Works Modifications.

Detailed information on required construction activities (e.g., access, construction work and staging areas, disposal areas, and equipment); construction schedule and hours of operation; personnel housing; short- and long-term operational changes; facility maintenance changes; acres of habitat loss; and potential permit requirements are provided for each facility, as well as, concept design drawings. Information is organized by construction project as identified on Table C-1.

Table C-2 includes best management practices and avoidance/protection measures to be implemented for modification of existing or construction of new Project facilities. Following completion of site-specific engineering designs for construction projects identified in Appendix C, PCWA will consult with resource agencies and review the measures included in Table C-2, and other applicable resource management plans, for adequacy in protecting resources. If additional site-specific construction measures are necessary, they will be developed in consultation with resource agencies and implemented as part of the project.

Table C-1. Middle Fork American River Construction Projects.

Hell Hole Reservoir Seasonal Storage Increase Improvement	
Table HH-1	Hell Hole Reservoir Seasonal Storage Increase Improvement – Construction, Operation, and Maintenance
Figure HH-1	Hell Hole Reservoir Seasonal Storage Increase Site Plan
Small Diversion Dam Modifications	
Duncan Creek Diversion Dam Modification	
Table DC-1	Duncan Creek Diversion Dam Modification – Construction, Operation, and Maintenance
Figure DC-1	Duncan Creek Diversion Site Plan
Figure DC-2	Plan and Profile View of Intake and Weir
Figure DC-3	Profile View of Intake “A-A”
Figure DC-4	Intake Sections “B-B” & “C-C”
Figure DC-5	Primary View of Primary Instream Flow Maintenance Facility
Figure DC-6	Tunnel Entrance & Box Culvert
North Fork Long Canyon Diversion Dam Modification	
Table NF-1	North Fork Long Canyon Diversion Dam Modification – Construction, Operation, and Maintenance
Figure NF-1	North Fork Long Canyon Diversion Site Plan
Figure NF-2	Plan and Profile View of Intake and Weir
Figure NF-3	Profile View of Intake "A-A"
Figure NF-4	Intake Sections "B-B" & "C-C"
South Fork Long Canyon Diversion Dam Modification	
Table SF-1	South Fork Long Canyon Diversion Dam Modification – Construction, Operation, and Maintenance
Figure SF-1	South Fork Long Canyon Diversion Site Plan
Figure SF-2	Plan and Profile View of Intake and Weir
Figure SF-3	Profile View of Intake "A-A"
Figure SF-4	Intake Sections "B-B" & "C-C"
Outlet Works Modifications	
French Meadows Reservoir Outlet Works Modification	
Table FMO-1	French Meadows Reservoir Outlet Works Modification – Construction, Operation, and Maintenance
Figure FMO-1	French Meadows Reservoir Outlet Works Modification
Hell Hole Reservoir Outlet Works Modification	
Table HHO-1	Hell Hole Reservoir Outlet Works Modification – Construction, Operation, and Maintenance
Figure HHO-1	Hell Hole Reservoir Outlet Works Modification
Middle Fork Interbay Outlet Works Modification	
Table IBO-1	Middle Fork Interbay Outlet Works Modification – Construction, Operation, and Maintenance
Figure IBO-1	Middle Fork Interbay Outlet Works Modification

Hell Hole Reservoir Seasonal Storage Increase Improvement

Table HH-1. Hell Hole Reservoir Seasonal Storage Increase Improvement – Construction, Operation, and Maintenance.

Activity	Description
Modifications to Existing Project Facilities or New Project Facilities	Modifications to Existing Facilities - Modify the existing 350-foot-long Hell Hole Dam ogee spillway to allow for installation of 6-foot-high pneumatically operated steel spillway crest gates (Hell Hole Dam Spillway Crest Gates). This includes concrete cutting the ogee spillway crest to accommodate the anchor and hinge for the crest gates and piping for compressed air to operate the pneumatic gates (control system). If necessary, anchor bolts will be used to secure the gates and enhance stability of the ogee crest. New Facilities - Construct a new 20 foot by 20 foot concrete block control building on the east abutment of Hell Hole Dam, between the dam and spillway. The Hell Hole Dam Spillway Crest Gates Control Building (control building) will house a propane powered emergency electric generator with an outdoor propane tank for power and control of the spillway crest gates. - Construct a new powerline from the existing 12 kilovolt (kV) “French Meadows Powerhouse and Switchyard to Hell Hole - Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator Cottages, and Hell Hole Powerhouse Communication Line/Powerline” to the control building. The powerline will run in a conduit attached to the existing bridge over the Hell Hole Dam Spillway and then underground for approximately 60 feet to the new control building. - Construct a new road (Hell Hole Dam Spillway Gates Road) to provide access to the new spillway gates. Refer to Figure HH-1.
FERC Project Boundary Revision	None. All facilities will be constructed within the existing FERC Project boundary.
Construction Access Roads	- Construction equipment and materials will arrive at the site via Mosquito Ridge Road (FR 96), Ralston Ridge Road (FR 23 and 25), FR 2, the Hell Hole Dam and Powerline Road, and the existing spillway access road between the dam and spillway. - Access will also be provided by the new Hell Hole Dam Spillway Gates Road that will be constructed as part of this improvement.
Construction Work and Staging Areas	- The construction work area includes the crest of Hell Hole Dam, the spillway channel, and the area between the spillway and the dam. - Construction staging will occur between the spillway and the dam and at the adjacent to the existing communication line/powerline near the dam. - The Foresthill Field Office Storage Yard will be used, as necessary, for secure storage of construction equipment.
Disposal Areas	Approximately 10 cubic yards of concrete will be disposed of at an agency-approved disposal area.
Construction Activities and Associated	Construction will occur in two phases. Phase I consists of installation of the spillway crest gates anchor, hinge, and control system; and construction of the

Table HH-1. Hell Hole Reservoir Seasonal Storage Increase Improvement – Construction, Operation, and Maintenance.

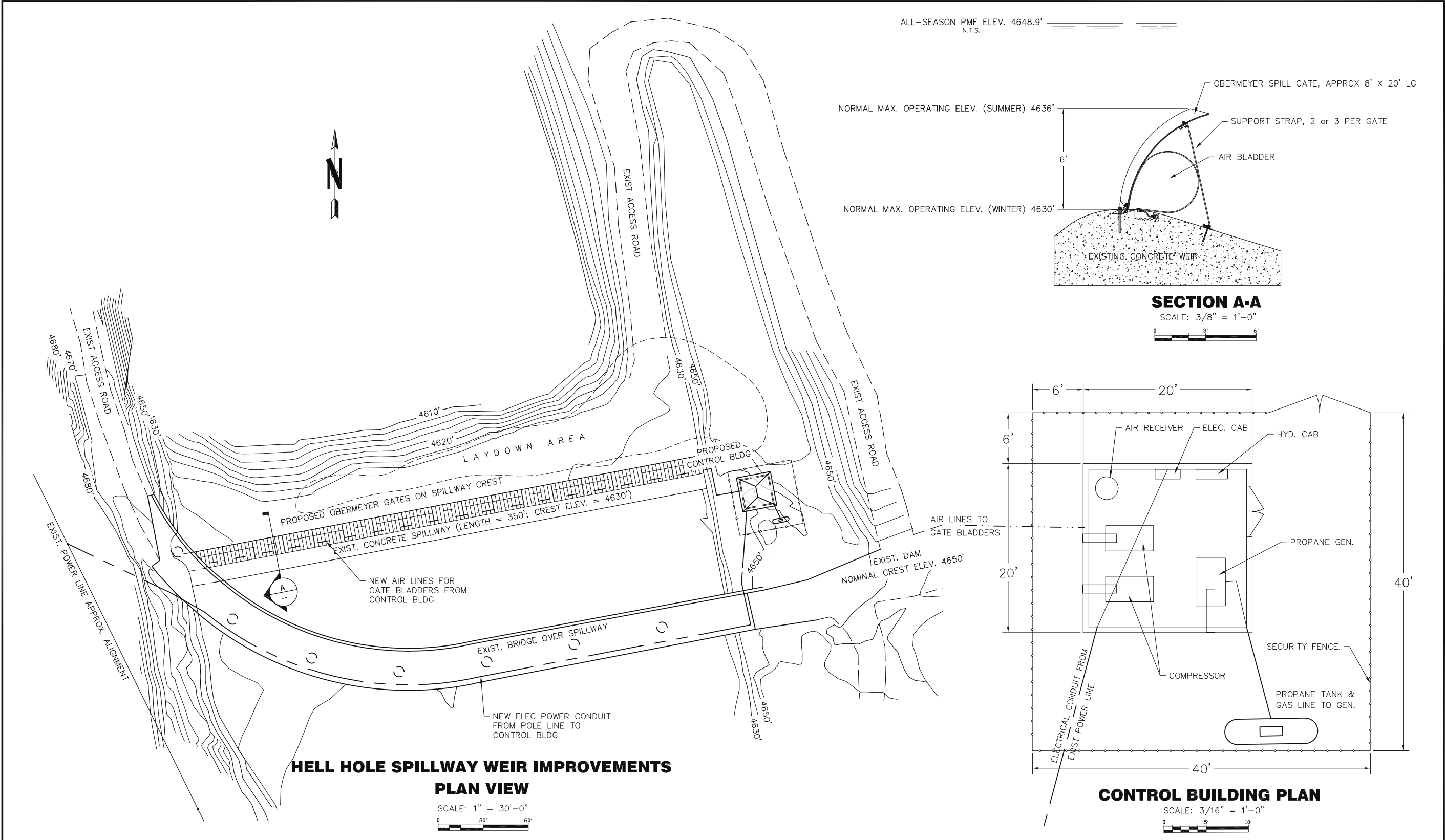
Activity	Description
Equipment	control building and powerline. Phase II includes installation of the spillway crest gates on the Hell Hole Dam ogee spillway. • All Phases ○ A front-loader, flat-bed trucks, pick-up trucks, and mobile cranes will be used to transport materials and personnel to- and within- the construction site. ○ A 30kW generator will provide power during construction activities. • Phase I ○ Expected to take approximately eight weeks to complete. ○ Construct Hell Hole Dam Spillway Gates Road. ○ Use large compressors, jackhammers, and concrete saws to install anchors and control system for the spillway crest gates into the underlying bedrock. ○ Construct the cement control building adjacent to the existing spillway. ○ Transport concrete to the site in concrete trucks with necessary concrete pumpers. ○ Install powerline tap to the existing 12 kV line that serves Hell Hole Powerhouse. ○ Connect powerline from the overhead 12 kV line to the bridge structure. ○ Trench 60 feet and install underground powerline and connect to new control building. ○ Use a small backhoe with “ramhoe” attachment as necessary for earthwork. • Phase II ○ Expected to take between six and eight weeks to complete. ○ Install new spillway crest gates and abutment blocks on the existing spillway crest. ○ Use a Lowboy trailers to transport sections of the new spillway crest gates to the construction site. ○ Use a 25-ton or greater, 4-wheel drive off-road hydraulic crane and an electrical boom line truck to install the new spillway crest gates.
Construction Schedule and Hours of Operation	• Implement within 3-5 years following license issuance. ○ Phase I – Implement in late July through September. ○ Phase II – Implement in September through Mid-October. • Construction personnel will work five, 10-hour days per week with additional weekend hours as needed.

Table HH-1. Hell Hole Reservoir Seasonal Storage Increase Improvement – Construction, Operation, and Maintenance.

Activity	Description
Personnel Housing	- Construction will be completed by a crew of approximately 10-20 personnel. The majority of the construction crew will commute to the site from Auburn or Foresthill. - Key personnel may be temporarily housed at the Hell Hole Dormitory Facility.
Short-Term Operational Changes	None. Construction of the control building and powerline and the spillway crest gates during summer and fall when the reservoir is normally drawn down.
Long-term Operational Changes	- In years when either French Meadows or Hell Hole reservoirs would have spilled, the spillway crest gates will allow storage of an additional 7,600 acre-feet which can later be used to increase net annual energy generation. - In all but the driest years, this improvement will also allow the MFP to shift the timing of some generation from the spring runoff period to the summer peak energy demand period. - In years when additional storage occurs, the reservoirs maximum operating water surface elevation (WSE) will increase from 4,630 feet to approximately 4,636 feet from April 15 through October 30 and the maximum reservoir inundation may be temporarily increased by up to 36 acres. During the remainder of the year, the spillway crest gates will be lowered and the existing maximum normal operating water level will be maintained.
Project Maintenance Changes	- Annually, and prior to seasonal use, the spillway crest gates will be inspected and subject to operational testing for the general condition of the gates and lifting mechanism. - The compressor, control system, and monitoring system associated with the spillway crest gates will undergo annual maintenance and testing. - The emergency generator will be periodically tested. - Vegetation trimming by hand will be implemented at the new control building. Rodents will be managed within the control building by using snap traps and over-the-counter rodenticides (e.g., d-CON®), as needed. - Routine annual and periodic road maintenance will be conducted on the new Hell Hole Dam Spillway Gates Road.
Acres of Habitat Loss	- No temporary or permanent habitat loss. - Approximately 36 acres around Hell Hole Reservoir will be temporarily inundated in years when additional storage is captured. The temporary inundation area will occur within the reservoir's existing flood pool (the part of the reservoir volume allotted to the temporary storage of floodwater).
Potential Permit Requirements	- The following permits/agreements will be obtained, as necessary, prior to construction: - USACE Clean Water Act Section 404 Permit for fill of jurisdictional waters of the U.S.

Table HH-1. Hell Hole Reservoir Seasonal Storage Increase Improvement – Construction, Operation, and Maintenance.

Activity	Description
	○ USDA-FS Road Use Permit for use of forest roads during construction activities. ○ SWRCB 401 Certification will be obtained prior to FERC's issuance of the new license. This certification will include implementation of the Proposed Action (including this facility improvement). ○ PCWA anticipates that preparation of a project-specific Water Quality Protection Plan (WQPP) will be a condition of the SWRCB 401 Certification. PCWA will develop a WQPP in consultation with SWRCB prior to commencement of any construction activities. ○ SWRCB Water Rights Permit to increase the maximum storage permitted at Hell Hole Reservoir. ○ CDFG Fish and Game Code Section 1600 Streambed Alteration Agreement for activities within the streambed and bank.



REDUCED NOTE DRAWING	DESIGNED _____		CHECKED _____		 144 Ferguson Street Auburn, CA 95604	 4100 14th Avenue Suite 200 San Rafael, California 94901 U.S.A.	MIDDLE FORK AMERICAN RIVER HYDROELECTRIC PROJECT HELL HOLE SEASONAL STORAGE INCREASE	DATE JUNE 16, 2010	
	DRAWN _____		SUBMITTED _____				FIGURE HH-1 HELL HOLE RESERVOIR SEASONAL STORAGE INCREASE SITE PLAN	DRAWING NUMBER	
	REV	DATE	DESCRIPTION	SUB			APP'D		

Duncan Creek Diversion Dam Modification

Table DC-1. Duncan Creek Diversion Dam Modification – Construction, Operation, and Maintenance.

Activity	Description
Modifications to Existing Project Facilities	Modifications to Existing Facilities • Modify the existing Duncan Creek Diversion Dam and intake structure into a self-cleaning, stream-bottom intake. • Construct a wedge-wire screen and collection channel immediately upstream of the existing diversion dam ogee spillway. • Raise the existing dam abutments by 3.5 feet. • Construct a concrete collection chamber on the upstream side of the south dam abutment. • Install a pre-cast diversion culvert to convey water from the collection channel at the dam to the tunnel entrance. • Extend the existing Duncan Creek Diversion Intake Road 150 feet to the south abutment of the dam. Refer to Figures DC-1 through DC-6.
FERC Project Boundary Revision	• None. All facilities will be constructed within the existing FERC Project boundary.
Construction Access Roads	• Construction equipment and materials will arrive at the site via Mosquito Ridge Road (FR 96). • Access to the north abutment of the dam will be via Duncan Creek Diversion Dam Road. The existing cleared trail (Duncan Creek Diversion Dam North Trail) from the access road to the north abutment of the dam will be used, as necessary. • Access to the south abutment of the dam will be via Duncan Creek Diversion Intake Road.
Construction Work and Staging Areas	• The construction work area will include the existing dam, tunnel intake, and surrounding unvegetated areas. • Construction staging will occur on the south side of Duncan Creek at the Duncan Creek Diversion Pool Access Point, near the tunnel intake.
Disposal Areas	• Any excess excavated material will be disposed of at an agency-approved disposal area.
Construction Activities and Associated Equipment	• Extend the existing Duncan Creek Diversion Intake Road to the Duncan Creek Dam south abutment. • Improve Duncan Creek Diversion Intake Road by re-grading and compacting the surface. • Construct small cofferdam upstream of the construction site and temporarily divert flows from Duncan Creek into a culvert connected to the existing 60-inch-diameter low-level outlet. • Excavate the streambed upstream of the Duncan Creek Diversion Dam and along the south bank of Duncan Creek between the tunnel intake and dam for installation of the new screen, collection channel, collection chamber, and diversion culvert.

Table DC-1. Duncan Creek Diversion Dam Modification – Construction, Operation, and Maintenance.

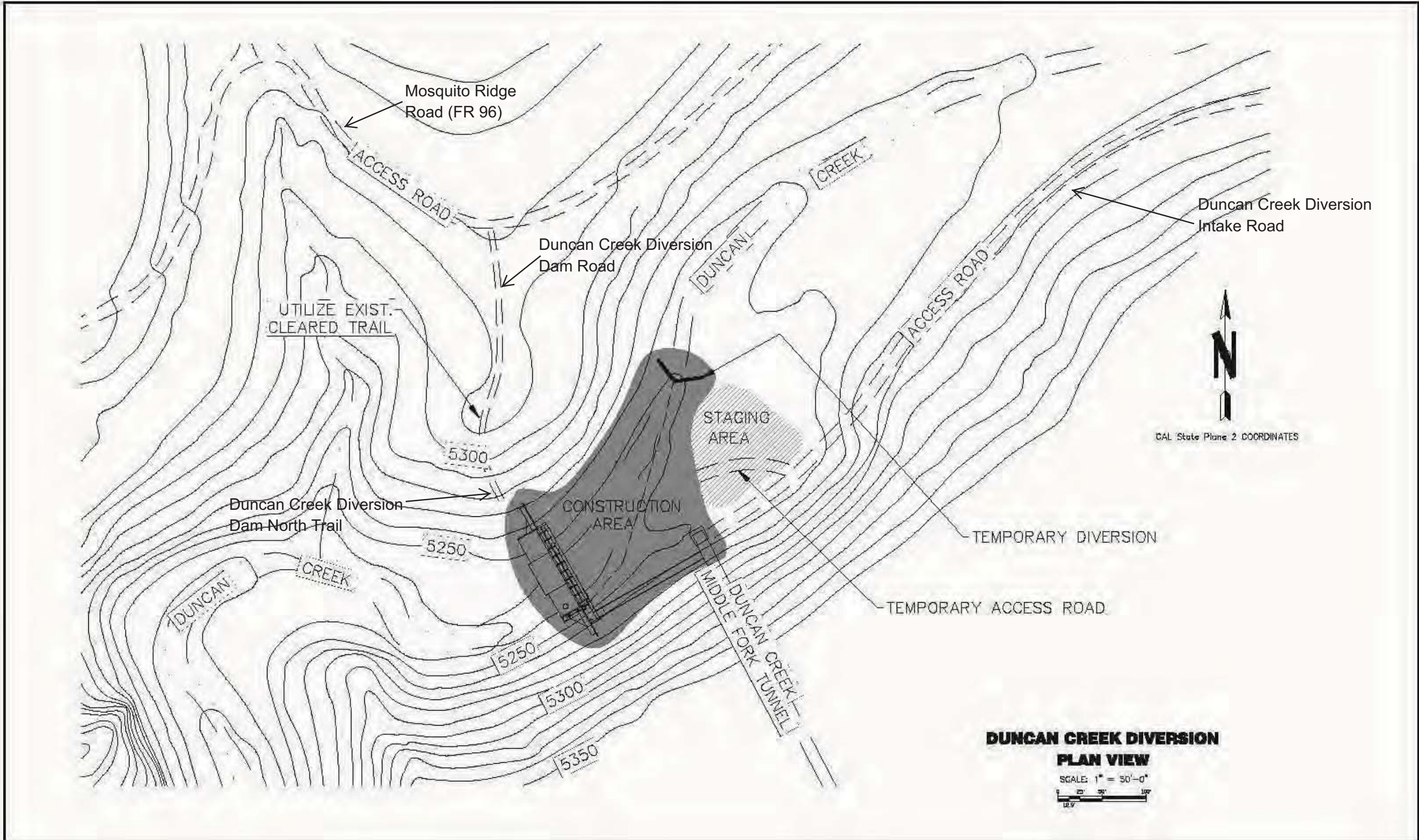
Activity	Description
	• Excavated material and rock will be spread over the staging area and compacted. • Modify existing tunnel intake to accommodate new diversion culvert and stoplogs. • Install a precast 8-foot box culvert between the diversion dam and tunnel intake. • Prepare existing diversion dam for new construction including concrete drilling, concrete cutting, and installing steel dowels. • Install reinforcing steel and forms for construction of new screen, collection system, and parapets on dam abutments. • Raise the abutments of the diversion dam by 3.5 feet. • Construct an 96-foot-long, 8-foot-wide concrete collection channel on the upstream side of the existing concrete diversion dam ogee spillway. • Construct a 3-foot-thick concrete overflow weir on the upstream side of the concrete collection channel. • If necessary, install sockets for flashboards on the top of the overflow weir to concentrate inflow to the wedge-wire screen screen. • Install a flat, self-cleaning screen made of 3/16-inch stainless steel wedge-wire with 0.04-inch-wide gaps, at a 15 degree slope in the downstream direction. • Construct a 3-foot-wide bypass channel with stoplogs to be used to bypass low flow during late summer when the intake is turned out. • Modify the instream flow outlet to maintain a bypass flow and that has first priority for water flowing into the intake. • Install an 8-foot-wide, 20-foot-long concrete collection chamber at the south abutment of the Duncan Creek Diversion Dam. • Install a new buried 8-foot pre-cast concrete box culvert connecting the new collection chamber to the existing Middle Fork Tunnel intake structure. • Install new stoplog guides, and stoplogs over the existing tunnel intake to control flows into the tunnel. Stoplogs can be removed to allow for direct flow into the tunnel. • Install a remote controlled slide gate to control inflow to the tunnel. • Replace the existing remote power supply with a self-contained solar/thermal electric power supply system to power flow monitoring and communication. • Install flow equipment to measure instream flow releases, flow diverted to French Meadows Reservoir, and inflow into the diversion pool. • Modify the low-level outlet to allow for dewatering the impoundment including the intake collection channel. • Construction equipment includes flat bed trucks, forklift, excavators, bulldozer, pumps, drills, compressors, 30kW size generators, mobile cranes, concrete transport trucks, concrete pumpers, lowboy trailers, and temporary sanitary facilities.

Table DC-1. Duncan Creek Diversion Dam Modification – Construction, Operation, and Maintenance.

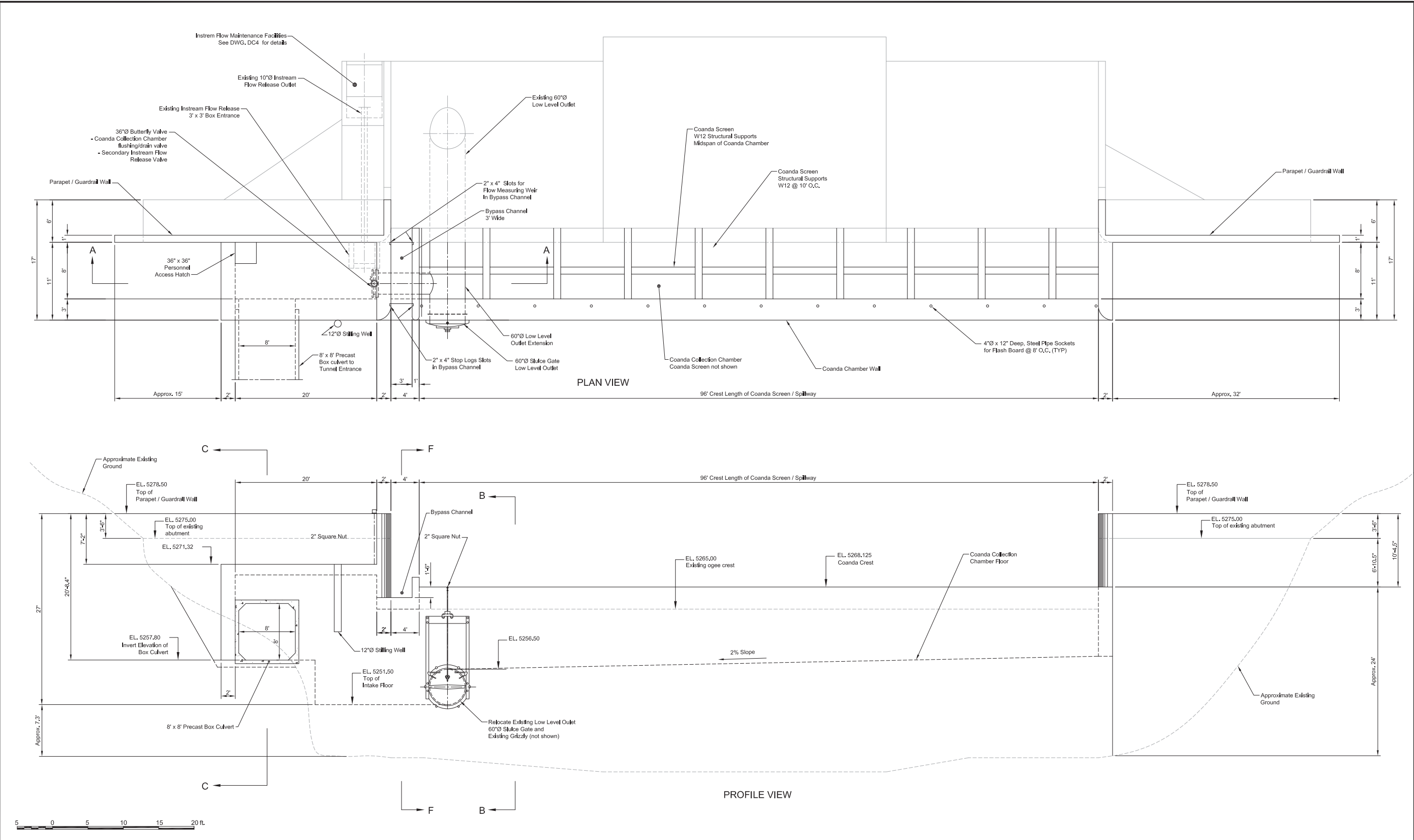
Activity	Description
Construction Schedule and Hours of Operation	• Implement July through November within 2-3 years following license issuance. • Removal of riparian vegetation necessary for construction will take place in August through March the year prior to construction. • Construction personnel will work five, 10-hour days per week with additional weekend hours as needed.
Personnel Housing	• Construction will be completed by a crew of approximately 6-15 personnel. The majority of the construction crew will commute to the site from Auburn or Foresthill. • Key personnel may be temporarily housed at the Hell Hole Dormitory Facility.
Short-Term Operational Changes	• Flows within Duncan Creek will be diverted around the construction site and discharged back to the Creek downstream of the work area.
Long-term Operational Changes	• Modifications will provide for meeting new minimum instream flow releases. • The minimum normal operating elevation of the diversion pool will increase from an elevation of 5,265 feet to 5,269 feet. • Debris and sediment diverted into the tunnel and French Meadows Reservoir will be reduced substantially. • Periodic reductions in diverted flows (from blockages in the existing tunnel intake entrance) during storm events will be alleviated. • The wedge-wire screened diversion will typically not be in operation (turned out) between July 1 and September 30 allowing stream flow to bypass the intake. In wetter water years, when stream flow on July 1 exceeds the spawning flow for that year, some diversion may continue beyond July 1.
Project Maintenance Changes	• Trash rack cleaning will no longer be necessary. • Interim sediment management will no longer be required. • Sediment management will consist of occasional removal of large stranded debris after major storm events. • Monitoring and visual inspections of the trash rack and intake during winter and spring, to verify proper facility function, will be substantially reduced. • The wedge-wire screen will be cleaned, as needed, to remove algae and other debris. • The remote controlled slide gates and associated control system will be tested annually. • The existing emergency generator will be periodically tested.
Acres of Habitat Loss	• Permanent loss of 0.03 acres of willow alder riparian habitat for construction of the modified diversion.
Potential Permit Requirements	• The following permits/agreements will be obtained, as necessary, prior to construction: ○ USACE Clean Water Act Section 404 Permit for fill of jurisdictional waters of the U.S.

Table DC-1. Duncan Creek Diversion Dam Modification – Construction, Operation, and Maintenance.

Activity	Description
	○ USDA-FS Road Use Permit for use of forest roads during construction activities. ○ SWRCB 401 Certification will be obtained prior to FERC's issuance of the new license. This certification will include implementation of the Proposed Action (including this facility modification). ○ PCWA anticipates that preparation of a project-specific Water Quality Protection Plan (WQPP) will be a condition of the SWRCB 401 Certification. PCWA will develop a WQPP in consultation with SWRCB prior to commencement of any construction activities. ○ CDFG Fish and Game Code Section 1600 Streambed Alteration Agreement for activities within the streambed and bank.

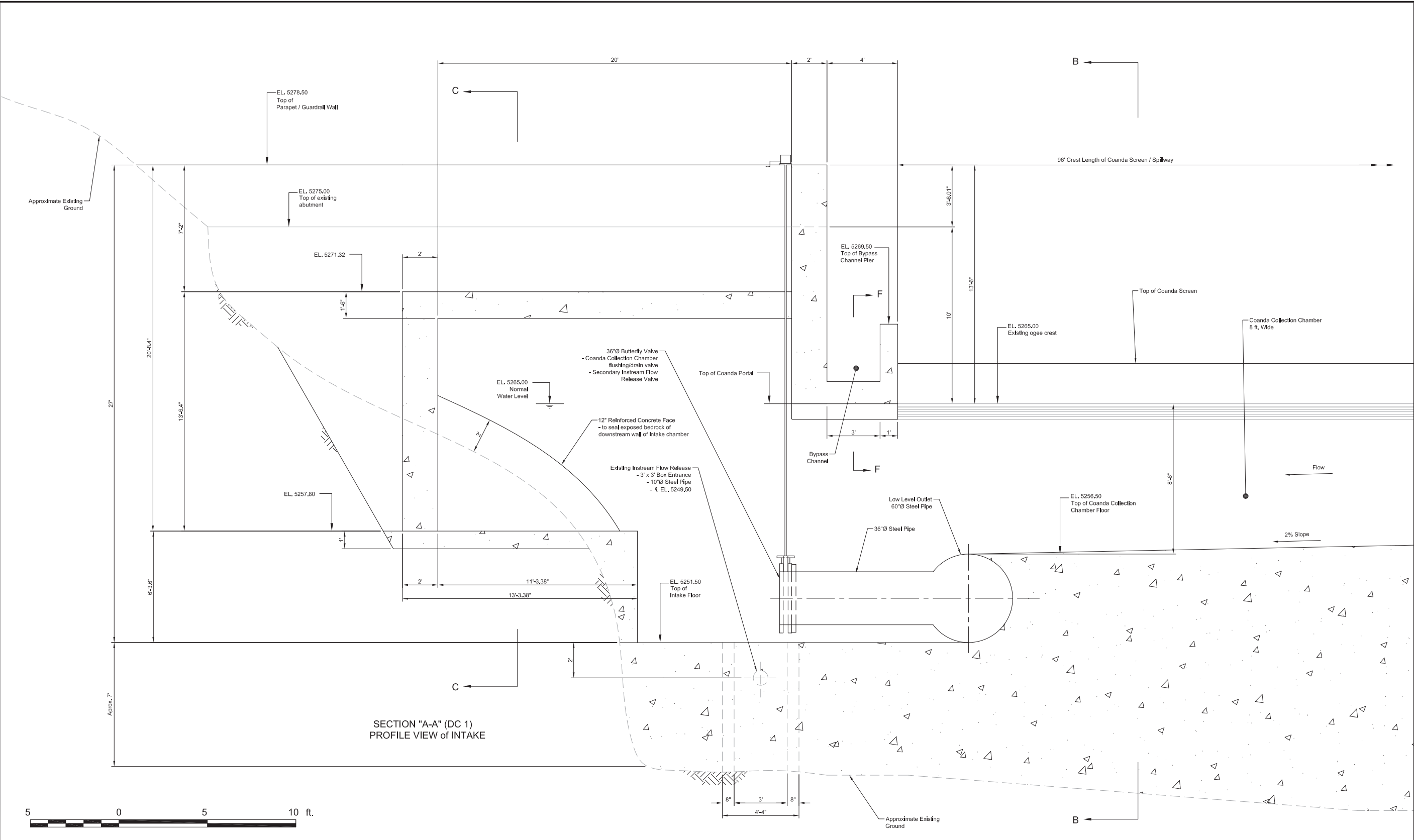


REDUCED NOTE DRAWING	DESIGNED: _____		CHECKED: _____		PCWA 144 Ferguson Street Auburn, CA 95604	CHRISTENSEN AN ENGINEERING FIRM 4000 E. Jackson Auburn, CA 95602 Phone: (916) 231-1100 Fax: (916) 231-1101	MIDDLE FORK AMERICAN RIVER HYDROELECTRIC PROJECT INTAKE SEDIMENT CONTROL MEASURES		DATE JULY 2010
	DRAWN: T. STANDERS		SUBMITTED: _____				FIGURE DC-1 DUNCAN CREEK DIVISION SITE PLAN		DRAWING NUMBER
REV	DATE	DESCRIPTION			SUB	APP'D	APPROVED		

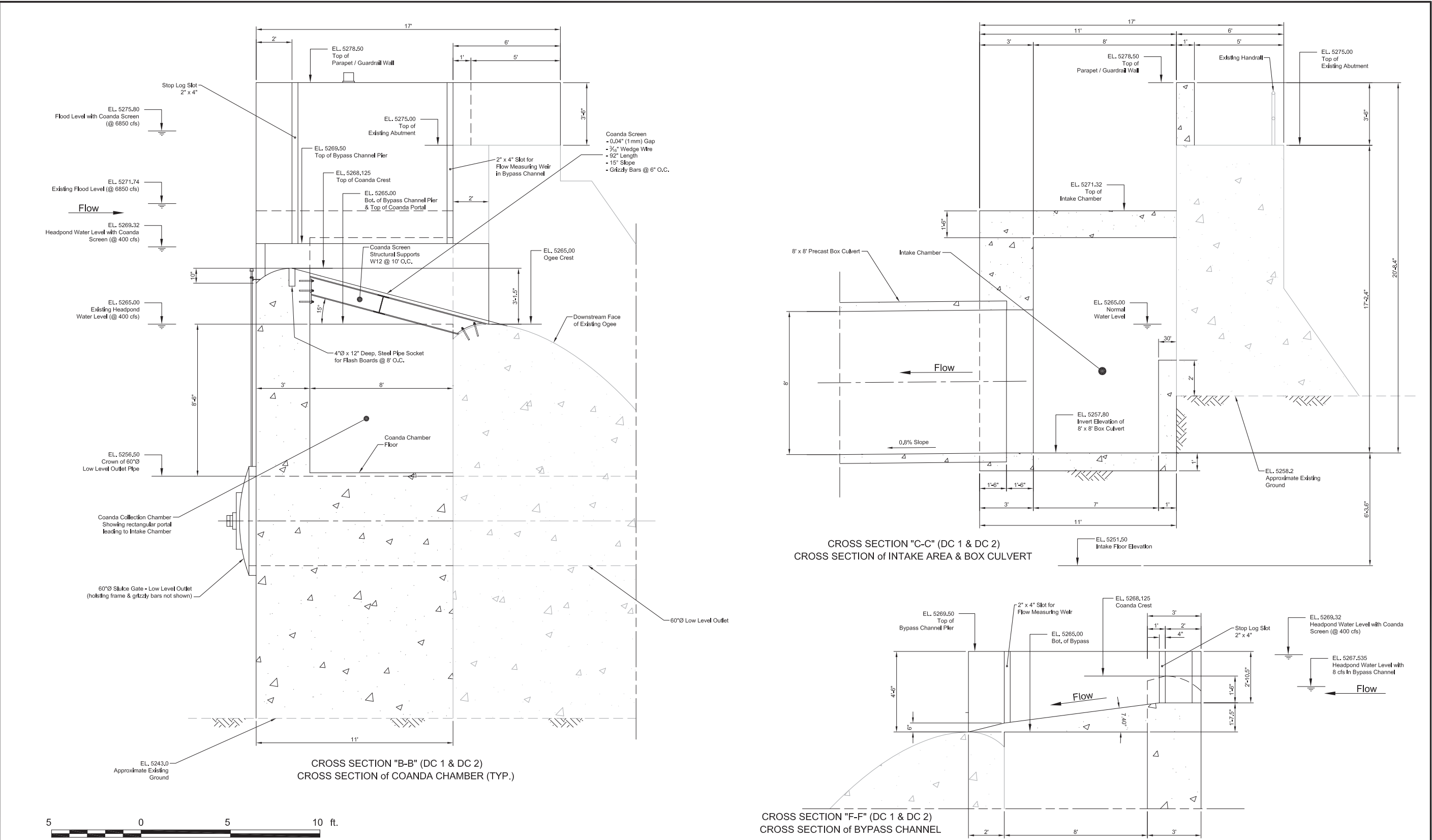


	DESIGNED <u>P.O. Stroman</u> CHECKED <u>J. Christensen</u>			MIDDLE FORK AMERICAN RIVER PROJECT INTAKE SEDIMENT CONTROL MEASURES		DATE January, 2010
	DRAWN <u>N.A. Kozobolis</u> SUBMITTED _____			FIGURE DC-2 DUNCAN CREEK DIVERSION SITE PLAN PLAN AND PROFILE VIEW OF INTAKE AND WEIR		DRAWING NUMBER
	REV DATE DESCRIPTION SUB APP'D APPROVED					

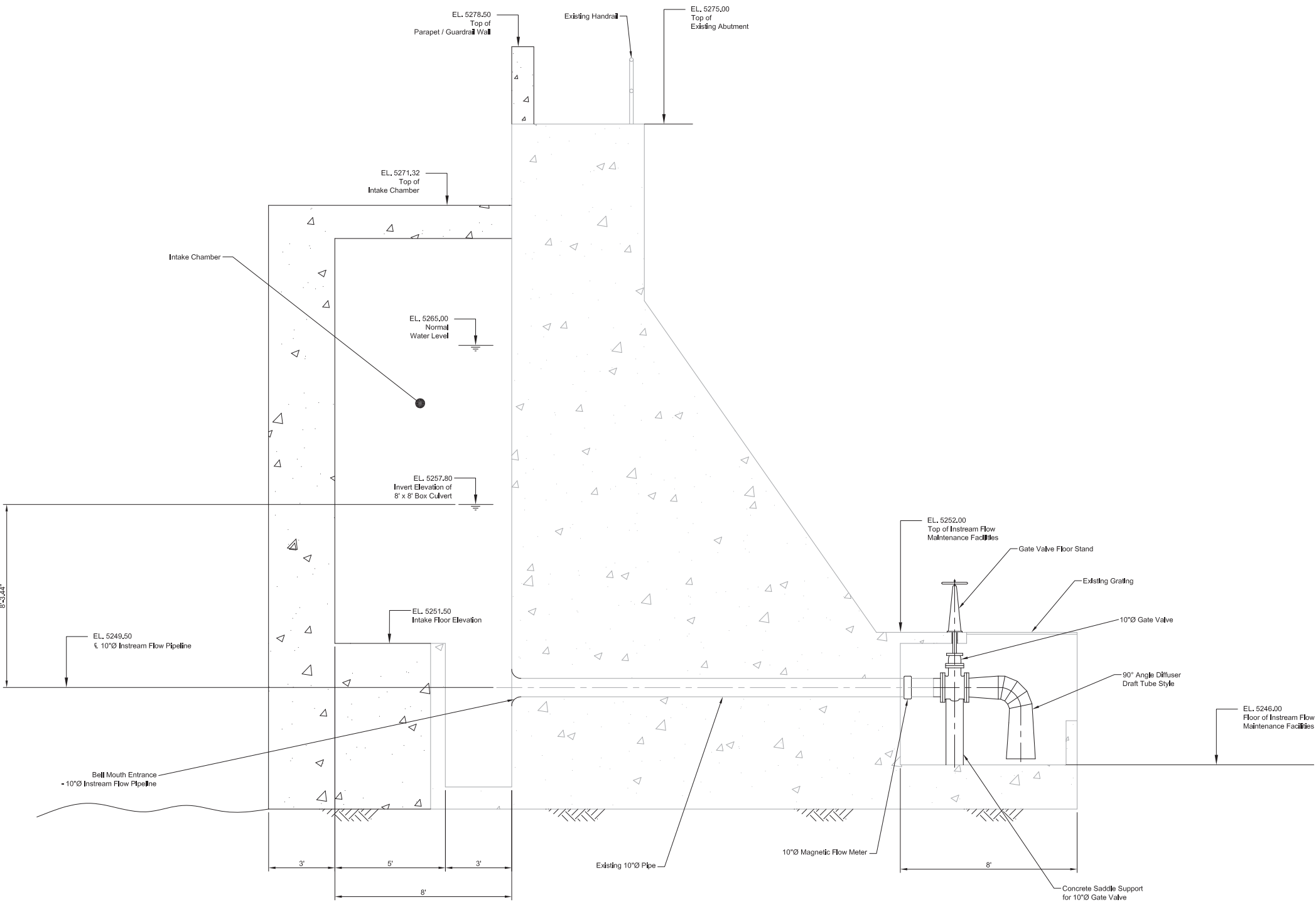
PLACER COUNTY WATER AGENCY
144 Ferguson Road, Auburn, CA 95604



	DESIGNED <u>P.O. Sjöman</u> CHECKED <u>J. Christensen</u>			MIDDLE FORK AMERICAN RIVER PROJECT INTAKE SEDIMENT CONTROL MEASURES		DATE January, 2010
	DRAWN <u>N.A. Kozobolis</u> SUBMITTED _____			FIGURE DC-3 DUNCAN CREEK DIVERSION SITE PLAN PROFILE VIEW OF INTAKE "A-A"		DRAWING NUMBER
	REV DATE DESCRIPTION SUB APP'D					
		APPROVED _____	PLACER COUNTY WATER AGENCY 144 Ferguson Road, Auburn, CA 95604			

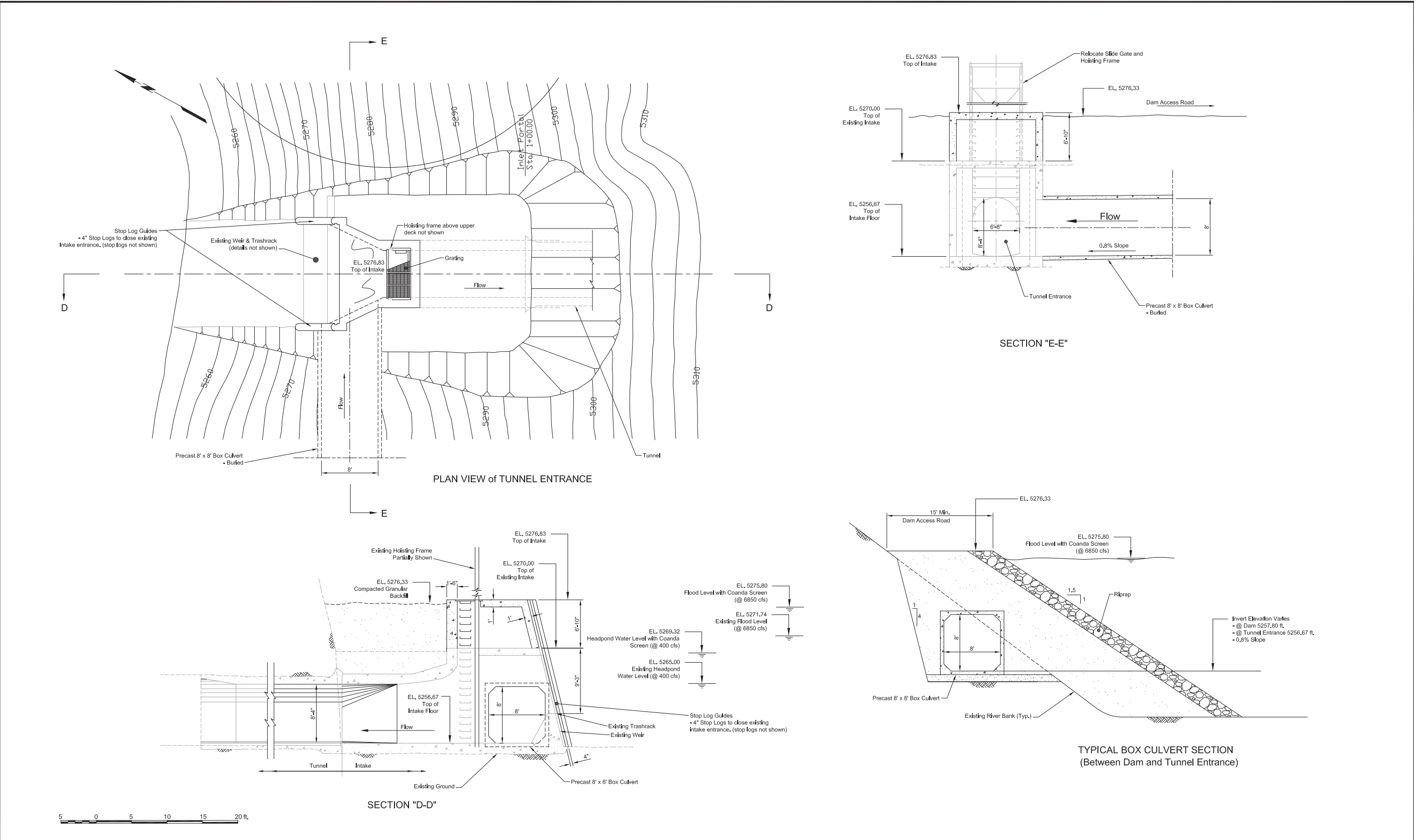


	DESIGNED <u>P.O. Sisman</u> CHECKED <u>J. Christensen</u>	 PLACER COUNTY WATER AGENCY 144 Ferguson Road, Auburn, CA 95604	 310 Park Avenue Auburn, CA 95601 Phone: (530) 885-1111 Fax: (530) 885-1112 www.christenseninc.com	MIDDLE FORK AMERICAN RIVER PROJECT INTAKE SEDIMENT CONTROL MEASURES		DATE January, 2010
	DRAWN <u>N.A. Kozobolis</u> SUBMITTED _____			FIGURE DC-4 DUNCAN CREEK DIVERSION SITE PLAN INTAKE SECTIONS "B-B" & "C-C"		DRAWING NUMBER
	REV DATE DESCRIPTION SUB APP'D APPROVED					



PROFILE VIEW of PRIMARY INSTREAM FLOW MAINTENANCE FACILITIES

	DESIGNED <u>P.O. Siderman</u> CHECKED <u>J. Christensen</u>			MIDDLE FORK AMERICAN RIVER PROJECT INTAKE SEDIMENT CONTROL MEASURES		DATE January, 2010
	DRAWN <u>N.A. Kozobolis</u> SUBMITTED _____			FIGURE DC-5 DUNCAN CREEK DIVERSION SITE PLAN		DRAWING NUMBER
	REV DATE DESCRIPTION SUB APP'D APPROVED			PRIMARY VIEW OF PRIMARY INSTREAM FLOW MAINTENANCE FACILITY		



REDUCED NOTE DRAWING	DESIGNED <u>P.O. Siderman</u>		CHECKED <u>J. Christensen</u>		 PLACER COUNTY WATER AGENCY 144 Ferguson Road, Auburn, CA 95604	 310 Park Avenue Fremont, CA 94536 Phone: (415) 871-1100 Fax: (415) 871-1101 www.christensenassoc.com	MIDDLE FORK AMERICAN RIVER PROJECT INTAKE SEDIMENT CONTROL MEASURES		DATE January, 2010
	DRAWN <u>N.A. Kozobolis</u>		SUBMITTED _____				FIGURE DC-6 DUNCAN CREEK DIVERSION SITE PLAN TUNNEL ENTRANCE & BOX CULVERT		DRAWING NUMBER
	REV	DATE	DESCRIPTION	SUB			APP'D	APPROVED	

North Fork Long Canyon Diversion Dam Modification

Table NF-1. North Fork Long Canyon Diversion Dam Modification – Construction, Operation, and Maintenance.

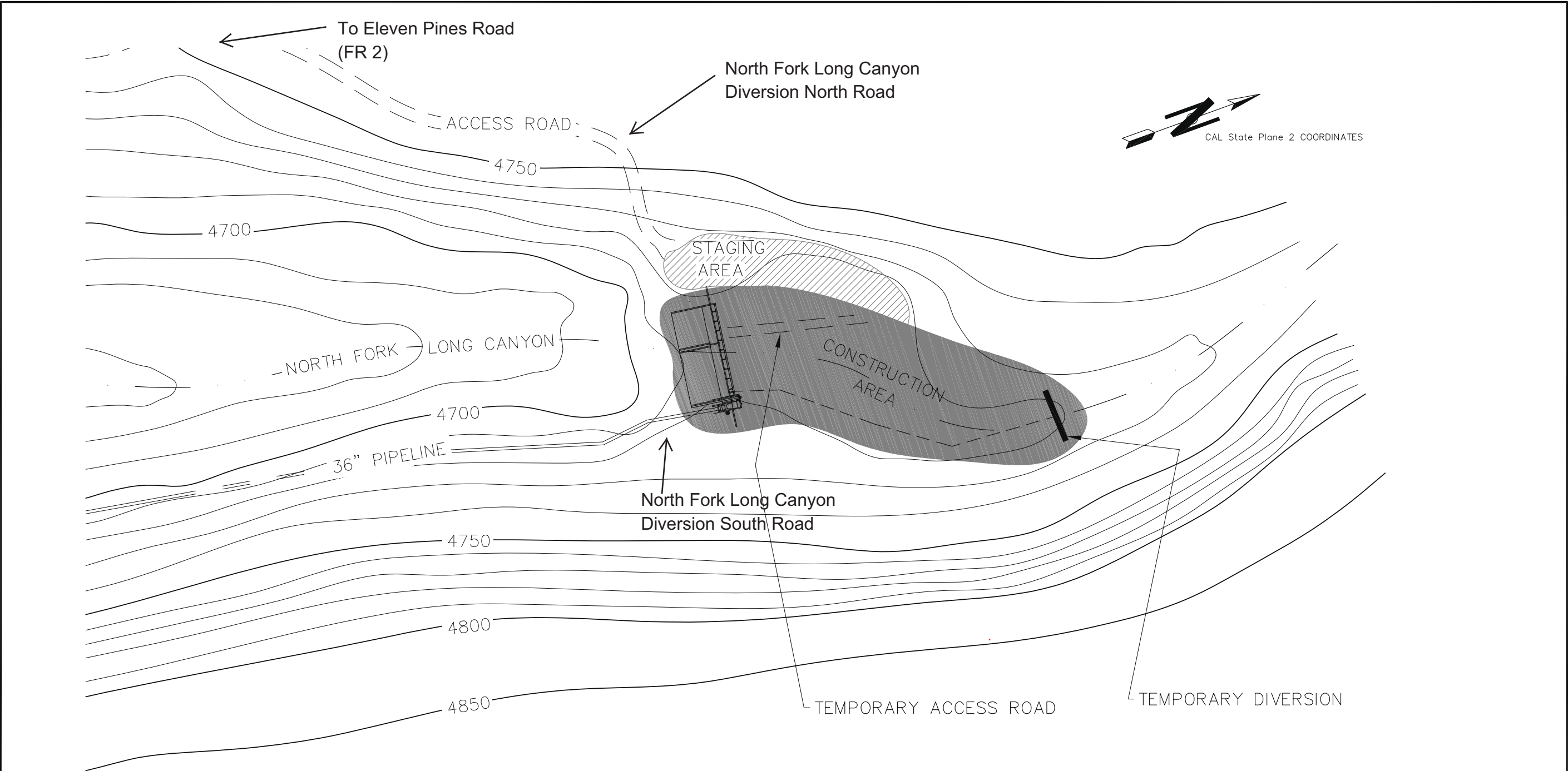
Activity	Description
Modifications to Existing Project Facilities	Modifications to Existing Facilities • Modify the existing North Fork Long Canyon Diversion Dam and intake structure into a self-cleaning, stream-bottom intake. • Construct a wedge-wire screen and collection channel immediately upstream of the existing diversion dam ogee spillway. • Raise the existing dam abutments by 3.5 feet. • Construct a concrete collection chamber on the upstream side of the east dam abutment connecting to the existing discharge pipeline. • Construct a temporary access road on the west bank of the existing North Fork Long Canyon Diversion Pool. Refer to Figures NF-1 through NF-4.
FERC Project Boundary Revision	• None. All facilities will be constructed within the existing FERC Project boundary.
Construction Access Roads	• Construction equipment and materials will arrive at the site via Eleven Pines Road (FR 2) and North Fork Long Canyon Diversion North Road and North Fork Long Canyon Diversion South Road. • A temporary access road will be constructed on the west bank of the existing North Fork Long Canyon Diversion Pool.
Construction Work and Staging Areas	• The construction work area will include the existing dam, tunnel intake, and surrounding unvegetated areas. • Construction staging will occur on the north side of Long Canyon Creek adjacent to the dam.
Disposal Areas	• Any excess excavated material will be disposed of at an agency-approved disposal area.
Construction Activities and Associated Equipment	• Construct a new temporary access road on the west bank of the North Fork Long Canyon Diversion Pool. • Construct small cofferdam upstream of the construction site and temporarily divert flows from North Fork Long Canyon Creek into a culvert connected to the existing 36-inch diameter low-level outlet. • Excavate the streambed upstream of the North Fork Long Canyon Diversion Dam for installation of the new screen, collection channel, and collection chamber. • Excavated material and rock will be spread over the staging area and compacted. • Prepare existing diversion dam for new construction including concrete drilling, concrete cutting, and installing steel dowels. • Install reinforcing steel and forms for construction of new screen, collection system, and parapets on dam abutments. • Raise the abutments of the diversion by 2.7 feet. • Construct a 90-foot-long, 3.7-foot-wide concrete collection channel on the upstream side of the existing concrete diversion dam ogee spillway.

Table NF-1. North Fork Long Canyon Diversion Dam Modification – Construction, Operation, and Maintenance.

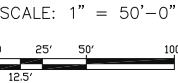
Activity	Description
	• Construct a 1.4-foot-thick concrete overflow weir on the upstream side of the concrete collection channel. • If necessary, install sockets for flashboards on top of the overflow weir to concentrate inflow to the wedge-wire screen. • Install a flat, self-cleaning screen made of 3/16-inch stainless steel wedge-wire with 0.04-inch-wide gaps, at a 15 degree slope in the downstream direction. • Construct a 3-foot-wide bypass channel with stoplogs to be used to bypass low flow during late summer when the intake is turned out. • Construct a 7.5-foot-wide, 13-foot-long concrete collection chamber at the east abutment of the North Fork Long Canyon Diversion Dam (uses the existing discharge pipeline and gate and connects to the Hell Hole - Middle Fork Tunnel). • Install a remote controlled slide gate to control inflow to the tunnel. • Replace the existing remote power supply with a self-contained solar/thermal electric power supply system to power flow monitoring and communication. • Install flow equipment to measure instream flow releases and flow diverted to Hell Hole - Middle Fork Tunnel. • Modify the low-level outlet to allow for dewatering the impoundment including the intake collection channel and collection chamber. • Construction equipment will include flat bed trucks, forklift, excavators, bulldozer, pumps, drills, compressors, 30kW size generators, mobile cranes, concrete transport trucks, concrete pumpers, lowboy trailers, and temporary sanitary facilities.
Construction Schedule and Hours of Operation	• Implement July through November within 3-4 years following license issuance. • Construction personnel will work five, 10-hour days per week with additional weekend hours as needed.
Personnel Housing	• Construction will be completed by a crew of approximately 6-10 personnel. The majority of the construction crew will commute to the site from Auburn or Foresthill. • Key personnel may be temporarily housed at the Hell Hole Dormitory Facility.
Short-Term Operational Changes	• Flows within North Fork Long Canyon Creek will be diverted around the construction site and discharged back to the creek downstream of the work area.
Long-term Operational Changes	• Modifications will provide for meeting new minimum instream flow releases. • The minimum normal operating elevation of the diversion pool will increase from an elevation of 4,716 feet to 4,717 feet. • Debris and sediment diverted into the Hell Hole - Middle Fork Tunnel will be reduced substantially. • Periodic reductions in diverted flows (from blockages in the existing tunnel

Table NF-1. North Fork Long Canyon Diversion Dam Modification – Construction, Operation, and Maintenance.

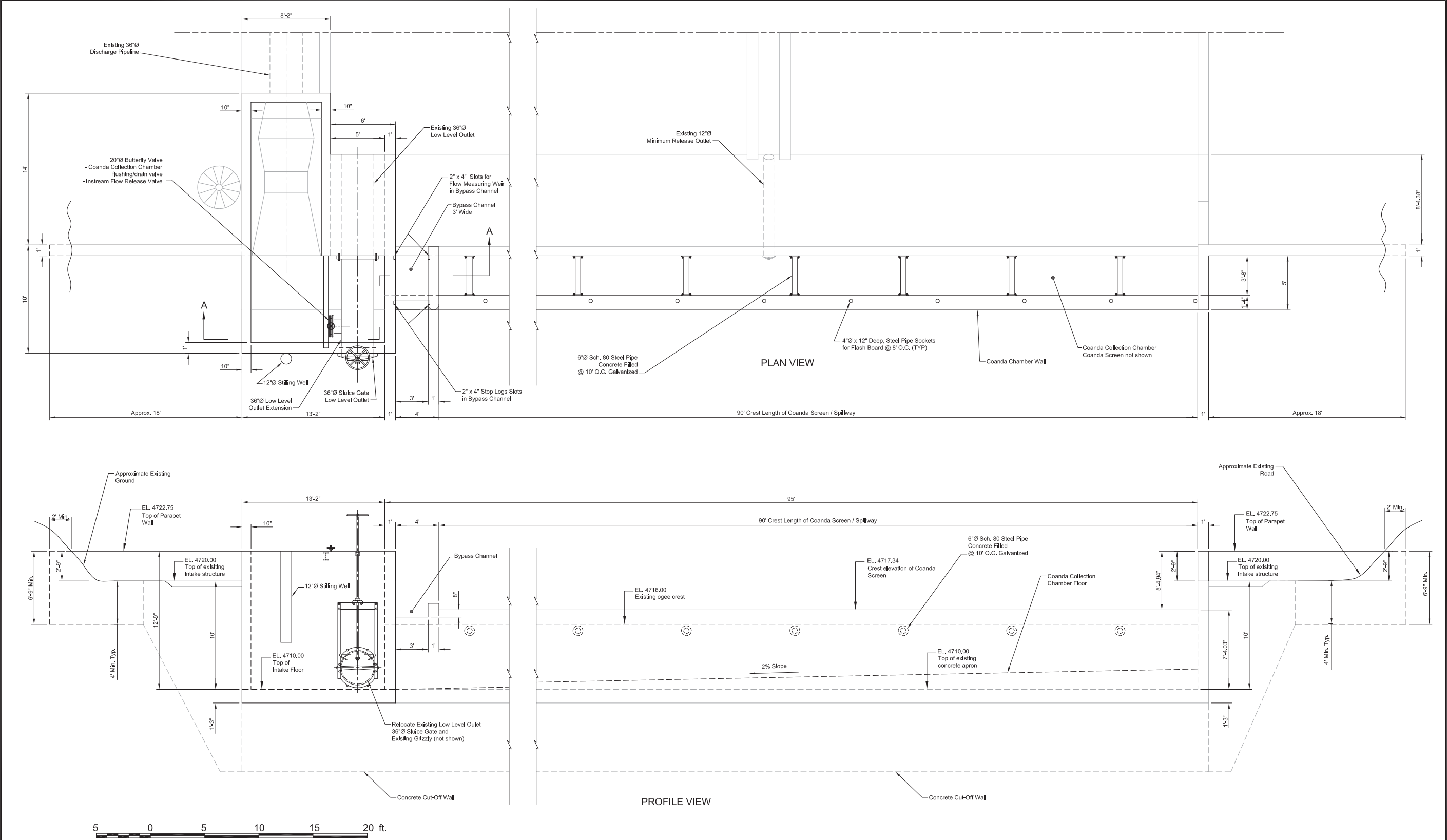
Activity	Description
	intake entrance) during storm events will be alleviated. • The wedge-wire screened diversion will typically not be in operation (turned out) between July 1 and September 30 allowing stream flow to bypass the intake. In wetter water years, when stream flow on July 1 exceeds the spawning flow for that year, some diversion may continue beyond July 1.
Project Maintenance Changes	• Trash rack cleaning will no longer be necessary. • Interim sediment management will no longer be required. • Sediment management will consist of occasional removal of large stranded debris after major storm events. • Monitoring and visual inspections of the intake during winter and spring, to verify proper facility function, will be substantially reduced. • The wedge-wire screen will be cleaned, as needed, to remove algae and other debris. • The remote controlled slide gates and associated control system will be tested annually. • The remote power supply will be periodically tested.
Acres of Habitat Loss	• No temporary or permanent habitat loss.
Potential Permit Requirements	• The following permits/agreements will be obtained, as necessary, prior to construction: ○ USACE Clean Water Act Section 404 Permit for fill of jurisdictional waters of the U.S. ○ USDA-FS Road Use Permit for use of forest roads during construction activities. ○ SWRCB 401 Certification will be obtained prior to FERC's issuance of the new license. This certification will include implementation of the Proposed Action (including this facility modification). ○ PCWA anticipates that preparation of a project-specific Water Quality Protection Plan (WQPP) will be a condition of the SWRCB 401 Certification. PCWA will develop a WQPP in consultation with SWRCB prior to commencement of any construction activities. ○ CDFG Fish and Game Code Section 1600 Streambed Alteration Agreement for activities within the streambed and bank.



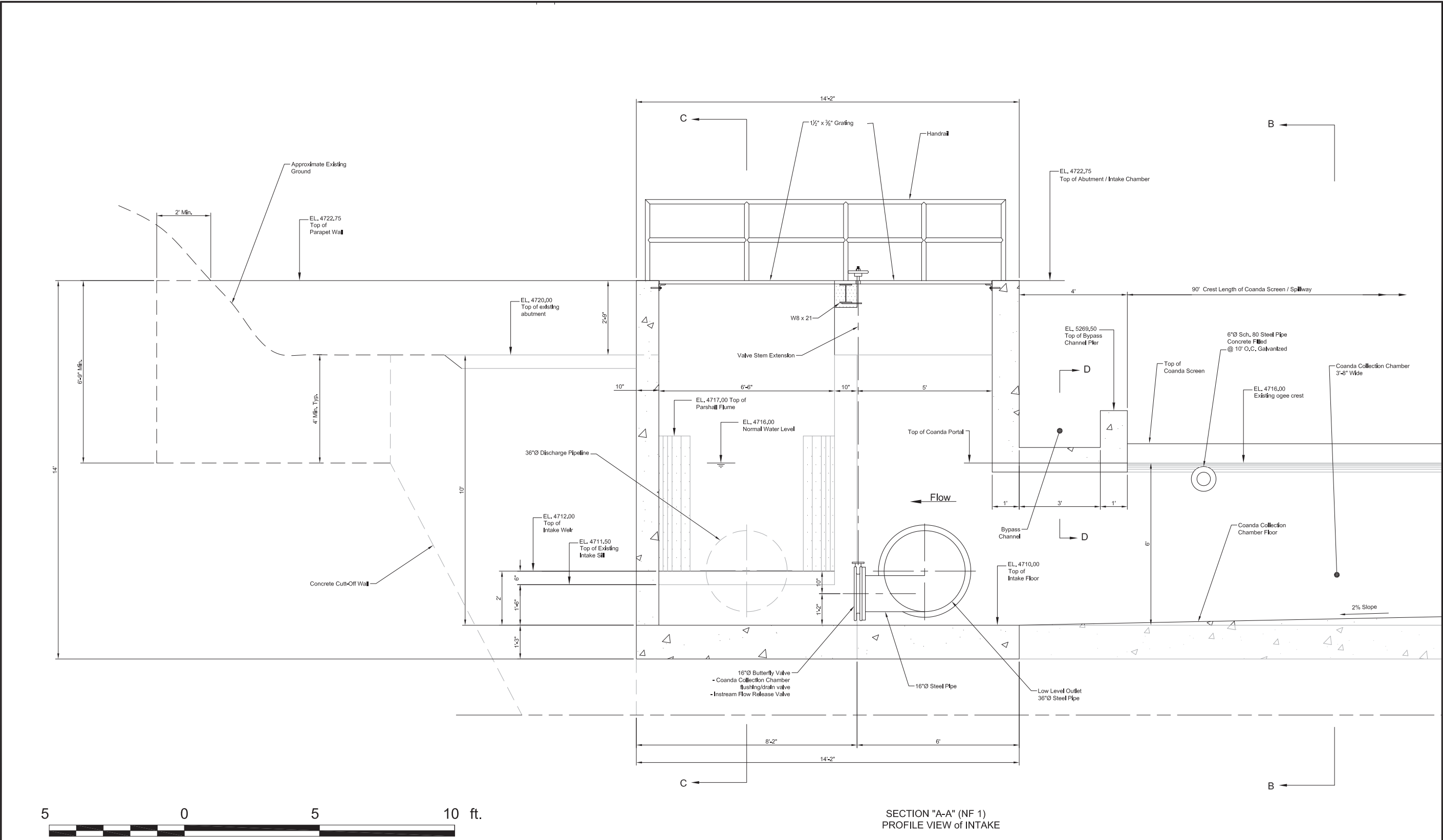
**NORTH FORK LONG CANYON CREEK DIVERSION
PLAN VIEW**



REDUCED NOTE DRAWING	DESIGNED _____		CHECKED _____		 144 Ferguson Street Auburn, CA 95604	 8100N Avenue Suite 200 San Rafael, California 94903 U.S.A.	MIDDLE FORK AMERICAN RIVER HYDROELECTRIC PROJECT INTAKE SEDIMENT CONTROL MEASURES	DATE JULY 2010
	DRAWN T. STANDERS		SUBMITTED _____				FIGURE NF-1	DRAWING NUMBER
							NORTH FORK LONG CANYON DIVERSION SITE PLAN	
REV	DATE	DESCRIPTION	SUB	APP'D	APPROVED			

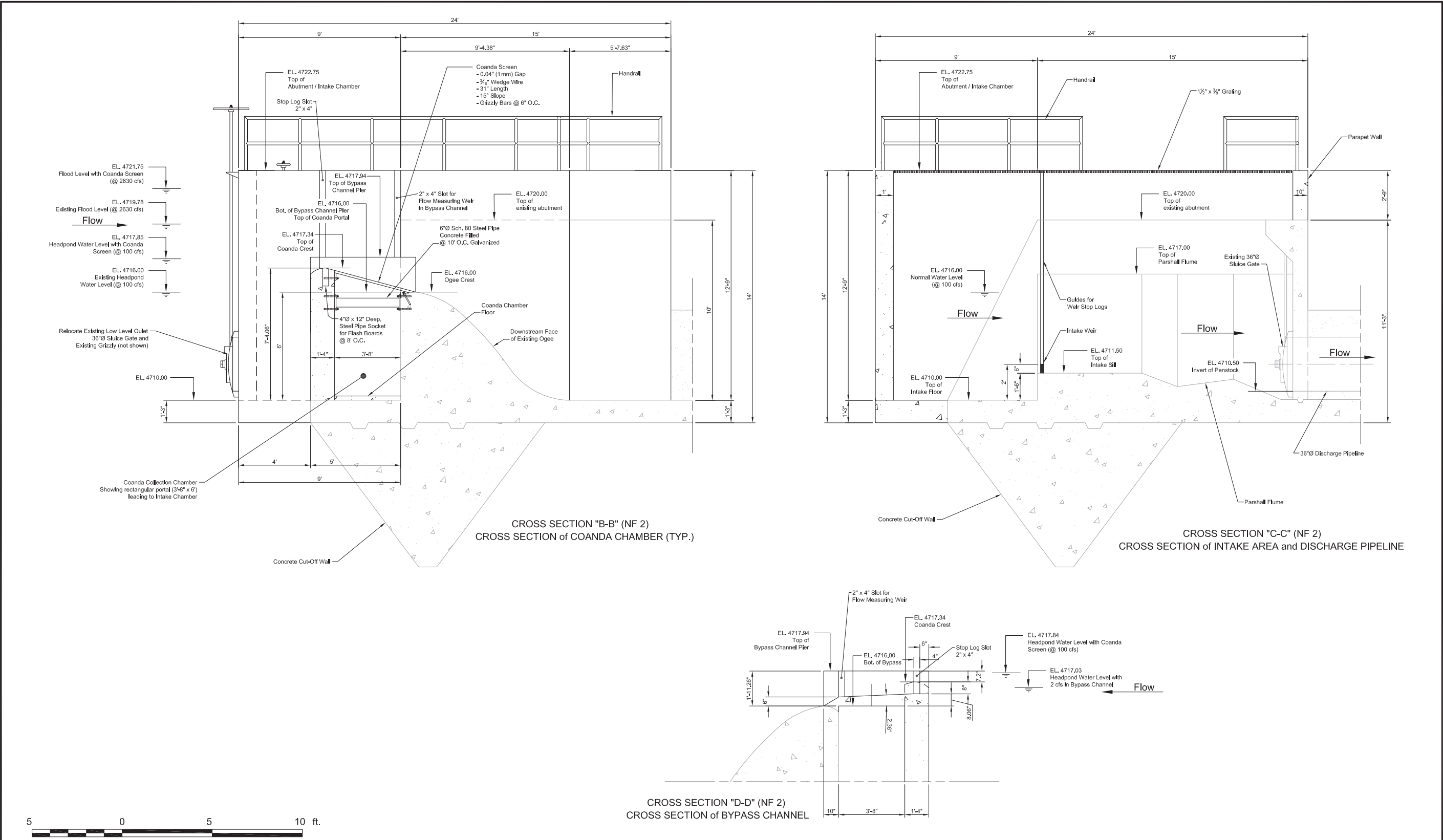


	DESIGNED <u>P.O. Sjöman</u>	CHECKED <u>J. Christensen</u>			MIDDLE FORK AMERICAN RIVER PROJECT INTAKE SEDIMENT CONTROL MEASURES	DATE January, 2010
	DRAWN <u>N.A. Kozobolis</u>	SUBMITTED _____			FIGURE NF-2 NORTH FORK LONG CANYON DIVERSION SITE PLAN PLAN AND PROFILE VIEW OF INTAKE AND WEIR	DRAWING NUMBER
	REV	DATE			DESCRIPTION	SUB



SECTION "A-A" (NF 1)
PROFILE VIEW OF INTAKE

REDUCED NOTE DRAWING	DESIGNED <u>P.O. Sjöman</u> CHECKED <u>J. Christensen</u>		 PLACER COUNTY WATER AGENCY 144 Ferguson Road, Auburn, CA 95604		 11070th Avenue Suite 214 San Ramon, California 94583 U.S.A.		MIDDLE FORK AMERICAN RIVER PROJECT INTAKE SEDIMENT CONTROL MEASURES		DATE January, 2010		
	DRAWN <u>N.A. Kozobolis</u> SUBMITTED _____						FIGURE NF-3 NORTH FORK LONG CANYON DIVERSION SITE PLAN PROFILE VIEW OF INTAKE "A-A"		DRAWING NUMBER		
	REV	DATE					DESCRIPTION	SUB	APP'D	APPROVED	



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PLACER COUNTY WATER AGENCY
144 Ferguson Road, Auburn, CA 95604



11070th Avenue
Suite 214
San Rafael, California 94903
U.S.A.

MIDDLE FORK AMERICAN RIVER PROJECT
INTAKE SEDIMENT CONTROL MEASURES

FIGURE NF-4
NORTH FORK LONG CANYON DIVERSION SITE PLAN
INTAKE SECTIONS "B-B" & "C-C"

DATE
January, 2010

DRAWING NUMBER

South Fork Long Canyon Diversion Dam Modification

Table SF-1. South Fork Long Canyon Diversion Dam Modification – Construction, Operation, and Maintenance.

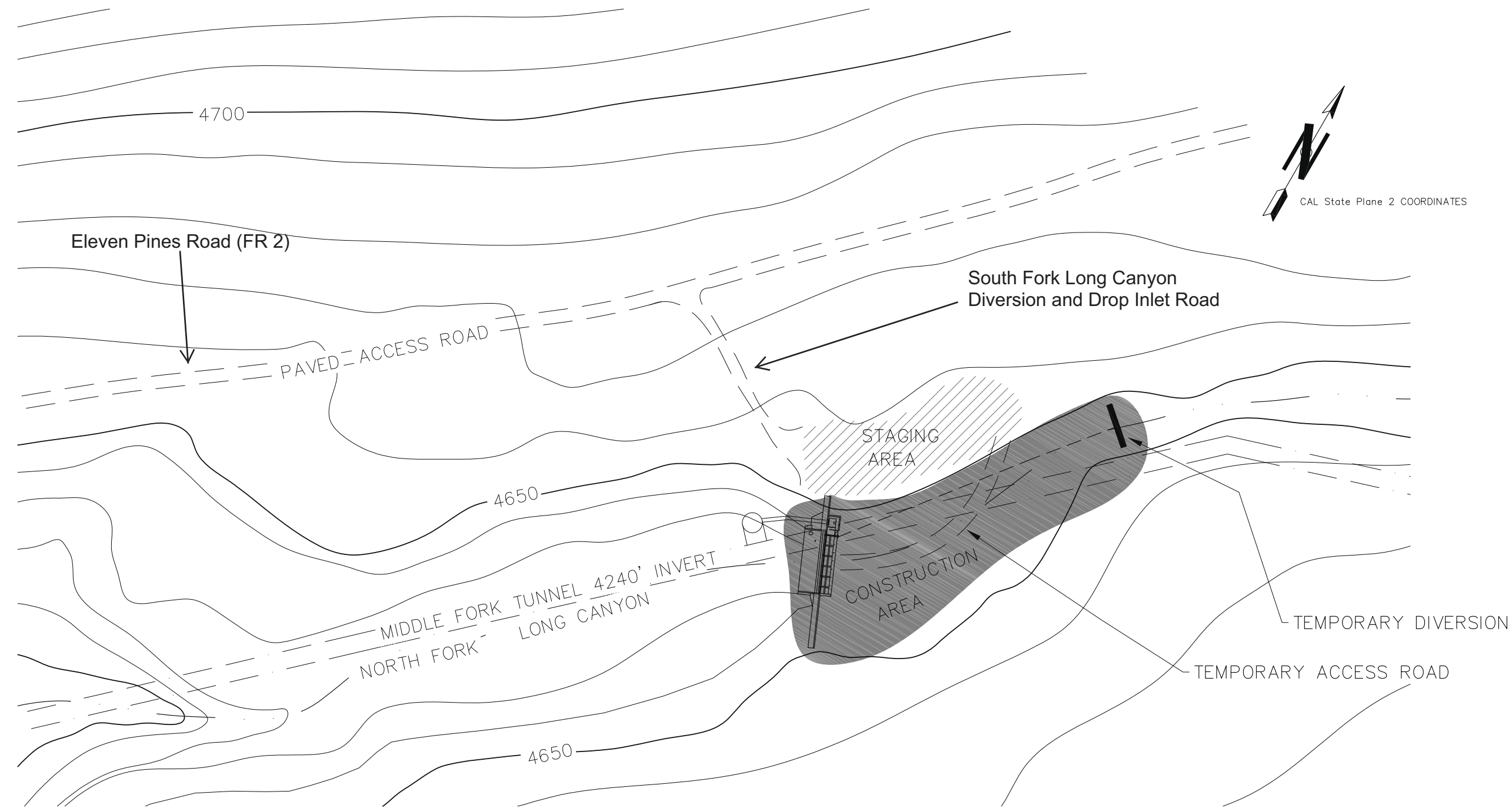
Activity	Description
Modifications to Existing Project Facilities	Modifications to Existing Facilities • Modify the existing South Fork Long Canyon Diversion Dam and intake structure into a self-cleaning, stream-bottom intake. • Construct a wedge-wire screen and collection channel immediately upstream of the existing diversion dam ogee spillway. • Raise the existing dam abutments by 3.5 feet. • Construct a concrete collection chamber on the upstream side of the north dam abutment connecting to the existing discharge pipeline. • Modify the existing low level outlet to extend to the upstream side of the new collection channel, to be used for instream flow discharge, and to dewater the impoundment, and the collection system (channel and chamber). • Construct a temporary access road on the north bank of the existing South Fork Long Canyon Diversion Pool. Refer to Figures SF-1 through SF-4.
FERC Project Boundary Revision	• None. All facilities will be constructed within the existing FERC Project boundary.
Construction Access Roads	• Construction equipment and materials will arrive at the site via Eleven Pines Road (FR 2) and South Fork Long Canyon Diversion and Drop Inlet Road. • A temporary access road will be constructed on the north bank of the existing South Fork Long Canyon Diversion Pool.
Construction Work and Staging Areas	• The construction work area will include the existing dam, tunnel intake, and surrounding unvegetated areas. • Construction staging will occur on the north side of South Fork Long Canyon Creek adjacent to the dam.
Disposal Areas	• Any excess excavated material will be disposed of at an agency-approved disposal area.
Construction Activities and Associated Equipment	• Construct a new temporary access road on the north bank of the South Fork Long Canyon Diversion Pool. • Construct small cofferdam upstream of the construction site and temporarily divert flows from South Fork Long Canyon Creek into a culvert connected to the existing 36-inch-diameter low-level outlet. • Excavate the streambed upstream of the South Fork Long Canyon Diversion Dam for installation of the new screen, collection channel, and collection chamber. • Excavated material and rock will be spread over the staging area and compacted. • Prepare existing diversion dam for new construction including concrete drilling, concrete cutting, and installing steel dowels. • Install reinforcing steel and forms for construction of new screen, collection system, and parapets on dam abutments. • Raise the abutments of the diversion by 3.5 feet. • Construct a 60-foot-long, 7.5-foot-wide concrete collection channel on the upstream side of the existing concrete diversion dam ogee spillway.

Table SF-1. South Fork Long Canyon Diversion Dam Modification – Construction, Operation, and Maintenance.

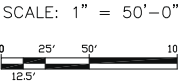
Activity	Description
	• Construct a 3-foot-thick concrete overflow weir on the upstream side of the concrete collection channel. • If necessary, install sockets for flashboards on top of the overflow weir to concentrate inflow to the wedge-wire screen. • Install a flat, self-cleaning screen made of 3/16-inch stainless steel wedge-wire with 0.04-inch-wide gaps, at a 15 degree slope in the downstream direction. • Construct a 3-foot-wide bypass channel with stoplogs to be used to bypass low flow during late summer when the intake is turned out. • Construct a 7.5-foot-wide, 13-foot-long concrete collection chamber at the north abutment of the South Fork Long Canyon Diversion Dam (uses the existing discharge pipeline and gate and connects to the Hell Hole - Middle Fork Tunnel). • Install a remote controlled slide gate to control inflow to the tunnel. • Replace the existing remote power supply with a self-contained solar/thermal electric power supply system to power flow monitoring and communication. • Modify the South Fork Long Canyon Gage at Diversion Tunnel (USGS Gage No. 11433060) to measure instream flow releases and flow diverted to Hell Hole - Middle Fork Tunnel. • Modify the low-level outlet to allow for dewatering the impoundment including the collection channel and collection chamber. • Construction equipment will include flat bed trucks, forklift, excavators bulldozer, pups, drills, compressors, 30kW size generators, mobile cranes, concrete transport trucks, concrete pumpers, lowboy trailers, and temporary sanitary facilities.
Construction Schedule and Hours of Operation	• Implement July through November within 3-4 years following license issuance. • Removal of riparian vegetation necessary for construction will take place in August through March the year prior to construction. • Construction personnel will work five, 10-hour days per week with additional weekend hours as needed.
Personnel Housing	• Construction will be completed by a crew of 6-10 personnel. The majority of the construction crew will commute to the site from Auburn or Foresthill. • Key personnel may be temporarily housed at the Hell Hole Dormitory Facility.
Short-Term Operational Changes	• Flows within South Fork Long Canyon Creek will be diverted around the construction site and discharged back to the Creek downstream of the work area.

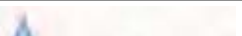
Table SF-1. South Fork Long Canyon Diversion Dam Modification – Construction, Operation, and Maintenance.

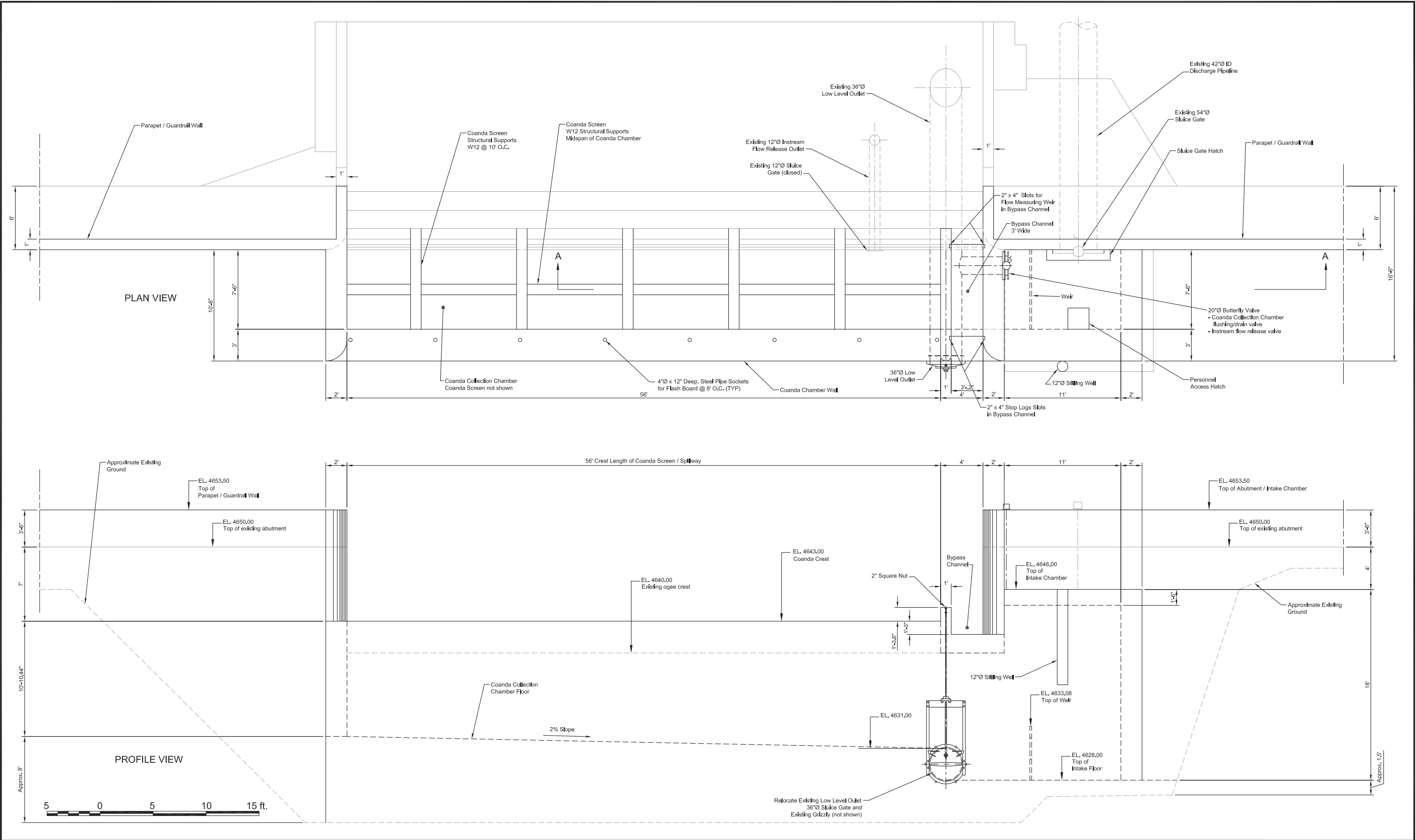
Activity	Description
Long-term Operational Changes	• Modifications will provide for meeting new minimum instream flow releases. • The minimum normal operating elevation of the diversion pool will increase from an elevation of 4,640 feet to 4,643 feet. • Debris and sediment diverted into the Hell Hole - Middle Fork Tunnel will be reduced substantially. • Periodic reductions in diverted flows (from blockages in the existing tunnel intake entrance) during storm events will be alleviated. • The wedge-wire screened diversion will typically not be in operation (turned out) between July 1 and September 30 allowing stream flow to bypass the intake. In wetter water years, when stream flow on July 1 exceeds the spawning flow for that year, some diversion may continue beyond July 1.
Project Maintenance Changes	• Trash rack cleaning will no longer be necessary. • Interim sediment management will no longer be required. • Sediment management will consist of occasional removal of large stranded debris after major storm events. • Monitoring and visual inspections of the intake during winter and spring, to verify proper facility function, will be substantially reduced. • The wedge-wire screen will be cleaned, as needed, to remove algae and other debris. • The remote controlled slide gates and associated control system will be tested annually. • The remote power supply will be periodically tested.
Acres of Habitat Loss	• Permanent loss of approximately 0.01 acre of willows and alders for the construction of modified diversion structure.
Potential Permit Requirements	• The following permits/agreements will be obtained, as necessary, prior to construction: ○ USACE Clean Water Act Section 404 Permit for fill of jurisdictional waters of the U.S. ○ USDA-FS Road Use Permit for use of forest roads during construction activities. ○ SWRCB 401 Certification will be obtained prior to FERC's issuance of the new license. This certification will include implementation of the Proposed Action (including this facility modification). ○ PCWA anticipates that preparation of a project-specific Water Quality Protection Plan (WQPP) will be a condition of the SWRCB 401 Certification. PCWA will develop a WQPP in consultation with SWRCB prior to commencement of any construction activities. ○ CDFG Fish and Game Code Section 1600 Streambed Alteration Agreement for activities within the streambed and bank.



**SOUTH FORK LONG CANYON CREEK DIVERSION
PLAN VIEW**



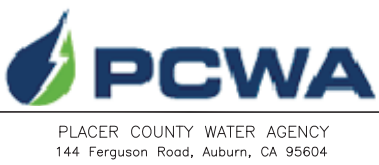
REDUCED NOTE DRAWING	DESIGNED _____		CHECKED _____		 144 Ferguson Street Auburn, CA 95604	 11070H Avenue Suite 200 San Ramon, California 94583 U.S.A.	MIDDLE FORK AMERICAN RIVER HYDROELECTRIC PROJECT INTAKE SEDIMENT CONTROL MEASURES	DATE JULY 2010
	DRAWN T. STANDERS		SUBMITTED _____				FIGURE SF-1 SOUTH FORK LONG CANYON DIVERSION SITE PLAN	DRAWING NUMBER
	REV	DATE	DESCRIPTION	SUB			APP'D	
APPROVED								



DESIGNED P.O. Sjöman CHECKED J. Christensen
DRAWN N.A. Kozobolis SUBMITTED _____

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

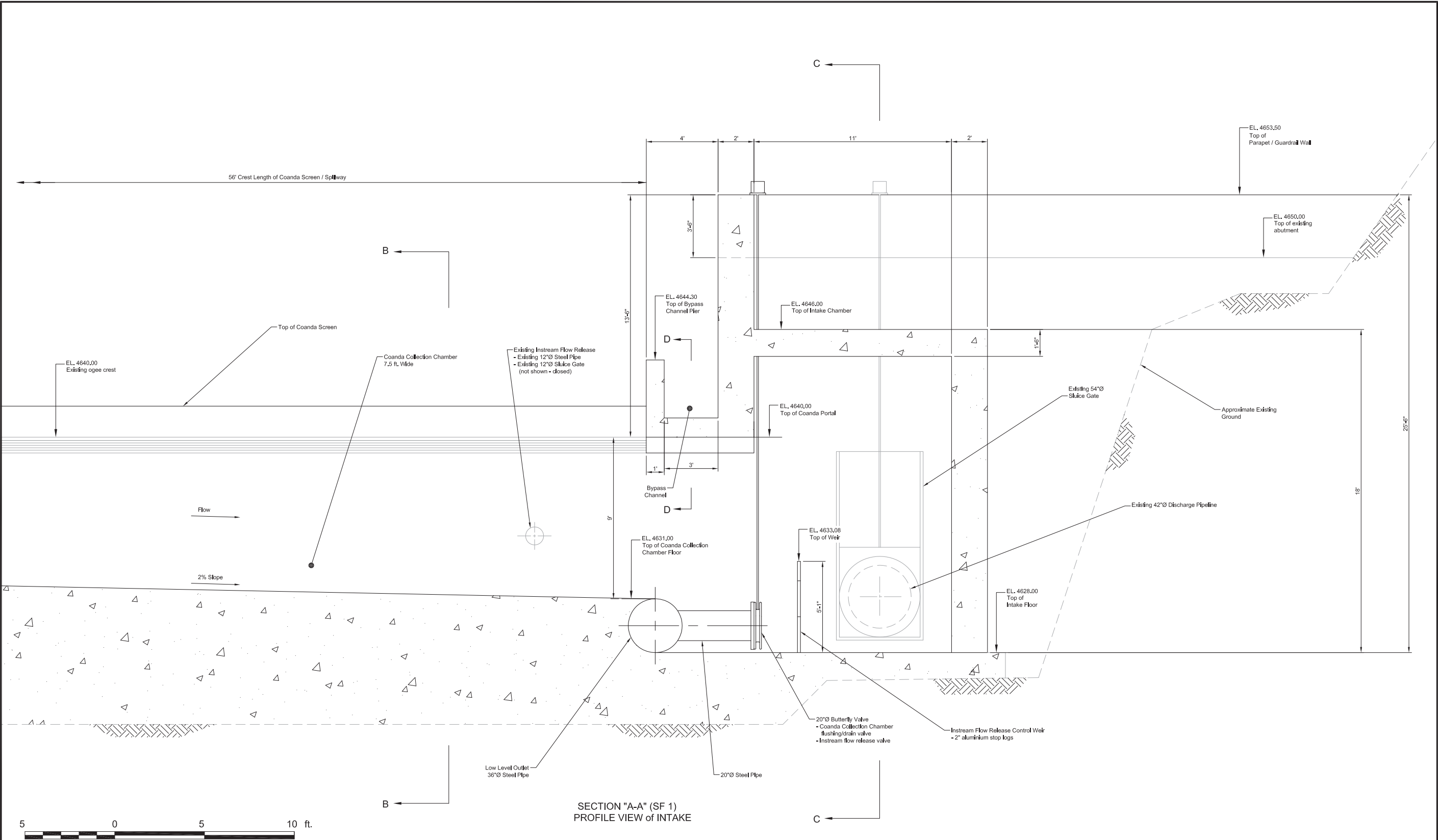


MIDDLE FORK AMERICAN RIVER PROJECT
INTAKE SEDIMENT CONTROL MEASURES

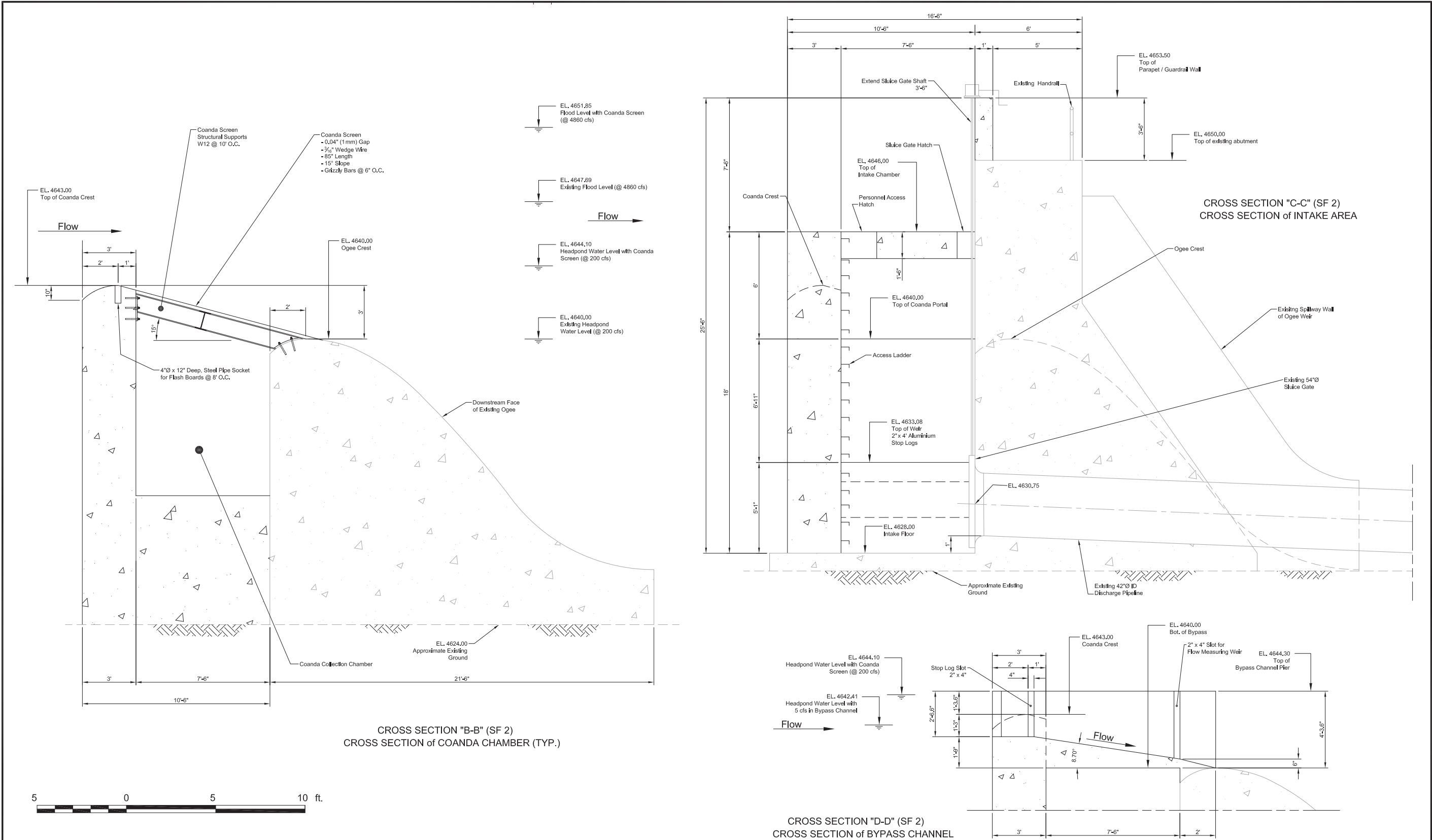
FIGURE SF-2
SOUTH FORK LONG CANYON DIVERSION SITE PLAN
PLAN AND PROFILE VIEW OF INTAKE AND WEIR

DATE
January, 2010

DRAWING NUMBER



REDUCED NOTE DRAWING	DESIGNED <u>P.O. Sjöman</u>		CHECKED <u>J. Christensen</u>		 PLACER COUNTY WATER AGENCY 144 Ferguson Road, Auburn, CA 95604	 11070th Avenue Suite 214 San Ramon, California 94583 USA	MIDDLE FORK AMERICAN RIVER PROJECT INTAKE SEDIMENT CONTROL MEASURES	DATE January, 2010		
	DRAWN <u>N.A. Kozobolis</u>						SUBMITTED _____		FIGURE SF-3 SOUTH FORK LONG CANYON DIVERSION SITE PLAN PROFILE VIEW OF INTAKE "A-A"	DRAWING NUMBER
	REV	DATE	DESCRIPTION				SUB	APP'D	APPROVED	



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DRAWN N.A. Kozobolis SUBMITTED _____

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PLACER COUNTY WATER AGENCY
144 Ferguson Road, Auburn, CA 95604

CHRISTENSEN
ASSOCIATES INC.
11070H Avenue
Suite 214
San Ramon, California 94583
U.S.A.

MIDDLE FORK AMERICAN RIVER PROJECT
INTAKE SEDIMENT CONTROL MEASURES

FIGURE SF-4
SOUTH FORK LONG CANYON DIVERSION SITE PLAN
INTAKE SECTIONS "B-B" & "C-C"

DATE
January, 2010

DRAWING NUMBER

Outlet Works Modifications

Table FMO-1. French Meadows Reservoir Outlet Works Modification – Construction, Operation, and Maintenance.

Activity	Description
Modifications to Existing Project Facilities	Modifications to Existing Facilities • Install an internal mount flowmeter in the 72-inch mainline. • Mount a magnetic style flowmeter on the smaller 10-inch stream maintenance line. • Install a cross-connection pipeline (less than 15 feet of 6-inch steel pipe) from the 72-inch to the 10-inch line. • Modify existing 10-inch line valve box for the addition of the flowmeter and cross-connection piping. Refer to Figure FMO-1.
FERC Project Boundary Revision	• None. All facilities will be constructed within the existing FERC Project boundary.
Construction Access Roads	• Construction equipment and materials will arrive at the site via Mosquito Ridge Road (FR 96). • No new roads or modifications to existing roads will be required.
Construction Work and Staging Areas	• The construction and staging area will be directly next to the existing discharge valvehouse.
Disposal Areas	• Any excess excavated material will be disposed of at an agency-approved disposal area.
Construction Activities and Associated Equipment	• Minor demolition of the existing smaller valve box. • Reform new valve box with concrete (Hand mixed or field supplied by using a ½ yard trailer mixer on-site using batch plant and delivered concrete). Quantity of finished concrete is expected to be less than one yard. • Spot reline interior of main 72-inch pipe (less than 200 feet) which includes minor grinding and application of coal tar patch. • Install 10-inch magnetic flowmeter which includes some minor welding, pipe fitting, grinding/welding. • Install solar panels, controls, and communication antenna(s). • Construction equipment to include a small backhoe with hoe ram, flat rack truck, electric jack hammer, small 5 kW generator (gas), Gen-set/welder, several light-duty pick-up trucks.
Construction Schedule and Hours of Operation	• Construction to begin in early summer and be finished by December 1 of any given year, within 1-2 years following license issuance. • Construction to last approximately 30 days. • Construction personnel to work five, 10-hour days per week with additional weekend hours as needed.

Table FMO-1. French Meadows Reservoir Outlet Works Modification – Construction, Operation, and Maintenance.

Activity	Description
Personnel Housing	Construction will be completed by a crew of approximately 2-10 personnel. The majority of the construction crew will commute to the site from Auburn or Foresthill.
Short-Term Operational Changes	- During installation of the cross connection and smaller magnetic flowmeter, the required stream maintenance flows will be supplied by the larger 60-inch ring valve. - Short-term pulse flows will be required for testing of the modified valves, flowmeter(s), and other release facilities.
Long-term Operational Changes	- Modifications will allow the existing outlet works to make larger stream maintenance flow releases without using the larger outlet valve. - The larger fixed cone valve can be annually flow tested with relatively higher flows to maintain the ability of the facility to release large amounts of water as required. The exact flow can be more closely monitored, recorded, and communicated off-site. - The proposed larger stream maintenance flow can be made from the smaller outlet line with flow sometimes coming from the main 72-inch line through the proposed cross-connection pipe.
Project Maintenance Changes	- Maintenance of the main pipelines will be improved with relining effort. - Wetted valve and pulse flow testing should be resumed on an annual basis to prove and maintain the reliability of the larger outlet works and valving. - Testing to involve partial opening of ring valve and closure testing of upstream isolation gate under pressure.
Acres of Habitat Loss	No temporary or permanent habitat loss.
Potential Permit Requirements	- The following permits/agreements will be obtained, as necessary, prior to construction: - USDA-FS Road Use Permit for use of forest roads during construction activities. - SWRCB 401 Certification will be obtained prior to FERC's issuance of the new license. This certification will include implementation of the Proposed Action (including this facility modification). - PCWA anticipates that preparation of a project-specific Water Quality Protection Plan (WQPP) will be a condition of the SWRCB 401 Certification. PCWA will develop a WQPP in consultation with SWRCB prior to commencement of any construction activities.

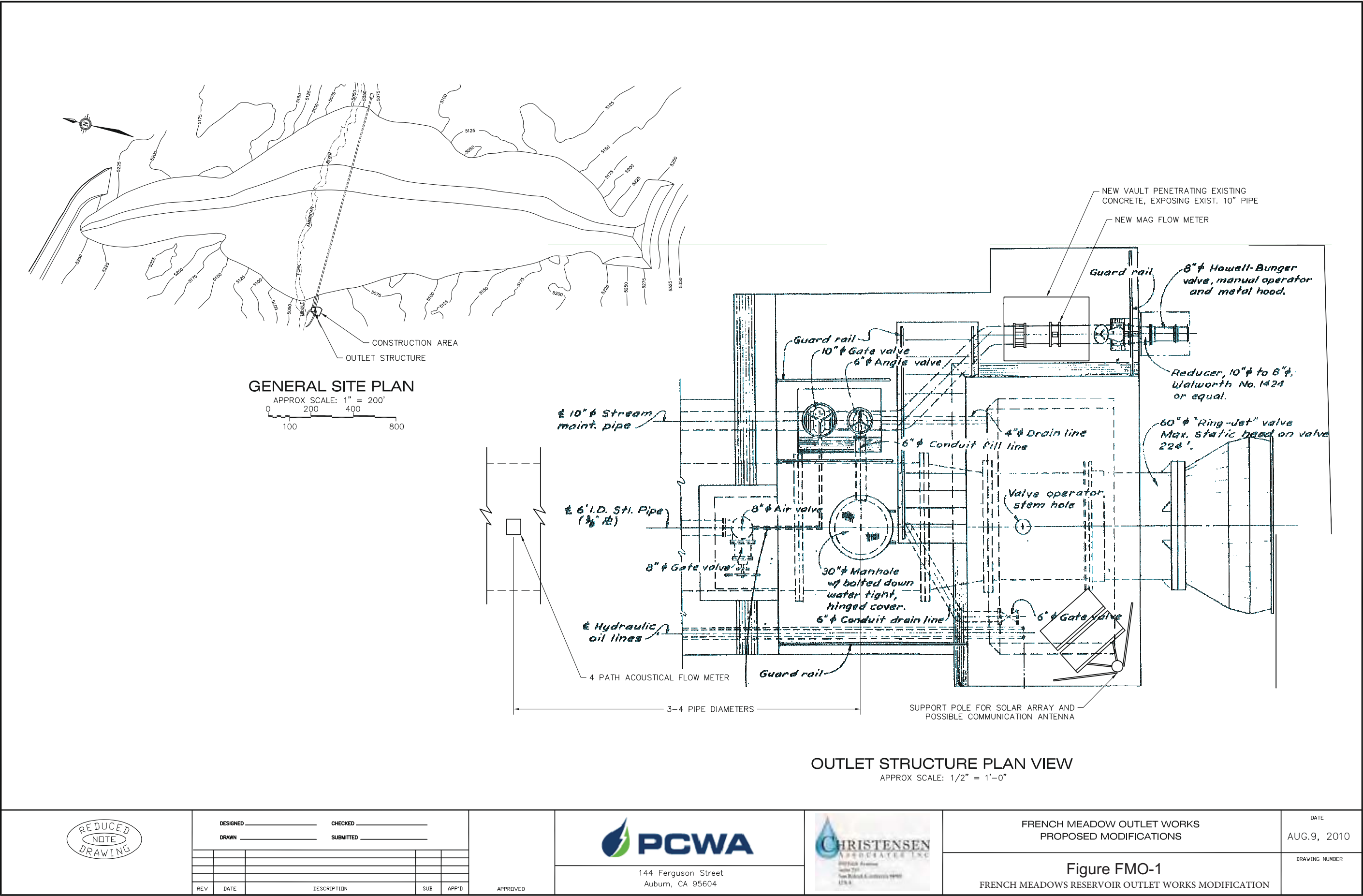


Table HHO-1. Hell Hole Reservoir Outlet Works Modification – Construction, Operation, and Maintenance.

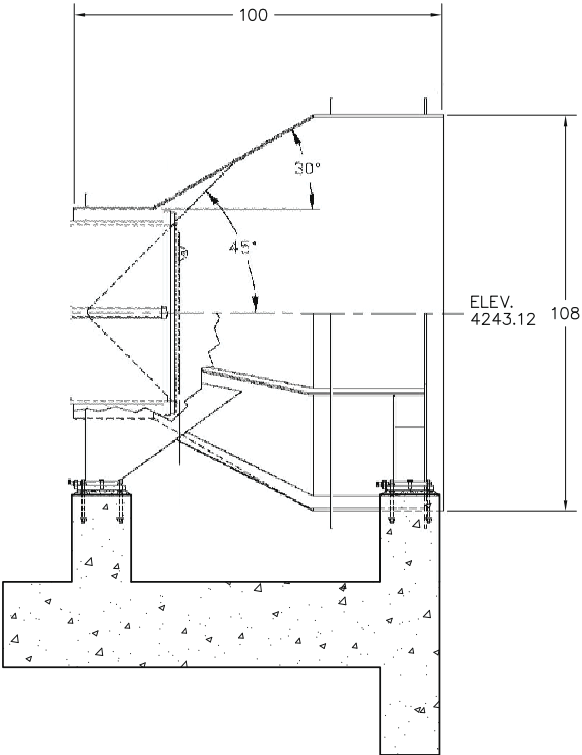
Activity	Description
Modifications to Existing Project Facilities or New Project Facilities	Modification to Existing Facilities • Install a 12-foot diameter, 20-foot long energy absorbing hood on the existing 48-inch fixed cone valve. • Modify the existing 48-inch fixed cone valve to be electrically operated. • Install an additional remote flow and pressure measuring devices on the two release pipes at the outlet works. • Replace and harden the high pressure control lines and hydraulic controls that can remotely close off the pipelines in the outlet works tunnel. Modification to Stream Channel • Recontour the discharge channel directly downstream of the 48-inch fixed cone valve to allow for the full discharge capacity for emergency releases without backwater effects and minor relocation of a Project road to allow for safe discharge of the proposed instream flow releases. Refer to Figure HHO-1.
FERC Project Boundary Revision	• None. All facilities will be constructed within the existing FERC Project boundary.
Construction Access Roads	• Construction equipment and materials will arrive at the site via Mosquito Ridge Road (FR 96), Ralston Ridge Road (FR 23 and 25), FR 2, the Hell Hole Dam and Powerline Road, and the existing spillway access road. • No new roads will be required.
Construction Work and Staging Areas	• Construction and staging will occur north of the Hell Hole Powerhouse and adjacent to the stream channel (above the ordinary high water mark) where the fixed cone valve currently discharges. • Some equipment may also be staged at the existing Hell Hole Staging Areas near the Hell Hole Dormitory.
Disposal Areas	• Any rock or gravel removed from the channel will be spread out in front of the existing Hell Hole Powerhouse. • Any excess excavated material will be disposed of at an agency-approved disposal area.
Construction Activities and Associated Equipment	• Extend the existing 16-inch pipe at the toe of the dam to divert Rubicon River flows around the construction site and allow for MIF to be maintained during construction activities. • Transport the fabricated and tested fixed cone valve hood to the site using a low-boy trailer. • Install anchors into the rock for the foundation of the valve hood with a drilling rig. • Modify existing 48-inch fixed cone valve by installing a free supported, energy absorbing cone valve hood. The hood will reduce the discharge energy and direct flow downstream at the toe of the dam. • Survey and grade the discharge channel (650 feet) directly downstream of valve to allow for full emergency discharge capacity without the potential

Table HHO-1. Hell Hole Reservoir Outlet Works Modification – Construction, Operation, and Maintenance.

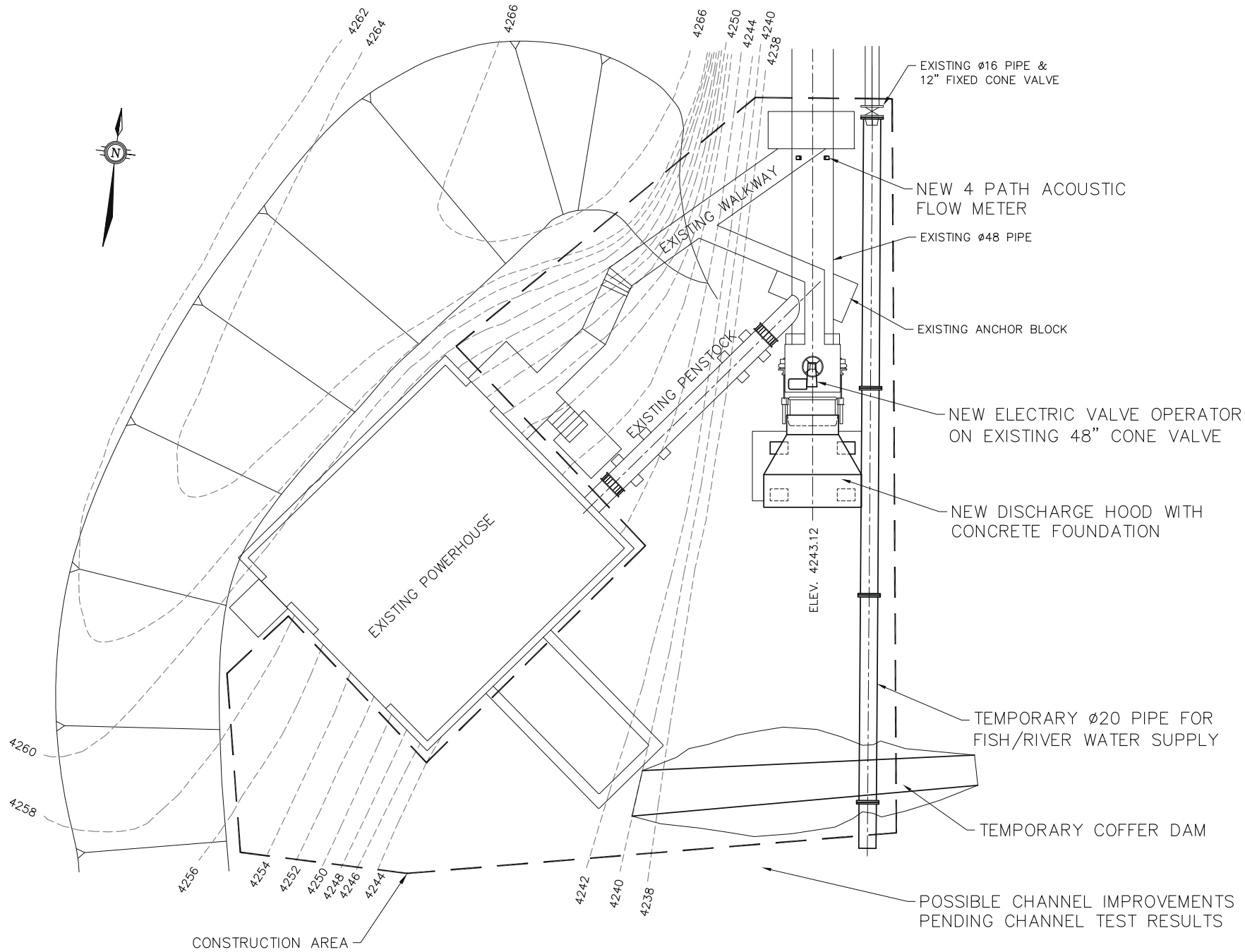
Activity	Description
	for backwater effects at the valve hood. - Inspect existing 48-inch and smaller 16-inch diameter stream maintenance line to determine if recoating or replacement is necessary. - Recoat or replace stream maintenance line, if necessary. - Install new flow measurement equipment (Rubicon River Gage at Hell Hole Dam Outlet Works) in the outlet pipe. - Replace and harden the high pressure control lines and hydraulic controls that can remotely close off the pipelines in the outlet works tunnel. - Improve the existing monitoring and security features. - Construction equipment includes a backhoe, medium excavator with “ramhoe” attachment, mid-size front loader, 10-yard dump truck, 25-ton hydraulic crane, flat rack truck, concrete transit truck, fork lift, towable air compressor, backhoe with rock breaker (hoe ram), large truck and trailer (low-boy trailer), several light-duty pick-up trucks.
Construction Schedule and Hours of Operation	- Implement between July and November; 2-3 years following license issuance. - Removal of riparian vegetation necessary for construction will take place in August through March the year prior to construction. - Construction personnel will work five, 10-hour days per week with additional weekend hours as needed.
Personnel Housing	Construction will be completed by a crew of approximately 6-20 personnel. The majority of the construction crew will commute to the site from Auburn or Foresthill.
Short-Term Operational Changes	- Flows from the outlet at the toe of the dam will be diverted around the construction site and discharged back to the river downstream of the work area. - The turbine generator at the toe of the dam will be temporality removed from service during construction. - Pulse flows will be required for testing the modified valves after construction.
Long-term Operational Changes	- Modifications will provide for safer discharge capacity and allow for larger releases from the reservoir, if required, for an emergency drawdown. - The electrified fixed cone will allow the valve to be operated remotely. - The larger fixed cone valve will be annually flow tested with higher flows to maintain the ability to release large amounts of water, as required.
Project Maintenance Changes	- Maintenance of the outlet works will be improved with relining and pipe recoating efforts. - Operation and maintenance of the larger electrified fixed cone valve operator. - Valve testing includes partial opening testing of fixed cone valve and closure testing of upstream isolation valve under pressure.

Table HHO-1. Hell Hole Reservoir Outlet Works Modification – Construction, Operation, and Maintenance.

Activity	Description
Acres of Habitat Loss	• Permanent loss of 0.24 acre of white alder riparian during recontouring of the discharge channel.
Potential Permit Requirements	• The following permits/agreements will be obtained, as necessary, prior to construction: ○ USACE Clean Water Act Section 404 Permit for fill of jurisdictional waters of the U.S. ○ USDA-FS Road Use Permit for use of forest roads during construction activities. ○ SWRCB 401 Certification will be obtained prior to FERC's issuance of the new license. This certification will include implementation of the Proposed Action (including this facility improvement). ○ PCWA anticipates that preparation of a project-specific Water Quality Protection Plan (WQPP) will be a condition of the SWRCB 401 Certification. PCWA will develop a WQPP in consultation with SWRCB prior to commencement of any construction activities. ○ CDFG Fish and Game Code Section 1600 Streambed Alteration Agreement for activities within the streambed and bank.



BASIC DISCHARGE HOOD & FOUNDATION ELEVATION
SCALE: 1/2" = 1'-0"
0 5' 4'



HELL HOLE OUTLET WORKS, PLAN VIEW
SCALE: 1" = 6'-0"
0 6' 12'



DESIGNED _____		CHECKED _____	
DRAWN _____		SUBMITTED _____	
REV	DATE	DESCRIPTION	SUB APP'D

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144 Ferguson Street
Auburn, CA 95604



HELL HOLE OUTLET WORKS
IMPROVEMENTS

Figure HHO-1
HELL HOLE RESERVOIR OUTLET WORKS MODIFICATION

DATE
AUG. 8, 2010

DRAWING NUMBER

Table IBO-1. Middle Fork Interbay Outlet Works Modification – Construction, Operation, and Maintenance.

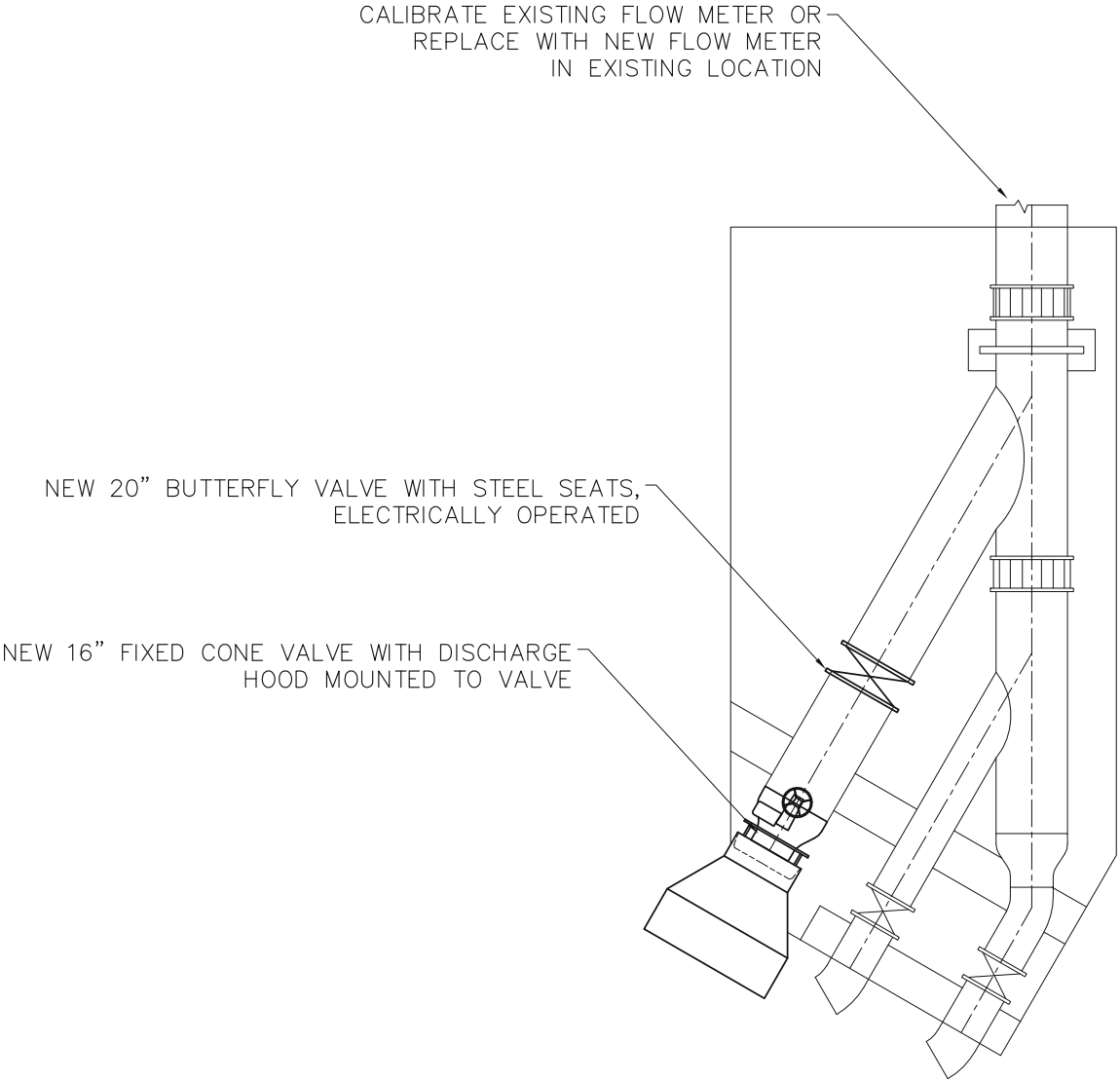
Activity	Description
Modifications to Existing Project Facilities	Modifications to Existing Facilities • Install a new or calibrate the existing 20-inch diameter main supply line flowmeter. • Install a new release valve and guard valve for release outlet works (isolation valve to be high performance low-loss biplane butterfly valve; outlet release valve to be fixed cone valve). • Install new stream gaging station below dam. Refer to Figure IBO-1.
FERC Project Boundary Revision	• None. All facilities will be constructed within the existing FERC Project boundary.
Construction Access Roads	• Construction equipment and materials will arrive to the site via Mosquito Ridge Road (FR 96) and Middle Fork Interbay Dam and Powerhouse Road. • No new roads or modifications to existing roads will be required.
Construction Work and Staging Areas	• The staging area will be directly next to the Middle Fork Powerhouse. • Construction of the replacement piping and valves to be located below the existing outlet works. • Construction area for new gaging station, if required, to be determined by study and discussion with USGS.
Disposal Areas	• Any excess excavated material will be disposed of at an agency-approved disposal area.
Construction Activities and Associated Equipment	• Minor demolition of existing piping system. • Reform new valve box with concrete (Hand mixed or field supplied by using a ½ yard trailer mixer on-site using batch plant and delivered concrete). Quantity of finished concrete is expected to be less than two yards. • Replace guard valve and installation of fixed cone valve. • Construction of the gaging station will require concrete blocks on both sides of the river with a cable tram system for moving across the river flows to take calibration data on flow and contour conditions. • Installation of local solar panels, controls, communication antenna(s) for and at the gaging site. • Construction equipment includes a hydraulic crane, concrete transport trucks, concrete pumper, compressor with rock drills, several light-duty pick-up trucks.
Construction Schedule and Hours of Operation	• Construction to begin early summer and be finished by December 1 of any given year within; 1-2 years following license issuance. • Construction to last less than 60 days. • Construction personnel to work five, 10-hour days per week with additional weekend hours as needed.

Table IBO-1. Middle Fork Interbay Outlet Works Modification – Construction, Operation, and Maintenance.

Activity	Description
Personnel Housing	Construction will be completed by a crew of approximately 2-15 personnel. The majority of the construction crew will commute to the site from Auburn or Foresthill.
Short-Term Operational Changes	- During installation of the new isolation valves and/or flowmeter the required stream maintenance flows will be supplied by the lower dam outlet or by spilling the diversion over the spillway gates. - Short-term pulse flows required for testing of the modified and newly installed valves, flowmeter(s), and stream gaging station.
Long-term Operational Changes	- Modifications will allow stream release flows to be more closely monitored, recorded, and communicated off-site. - The larger stream maintenance flow can be made by either spilling over the existing gates, by lifting a gate section, or by using the dam's lower outlet.
Project Maintenance Changes	- Maintenance of the outlet works will be improved with the new valves and controls. - Pulse flow testing can be done, depending on the water year, to prove and maintain the reliability and accuracy of the proposed stream gaging station. - Testing to include matching spilled overdraft flows from Middle Fork Interbay with spill flows at the diversion.
Acres of Habitat Loss	No temporary or permanent habitat loss.
Potential Permit Requirements	- The following permits/agreements will be obtained, as necessary, prior to construction: - USACE Clean Water Act Section 404 Permit for fill of jurisdictional waters of the U.S. - USDA-FS Road Use Permit for use of forest roads during construction activities. - SWRCB 401 Certification will be obtained prior to FERC's issuance of the new license. This certification will include implementation of the Proposed Action (including this facility modification). - PCWA anticipates that preparation of a project-specific Water Quality Protection Plan (WQPP) will be a condition of the SWRCB 401 Certification. PCWA will develop a WQPP in consultation with SWRCB prior to commencement of any construction activities. - CDFG Fish and Game Code Section 1600 Streambed Alteration Agreement for activities within the streambed and bank.



INTERBAY DAM & DOWNSTREAM VICINITY
SCALE: N.T.S.



INTERBAY DAM OUTLET WORKS
PROPOSED MODIFICATION
SCALE: N.T.S.

REDUCED NOTE DRAWING	DESIGNED _____		CHECKED _____		 144 Ferguson Street Auburn, CA 95604	 201 Fifth Avenue Suite 200 San Rafael, California 94901 578.6.1	INTERBAY DAM OUTLET WORKS IMPROVEMENTS		DATE AUG. 10, 2010	
	DRAWN _____		SUBMITTED _____				Figure IBO-1		DRAWING NUMBER	
	REV	DATE	DESCRIPTION	SUB			APP'D	MIDDLE FORK INTERBAY OUTLET WORKS MODIFICATION		

**Permits, Best Management Practices, and Avoidance/Protection Measures
to be Obtained/Implemented for Modification of
Existing Project Facilities or Construction of New Project Facilities**

Table C-2. Best Management Practices and Avoidance/Protection Measures to be Implemented for Modification of Existing or Construction of New Project Facilities.

Best Management Practice or Avoidance/Protection Measure	Modified/New Facility						
	Hell Hole Reservoir Seasonal Storage Increase Improvement	Small Diversion			Outlet Works		
		Duncan Creek Diversion Dam	North Fork Long Canyon Diversion Dam	South Fork Long Canyon Diversion Dam	French Meadows Dam Outlet Works	Hell Hole Dam Outlet Works	Middle Fork Interbay Dam Outlet Works
USDA-FS Water Quality Best Management Practices							
Road and Building Site Construction BMPs							
General Guidelines for the Location and Design of Roads (Practice 2-1): Includes consideration for the location and design of roads to minimize resource damage.	X						
Erosion Control Plan (Practice 2-2): Limits and mitigates erosion and sedimentation through effective planning prior to initiation of construction activities and through effective contract administration during construction.	X	X	X	X	X	X	X
Timing of Construction Activities (Practice 2-3): Minimizes erosion by conducting operations during periods of minimal runoff.	X	X	X	X	X	X	X
Stabilization of Road Slope Surfaces and Spoil Disposal Areas (Practice 2-4): Minimizes erosion from exposed cut slopes, fill slopes, and spoil disposal areas.	X	X	X	X	X	X	X
Road Slope Stabilization Construction Practices (Practice 2-5): Reduces sedimentation by minimizing erosion from road slopes and slope failure along roads.	X						
Dispersion of Subsurface Drainage From Cut and Fill Slopes (Practice 2-6): Minimizes the possibilities of cut or fill slope failure and the subsequent production of sediment.	X						
Control of Road Drainage (Practice 2-7): Minimizes the erosive effects of water concentrated by road drainage features; to disperse runoff from disturbances within the road clearing limits; to lessen the sediment yield from roaded areas; to minimize erosion of the road prism by runoff from road surfaces and from uphill areas.	X						
Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects (Practice 2-9): Minimizes erosion and sedimentation from disturbed ground on incomplete projects.	X	X	X	X	X	X	X
Control of Side cast Material During Construction and Maintenance (Practice 2-11): Minimizes sediment production originating from sidecast material during road construction or maintenance.	X						
Servicing and Refueling of Equipment (Practice 2-12): Prevents pollutants (e.g., fuels, lubricants, or other hazardous materials) from being discharged into river, streams, or impoundments.	X	X	X	X	X	X	X
Control of Construction and Maintenance Activities Adjacent to SMZs (Practice 2-13): Protects water quality by controlling construction and maintenance actions within and adjacent to any streamside management zone (SMZs).	X	X	X	X	X	X	X
Controlling In-Channel Excavation (Practice 2-14): Minimizes stream channel disturbances and related sediment production.	X	X	X	X	X	X	X
Diversion of Flows around Construction Sites (Practice 2-15): Ensures that all stream diversions are carefully planned to minimize downstream sedimentation, and to restore stream channels to their natural grade, condition, and alignment as soon as possible.	X	X	X	X	X	X	X
Stream Crossings on Temporary Roads (Practice 2-16): Ensures that temporary roads do not unduly damage stream channels and to ensure that fish passage is unimpeded by stream crossing structures.			X	X			
Disposal of Right-of-Way and Roadside Debris (Practice 2-19): Ensures that debris generated during road construction is kept out of streams and that debris dams are not formed.	X	X	X	X	X	X	X
Specifying Riprap Composition (Practice 2-20): Minimizes sediment production associated with the installation and utilization of riprap material.	X	X	X	X	X	X	X
Road Surface Treatment to Prevent Loss of Materials (Practice 2-23): Minimizes the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.	X	X	X	X	X	X	X
Traffic Control During Wet Periods (Practice 2-24): Reduces road surface disturbance and rutting of roads, and minimize sediment washing from disturbed road surfaces.	X	X	X	X	X	X	X
Obliteration or Decommissioning of Roads (Practice 2-26): Reduces sediment generated from unneeded system roads by obliterating or decommissioning them at the completion of their intended use.			X	X			
Surface Erosion Control at Facility Sites (Practice 2-28): Reduces the amount of surface erosion at developed sites and the amount of soil entering streams.	X	X	X	X	X	X	X

Table C-2. Best Management Practices and Avoidance/Protection Measures to be Implemented for Modification of Existing or Construction of New Project Facilities (continued).

Best Management Practice or Avoidance/Protection Measure	Modified/New Facility						
	Hell Hole Reservoir Seasonal Storage Increase Improvement	Small Diversion			Outlet Works		
		Duncan Creek Diversion Dam	North Fork Long Canyon Diversion Dam	South Fork Long Canyon Diversion Dam	French Meadows Dam Outlet Works	Hell Hole Dam Outlet Works	Middle Fork Interbay Dam Outlet Works
USDA-FS Water Quality Best Management Practices (continued)							
Recreation Best Management Practices							
Protection of Water Quality Within Developed and Dispersed Recreation Areas (Practice 4-9): Protects water quality by regulating the discharge and disposal of potential pollutants.		X					
Vegetative Manipulation Best Management Practices							
Slope Limitations for Mechanical Equipment Operation (Practice 5-2): Reduces gully and sheet erosion and associated sediment production by limiting tractor use.	X	X	X	X	X	X	X
Revegetation of Surface Disturbed Areas (Practice 5-4): Requires minimization of soil erosion through establishment and vegetation foliage and root networks.	X	X	X	X	X	X	X
Soil Moisture Limitations for Mechanical Equipment Operations (Practice 5-6): Prevents compaction, rutting, and gullyng, with resultant sediment production and turbidity.	X	X	X	X	X	X	X
Watershed Best Management Practices							
Forest and Hazardous Substance Spill Prevention Control and Counter Measure Plan (Practice 7-4): Prevents contamination of waters from accidental spills.	X	X	X	X	X	X	X
Avoidance and Protection Measure							
Fire Prevention and Suppression							
The contractor, its employees, and subcontractors and their employees, will make all reasonable efforts to prevent and suppress wild fires, and will exercise diligence in protecting from damage the land and property of the United States.	X	X	X	X	X	X	X
No burning of any kind will occur as part of the construction activities.	X	X	X	X	X	X	X
The following fire equipment will be on site at all times:							
One shovel, one axe and one fire extinguisher UL rated at 4 BC or more on each truck, personnel vehicle, tractor, grader, and any other heavy equipment used.	X	X	X	X	X	X	X
One shovel and on back-pack five gallon water filled tank with pump with each welder.	X	X	X	X	X	X	X
One shovel and one chemical pressurized fire extinguisher (fully charged) located at a point no greater than a distance of 25-feet from the work site, for each gasoline powered tool, including but not limited to chain saws, rock drills, etc.	X	X	X	X	X	X	X
Air Quality							
Fugitive Dust Reduction Measures							
Require contractors to comply with provisions of the Placer County Air Pollution Control District Rule 228 - Fugitive Dust, including Section 300 limits on visible emissions, PM ₁₀ concentrations, track-out onto paved public roadways, and other applicable requirements.	X	X	X	X	X	X	X
Stabilize unpaved areas subject to vehicle traffic by watering, treating with a non-toxic chemical dust suppressant, or covering.	X	X	X	X	X	X	X
Limit the speed of any vehicles and equipment traveling across unpaved areas no more than 15 miles per hour unless the road surface and surrounding area is sufficiently stabilized.	X	X	X	X	X	X	X
Stabilize storage piles and disturbed areas not subject to vehicular traffic by keeping wet, treating with a non-toxic chemical dust suppressant, or covering when material is not being added to, or removed from, the pile.	X	X	X	X	X	X	X
Prior to any ground disturbance, including grading, excavating, and land clearing, apply sufficient water to the area to be disturbed to limit dust and minimize emissions from crossing the boundary line.	X	X	X	X	X	X	X
Clean construction vehicles leaving the site to prevent dust, silt, mid, and dirt, from being released or tracked offsite.	X	X	X	X	X	X	X
Remove significant accumulations of mud or dirt from paved, public streets at the end of each work day using wet sweeping or a HEPA filter equipped vacuum device. Do not use blower devices.	X	X	X	X	X	X	X
Suspend grading and earthmoving operations if wind speeds are high enough to result in dust emissions crossing the boundary line, despite the application of dust mitigation measures.	X	X	X	X	X	X	X

Table C-2. Best Management Practices and Avoidance/Protection Measures to be Implemented for Modification of Existing or Construction of New Project Facilities (continued).

Best Management Practice or Avoidance/Protection Measure	Modified/New Facility						
	Hell Hole Reservoir Seasonal Storage Increase Improvement	Small Diversion			Outlet Works		
		Duncan Creek Diversion Dam	North Fork Long Canyon Diversion Dam	South Fork Long Canyon Diversion Dam	French Meadows Dam Outlet Works	Hell Hole Dam Outlet Works	Middle Fork Interbay Dam Outlet Works
Air Quality (continued)							
Fugitive Dust Reduction Measures (continued)							
Prevent spillage from materials transported off-site by either covering with tarps, or wetting loads such that the material does not touch the front, back, or sides of the cargo compartment at any point less than six inches from the top and that no point of the load extends above the top of the cargo compartment.	X	X	X	X	X	X	X
If any naturally occurring asbestos, ultramafic rock, or serpentine is disturbed: (1) wash all equipment before moving from the property onto a paved public road, and (2) upon completion of the project, stabilize disturbed surfaces using one or more of the following methods: (a) establishment of a vegetative cover; (b) placement of at least one foot of non-asbestos-containing material, or (c) paving.	X	X	X	X	X	X	X
Diesel Emissions Reduction Measures							
Depending on equipment availability, require that all diesel construction engines with a rating of 50 horsepower or greater meet, at a minimum, the Tier 2 California emission standards for off-road engines (13 CCR 2423 per 40 CFR 89.112).	X	X	X	X	X	X	X
Require contractors to limit idling of construction vehicles and equipment on site to 15 minutes or less, unless idling is necessary for effective work progress or equipment operation.	X	X	X	X	X	X	X
Require contractors to maintain construction equipment in proper working order, and in accordance with manufacturer specifications.	X	X	X	X	X	X	X
Fuel Emissions Measures							
Comply with the use of ultra-low sulfur diesel fuel for all construction equipment, as required by the state of California, to minimize diesel particular matter emissions.	X	X	X	X	X	X	X
Biological Resources							
Noxious Weed Measures							
Revegetation and seeding will be implemented consistent with measures outlined in the Vegetation and Integrated Pest Management Plan (VIPMP).	X	X	X	X	X	X	X
The Licensee will implement measures to prevent the introduction or spread of noxious weeds as defined in the VIPMP.	X	X	X	X	X	X	X
Riparian Measures							
Riparian vegetation will not be removed or destroyed, with the exception of planned removals necessary for modification/construction activities including 0.01 acres at South Fork Long Canyon Diversion Pool, 0.03 acres at Duncan Creek Diversion Pool, and 0.24 acres at the Hell Hole Dam Outlet Works.		X		X		X	
One-time removal of riparian vegetation at South Fork Long Canyon Diversion Pool, Duncan Creek Diversion Pool, and Hell Hole Dam Outlet Works will be conducted between August and March one year prior to construction to avoid impacts to riparian nesting songbirds.		X		X		X	
The Licensee will use existing ramps to access reservoirs and diversion pools whenever possible. When it is not possible to use existing ramps, an access route will be selected in an area that does not support riparian vegetation.	X	X	X	X	X	X	X

Table C-2. Best Management Practices and Avoidance/Protection Measures to be Implemented for Modification of Existing or Construction of New Project Facilities (continued).

Best Management Practice or Avoidance/Protection Measure	Modified/New Facility						
	Hell Hole Reservoir Seasonal Storage Increase Improvement	Small Diversion			Outlet Works		
		Duncan Creek Diversion Dam	North Fork Long Canyon Diversion Dam	South Fork Long Canyon Diversion Dam	French Meadows Dam Outlet Works	Hell Hole Dam Outlet Works	Middle Fork Interbay Dam Outlet Works
Biological Resources (continued)							
Special-Status Plant Measures							
If a new special-status plant population that could be affected by sediment management activities is detected prior to implementation of facility modifications or new facility construction, the Licensee will consult with USDA-FS, USFWS, and CDFG, as appropriate, to determine a site-specific protective buffer around the population considering the special-status plant species, location of the population, and topography of the site.	X	X	X	X	X	X	X
Aquatic Measures							
Check reservoirs during dewatering, transport stranded species. Prior to diverting or bypassing flows, all fish inhabiting the affected reach shall be captured and rescued to a downstream location.		X	X	X		X	
If fish are present within the small diversion pools during dewatering, fish will be rescued and transported downstream of the diversion. A record will be maintained of all fish rescued. This will include survey personnel names, date captured and relocated, and method of capture. The complete record will be provided to resources agencies following completion of sediment management.		X	X	X		X	
If fish are present within Middle Fork Interbay during dewatering, fish will be rescued and transported downstream of the sediment augmentation site and associated silt fence. In addition, fish present at the sediment augmentation site will be rescued and transported downstream of the silt fence. A record will be maintained of all fish rescued. This will include survey personnel names, date captured and relocated, and method of capture. The complete record will be provided to resources agencies following completion of sediment management.		X	X	X		X	
Raptor Measures							
All new power poles and powerlines will be constructed using APLIC raptor-safe design configurations.	X	X	X	X	X	X	X
Ground disturbing and construction activities will be not conducted within 500 feet of an active raptor nest during the raptor breeding season (February 15 through September 15). – If ground disturbing and construction activities must occur during the breeding season, a pre-construction survey shall be conducted by a qualified biologist to determine if there are active nests present. The survey shall be conducted no more than 30 days prior to implementation of the activity. – If the biologist determines that the area surveyed does not contain any active nests, then activities may be implemented. – If active raptor nests are found, activities shall not occur within 500 feet of an active nest until the end of the breeding season or until the Licensee receives written authorization from resource agencies to proceed.	X	X	X	X	X	X	X
Cultural Resources							
Licensee will implement measures for the protection of cultural resources consistent with the Historic Properties Management Plan (HPMP).	X	X	X	X	X	X	X
Public and Worker Safety							
Material Safety Data Sheets for all substances used on the job site will be on file at the job headquarters in the Rock Creek Yard at Auburn, as required by the Hazard Communication Law, General Industry Safety Orders, Sec 5194, and will be available as necessary.	X	X	X	X	X	X	X
Normal construction safety procedures, road signage, employee training and tailboards, and good housekeeping will be implemented to assure that no unseen safety hazards exist.	X	X	X	X	X	X	X
Traffic control will consist of temporary construction signs, trucks entering roadway signs, and flaggers as needed.	X	X	X	X	X	X	X
Road closures will be implemented as necessary during construction activities.	X	X	X	X	X	X	X

APPENDIX D

California Red-Legged Frog Site Assessment

ATTACHMENT A

California Red-legged Frog Site Assessment Report

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1.0 INTRODUCTION

This report presents the California Red-legged Frog (CRLF) (*Rana aurora draytonii*) Site Assessment conducted for the relicensing of Placer County Water Agency's (PCWA's) Middle Fork American River Project (MFP or Project). The purpose of the Site Assessment is to provide the U.S. Fish and Wildlife Service (USFWS) with sufficient information to make a determination as to whether protocol-level presence/absence surveys for the federally listed CRLF are required for relicensing of the MFP.

This Site Assessment was prepared in accordance with the *USFWS Revised Guidance on Site Assessments and Field Surveys for California Red-legged Frogs* (Guidance) (USFWS 2005) and with the study approach for CRLF site assessment surveys described in PCWA's AQ 12 - Special-Status Amphibian and Aquatic Reptile Technical Study Plan. The study area for this Site Assessment encompasses one mile around all existing Project facilities and features, Project recreation facilities, stakeholder-identified dispersed concentrated use areas, and river/stream reaches affected by the MFP within the historic range of the species (below 5,000 feet in elevation). The study area also includes one mile around potential Project betterments/improvements (less than 5,000 feet in elevation), including proposed new facilities, roads, trails; staging and disposal sites; as well as potential new inundation areas.

A draft report was distributed to the Terrestrial Technical Working Group, including USFWS, on February 19, 2008 for a 60 day comment period. The comment period ended on April 19, 2008. One comment was received from USDA-FS during the March 10, 2008, working group meeting. This comment is addressed in this report. On March 27, 2008, USFWS provided a letter to PCWA stating that following review of the report, they determined that protocol level CRLF surveys should be conducted at four locations in the study area. Refer to Appendix A for a copy of this letter.

2.0 PROJECT DESCRIPTION

PCWA owns and operates the MFP, a system consisting of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses that began operations in 1967. The MFP seasonally stores and releases water to meet consumptive demands within western Placer County and to generate power for the California electrical grid. PCWA operates the MFP under a 50-year license (FERC Project No. 2079) issued in 1963. The current license expires on March 1, 2013. PCWA is seeking the renewal of its license to continue operations of the MFP pursuant to FERC's Integrated Licensing Process (ILP) regulations.

The MFP is located on the western slope of the Sierra Nevada primarily in Placer County, California (Map 1). A small component of the Project (a portion of Ralston Afterbay Dam) is located in El Dorado County, California. The MFP is located within the Middle Fork American River Watershed (Watershed) at elevations ranging from approximately 1,100 feet to 5,300 feet. The Project is almost entirely in the Tahoe National Forest (TNF) and the Eldorado National Forest (ENF), with a small portion on PCWA-owned property.

A detailed description of Project facilities and operations and maintenance activities is provided in Supporting Document (SD) B of the Pre-Application Document (PAD) filed with the FERC on December 13, 2007 (PCWA 2007) and provided under separate cover to the USFWS. The following briefly summarizes this information.

The MFP serves as a multi-purpose water supply and hydro-generation project designed to conserve and control waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. Water for hydroelectric generation and consumptive use is diverted and stored under permits and licenses issued by the State Water Resources Control Board.

Water for consumptive purposes is released from the MFP and re-diverted at two locations: (1) the American River Pump Station, located on the North Fork American River near the City of Auburn; and (2) Folsom Reservoir. Both points of re-diversion are downstream of the MFP facilities and neither is part of the MFP as defined in the FERC Project License.

Hydroelectric power from the MFP is produced at five Project powerhouses with a combined nameplate generating capacity of approximately 224 megawatts. The total annual flow through the MFP and the resulting total annual generation are highly variable. The MFP produces an average of 1,030,000 megawatt-hours annually on mean generation flows of 452,000 acre-feet (ac-ft).

2.1 PROJECT FACILITIES

The MFP diverts, stores, and transports water through a series of stream diversions, reservoirs, water conveyance systems, and powerhouses before it is released back into the Middle Fork American River below Oxbow Powerhouse, approximately 29 miles upstream of Folsom Reservoir (Map 1). Instream flow releases below each diversion are made in accordance with FERC license requirements. All electricity generated by the MFP is delivered to Pacific Gas and Electric's (PG&E's) transmission system at Project switchyards and substations, typically located near powerhouses. PG&E's transmission system is not part of the MFP.

The backbone of the MFP is its two principal water storage reservoirs, French Meadows and Hell Hole. These reservoirs are located on the Middle Fork American River and the Rubicon River, respectively, and have a combined gross storage capacity of 342,583 ac-ft.

Starting at the highest elevation of the MFP, water is diverted from Duncan Creek at the Duncan Creek Diversion and routed through the Duncan Creek-Middle Fork Tunnel into French Meadows Reservoir (134,993 ac-ft of gross storage). Flows in the Middle Fork American River are captured and stored in French Meadows Reservoir along with diversions from Duncan Creek. Water is released into the Middle Fork American River downstream of French Meadows Dam. From French Meadows Reservoir, water is transported via the French Meadows-Hell Hole Tunnel, passed through the French Meadows Powerhouse (installed generating capacity of 15.3 MW) and released into

Hell Hole Reservoir (207,590 ac-ft of gross storage). Flows in the Rubicon River are captured and stored in Hell Hole Reservoir along with water released from French Meadows Reservoir through French Meadows Powerhouse. Water released from Hell Hole Reservoir into the Rubicon River to meet instream flow requirements first pass through the Hell Hole Powerhouse (installed generating capacity of 0.73 MW), which is located at the base of Hell Hole Dam.

From Hell Hole Reservoir, water is also transported via the Hell Hole-Middle Fork Tunnel, passed through the Middle Fork Powerhouse (installed generating capacity of 122.4 MW) and released into the Middle Fork Interbay (175 ac-ft of gross storage). Between Hell Hole Reservoir and Middle Fork Powerhouse, water is diverted from the North and South Forks of Long Canyon creeks directly into the Hell Hole-Middle Fork Tunnel.

Flows from the Middle Fork American River (including instream flow releases from French Meadows Reservoir) are captured at Middle Fork Interbay along with water released from Hell Hole Reservoir through Middle Fork Powerhouse. From Middle Fork Interbay, water is transported via the Middle Fork-Ralston Tunnel, passed through the Ralston Powerhouse (installed generating capacity of 79.2 MW) and released into the Ralston Afterbay (2,782 ac-ft of gross storage).

Flows from the Middle Fork American River (including instream releases from Middle Fork Interbay) and flows from the Rubicon River (including instream releases from Hell Hole Reservoir) are captured in Ralston Afterbay along with water transported from Middle Fork Interbay through Ralston Powerhouse. From Ralston Afterbay, water is transported via the Ralston-Oxbow Tunnel, passed through the Oxbow Powerhouse (installed generating capacity of 6.1 MW) and released from the MFP to the Middle Fork American River.

In addition to these major water and power facilities, the MFP includes 35 Project roads (totaling almost 18 miles) and 10 Project trails (totaling approximately 0.5 miles). These roads and trails are used almost exclusively by PCWA to access Project facilities. The Project roads and trails represent less than 1% of the total miles of roads and trails in the Watershed. There are also over 6 miles of Project powerlines and communication lines, which provide power to operate Project equipment and allow communication between Project facilities. In addition, numerous smaller facilities and features support MFP operations including flow gaging stations and weirs, photovoltaic poles, microwave reflectors and radio towers, sediment disposal sites, generator and storage buildings, operator cottages, a maintenance shop, a dormitory facility, and security and public safety fences.

The MFP also includes 21 developed recreation facilities to enable public access to public lands and Project reservoirs. The developed Project recreation facilities are concentrated around French Meadows Reservoir, Hell Hole Reservoir, South Fork Long Canyon Diversion Pool, and Ralston Afterbay.

2.2 PROJECT OPERATION

The MFP has been operated for over 40 years by PCWA as a multi-purpose project to benefit the people of Placer County. The MFP is operated with respect to four objectives, as follows:

- Meet FERC license requirements that protect environmental resources and provide for recreation;
- Meet the consumptive water demands of western Placer County;
- Generate power to help meet California's energy demand and provide valuable support services required to maintain the overall quality and reliability of the state's electrical supply system; and
- Maintain Project facilities to ensure their continued availability and reliability.

Project operations for water supply and electric power generation are constrained by regulatory and contract requirements, the physical capacities of the Project facilities, and water availability. Regulatory and contract requirements include conditions imposed by the FERC license, water rights permits, water delivery contracts, and the existing power purchase contracts with PG&E. Water availability is influenced by carryover storage in the Project reservoirs and the timing and quantity of annual runoff.

Typical annual operation of the Project results in the capture of runoff which is diverted to increase storage in French Meadows and Hell Hole reservoirs in the winter and spring (filling period), and drawdown of the reservoirs during the summer, fall, and early winter (release period). Operation of the MFP varies from year-to-year based on the timing and magnitude of spring runoff, which is influenced by the amount of winter snow pack and ambient temperature conditions, as well as precipitation.

2.3 TESTING AND MAINTENANCE

To maintain and protect system reliability, PCWA conducts annual inspections, testing, and maintenance of Project facilities. Annual maintenance is scheduled at a time when the work can be expeditiously completed (during favorable flow and weather conditions) and have the least effect on water supply deliveries and power production.

These activities typically occur for facilities in the lower Project area beginning in late September, and require that the lower MFP powerhouses (Middle Fork, Ralston, and Oxbow) be taken out of service for 3 to 6 weeks. During the fall maintenance period, Middle Fork Interbay and Ralston Afterbay water levels are lowered to allow access to the facilities. Consumptive demands and instream flow requirements downstream of Oxbow Powerhouse during the fall outage are typically met by increasing flow releases from Hell Hole Reservoir into the Rubicon River. Inspection, testing, and the maintenance of facilities in the upper Project area (i.e., French Meadows and Hell Hole powerhouses) typically occur during the spring, once the roads to the Project facilities are passable.

PCWA also implements routine maintenance activities within and around Project facilities to:

- Preserve Project flow and storage capacities by implementing sediment and debris management;
- Protect worker and public health and safety by implementing vegetation management, pest management, signage, and erosion and rock control measures;
- Provide facility access by implementing road and trail maintenance; and
- Protect facility reliability by implementing equipment maintenance, erosion and rock control measures, facility painting, and powerline and communication line pole replacement.

For Project recreational facilities, PCWA has on-going agreements with the TNF and ENF under which it provides the financial resources necessary to support a portion of the operation and restoration of these facilities by the respective National Forests.

2.4 POTENTIAL PROJECT BETTERMENTS/IMPROVEMENTS

In preparation for the relicensing of the MFP, PCWA conducted an assessment to identify potential modifications or additions (betterments) to existing Project facilities that would improve operations or maintenance of the Project, and result in an increase in net or peaking generation. As a result of this assessment, PCWA included the following three potential Project betterments in the PAD:

- Hell Hole Reservoir Seasonal Storage Increase.
- French Meadows Powerhouse Capacity Upgrade.
- Ralston Powerhouse Capacity Upgrade.

Refer to Maps 2a-2d for the location of the three potential Project betterments. PCWA intends to further evaluate these potential betterments during relicensing with respect to their engineering and economic feasibility and the potential protection, mitigation, or enhancement measures that may be necessary to address potential effects on environmental and cultural resources. The specific Project betterments to be included in the License Application will be determined after reviewing the results of on-going engineering, economic, cultural, and environmental studies in relation to potential future license conditions.

2.4.1 Hell Hole Reservoir Seasonal Storage Increase

The purpose of this betterment would be to seasonally increase the storage capacity of Hell Hole Reservoir. The betterment would utilize a portion of the existing flood control pool, above the present normal maximum operating water level, to store additional

water during the spring and summer after the peak of the runoff period. An approximate 9,750 ac-ft to 12,000 ac-ft increase in seasonal storage in the reservoir would be achieved by installing 8-10 foot high crest gates on the existing dam spillway. The crest gates would be raised when needed to increase reservoir storage. Operation of the crest gates would also seasonally increase the reservoir's inundation area within the existing flood pool by approximately 37 acres.

In years when either French Meadows or Hell Hole reservoirs would have spilled, this betterment would allow the MFP to capture additional water in storage in Hell Hole Reservoir which can later be used to increase net annual energy generation. In all but the driest years, the betterment would also allow the MFP to shift the timing of some generation from the spring run-off period to the summer peak energy demand period. While the shift in the timing of the generation will not increase total annual MFP generation, it will increase the benefit of the Project by increasing generation during the peak energy demand period. This betterment would require a new water right to allow for additional storage at Hell Hole Reservoir.

This betterment would require the following modifications to existing Project facilities:

- Hell Hole Dam Spillway - install 8-10 foot-high crest gates on the existing concrete spillway.
- Hell Hole Dam - install 2 foot-high parapet walls on each end of the existing dam to maintain minimum freeboard requirements, if 10 foot-high crest gates are installed.
- French Meadow Powerhouse - install 4 foot-high parapet wall at the powerhouse to avoid inundation from wave action when the reservoir is at its maximum water surface elevation.
- Hell Hole - Middle Fork Tunnel Gatehouse - install 4 foot-high parapet wall around the gatehouse to avoid inundation from wave action.
- South Fork Long Canyon Diversion Dam - install 3 foot-high crest gates on the diversion dam or a check valve at the drop inlet to avoid the backflow of water from the Hell Hole - Middle Fork Tunnel into South Fork Long Canyon Creek when Middle Fork Powerhouse is not operating.

The betterment would also require construction of three new Project facilities including:

- Hell Hole Dam Spillway Crest Gates Control Building - construct a small control building adjacent to the spillway to provide power to operate the spillway crest gates.
- Hell Hole Dam Spillway Crest Gates Control Building Powerline - construct a short spur line (approximately 525 feet) from the control building to an existing powerline to provide power for spillway crest gate operations.
- South Fork Long Canyon Diversion Dam Generator Building - construct a control building with a generator to provide power to operate the crest gate.

2.4.2 French Meadows Powerhouse Capacity Upgrade

The purpose of this betterment would be to increase the generating capacity of the existing French Meadows Powerhouse from 15.3 MW to approximately 30 MW. Generating capacity would be increased by adding a second powerhouse immediately adjacent to the existing powerhouse. The existing French Meadows Powerhouse is only able to utilize approximately one-half of the maximum hydraulic capacity of the French Meadows - Hell Hole Tunnel. The addition of a second unit would allow the maximum hydraulic capacity of the tunnel to be used to transport more water over a shorter period of time from French Meadows Reservoir to Hell Hole Reservoir, thereby increasing the MFP's peaking generation capabilities. This betterment would require a new water right to allow for an increase in the permitted direct diversion rate from French Meadows Reservoir to Hell Hole Reservoir.

The new powerhouse would also increase the capability of the MFP to supply electrical grid support services. The new generating unit could be operated simultaneously or independently of the existing generating unit. The existing PG&E 60-kV French Meadows - Middle Fork Transmission Line will be used to interconnect the new powerhouse with the PG&E transmission system.

This betterment would require the following modifications to existing Project facilities:

- French Meadows - Hell Hole Tunnel Intake Trash Rack - possible replacement of the existing cylindrical trash rack with a larger trash rack to reduce head losses and allow greater volume of water to flow into the tunnel.
- French Meadows Powerhouse Switchyard - expand the existing switchyard to include additional buswork, transformers, and electrical switching equipment necessary to convey the additional power generated at the new powerhouse.
- Middle Fork Powerhouse Upper Switchyard - upgrade the transformers and switchgear at the existing 60kV substation at Middle Fork Interbay to handle the additional power transfer.

This betterment would also require construction of the following new Project facilities:

- French Meadows Powerhouse - construct a second powerhouse with installed generating capacity of approximately 15 MW immediately adjacent to existing powerhouse.
- French Meadows Powerhouse Penstock - construct a second penstock, parallel to the existing penstock, to provide water to the new powerhouse.
- Additional Surge Capacity Facility - develop additional surge capacity through construction of a surge shaft, surge shaft and tank, or surge pipeline located above the French Meadows - Hell Hole Tunnel Portal, or installation of a bypass valve in the new powerhouse.

- French Meadows - Hell Hole Tunnel Surge Shaft or Pipeline Access Road - construct a new Project road from an existing Forest Service road to the surge shaft or pipeline and temporarily improve the existing Forest Service road.

2.4.3 Ralston Powerhouse Capacity Upgrade

The purpose of this betterment is to improve the operating efficiency of the Middle Fork - Ralston system by increasing the hydraulic capacity of Ralston Powerhouse to match Middle Fork Powerhouse throughput, plus accretions at Middle Fork Interbay. This betterment would allow the MFP to maximize peaking generation during periods of high energy demand, thereby increasing the overall benefit of the MFP. This betterment would only require upgrades to electrical and mechanical equipment within the Ralston Powerhouse. This betterment may result in the ability of Ralston Powerhouse to utilize more than 1,000 cubic feet per second (cfs), in which case a new water right will be needed.

3.0 METHODS

Methods used to develop information for this Site Assessment included: (1) documenting whether the study area is within the current or historic range of CRLF; (2) describing any known records of CRLF in the study area; (3) a describing CRLF habitat requirements, and (4) characterizing, mapping, and evaluating existing upland and aquatic habitat conditions for CRLF in the study area.

3.1 CURRENT AND HISTORIC RANGE OF CRLF

Available literature was reviewed to determine the current and historic range of CRLF in the study area. Literature reviewed included *Designation of Critical Habitat for the California Red-legged Frog and Special Rule Exemption Associated with Final Listing for Existing Routine Ranching Activities, Final Rule* (USFWS 2006), *Recovery Plan for the California Red-legged Frog* (USFWS 2002), and other information referenced as appropriate.

3.2 KNOWN CRLF RECORDS

Known CRLF records in the study area were compiled from a review of the following sources: the *California Natural Diversity Database* (CNDDB) (CDFG 2007), *University of California Berkeley's Museum of Vertebrate Zoology Data Access* (UC Berkeley 2007); and the *California Red-Legged Pond Survey Report for the Ralston Ridge Pond* (PG&E 2004).

In addition, agency representatives and species experts familiar with CRLF in the Middle Fork American River (MFAR) watershed were consulted. This includes USFWS-recognized CRLF expert Sean Barry, Amy Fesnock of USFWS, and Jann Williams of U.S. Department of Agriculture, Forest Service (USDA-FS). Other local individuals familiar with amphibian studies or resources in the study area were also consulted.

3.3 CRLF HABITAT CHARACTERISTICS

Available sources were reviewed to characterize CRLF habitat requirements. The sources included a review of the *Recovery Plan for the California Red-legged Frog* (USFWS 2002), USFWS Guidance (USFWS 2005), *Designation of Critical Habitat for the California Red-legged Frog and Special Rule Exemption Associated with Final Listing for Existing Routine Ranching Activities, Final Rule* (USFWS 2006), the USFWS species account for CRLF (USFWS 2007), and other information referenced as appropriate. In addition, USFWS-recognized CRLF expert Sean Barry was consulted to provide additional information on the characteristics of CRLF habitat.

3.4 UPLAND AND AQUATIC HABITAT CHARACTERIZATION

The USFWS Guidance requires that CRLF Site Assessments include descriptions and maps of upland and aquatic habitat within 1 mile of the Project boundary. The methods implemented to characterize and map upland and aquatic habitats in the study area are provided below.

3.4.1 Upland Habitat

Mapping and descriptions of upland habitats present in the study area are based primarily on technical studies implemented by PCWA in 2007. A summary of the methods used in these studies is provided below. Refer to TERR 1 - Vegetation Communities and Wildlife Habitats Technical Study Report (PCWA 2007) for more detailed methods and study results.

Preliminary information on upland vegetation communities in the vicinity of the MFP was developed based on USDA-FS CalVeg data (PCWA 2007). Detailed information on riparian communities in the study area was developed from field surveys (helicopter and ground) conducted in August, September, and October 2005, as part of PCWA's Physical Habitat Characterization Study (PCWA 2006). These data were integrated to develop preliminary vegetation community maps in the study area.

The preliminary vegetation maps were verified through a review of aerial photographs of the study area (AirPhoto USA 2005) and video of stream reaches and reservoirs associated with the MFP in August 2007. Ground-truth surveys were conducted by helicopter and on the ground August through November 2007. Corrections or modifications to CalVeg data resulting from the review of aerial photographs and video and from ground-truth surveys were incorporated into GIS layers and finalized maps were developed.

3.4.2 Aquatic Habitat

Methods implemented to develop descriptions and maps of aquatic habitat in the study area include a review of aerial photos, low-elevation helicopter surveys, and ground surveys.

Review of Aerial Photographs

Aerial photographs were reviewed to identify potential aquatic habitat (e.g., backwater areas) along the rivers, large and moderate creeks, and small tributary streams associated with the MPF. In addition, the photographs were reviewed to identify permanent or semi-permanent natural ponds, or artificial impoundments such as stock ponds and irrigation ponds in the study area. All photos were full-color orthophotos taken September 13 and 15, 2005, at a sensor height of 12,000 feet above ground level and at a photo scale of 1:2000 with 35% overlap, subsequently scanned at 2000 DPI, creating 18-inch pixel resolution.

Low-Elevation Helicopter Surveys

Low-elevation helicopter surveys of all areas within the study area were conducted in August 2007 by two biologists and CRLF expert Sean Barry. Potential aquatic habitat identified during the surveys was recorded, and additional information for these areas was collected during ground surveys, as described below. Inaccessible areas were surveyed by helicopter only.

Ground Surveys

A description of survey methods implemented to obtain aquatic habitat data in the study area is provided below. Refer to Table 1 for a list of aquatic habitats evaluated in this assessment.

Rivers

Habitat data on the large rivers within the MFP were collected as part of studies conducted in 2005 and 2006 for PCWA's *Draft Physical Habitat Characterization Report* (PCWA 2006), including geomorphology studies, riparian habitat mapping studies, and aquatic habitat characterization studies.

Data obtained that are pertinent to this CRLF Site Assessment include:

- Average and maximum bankfull depth.
- Bankfull width.
- Water surface slope (i.e., longitudinal profile).
- Dominant particle size class (i.e., sand, gravel, cobble, boulder, or bedrock).
- Mean riparian corridor width and riparian vegetation community composition.
- Riparian vegetation percent canopy cover.
- Mesohabitat composition, including information on the extent of pool-type and non-pool habitat (cascades, riffles, and runs).
- Fish species present.

Refer to the *Draft Physical Habitat Characterization Report* (PCWA 2006) for detailed methodologies for collection of these data in conjunction with other habitat characterization studies.

Large and Moderate Creeks and Small Tributary Streams

Habitat information on large and moderate creeks and small tributary streams in the study area was obtained during foothill yellow-legged frog (FYLF) surveys conducted by PCWA in 2007 as part of the AQ-12, Special-Status Amphibian and Aquatic Reptile technical studies. Only accessible streams were surveyed.

During the surveys, photographs were taken of each stream, and the following data were collected, as required by the USFWS Guidance:

- GPS location.
- Bankfull width and depth.
- Stream gradient (percent slope).
- Size and depth of instream pools, if present.
- Characterization of non-pool habitat.
- Presence of emergent or overhanging vegetation.
- Substrate composition.
- Descriptions of the stream bank.
- Presence of CRLF individuals (if any).
- Predators (such as bullfrogs and predatory fish) and/or other wildlife species present.

Data were recorded on CRLF Habitat Site Assessment Data Sheets (Appendix D of the USFWS Guidance).

Reservoirs and Diversion Pools

Information on reservoirs and diversion pools associated with the MFP was developed from field data collected in 2007 as part of PCWA's TERR 1 Vegetation Communities and Wildlife Habitats technical studies, from consultation with PCWA staff, and a review of SD B - Detailed Existing Project Description of the PAD (PCWA 2007). Data obtained that are pertinent to this CRLF Site Assessment include:

- Photographs of the reservoirs and diversion pools.
- Size (acreage) and depth of the reservoirs and diversion pools.
- General physical setting and characteristics of surrounding landscape.
- Substrate composition.

- Vegetation communities present.
- Emergent and overhanging vegetation present.

Off-Channel Ponds

Habitat data on off-channel ponds in the study area were obtained through ground surveys conducted August through December 2007 by teams of two biologists and by CRLF expert Sean Barry. During the surveys, photographs were taken of each off-channel pond, and the following data were collected, as required by the USFWS Guidance:

- GPS location.
- Pond size and maximum depth.
- Presence of emergent or overhanging vegetation and dominant species.
- Substrate composition.
- Whether pond is ephemeral or perennial.
- CRLF individuals present (if any).
- Predators (such as bullfrogs and predatory fish) and/or other wildlife species present.

Data were recorded on CRLF Habitat Site Assessment Data Sheets (Appendix D of the USFWS Guidance).

4.0 RESULTS

4.1 CURRENT AND HISTORIC RANGE OF CRLF

The study area is within the historic range of CRLF, which includes aquatic, riparian, and upland habitats throughout much of California and northern Baja California. Currently, CRLF are known to occur from sea level to approximately 3,500 feet in elevation, although historical sightings have been reported as high as 4,900 feet in the Sierra Nevada (USFWS 2002). Jennings and Hayes (1994) suggested that populations at the upper elevation limit may represent translocations.

In the foothills along the west slope of the Sierra Nevada, five isolated populations of CRLF are currently known, compared to over 60 historic locations reported (USFWS 2002). However, much of the land in the Sierra Nevada foothills is privately owned and has not been surveyed. Therefore, the actual distribution of CRLF in this region is unknown.

The MFP is within the USFWS CRLF Recovery Unit 1 (Sierra Nevada Foothills and Central Valley) (USFWS 2002), but does not contain USFWS-designated critical habitat. The nearest critical habitat unit, ELD-1, is located south of the MFAR watershed in El Dorado County (USFWS 2006).

4.2 KNOWN CRLF RECORDS

4.2.1 Records Within the Study Area

There is only one known CRLF record within the study area (Table 2 and Map 3). In June 2001, a single adult CRLF was observed in an ephemeral pool north of Pennsylvania Point, on the western end of Ralston Ridge (CNDDDB 2007, PG&E 2004). Experts believe the frog was at this site during dispersal (Barry, pers. comm., 2007a). The site, which is on a right-of-way below a PG&E transmission line, was almost completely burned in the Ralston Ridge wildfire of 2006 and remains almost completely denuded. The pond, which appears to have been formed in a depression caused by ground disturbance and erosion resulting from logging operations, was completely dry in 2007 during helicopter surveys completed for this Site Assessment. No frogs have been detected at the site since 2001 (Barry, pers. comm., 2007a).

No CRLF were observed during ground surveys conducted in 2007 for this Site Assessment. In addition, there were no incidental sightings of CRLF recorded during numerous aquatic surveys conducted for the MFP in 2005 through 2007 as part of early relicensing studies.

4.2.2 Records Outside the Study Area, but within the MFAR Watershed

There are two additional CRLF records outside the study area, but within the MFAR watershed (Table 2 and Map 3):

- One CRLF museum specimen was found in the vicinity of Michigan Bluff, in 1916, approximately 1 1/3 mile north of the study area.
- In 2006, a population of more than fifty CRLF was observed in ponds on private land at Michigan Bluff, just less than one mile north of the study area. All life stages were observed at the site (i.e., eggs, tadpoles, metamorphs, and adults), and the population is believed to be reproductive (Fesnock, pers. comm., 2007).

4.3 CRLF HABITAT CHARACTERISTICS

4.3.1 Upland Habitat

The USFWS defines upland habitats broadly as those which “provide food and shelter sites for CRLF and assist in maintaining the integrity of aquatic sites by protecting them from disturbance and supporting the normal functions of the aquatic habitat” (USFWS 2006). For example, upland habitats may be riparian areas immediately adjacent to aquatic breeding areas, or grasslands that contain seeps and springs (USFWS 2002). Adult CRLF may move from spawning pools into deeply shaded forest streams during the summer, and seek shelter in root masses and undercuts (Barry, pers. comm., 2007c). Due to the fact that CRLF in coastal California are known to make long-distance movements “without regard to topography, vegetation type, or riparian corridors” (USFWS 2002), any upland habitat that does not contain significant barriers to dispersal may potentially be used by CRLF. Barriers to dispersal defined by USFWS

(2006) include urban and suburban developments, wide or fast-flowing rivers and streams, lakes and reservoirs greater than 50 acres, and heavily traveled roads without underpasses or culverts.

4.3.2 Aquatic Habitat Characteristics

The USFWS Guidance document states that the following aquatic habitats represent potential habitat for CRLF:

- Marshes.
- Springs.
- Permanent and semi-permanent natural ponds.
- Ponded and backwater portions of streams.
- Artificial impoundments such as stock ponds, irrigation ponds, and siltation ponds.
- Slow-moving shallow riffle zones in creeks.

The USFWS Guidance document further states that the following aquatic habitat does not represent appropriate habitat for CRLF:

- Deep lacustrine water bodies, such as lakes and reservoirs (greater than 50 acres in size) (USFWS 2002).

The following additional characteristics of potential CRLF spawning habitats were identified through a review of available information:

- Most spawning habitat is associated with dense or shrubby riparian vegetation including, but not limited to, willows (*Salix* spp.), cattails (*Typha* spp.), and bulrushes (*Scirpus* spp.) (USFWS 2007).
- Vegetation typically provides shade for a significant portion of the water body, with dense vegetation located at or near water level (Hayes and Jennings 1998).
- CRLF prefer relatively deep (between 0.5 and 1.5 meters in depth) (Barry, pers. comm., 2007c), still or slow-moving water (Hayes and Jennings 1998, Jennings and Hayes 1994).
- At seasonal spawning habitat, water must remain long enough in most years to allow for metamorphosis of most of the tadpoles (generally between July and September) (USFWS 2006).
- Most populations of CRLF are found in habitats that are free of introduced predators. Predators on one or more life stages of CRLF are believed to include bullfrogs, non-native crayfish, and various fishes including bass, catfish, and mosquito fish (USFWS 2002).

4.4 UPLAND AND AQUATIC HABITAT CHARACTERIZATION

This section provides a description of upland and aquatic habitats present in the study area.

4.4.1 Upland Habitat

Upland habitats are used primarily by CRLF during the non-breeding season for dispersal and/or estivation. Specific upland habitat requirements are poorly understood and USFWS (2002) stated that “any upland habitat that does not contain significant barriers to dispersal may potentially be used by CRLF.” Therefore, the description of upland habitat in this assessment is provided as overview of general habitat conditions in the study area. The following describes vegetation communities within the study area as well as associated lands uses and potential dispersal barriers.

Vegetation Communities

Twenty-three upland vegetation communities are present in the study area. These include two herb-dominated, four shrub-dominated, and 17 tree-dominated communities. Vegetation communities in the study area vary with elevation. At higher elevations, two mixed conifer communities are present—one dominated by fir species (white fir) and the other dominated by pine species (sugar pine and Jeffrey pine). These mixed conifer communities transition into stands of Ponderosa pine and Douglas-fir at intermediate elevations near Middle Fork Interbay. At the lower elevations, the surrounding vegetation is dominated by canyon live oak woodland communities. A list of the vegetation communities in the study area is provided in Table 3 and descriptions of these communities are provided in Appendix B. A map of the location of these communities is provided as Map 4.

Land Use

The study area is situated in the foothills and mountainous uplands of the western slope of the central Sierra Nevada. The study area is heavily forested, rural in nature, and sparsely populated. There are no residential or commercial developments in the immediate vicinity of the study area. The nearest population center is Foresthill (population 1,791), located approximately four miles west-northwest of Ralston Afterbay. Several paved roads provide the primary access to the MFP vicinity. These include: Mosquito Ridge Road, Ralston Ridge Road, Blacksmith Flat Road, and Soda Springs Riverton Road. Lands within the study area are located primarily within the Eldorado National Forest (ENF) and Tahoe National Forest (TNF). Private parcels are also present throughout the study area at various locations. Land use within the FERC Project boundary is focused on hydropower generation and recreation. Land use outside the FERC Project boundary is managed mainly for recreation, timber harvest, grazing, natural resource protection, and to a lesser extent mining.

Potential Barriers to CRLF

By USFWS definition (2006), large rivers and reservoirs such as the Middle Fork American River, the Rubicon River, Hell Hole Reservoir, and Ralston Afterbay represent barriers that would restrict the northward and/or southward movement of CRLF throughout the study area.

4.4.2 Aquatic Habitat

The following characterizes aquatic habitat for CRLF in the study area. Table 1 provides a list of aquatic habitats (including rivers, large and moderate creeks, small tributary streams, reservoirs, diversion pools, and off-channel ponds) evaluated in this Site Assessment. Map 5 provides an overview of the locations of these aquatic habitats.

Rivers

There are two major rivers associated with the MFP, the MFAR and the Rubicon River. Both rivers are rocky, fast-flowing rivers and do not provide appropriate habitat for CRLF. The rivers do not contain ponded or backwater areas that represent appropriate aquatic habitat for CRLF (USFWS 2006). Further, the rivers do not have still, slow-moving water or vegetation characteristics typical of most sites known to support populations of CRLF. According to USFWS-approved CRLF expert Sean Barry, decades of surveys along fast, rocky waterways such as the MFAR and the Rubicon River have yet to reveal a single CRLF population (Barry, pers. comm., 2007b). In addition, the MFAR below Ralston Afterbay often experiences substantial daily fluctuations in flow levels due to peaking generation. These flow fluctuations would likely exclude breeding CRLF populations. Finally, these rivers represent barriers to CRLF dispersal as defined by USFWS (2006).

An overview of the MFAR and the Rubicon River is provided below. Table 4 provides more information on the geomorphology, hydrology, and riparian vegetation patterns along these rivers.

The MFAR, which flows west from the crest of the Sierra Nevada to the Central Valley floor, is contained within a deeply incised river canyon between 2,000 to 4,000 feet-deep. Stream channel gradients along the MFAR from French Meadows Reservoir down to Ralston Afterbay are relatively steep (slopes of greater than 2%), and the water is confined within the bedrock channel. As a result, floodplains within the river canyon are generally small, poorly developed, or non-existent. Substrate materials include bedrock, boulder, cobble, and gravel, often in equal mixtures. Downstream of Ralston Afterbay, the MFAR has a more moderate gradient (slopes of between 2.5%), with a broader floodplain and large alluvial bars present along the river reach.

Similar to the MFAR, the Rubicon River is typically confined within deeply incised canyon walls. However, a four-mile reach immediately downstream of Hell Hole Dam is different from the remainder of the river. This reach was widened and aggraded by the failure of Hell Hole Dam in 1964, and the valley bottom was transformed from a narrow

v-shape to a wider u-shaped cross-sectional profile. Stream channel gradients along the Rubicon River are moderate, ranging between 1 to 2%. The river channel is approximately 20 meters wide, often with a floodplain or large bar along at least one bank. Substrate materials include bedrock, boulder, and cobble.

Riparian vegetation is often absent or sparse along both rivers, although narrow, discontinuous bands of riparian vegetation are present along reaches where localized sediment inputs from hill slope or upstream sources accumulate. In general, riparian communities are dominated by alder and willow trees and shrubs, with cottonwoods co-dominant in several locations.

Flows on the MFAR and the Rubicon River are altered year-round. Flows on the MFAR and Rubicon River upstream of Ralston Afterbay are typically reduced and more stable during the winter and spring season as water is diverted into storage or for power generation. Currently, high spring flows in these river reaches generally only occur when the reservoirs are spilling. During the summer and fall season, flows in these rivers are typically equal to or slightly higher than under natural conditions as water is released from storage to meet minimum instream flow requirements mandated in the FERC license. On the MFAR downstream of Ralston Afterbay (the “peaking reach”), flows fluctuate substantially to meet power demands or to support whitewater recreation. Daily fluctuations in flow in this reach can range between 75 cfs and 1,080 cfs.

Large and Moderate Streams

The large and moderate streams in the study area, which include Duncan Creek, Long Canyon Creek, North Fork Long Canyon Creek and South Fork Long Canyon Creek, do not represent appropriate habitat for CRLF because the streams do not contain ponded and backwater areas. All four streams are steep, high-gradient streams that run through bedrock channels with alternating sections of boulder and cobbles. The geomorphology of these streams results in swift-moving water and rocky banks with small or nonexistent floodplains which are not conducive to the development of ponded or backwater areas. The instream pool habitats of these streams are characterized by large, rocky, open pools. These instream pool types do not support CRLF because the water is too fast and cold, and because they are devoid of bordering emergent or floating vegetative cover (Barry, pers. comm., 2007c). In addition, the banks along these streams do not have the characteristic vegetation typical of most sites known to support populations of CRLF.

The following briefly describes aquatic habitat in each of the streams. Summary data for these streams are provided in Table 5. Refer to Appendix C for the CRLF Site Assessment datasheets and photographs of these streams.

Duncan Creek is a moderate to high-gradient perennial creek with slopes ranging between about 2 and 10%. The creek runs within a bedrock channel, although substrates also include boulders and rocks, and some cobble. The instream habitat is characterized by waterfalls and cascades, interrupted by plunge pools. There is no

emergent or aquatic vegetation instream or immediately along the banks, which tend to be steep and rocky. Riparian vegetation is relatively sparse along the creek, composed primarily of alders and willows, with about 25% canopy cover. The upper portion of Duncan Creek is above 5,000 feet in elevation.

Long Canyon Creek runs through two different river canyon types. The lower reach of Long Canyon Creek runs through a narrow, v-shaped canyon similar to the MFAR (although smaller in size). Gradients in this section are greater than 5%, and the stream is entrenched in bedrock, with some boulder and cobble substrates. The upper reach of Long Canyon Creek runs through a wider U-shaped valley, in which stream gradients are more moderate, about 2%. Substrate included exposed bedrock, but was co-dominant with boulders and cobbles. There is no emergent or aquatic vegetation instream or immediately along the banks. Riparian vegetation includes small to medium-sized alders and willows, with canopy cover generally less than 50%.

North and South Fork Long Canyon creeks are geomorphically similar, and portions of both streams are above 5,000 feet in elevation. Both streams are perennial, and have a moderate to high gradient of between about 2 to 5%. Instream habitats include high-gradient riffles, cascades, and plunge pools. There is no emergent or aquatic vegetation instream, although some herbaceous species such as sedges (*Carex* spp.) and Indian rhubarb grow on and between rock along the sides of the streams. The streams flow through mixed conifer-pine forests, and there are narrow bands of riparian vegetation along the streams dominated by alders and willows, generally with about 50% canopy cover or greater.

Small Tributary Streams

Habitat surveys were conducted at eleven small tributary streams that were accessible to field crews. Other small, remote tributaries in the upper MFAR watershed that were not accessible to field crews were evaluated through the review of aerial photography and by helicopter.

Small tributary streams in the study area do not represent appropriate habitat for CRLF. The small tributary streams are steep, high-gradient streams that run through bedrock channels with alternating sections of boulder and cobbles. The geomorphology of these streams results in swift-moving water and rocky banks with small or nonexistent floodplains which are not conducive to the development of ponded or backwater areas. In addition, these streams do not have the characteristic vegetation typical of most sites known to support populations of CRLF. CRLF expert Sean Barry stated that, based on his evaluation of these streams, “flat or gently sloping sunlit sections with vegetated pools of the preferred water depth” that would represent appropriate habitat for CRLF “appeared to be absent” from the small tributary streams evaluated (Barry, pers. comm., 2007b).

The following briefly describes aquatic habitat in each of the small tributary streams. Summary data for each stream are provided in Table 5. Refer to Appendix C for the CRLF Site Assessment datasheets and photographs of these small tributary streams.

American Canyon Creek

American Canyon Creek is a narrow, confined perennial stream that meets the MFAR at RM 6.4. Cobble runs alternate with steeper bedrock cascades and pools. Riparian vegetation, which is dominated by small to medium-sized willow shrubs and alder trees, is present only along the water's edge. Canopy coverage varies from less than 25 to 100%, depending on valley width. Flows were approximately 1cfs during the fall surveys. Non-native aquatic predators were not observed.

Todd Creek

Todd Creek is an intermittent stream that flows within steep canyon walls. The substrate is dominated by cobble, boulder, and bedrock. Pools found along the stream course range from 15 to 25 feet-wide and average 2.5 feet-deep. Non-pool habitat is characterized by cascades and runs with no backwater or secondary channels. The stream gradient averages 5% with larger cascades found upstream where the gradient is higher. The bankfull width average 10 feet and bankfull depths average 0.5 to 1.5 feet. The canopy along the bank is dominated by small and medium-sized alder and willow with scattered California buckeye (*Aesculus californica*) and provides between 25 and 100% cover along the stream course. No emergent or floating vegetation is found in the channel.

Gas Canyon Creek

Gas Canyon Creek is a narrow, high-gradient, intermittent stream with no floodplains. It flows within steep, canyon walls with a substrate dominated by bedrock and cobble. The stream gradient averages 3% with higher gradients at the upstream reach. Pools range from 15 to 40 feet-wide and have a maximum depth of 5 feet. Non-pool habitat includes cascades and runs with no backwater or secondary channels. The stream has a bankfull width of 32 feet and bankfull depth that ranges from 0.5 to 1.5 feet. Vegetation along the bank is dominated by overhanging willow and alder, which provide shade along the stream course. California grape (*Vitis californicus*) occurs along the bank. No emergent or floating vegetation is found in the channel.

Canyon Creek

Canyon Creek is a perennial stream that flows within a narrow, steep canyon without floodplains. It has an average stream gradient of 5%. The stream substrate is composed of bedrock with bankfull stream widths of 35 feet and depths of 3 feet. Pools are up to 2.5 feet-deep and range from 15 to 35 feet-wide. Non-pool habitat includes both bedrock chutes and cascades. The understory along the bank is composed of small to medium-sized alder (*Alnus* sp.) and willow (*Salix* sp.). An overstory canopy of

oaks is found further from the bank. Canopy cover along the stream is high, although several open bedrock areas occur.

Otter Creek

Otter Creek is a perennial stream that typically has a floodplain along at least one bank. It flows with a 5% stream gradient within a narrow, bedrock-confined channel with no backwater or secondary channels. The substrate is dominated by bedrock and boulder in the upstream reaches and boulder and cobble in the downstream reaches. Stream bankfull widths are approximately 15 feet with bankfull depths of 0.5 to 1.5 feet. Pools average 15 to 40 feet-wide with maximum depths of 3 feet. Non-pool habitat includes riffles, runs, and cascades with riffles and runs dominating instream habitat near the MFAR confluence. The canopy along the banks is dominated by medium to large-sized willow, alder and cottonwood (*Populus fremontii*) with an average of 50% cover. Other species found along the stream bank include Indian rhubarb, and grasses and sedges, but no emergent or overhanging vegetation.

Jesse Canyon Creek

Jesse Canyon Creek is a perennial stream that flows within a steep, narrow canyon. The substrate is composed primarily of bedrock and stream gradients average 7%. The bankfull width is approximately 10 feet and bankfull depth ranges from 0.5 to 1.5 feet. Pools are found along the stream course and range in width from 15 to 25 feet, with a maximum depth of 3 feet. Non-pool habitat includes chutes and waterfalls with no backwater or secondary channels. The canopy along the bank is composed of willow and alder with no emergent or overhanging vegetation. Other species found along the stream bank include Indian rhubarb (*Darmera peltata*) and poison oak (*Toxicodendron diversilobum*).

Pond Creek

Pond Creek is perennial stream within a steep, narrow canyon. It flows at a 7% slope with a primarily boulder substrate. Pools range in size from 15 to 20 feet-wide with depths of approximately 3 feet. Non-pool habitat includes waterfalls and chutes with no backwater or secondary channels. The bankfull widths are 10 feet with bankfull depths of approximately 0.5 to 1.5 feet. Pools are present along the stream course and range from 15 to 20 feet-wide and up to 3 feet-deep. The bank vegetation is dominated by alders and willows with no emergent, floating or overhanging vegetation.

Volcano Canyon Creek

Volcano Canyon Creek is a perennial stream that flows at a 7% slope within steep canyon walls. Pools are found along the stream course and average 15 to 20 feet-wide and 3 feet-deep. Instream habitats primarily include cascades and step-pools with a bedrock and large boulder substrate. The bankfull width of the stream is approximately 15 feet with bankfull depths of 0.5 to 1.5 feet. The vegetation along the bank is

composed of small to medium-sized alder and willow, which generally provide high canopy coverage with several open bedrock sections.

Brushy Canyon Creek

Brushy Canyon is a perennial stream which flows at a 7% gradient within steep canyon walls. Pools range in size from 20 to 45 wide with a maximum depth of 3 feet. Non-pool habitat is characterized by high-gradient cascades and plunge-pools. The bankfull width of the stream is approximately 15 feet with bankfull depths ranging from 0.5 to 1.5 feet. The substrate is primarily composed of bedrock boulders. The overstory along the bank is composed of oaks (*Quercus* spp.) with up to 90% canopy cover.

Pilot Creek

Pilot Creek, downstream of Stumpy Meadows Reservoir (gross capacity of 20,000 ac-ft), is a perennial stream that flows at a 5% gradient within a steep canyon. Pools range in size from 25 to 40 feet-wide with a maximum depth of 15 feet. Non-pool habitat is characterized by high-gradient cascades and plunge pools with a few riffles in lower-gradient areas. The bankfull widths average 45 feet with bankfull depths of approximately one foot. The canopy along the banks is dominated by willows and alders with an overstory of oaks found further from the bank in some sections.

Wallace Creek

Wallace Canyon is a high-gradient, perennial stream that flows within steep, canyon walls. The substrate is dominated bedrock and boulders. It has an average stream gradient of 7% with waterfalls and chutes along the stream course. Pools range in width from 20 to 25 feet with a maximum depth of 5 feet. The bankfull width of the stream is approximately 20 feet with bankfull depths of 3 feet. The understory along the bank is composed of small to medium-sized alder and willow, with an overstory of oaks found further from the bank.

Reservoirs

Three reservoirs associated with the MFP—Hell Hole Reservoir, Middle Fork Interbay, and Ralston Afterbay—were evaluated in this Site Assessment. French Meadows Reservoir was not evaluated in this Site Assessment because it is located above 5,000 feet in elevation. Hell Hole Reservoir and Ralston Afterbay are large, deep reservoirs greater than 50 acres in size. By USFWS definition, these reservoirs do not represent appropriate habitat for CRLF (USFWS 2006). While Middle Fork Interbay is smaller than 50 acres in size, it also does not represent appropriate habitat for CRLF because it does not have characteristics of artificial ponds typically supporting CRLF as described in Section 4.3.2 of this document. A brief description of Hell Hole Reservoir, Middle Fork Interbay, and Ralston Afterbay is provided below.

Hell Hole Reservoir is an impoundment of the Rubicon River. It is a large, deep reservoir with a maximum surface area of 1,253 acres and a maximum depth of 378

feet. Hell Hole Reservoir has steep, rocky shores and supports several vegetation communities including canyon live oak, black oak, and mixed conifer-pine communities. The northwestern shoreline supports a number of Project facilities including the Hell Hole Dam, employee housing including caretakers houses and the Hell Hole dormitory facility, French Meadows Powerhouse; recreation facilities including a boat ramp and picnic area and a campground; and several Forest Service and PCWA-owned roads. As stated previously, USFWS does not consider large reservoirs (greater than 50) as potential habitat for CRLF. Furthermore, Hell Hole Reservoir is considered a barrier to dispersal.

Middle Fork Interbay is set within the steep, rocky river canyon of the MFAR. It has a maximum surface area of 7 acres and a maximum depth of 64 feet (also at maximum operating water surface). While this impoundment is smaller than 50 acres, this impoundment is much deeper than the 2 to 5 foot water depth preferred by CRLF. In addition, the canyon walls are very steep, resulting in high gradient shorelines that allow room for only scattered riparian vegetation (e.g., shrubby willows). There is no emergent or aquatic vegetation around the impoundment. Middle Fork Interbay does not represent potential CRLF habitat because it is relatively large and deep and it lacks emergent and aquatic vegetation and/or dense shrubby riparian vegetation at the level of the water to provide attachment sites for eggs and cover and protection from potential predators. Middle Fork Interbay also experiences daily fluctuations in level of several feet.

Ralston Afterbay is also an impoundment set within the deep river canyon of the MFAR. It has a maximum surface area of 83 acres and a maximum depth of 130 feet. Similar to Middle Fork Interbay, the canyon walls are very steep, resulting in high gradient shorelines that allow room for only scattered riparian vegetation (e.g., shrubby willows). There is no emergent or aquatic vegetation around the impoundment. There are several developed areas surrounding Ralston Afterbay, including recreation facilities. Ralston Afterbay also experiences daily fluctuations in level of several feet. As stated previously, USFWS does not consider large reservoirs (greater than 50 acres) as potential habitat for CRLF. Furthermore, Ralston Afterbay is considered a barrier to dispersal.

Diversion Pools

Two diversion pools are evaluated in this Site Assessment, the North and South Fork Long Canyon diversion pools. Duncan Creek Diversion Pool was not evaluated because it is located above 5,000 feet in elevation. The North and South Fork Long Canyon diversions pools do not represent appropriate aquatic habitat for CRLF because they do not have characteristics of artificial ponds typically supporting CRLF as described in Section 4.3.2 of this document. Summary descriptions of the diversion pools surveyed are provided below, and summary data are provided in Table 6. Refer to Appendix C for the CRLF Site Assessment datasheets and photographs of these diversion pools.

The North and South Fork Long Canyon diversion pools are small impoundments (both significantly less than one acre in surface area) that serve as a point of diversion for the Hell Hole - Middle Fork Tunnel. They do not serve as water storage impoundments. PCWA does not currently divert water through the North and South Fork Long Canyon diversion pools after July of each year. Therefore, at the time surveys were conducted (in August 2007), both impoundments held less than a foot of water, with portions of the impoundment bottom fully exposed. There was no emergent or aquatic vegetation, although annual grasses lined portions of the impoundments. The land surrounding the North and South Fork Long Canyon diversion pools is mature mixed conifer-pine forest with sparse or no understory layer.

The North and South Fork Long Canyon diversion pools lack most of the characteristics of appropriate CRLF habitat. While CRLF prefer moderately deep water (between 2 and 5 feet) surrounded by dense emergent or aquatic vegetation and/or dense riparian vegetation such as willows, the diversions had very shallow water and there was only sparse vegetation around the diversion pools. In addition, the impoundments lack vertical emergent vegetation or other structures for the attachment of eggs, and do not contain sufficient water through August or September to allow for complete metamorphosis of tadpoles.

Off-Channel Ponds

Off-channel ponds at five locations were identified through the review of aerial photographs, helicopter surveys, expert and agency consultation, and ground-truth surveys. Of the ponds surveyed, only two ponds (Ponds "D" and "E") located at Horseshoe Bar had sufficient characteristics to be considered potential CRLF breeding habitat (see Section 4.3.2). Two other ponds at Horseshoe Bar (Ponds "C" and "F") may provide non-breeding (dispersal) habitat for CRLF. The Summit Hill Ranch pond was not surveyed because permission was not obtained to access the pond. The remainder of the ponds evaluated in this section did not have the characteristics of typical CRLF breeding habitat as described in Section 4.3.2 and/or as evaluated by CRLF expert Sean Barry (Barry, pers. comm., 2007b).

The following briefly describes aquatic habitat in each of the ponds. Summary descriptions and evaluations of the ponds surveyed are provided below, and summary data are provided in Table 6. Refer to Appendix C for the CRLF Site Assessment datasheets and photographs of these ponds.

Auburn State Recreation Area (Pond A)

A cattle pond located at a historic homesite in the Auburn State Recreation Area was surveyed by helicopter on August 9, 2007 and by foot on August 24, 2007. The pond, which is perennial and measures approximately 80 feet in diameter and about 15 feet maximum depth, is impounded by a dam located on its west end. Floating pondweed (*Potamogeton* spp.) was seen in the pond and cattails (*Typha* spp.) and rushes (*Juncus* spp.) grew on portions of the perimeter of the pond. A moist drainage overgrown with

cattails and rushes leads up to the dam. The pond is located within an oak woodland. Upland plant species near the pond include Himalayan blackberry (*Rubus discolor*) and various annual grasses. More than 35 bullfrogs (first-year metamorphs) were seen on the edge of the pond, and a number of bullfrog tadpoles were seen in the pond. A large population of fish in the pond included mosquito fish (*Gambusia* spp.) and bass (*Micropterus* spp.).

The large population of bullfrogs and predatory fish at this pond indicates that this is not appropriate breeding habitat for CRLF (Barry, pers. comm., 2007b).

Tiechert Industries open-pit mines

Tiechert Industries operates an open-pit mine on the southern side of the MFAR near Highway 49. Several ponds that have formed as a result of mining operations were identified based on a review of aerial photographs. These ponds were surveyed by helicopter on August 9, 2007. Access to view these ponds on foot was not requested, because the ponds did not represent appropriate habitat for CRLF.

The Tiechert ponds were up to 25 feet-deep and contained no emergent or aquatic vegetation for egg attachment. The ponds are located in a 2 to 3 acre area that is composed entirely of rock (i.e., gravel) and this is almost completely devoid of vegetation.

The depth of the ponds and lack of vegetation indicate that these ponds do not represent appropriate habitat for CRLF. Additionally, the roads in the mine and traffic from mining trucks and other heavy equipment operated on-site represent potential dispersal barriers for CRLF.

Summit Hill Ranch (Pond B)

A large cattle pond located at the Summit Hill Ranch off of Sliger Mine Road was identified as potential CRLF habitat. This pond was surveyed by helicopter on August 9, 2007. The pond is less than one acre in size and appears to be surrounded by shrubby vegetation. However, detailed information on this pond was not collected because the pond is on private land and the landowner did not grant permission to access the pond.

Horseshoe Bar (Ponds C-G)

The land at Horseshoe Bar was exposed in the 1850s when gold miners rerouted the original course of the MFAR through what is now called the Tunnel Chute. Five ponds and one large instream impoundment were surveyed at this location. Refer to the Horseshoe Bar inset in Map 5 for the location of these ponds in relation to the site. Of the ponds and impoundment surveyed for this Site Assessment, we conclude that two ponds, Pond "D" and "E" represent potential breeding habitat for CRLF. USDA-FS also conducted CRLF habitat assessment surveys at Horseshoe Bar in April and May 2003

(USDA-FS 2003). The surveyor concluded that the ponds at this location represented potential habitat for CRLF. However, bullfrog reproduction was also documented at high levels in all ponds during the 2003 surveys. No CRLF were detected during the 2003 surveys.

Descriptions and assessments for all of the Horseshoe Bar ponds surveyed during this Site Assessment are provided below.

- Pond “C” does not represent appropriate aquatic breeding habitat for CRLF. However, it does represent appropriate non-breeding (dispersal) habitat. Pond “C” is located in an old mining excavation and is impounded by a beaver dam at its upper end. The beaver dam was built approximately two years ago (John Close, pers. comm., 2007). The pond, which is about 50 feet-long, 15 feet in maximum width, and less than 2 feet-deep, is bordered by a steep canyon wall on its western side. The pond is not accessible by foot, and is visible only from a path that ascends the canyon wall. Because the pond is difficult to access, it is uncertain whether the pond is perennial or ephemeral (John Close, pers. comm., 2007). There is no floating or emergent vegetation in the pond. The bottom substrate of the pond appears to be silt/mud. The vegetation surrounding the pond does not shade the pond, although limited shading is provided by the canyon wall itself.

This pond does not represent breeding habitat for CRLF because the water in this pond is too shallow for breeding CRLF, which prefer water of 2 to 5 feet in depth, and the pond lacks vertical emergent vegetation or other structures for the attachment of eggs. If the pond dries up in summer, then the pond would not contain sufficient water to allow for complete metamorphosis of tadpoles. This pond, however, represents appropriate non-breeding (dispersal) habitat for CRLF.

- Pond “D” represents potential breeding habitat for CRLF. Pond “D” is a perennial impoundment that was created in the widening of an old mining excavation. The pond is approximately 35 to 40 feet in maximum width, 375 feet-long, and between 6 and 20 feet-deep depending on the season. The pond is hydrologically connected to Pond “E” in winter by a culvert that runs from the east end of the pond and under a dirt road. There is no floating or emergent vegetation in the pond. The pond is surrounded by willow trees (*Salix* spp.), and bramble-forming species such as Himalayan blackberry and California grape (*Vitis californica*). This vegetation does not overhang or provide shade over the pond. Herbaceous species growing nearby the pond include woolly mullein (*Verbascum thapsus*), curly dock (*Rumex* spp.) and Yerba santa (*Eriodictyon* spp.). A sheer canyon wall borders the southern side of the pond. The substrate is silt, and the bottom of the pond appears to be covered in fallen leaves or other organic matter.

Under our evaluation, Pond “D” represents potential CRLF breeding habitat. While the water is deeper than 2 to 5 feet cited by Sean Barry as the optimum for

CRLF, portions of the pond may be of appropriate depth, and the pond retains the water long enough for CRLF to complete metamorphosis. The banks of the pond support dense, bramble-forming vegetation that may provide structure for egg attachment or cover from predators.

- Pond “E” represents potential breeding habitat for CRLF. Pond “E” is an impoundment that was created in the widening of an old mining excavation. There is generally water in the pond year-round, although it has dried up in past drought years (John Close, pers. comm., 2007). As stated above, Pond “E” is hydrologically connected to Pond “D” in winter by a culvert. The pond is approximately 30 feet in maximum width, 450 feet-long, and 7 feet in maximum depth. There is no emergent vegetation in the pond, although floating pondweed was seen in the pond during an August survey. Similar to Pond “D”, the pond is surrounded by willow trees, and bramble-forming species such as Himalayan blackberry and California grape. This vegetation does not overhang or provide shade over the pond. Herbaceous species growing nearby the pond include woolly mullein, curly dock, and Yerba Santa. The substrate is silt, and the bottom of the pond appears to be covered in organic matter.

Similar to Pond “D”, Pond “E” represents CRLF breeding habitat because it has water of appropriate depth for adult CRLF, it retains the water long enough for CRLF to complete metamorphosis, and it supports dense, bramble-forming vegetation on the banks of the pond that may provide structure for egg attachment or that may provide cover from predators.

- Pond “F” does not represent breeding habitat for CRLF. However, it does represent appropriate non-breeding (dispersal) habitat. Pond “F” is a shallow (1 foot deep) ephemeral pond that was created in the widening of an old mining excavation. It is about 45 feet in maximum width and about 129 feet-long. The pond dries up in late June (John Close, pers. comm., 2007). The pond is bordered on its west side by a sheer canyon wall. There is no floating or emergent vegetation in the pond. Surrounding vegetation is similar to that around Ponds “D” and “E”, with the addition of several incense cedar trees (*Calocedrus decurrens*). The substrate is silt, and the water in the pond is very muddy and opaque.

This pond does not represent appropriate habitat for CRLF because of the lack of emergent or aquatic vegetation, the insufficient depth of the water (i.e., less 2 to 5 feet cited as optimal for CRLF), and the fact that the water dries up in early summer, which would not allow sufficient time for the metamorphosis of CRLF tadpoles into terrestrial adults. However, the pond provides appropriate habitat for CRLF dispersal.

- Pond “G” does not represent appropriate habitat for CRLF. Pond “G” is a perennial pond that is hydrologically connected to the MFAR during flood events (i.e., is within the floodplain of the MFAR). It is formed in a depression between a

granite wall and a sandbar. The pond is approximately 50 to 60 feet-long and 20 feet in maximum width. It was approximately 2 feet-deep at the time of the survey, but marks on the canyon wall indicate that the water may be up to about 8 feet-deep during the rainy season or during flood events. The pond is bordered by the canyon wall on its west side. The substrate is primarily sand, with larger rocks and boulders on the eastern edge of the pond where it joins with the floodplain of the MFAR. The area around the pond is sparsely vegetated with small sedges (*Carex* spp.), several clumps of deer grass (*Muhlenbergia rigens*) and shrubby willows. Submerged vegetation (unidentified) was seen growing in the bottom of the pond. The pond is not shaded, except by the canyon wall.

Pond “G” does not represent appropriate habitat for CRLF, in that it does not support emergent or aquatic vegetation for egg attachment, and it is surrounded by canyon wall on one side and large rocks and boulders on the other. It supports only very sparse vegetation. In addition, because the pond is within the floodplain of the MFAR, periodic flood events would make this an intolerable environment for CRLF.

- South Lake does not represent potential habitat for CRLF. South Lake is an impoundment that has formed in the widening of the MFAR on the downstream side of the Tunnel Chute. The water flows back into the main channel of the MFAR from drainages on the northeast and northwest sides of the lake. The lake is 1 to 2 acres in size, with a maximum depth of approximately 50 to 60 feet during the rainy season. There is no vegetation in the water or on the banks of the lake. Surrounding vegetation includes birch and alder, shrub willows on the sandbars, horsetails (*Equisetum* spp.) and bramble-forming species such as Himalayan blackberry and California grape. The substrate is silt. Bullfrogs were heard in the vicinity of the lake. Trout species (*Onchorhynchus* spp.) in the lake include rainbow and brown trout. The river is also occupied by beaver (*Castor canadensis*) and river otter (*Lontra canadensis*) (John Close, pers. comm., 2007). Bullfrogs were heard calling in the vicinity of the lake during surveys.

South Lake does not represent appropriate habitat for CRLF. It is an in-channel impoundment located downstream from Ralston Afterbay in the “peaking reach” of the MFAR, and therefore it is highly influenced by daily fluctuating water levels. Because of this, it does not support emergent or aquatic vegetation for egg attachment and it is devoid of dense or shrubby riparian vegetation at the water level to provide sufficient escape cover or shading for the pond. South Lake is also very deep, and bullfrogs and other potential predators such as trout are known to be present at the lake.

Ralston Ridge

The Ralston Ridge pond does not represent appropriate aquatic habitat for CRLF. However, this site has been known to support CRLF during dispersal. As described in Section 4.2.1 of this document, an adult CRLF was observed in a drying ephemeral pond at this location on the west end of Ralston Ridge in June 2001 by biologists

conducting surveys for the PG&E (2004). No frogs have been detected at this site since 2001 (Barry, pers. comm., 2007). A CRLF habitat survey was conducted by helicopter at this site on August 9, 2007. At the time of the helicopter survey the site, which is on a right-of-way below a PG&E transmission line, was almost completely burned (a result of the Ralston Ridge wildfire of 2006) and remains almost completely denuded. The pond, which appears to have been formed in a depression caused by ground disturbance and erosion resulting from logging operations, was completely dry at the time of the survey. Surveys on foot were not conducted at this site.

5.0 CONCLUSIONS

Based on the results of the CRLF Site Assessment, it was determined that the MFAR and Rubicon River do not represent habitat for CRLF and are dispersal barriers as defined by USFWS. Large and moderate streams and small tributary streams do not support appropriate CRLF habitat (i.e., ponded or backwater areas), and do not support appropriate vegetation for egg attachment or cover. Therefore, they do not represent potential breeding habitat for CRLF.

Project reservoirs (Hell Hole Reservoir and Ralston Afterbay) are large, deep reservoirs greater than 50 acres in size that are not considered appropriate habitat for CRLF as defined by USFWS. Middle Fork Interbay is a deep, in-channel impoundment of the MFAR. This impoundment does not represent CRLF habitat because it is located in a steep, rocky river canyon, it is deeper than the preferred water depth for CRLF, it has no emergent vegetation, and it supports only very sparse willows around the perimeter. Furthermore, it represents a dispersal barrier to CRLF. Project diversion pools (North Fork and South Fork Long Canyon Creek diversion pools) are too shallow, do not contain sufficient water through the breeding period, do not support emergent or aquatic vegetation for egg attachment, and have no surrounding riparian vegetation.

The majority of off-channel ponds observed in the study area do not represent potential breeding habitat for one or more of the following reasons:

- Extensive predator populations (i.e., bull frogs, or predatory fish species such as mosquito fish and bass) are present.
- Aquatic or emergent vegetation for egg attachment is absent.
- Dense, shrubby riparian vegetation, vegetation for cover and protection from predators is not supported.
- Water conditions that allow for complete metamorphosis of tadpoles is not present.

However, two ponds in the Horseshoe Bar area were determined to represent potential CRLF breeding habitat (Ponds D and E) because the ponds: (1) have appropriate water depth for CRLF; (2) retain the water long enough for CRLF to complete metamorphosis,

and: (3) support dense, bramble-forming vegetation on the banks of the pond that may provide structure for egg attachment or that may provide cover from predators.

One additional pond, Summit Hill Ranch Pond, is located on private property where access was not granted. Information collected on this pond is limited to characteristics identifiable from aerial photo review and helicopter surveys. Information obtained on this pond was insufficient to determine if the pond represents potential CRLF breeding habitat.

One occurrence of CRLF is documented within the study area on Ralston Ridge within the PG&E Transmission Line right-of-way in 2001. The area that this frog was observed in does not support characteristics of breeding habitat and experts believe that this frog was observed during dispersal. No frogs have been observed at this site since 2001 and the entire area was burned during the Ralston Ridge fire.

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- . 2007c. Consulting herpetologist. Dixon, CA. February 11, 2008—e-mail to Sara Gillespie of RBI regarding upland and aquatic habitat characteristics of CRLF.
- Close, John. 2007. Caretaker, Horseshoe Bar. Foresthill, CA. December 8, 2007—conversation with Janelle Nolan-Summers and Sara Gillespie of RBI regarding the natural history of the Horseshoe Bar ponds.
- Fesnock, Amy. 2007. Senior Fish and Wildlife Biologist, U.S. Fish and Wildlife Service. Sacramento, CA. April 9, 2007—e-mail to Janelle Nolan-Summers of RBI regarding the CRLF population at Michigan Bluff.

TABLES

Table 1. Aquatic Habitats in the CRLF Study Area.

Rivers
Middle Fork American River
Rubicon River
Large and Moderate Streams
Duncan Creek
Long Canyon Creek
North Fork Long Canyon Creek
South Fork Long Canyon Creek
Small Tributary Streams
American Canyon Creek
Todd Creek
Gas Canyon Creek
Canyon Creek
Otter Creek
Jesse Canyon Creek
Pond Creek
Volcano Canyon Creek
Brushy Canyon Creek
Pilot Creek
Wallace Creek
Reservoirs
Hell Hole Reservoir
Middle Fork Interbay
Ralston Afterbay
Diversion Pools
North Fork Long Canyon Diversion Pool
South Fork Long Canyon Diversion Pool
Off-Channel Ponds
Auburn State Recreation Area
Teichert Mine Ponds
Summit Hill Ranch
Horseshoe Bar
Ralston Ridge

Table 2. Known CRLF Occurrences.

Source	Date	Collector	Locality	County	Catalog or Occurrence Number
Records within 1 mile of the MFP					
CNDDDB ¹	2001	Gary Fellers	Pennsylvania Point, Ralston Ridge	Placer	446
Records greater than 1 mile from the MFP, but within the MFAR watershed					
MVZ ²	8/12/1916	Joseph Dixon	Michigan Bluff	Placer	6111
CNDDDB	2006	Gary Fellers	Near Michigan Bluff	Placer	890

¹California Natural Diversity Database

²Museum of Vertebrate Zoology

Table 3. Upland Vegetation Communities in the CRLF Study Area

Herb-Dominated Vegetation Communities
Annual Grasses and Forbs (HG)
Wet Meadow (Grass–Sedge–Rush) (HJ)
Shrub-Dominated Vegetation Communities
Huckleberry Oak (CH)
Lower Montane Mixed Chaparral (CQ)
Upper Montane Mixed Chaparral (CX)
Mountain (Thinleaf) Alder (TF)
Tree-Dominated Vegetation Communities
Black Oak (QK)
Blue Oak (QD)
Canyon Live Oak (QC)
Cottonwood–Alder (QJ)
Douglas-Fir–Pine (DP)
Gray Pine (PD)
Interior Live Oak (QW)
Interior Mixed Hardwoods (NX)
Mixed Conifer–Fir (MF)
Mixed Conifer–Pine (MP)
Mixed Riparian Hardwoods (NR)
Montane Mixed Hardwoods (TX)
Pacific Douglas-Fir (DF)
Ponderosa Pine (PP)
White Fir (WF)
White Alder (QD)
Willow (QO)
Willow–Alder (QY)

Table 4. Data Summary for Rivers in the CRLF Study Area.

River	Description	Average Bankfull Depth	Maximum Bankfull Depth		Substrates (Dominant Particle Size)	Mean Riparian Corridor Width	Riparian Vegetation Community Composition															Streambank Vegetation (avg) Percent Cover	Average Percent Length Mesohabitat Types					Pool Habitat	
							Arroyo willow/Douglas' sagewort	Blackberry	Canyon live oak/poison oak	Douglas fir/incense cedar/white alder	Fremont cottonwood/red willow	Incense cedar/white alder	Miscellaneous willow	Narrowleaf willow/Douglas' sagewort	Ponderosa pine/white alder	Redosier dogwood/arrowleaf groundsel	Thinleaf alder	White alder/Indian rhubarb	White alder/narrowleaf willow	White alder/red willow	White alder/sedge		Bedrock and boulder	Non-vegetated	Cascade/Sheet	High Gradient Riffle	Low Gradient Riffle	Runs	Pools
Middle Fork American River	French Meadows Dam to Middle Fork Interbay	.8 to 3.2 feet	2.5 to 5.2 feet	31 to 78 feet	Gravel	0 to 50 feet														45-65	5%	17%	5%	16%	57%	60 to 180 feet	4 to 10 feet		
Middle Fork American River	Middle Fork Interbay Dam to Ralston Afterbay	1.9 to 5.7 feet	3.2 to 13.0 feet	75 to 198 feet	Boulder/gravel	21 to 95 feet														62-78	6%	20%	7%	27%	41%	50 to 150 feet	5 to 15 feet		
Middle Fork American River	Peaking Reach (Oxbow PH to the NFAR confluence)	3.9 to 12 feet	7.7 to 17.5 feet	94 to 456 feet	Cobble	0 to 253 feet														42-47	1%	4%	9%	29%	57%	200 to 900 feet	> 15 feet		
Rubicon River	Hell Hole Dam to Ralston Afterbay	1.2 to 3.7 feet	2.6 to 6.2 feet	62 to 185 feet	Cobble	6 to 150 feet														25-93	5%	14%	11%	25%	45%	60 to 375 feet	1.5 to 17 feet		

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area.

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization													Other Notes
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral	Date Goes Dry		
8/29/2007	Earl Gonsolin, Christina Buck, Chet Van Dellen	Brushy Canyon	701685	4321631	Yes	No	15	.5-1.5	7	Yes	20-45	3	High gradient cascades	An oak overstory shaded the channel.	Bedrock/boulders	Steep Canyon	Perennial	—	Brushy Canyon Creek was a small, narrow bedrock stream within steep canyon walls dominated by high-gradient cascades and plunge-pools.	
8/27/2007	Peter Graf, Chet Van Dellen	Canyon Creek	681773	4313650	Yes	No	35	3	5	Yes	15-35	2.5	Bedrock chutes and cascades	Medium to small-sized alder and willow trees and shrubs were established within the channel, while oaks provided most of the overstory canopy. Canopy cover along the stream margins was typically high, although several open bedrock areas occurred.	Bedrock	Steep canyon walls	Perennial	—	Canyon Creek flowed within a narrow, steep canyon without floodplains	
8/29/2007	Craig Addley	Duncan Creek	712456	4323952	Yes	No	33 to 53 feet	1.3 to 9.2 ft	> 3%	Yes	40 to 75 feet long	5.5 feet	Waterfalls and cascades interrupted by plunge pools.	No emergent, floating or overhanging vegetation. Riparian vegetation includes sparse alders and some forb species along the stream margin. Canopy cover is approximately 25%.	Bedrock and boulder; cobble	Stream is steep, confined, and bedrock-dominated. Banks are steep and rocky, not vegetated.	Perennial	—	No bullfrogs observed	
5/17/2007	Peter Graf, Brian Freiermuth	Gas Canyon Creek	679004	4314803	Yes	No	32	.5-1.5	3	Yes	15-40	5	Cascades and runs; Bedrock-confined, narrow, no backwater or secondary channels. In the lower portion of the reach, small pools and cascades dominated, while upstream the gradient increased with larger cascades and pools.	No emergent or floating vegetation. Canopy cover along the stream margins was variable within the reach, ranging from 0 to 100%. Willow and alder shrubs and trees were the primary shade providers.	Bedrock and cobble were the dominant substrates.	Steep canyon walls	Ephemeral	Mostly dry on 8/23/2007 this year	Gas Canyon Creek was a narrow (less than 10 meters wide), high-gradient intermittent stream with steep confined canyon walls and no floodplain. Flows were less than 5 cfs during the breeding season surveys. Water was not flowing during the August field survey, although pools remained. Crayfish were observed during surveys.	
6/5/2007	Peter Graf, Brian Freiermuth	Gas Canyon Creek	679004	4314803	Yes	No	32	.5-1.5	3	Yes	15-40	5	Cascades and runs; Bedrock-confined, narrow, no backwater or secondary channels. In the lower portion of the reach, small pools and cascades dominated, while upstream the gradient increased with larger cascades and pools.	No emergent or floating vegetation. Canopy cover along the stream margins was variable within the reach, ranging from 0 to 100%. Willow and alder shrubs and trees were the primary shade providers.	Bedrock and cobble were the dominant substrates.	Steep canyon walls	Ephemeral	Mostly dry on 8/23/2007 this year	Gas Canyon Creek was a narrow (less than 10 meters wide), high-gradient intermittent stream with steep confined canyon walls and no floodplain. Flows were less than 5 cfs during the breeding season surveys. Water was not flowing during the August field survey, although pools remained. Crayfish were observed during surveys.	

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization											Other Notes	
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral		Date Goes Dry
8/23/2007	Peter Graf, Brian Freiermuth	Gas Canyon Creek	679005	4314804	Yes	No	32	.5-1.5	3	Yes	15-40	5	Cascades and runs; Bedrock- confined, narrow, no backwater or secondary channels. In the lower portion of the reach, small pools and cascades dominated, while upstream the gradient increased with larger cascades and pools.	No emergent or floating vegetation. Canopy cover along the stream margins was variable within the reach, ranging from 0 to 100%. Willow and alder shrubs and trees were the primary shade providers.	Bedrock and cobble were the dominant substrates.	Steep canyon walls	Ephemeral	Mostly dry on 8/23/2007 this year	Gas Canyon Creek was a narrow (less than 10 meters wide), high-gradient intermittent stream with steep confined canyon walls and no floodplain. Flows were less than 5 cfs during the breeding season surveys. Water was not flowing during the August field survey, although pools remained. Crayfish were observed during surveys.
10/15/2007	Craig Addley	Jesse Canyon Creek MF 16	687906	4316268	Yes	No	10	.5-1.5	7	Yes	15-20	3	Waterfalls and chutes; Bedrock- confined, narrow, no backwater or secondary channels	No emergent, floating, or overhanging vegetation. Bank vegetation includes alder and willow shrubs/trees	Boulder	steep, narrow canyon	Perennial	—	Jesse Canyon flowed within a steep, narrow canyon. The channel was primarily bedrock with waterfalls and chutes. Alder and willow trees and shrubs lined the channel. Suitable breeding habitat was not observed within the site. Flow during the site visit in October was less than 0.5 cfs. Non-native aquatic predators were not observed.
8/24/2007	Peter Graf, Chet VanDellen	Long Canyon Creek	700305	4318232	Yes	No	35 to 80 feet	1.4 to 3.5 ft	2 to 4%	Yes	10 to 220 feet long	6 feet	High-gradient riffles, cascades, and plunge pools	No emergent, floating or overhanging vegetation. Riparian vegetation includes small to medium-sized willow and alder shrubs and trees, with canopy cover typically less than 50%.	Boulder and bedrock, some cobble	Stream is confined within steep canyon walls and dominated by high-gradient instream habitats	Perennial	—	
9/24/2007	Sarah Yarnell	Middle Fork RM 6.4 American Canyon Creek	678261	4311623	Yes	No	6	3	< 1%	Yes	15-35	2.5	Sections of cobble runs alternated with steeper bedrock cascades and pools sections.	Riparian vegetation was patchy along the water's edge, and was dominated by small to medium-sized willow shrubs and alder trees.	Bedrock and Cobble	Steep canyon walls	Perennial	—	A narrow and confined stream.
5/31/2007	Peter Graf, Brian Freiermuth	North Fork Long Canyon Creek	715087	4322045	Yes	No	26 to 40 feet	1.1 to 1.5 feet	> 2%	Yes	10 to 220 feet long	2 feet	High-gradient riffles, cascades, and plunge pools	No emergent, floating, or overhanging vegetation. Riparian cover typically greater than 50%, dominated by alders and willows. Firs and pines contributed to the overstory in some areas.	Boulder and cobble, some bedrock	Runs through forested habitat. Stream banks composed of rocks and boulders, some bedrock. Some clumps of vegetation (Carex spp.) and Indian rhubarb along banks.	Perennial	—	No bullfrogs observed
5/21/2007	Chet Van Dellen, Earl Gonsolin	Otter Creek	686476	4314265	Yes	No	15	.5-1.5	1.5	Yes	15-40	3	Riffles, runs and cascades; Bedrock-confined, narrow, no backwater or secondary channels. Instream habitats were predominately riffles and runs in near the confluence with the Middle Fork American River. The habitat transitioned to cascades and plunge-pools as channel widths decreased upstream. Floodplains also became less frequent with increased distance upstream.	No emergent, floating, or overhanging vegetation. Riparian vegetation was dominated by large to medium- sized willow, cottonwood, and alder trees and shrubs. Canopy cover along the stream margins was usually greater than 50%.	Boulder and cobble were the dominant substrates in downstream reaches, while bedrock and boulders dominated further upstream.	floodplain typically along at least one bank	Perennial	—	Otter Creek was a perennial stream approximately 4.5 meters wide, typically with a floodplain along at least one bank. During the month of August, flows were less than 1 cfs, and average daily water temperatures ranged from 62 oF to 76 oF, with an average of 68 oF. Observed non-native predators included crayfish.

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization												Other Notes
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral	Date Goes Dry	
6/6/2007	Chet Van Dellen, Earl Gonsolin, Christina Buck	Otter Creek	686476	4314265	Yes	No	15	.5-1.5	1.5	Yes	15-40	3	Riffles, runs and cascades; Bedrock-confined, narrow, no backwater or secondary channels. Instream habitats were predominately riffles and runs in near the confluence with the Middle Fork American River. The habitat transitioned to cascades and plunge-pools as channel widths decreased upstream. Floodplains also became less frequent with increased distance upstream.	No emergent, floating, or overhanging vegetation. Riparian vegetation was dominated by large to medium-sized willow, cottonwood, and alder trees and shrubs. Canopy cover along the stream margins was usually greater than 50%.	Boulder and cobble were the dominant substrates in downstream reaches, while bedrock and boulders dominated further upstream.	floodplain typically along at least one bank	Perennial	–	Otter Creek was a perennial stream approximately 4.5 meters wide, typically with a floodplain along at least one bank. During the month of August, flows were less than 1 cfs, and average daily water temperatures ranged from 62 oF to 76 oF, with an average of 68 oF. Observed non-native predators included crayfish.
8/22/2007	Chet Van Dellen, Earl Gonsolin, Rebecca Kipp	Otter Creek	686476	4314265	Yes	No	15	.5-1.5	1.5	Yes	15-40	3	Riffles, runs and cascades; Bedrock-confined, narrow, no backwater or secondary channels. Instream habitats were predominately riffles and runs in near the confluence with the Middle Fork American River. The habitat transitioned to cascades and plunge-pools as channel widths decreased upstream. Floodplains also became less frequent with increased distance upstream.	No emergent, floating, or overhanging vegetation. Riparian vegetation was dominated by large to medium-sized willow, cottonwood, and alder trees and shrubs. Canopy cover along the stream margins was usually greater than 50%.	Boulder and cobble were the dominant substrates in downstream reaches, while bedrock and boulders dominated further upstream.	floodplain typically along at least one bank	Perennial	–	Otter Creek was a perennial stream approximately 4.5 meters wide, typically with a floodplain along at least one bank. During the month of August, flows were less than 1 cfs, and average daily water temperatures ranged from 62 oF to 76 oF, with an average of 68 oF. Observed non-native predators included crayfish.
8/28/2007	Christina Buck, Earl Gonsolin, Chet Van Dellen	Pilot Creek	700716	4316067	Yes	No	15	1	5	Yes	25-40	15	Instream habitats were primarily high-gradient cascades and plunge-pools, although a few lower-gradient sections with high-gradient riffles occurred.	Riparian vegetation was dominated by small to medium-sized willow and alder trees, with moderate canopy coverage along the stream margins.		Steep Canyon	Perennial	–	Pilot Creek was a narrow (approximately 4.5 meters wide) perennial stream confined within steep bedrock canyon walls. Flow in Pilot Creek was regulated by Sacramento Municipal Utility District (SMUD) at Stumpy Meadows Reservoir (FERC Project No. 2101). Flows in Pilot Creek at this time were less than 2 cfs. During the month of August, average daily water temperatures ranged from 58 oF to 68 oF, with an average of 62 oF. Flow was less than 1 cfs during the August field surveys. Non-native predators were not observed during the site surveys.
10/15/2007	Craig Addley	Pond Creek	687945	4317961	Yes	No	10	.5-1.5	7	Yes	15-20	3	Waterfalls and chutes; Bedrock-confined, narrow, no backwater or secondary channels	No emergent, floating, or overhanging vegetation. Bank vegetation includes alder and willow shrubs/trees	Boulder	steep, narrow canyon	Perennial	–	Pond Creek was located within a steep, narrow canyon. Suitable breeding habitat was not observed within the site. Flow during the site visit was less than 0.5 cfs. Non-native aquatic predators were not observed.

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization													Other Notes
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral	Date Goes Dry		
5/31/2007	Peter Graf, Brian Freiermuth	South Fork Long Canyon Creek	714667	4321687	Yes	No	25 to 38 feet	1.2 to 1.5 feet	1.50%	Yes	11 to 220 feet long	3 feet	High-gradient riffles, cascades, and plunge pools	No emergent, floating, or overhanging vegetation. Riparian cover typically greater than 50%, dominated by alders and willows. Firs and pines contributed to the overstory in some areas.	Boulder and cobble, some bedrock	Runs through forested habitat. Stream banks composed of rocks and boulders, some bedrock. Some clumps of vegetation (Carex spp.) and Indian rhubarb along banks.	Perennial	—	No bullfrogs observed	
5/17/2007	Earl Gonsolin, Chet VanDelen, Christina Buck	Todd Creek	679869	4314562	Yes	No	10	.5-1.5	5	Yes	15-25	2.5	Cascades and runs; Bedrock- confined, narrow, no backwater or secondary channels	No emergent or floating vegetation. Riparian vegetation downstream of Drivers Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy coverage along the stream margins was generally less than 25%, with dense vegetation with up to 100% cover in some areas.	Bedrock/ boulder/ cobble	Steep canyon walls	Ephemeral	Dry on 8/23/2007 this year	The stream channel was approximately 3 meters wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Spring flows were less than 1 cfs. The creek was dry during the fall field surveys. Non-native aquatic predators were not observed.	
6/5/2007	Earl Gonsolin, Chet VanDelen, Christina Buck	Todd Creek	679869	4314562	Yes	No	10	.5-1.5	5	Yes	15-25	2.5	Cascades and runs; Bedrock- confined, narrow, no backwater or secondary channels	No emergent or floating vegetation. Riparian vegetation downstream of Drivers Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy coverage along the stream margins was generally less than 25%, with dense vegetation with up to 100% cover in some areas.	Bedrock/ boulder/ cobble	cobble/boulders or bedrock	Ephemeral	Dry on 8/23/2007 this year	The stream channel was approximately 3 meters wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Spring flows were less than 1 cfs. The creek was dry during the fall field surveys. Non-native aquatic predators were not observed.	
8/23/2007	Earl Gonsolin, Christina Buck, Thomas Degabriele	Todd Creek	679869	4314562	Yes	No	10	.5-1.5	5	Yes	15-25	2.5	Cascades and runs; Bedrock- confined, narrow, no backwater or secondary channels	No emergent or floating vegetation. Riparian vegetation downstream of Drivers Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy coverage along the stream margins was generally less than 25%, with dense vegetation with up to 100% cover in some areas.	Bedrock/ boulder/ cobble	cobble/boulders or bedrock	Ephemeral	Dry on 8/23/2007 this year	The stream channel was approximately 3 meters wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Spring flows were less than 1 cfs. The creek was dry during the fall field surveys. Non-native aquatic predators were not observed.	
5/24/2007	Chet Van Dellen, Earl Gonsolin, Rebecca Kipp	Volcano Creek	691520	4319082	Yes	No	15	.5-1.5	7	Yes	15-20	3	Instream habitats were dominated by cascades and step-pools	Small to medium-sized alder and willow trees and shrubs were present in the channel. Canopy cover along the stream margins was generally high, with several open bedrock sections.	bedrock and large boulders dominant		Perennial	—	Volcano Canyon Creek was a small perennial creek (approximately 4.5 meters wide) flowing within steep canyon walls. Suitable breeding habitat was not observed within the site. Flows during field surveys were less than 1 cfs. Non-native aquatic predators were not observed.	

Table 5. Data Summary for Large, Moderate, and Small Tributary Streams in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Stream Habitat Characterization											Other Notes	
			Latitude	Longitude			Width (bank full)	Depth (bank full)	Stream gradient (percent slope)	Pools present? (Y/N)	Size of pools	Max depth of pools	Characterize non-pool habitat (run, riffle, glide, other)	Vegetation Description	Substrate Description	Bank Description	Perennial or Ephemeral		Date Goes Dry
6/11/2007	Chet Van Dellen, Earl Gonsolin, Rebecca Kipp	Volcano Creek	691520	4319082	Yes	No	15	.5-1.5	7	Yes	15-20	3	Instream habitats were dominated by cascades and step-pools	Small to medium-sized alder and willow trees and shrubs were present in the channel. Canopy cover along the stream margins was generally high, with several open bedrock sections.	bedrock and large boulders dominant		Perennial	—	Volcano Canyon Creek was a small perennial creek (approximately 4.5 meters wide) flowing within steep canyon walls. Suitable breeding habitat was not observed within the site. Flows during field surveys were less than 1 cfs. Non-native aquatic predators were not observed.
8/30/2007	Chet Van Dellen, Rebecca Kipp	Volcano Creek	691520	4319082	Yes	No	15	.5-1.5	7	Yes	15-20	3	Instream habitats were dominated by cascades and step-pools	Small to medium-sized alder and willow trees and shrubs were present in the channel. Canopy cover along the stream margins was generally high, with several open bedrock sections.	bedrock and large boulders dominant		Perennial	—	Volcano Canyon Creek was a small perennial creek (approximately 4.5 meters wide) flowing within steep canyon walls. Suitable breeding habitat was not observed within the site. Flows during field surveys were less than 1 cfs. Non-native aquatic predators were not observed.
8/30/2007	Chet Van Dellen, Christina Buck	Wallace Canyon	707906	4317361	Yes	No	20	3	7	Yes	20-25	5	The channel was very high-gradient, dominated by large boulders and bedrock waterfalls and chutes.	Small to medium-sized alder and willow trees and shrubs were present in the channel, with oaks providing the overstory. Canopy cover along the stream margins was typically high.	Bedrock/boulders	Steep Canyon	Perennial	—	Wallace Creek was a small stream (approximately 6 meters wide) located within steep canyon walls with no flood plains.

Table 6. Data Summary for Diversion Pools and Off-Channel Ponds in the CRLF Study Area.

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Pond Habitat Characterization						Other Notes
			Latitude	Longitude			Size	Max. Depth (ft)	Vegetation Description	Substrate Description	Perennial or Ephemeral	Date Goes Dry	
8/15/2007	Sara Gillespie Steve Tucker	South Fork Long Canyon Diversion Pool	718882	4325530	Yes	No	.42 acres	25 ft	The diversion is lined with trees including several black oak and pine trees. Annual grasses/non-native herbs line the banks. No emergent/aquatic vegetation	Mud and silt sediment accumulations	Ephemeral	July	PCWA does not divert water through the diversion after July of each year
8/15/2007	Sara Gillespie Steve Tucker	North Fork Long Canyon Diversion Pool	717940	4325461	Yes	No	.72 acres	10 ft	No overhead canopy cover immediately around diversion. Several small Salix in the diversion itself. Banks and floor of pool are lined with annual grasses/weedy herbs.	Mud and silt sediment accumulations	Ephemeral	July	PCWA does not divert water through the diversion after July of each year
8/24/2007	Ann Hendrickson Sean Barry	Pond "A", Auburn State Recreation Area	671188	4306389	Yes	No	80' diameter	15 ft	Floating (<i>Potomageton</i> spp.)vegetation and emergent (<i>Typha</i> spp.) vegetation in and along the pond.	Sandy/muddy substrate	Perennial	–	A dam is located at west edge of pond. Many bullfrogs (35+) and 1st year metamorphs seen. Mosquito fish and bass observed in pond.
8/24/2007	Janelle Nolan- Summers Sean Barry	Pond "B", Sliger Mine Road			Yes	No	–	–	Not able to obtain access-private property.	–	–	–	Summit Hill Ranch, Rod Williams Highland Cattle 1461 Sliger Mine Rd. Greenwood, CA 95635
8/24/2007	Janelle Nolan- Summers Sean Barry	Pond "C", Horseshoe Bar	693375	4319879	Yes	No	15 x 50 ft	2 ft	No floating or emergent vegetation, some shading provided by canyon wall	Unknown	??	–	Pond developed in past year or two from beaver dam
8/24/2007	Janelle Nolan- Summers Sean Barry	Pond "D", Horseshoe Bar	693943	4319370	Yes	No	40 ft wide	20 ft	10% shading (trees). No floating or emergent vegetation. Surrounding vegetation includes Salix spp., <i>Vitis californica</i>	Silt	Perennial	–	Old mining pond. Hydrologically connected to Pond C during winter.
12/8/2007	Janelle Nolan- Summers Sara Gillespie	Pond "D", Horseshoe Bar	693943	4319370	Yes	No	35 x 375 ft	6 ft	10% shading (trees). No floating or emergent vegetation. Surrounding vegetation includes Salix spp., <i>Vitus californica</i> , <i>Eriodictyon angustifolium</i> , <i>Cephalanthus occidentalis</i>	Silt and organic matter	Perennial	–	Sheer cliff face on both sides.

Table 6. Data Summary for Diversion Pools and Off-Channel Ponds in the CRLF Study Area (continued).

Date	Surveyors	Location	GPS Coordinates		In current/ historic range of CRLF?	Known records w/in 1 mile?	Pond Habitat Characterization						Other Notes
			Latitude	Longitude			Size	Max. Depth (ft)	Vegetation Description	Substrate Description	Perennial or Ephemeral	Date Goes Dry	
8/24/2007	Janelle Nolan-Summers Sean Barry	Pond "E", Horseshoe Bar	694051	4319686	Yes	No	25 x 25 ft	10 ft	No overhanging or emergent vegetation. Some floating vegetation (<i>Potamogeton</i> spp.). Site dominated by <i>Salix</i> spp.	Silt and organic matter	Ephemeral in dry years only	Late June	Mining-derived pond. Hydrologically connected to Pond B during winter. Bullfrogs observed.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	Pond "E", Horseshoe Bar	694051	4319686	Yes	No	30 x 450 ft	4 ft	No overhanging or emergent vegetation. Site dominated by <i>Salix</i> spp. <i>Rubus discolor</i> , <i>Vitis californica</i> ., <i>Verbascum thapsus</i> , <i>Rumex</i> sp.	Silt and organic matter	Ephemeral in dry years only	Late June	Mining-derived pond. Hydrologically connected to Pond B during winter.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	Pond "F", Horseshoe Bar	693905	4319632	Yes	No	45 x 129 ft	1 ft	<i>Salix</i> sp., <i>Rubus discolor</i> , <i>Vitis californica</i> ., annual grass, <i>Calcedrus decurrens</i>	Mud	Ephemeral	Late June	Cliff on west side of pond -plunges downhill
8/24/2007	Janelle Nolan-Summers Sean Barry	Pond "G", Horseshoe Bar	693678	4319863	Yes	No	20 ft wide	2 ft	No emergent, overhanging, or floating vegetation. Sedges (very small and bushy), <i>Salix</i> sp., & <i>Muhlenburgia rigens</i> .	Boulder and cobble	Perennial	—	Backwater area connected to river.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	Pond "G", Horseshoe Bar	693678	4319863	Yes	No	20 ft	2 ft	Sedges (very small and bushy), <i>Salix</i> s p., <i>Muhlenburgia rigens</i> , unknown submerged aquatic vegetation	Sand	Perennial	—	Granite cliff face on one side of pond, sandy on other side.
8/24/2007	Janelle Nolan-Summers Sean Barry	South Lake, Horseshoe Bar	693601	4320012	Yes	No	2 acres	60 ft	No vegetation along or in water. Area surroundning by <i>Alnus</i> sp, <i>Betula</i> sp., <i>Equisetum</i> sp., <i>Rubus discolor</i> . Some <i>Salix</i> sp. on edge.	Silt	Perennial	—	Beaver and river otter occupy pond and lake.
12/8/2007	Janelle Nolan-Summers Sara Gillespie	South Lake, Horseshoe Bar	693601	4320012	Yes	No	2 acres	30 ft	No vegetation along banks or in water. Area surrounding by <i>Alnus</i> sp, <i>Betula</i> sp., <i>Equisetum</i> sp., <i>Rubus discolor</i> . Some <i>Salix</i> sp. on edge.	Silt	Perennial	—	Connected to river, wide spot on other side of tunnel. No attachment to other ponds in area. Population of rainbow, brook, and brown trout. Bullfrog present.

MAPS

CONFIDENTIAL

MAP 3

“Known Locations of CRLF in the Middle Fork American River Watershed”

*from Attachment A of AQ 12 – Special-Status Amphibian
and Aquatic Reptile Technical Study Report – 2007*

*(See Volume 4 – Exhibit E, Confidential Information, SD B, Final Technical Study Reports, Aquatic
Resources, AQ 12 – Special-Status Amphibian and Aquatic Reptile (2007), Attachment A:
California Red-legged Frog Site Assessment Report)*

Map 3 has been removed from this document because it contains the location(s) of sensitive biological resources and is considered “confidential” information. Confidential biological resources information is located in Volume 4 which may not be made available to the public pursuant to the Federal Energy Regulatory Commission’s (FERC’s) regulations contained in 36 CFR 385.1112. This information is not maintained in FERC’s Public Reference Room or on the Commission’s electronic library except as an indexed item.

APPENDIX A

USFWS Review of CRLF Site Assessment for the Middle Fork American River Project



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846



In Reply Refer To:
81420-2008-TA-0986-1

MAR 27 2008

Mr. Mal Toy
Director of Resource Development
Placer County Water Agency
P.O. Box 6570
Auburn, California 95604

Subject: Review of California Red-Legged Frog Site Assessment for the
Middle Fork American River Project (FERC No. 2079), Placer County,
California.

Dear Mr. Toy:

This is in response to the February 19, 2008, *California Red-legged Frog Site Assessment Report* that was submitted to the U.S. Fish and Wildlife Service (Service) for review. Placer County Water Agency is in the process of obtaining a new license to operate the existing hydroelectric power generation project along the Middle Fork of the American River, Placer County, California. At issue are the potential effects of the project on the threatened California red-legged frog (*Rana aurora draytonii*) (frog). This letter is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

The nearest known California red-legged frog population is approximately 2 miles north of the project near Michigan Bluff, California, and an additional known frog occurrence is located within 1 mile of the project boundary on Ralston Ridge. Because no frogs have been identified as occupying the Ralston Ridge site in the years following its 2001 discovery, it is possible that this site represents dispersal habitat for the frog. Searches of areas surrounding the Ralston Ridge site have not located a source California red-legged frog population. Given the lack of barriers between Ralston Ridge and Michigan Bluff, the individual located in 2001 could have dispersed from the known Michigan Bluff population. A frog dispersing from the Michigan Bluff site to Ralston Ridge would cross the Middle Fork of the American River in a reach affected by this proposed project. Therefore, the Service concludes this project may affect this listed species.

Furthermore, in order to adequately assess the effects of the project on the frog, additional areas of suitable habitat should be surveyed for this listed species. While no frogs have been detected at Ralston Pond since 2001, the pond was last surveyed in 2004. Since 2001, no protocol level surveys have been conducted at this site. Because the Ralston Ridge pond appears to provide

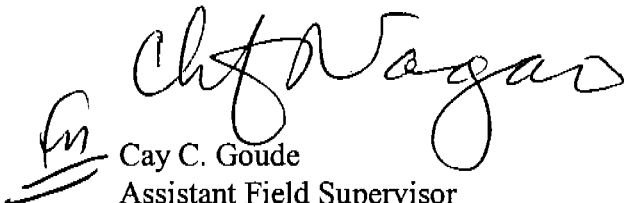
TAKE PRIDE
IN AMERICA 

suitable habitat for the California red-legged frog, we recommend protocol level surveys of this aquatic feature be conducted following the Service's 2005, *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog* (Guidelines), and the results of these surveys be submitted to the Service for review

The area identified in the site assessment as Horseshoe Bar contains suitable breeding habitat for the California red-legged frog. Given that Horseshoe bar is located approximately 2.8 miles from the known Michigan Bluff frog population, is within the same watershed, and maintains connectivity with the known population, it is probable that the ponds at Horseshoe Bar contain this listed frog. Therefore since three ponds located at Horseshoe Bar (ponds C, E, and F) appear to provide suitable breeding habitat for the frog, we recommend protocol level surveys of these aquatic features be conducted following the Service's 2005, Guidelines. Since the Horseshoe Bar ponds are located on private property, we understand that access to conduct surveys may be an issue. If permission to conduct surveys is not granted, based on connectivity with, and proximately to, a known frog population, Placer County Water Agency should assume presence of this listed amphibian and analyze the effects that the proposed project may have on a California red-legged frog population at Horseshoe Bar.

Please address any questions or concerns regarding this response on the Middle Fork American River Project to Jeremiah Karuzas, or Amy Fesnock, acting Forest and Foothills Branch Chief, at (916) 414-6600.

Sincerely,


Cay C. Goude
Assistant Field Supervisor

cc:

Service List – Middle Fork American River Project

APPENDIX B

Descriptions of Upland Vegetation Communities in the CRLF Study Area

Provided below is a brief description of CalVeg vegetation communities and non-vegetated areas identified in the study area. Vegetation community and non-vegetated area descriptions and nomenclature are based on *Vegetation Descriptions. North Sierran Ecological Province - CALVEG Zone 3* (USDA-FS 2005a).

Upland Vegetation Communities

Herb-Dominated Communities

Annual Grasses and Forbs (HG)

Annual grass and forb communities are dominated by introduced annual grasses in the genera *Bromus*, *Vulpia*, *Avena*, and *Lolium*. HG may occur as a pure patch or as an understory layer in other communities. Native species that may occur include bluegrass (*Poa annua*), purple needlegrass (*Nassella pulchra*), Idaho fescue (*Festuca idahoensis*), and California poppy (*Eschscholzia californica*).

Wet Meadow (Grass–Sedge–Rush) (HJ)

The wet meadow community occurs in level or gently sloping areas that have moist soils and permanent water sources such as streams, meadows, and lakes. HJ may also occasionally occur as an understory community. Dominant species include sedges and rushes (*Juncus* spp.), as well as water-tolerant grass and forb species.

Shrub-Dominated Communities

Huckleberry Oak (CH)

The huckleberry oak (*Quercus vaccinifolia*) community occurs in the Sierra Nevada on very shallow, stony, or gravelly soils between approximately 3,850 and 9,000 feet in elevation. Stands may be mixed with manzanita (*Arctostaphylos* spp.), bush chinquapin (*Chrysolepis sempervirens*), mountain whitethorn (*Ceanothus cordulatus*), and bitter cherry (*Prunus emarginata*). Conifer species may include Jeffrey pine (*Pinus jeffreyi*), red fir (*Abies magnifica*), western white pine (*Pinus monticola*), lodgepole pine (*Pinus contorta* var. *murrayana*), and western juniper (*Juniperus occidentalis*).

Lower Montane Mixed Chaparral (CQ)

This low-elevation mixed shrub community occurs scattered in foothill areas between 750 to 6,350 feet in elevation. CQ includes a mixture of whiteleaf manzanita (*Arctostaphylos viscida*), common manzanita (*Arctostaphylos manzanita*), wedgeleaf ceanothus (*Ceanothus cuneatus*), lemmon ceanothus (*Ceanothus lemmonii*), chaparral whitethorn (*Ceanothus leucodermis*), chamise (*Adenostoma fasciculatum*), Fremont silktassel (*Garrya fremontii*), birchleaf mountain mahogany (*Cercocarpus betuloides*), poison oak (*Toxicodendron diversilobum*), various shrub oaks (*Quercus* spp.), hoary coffeeberry (*Rhamnus tomentella*), and other lower elevation shrub species.

Upper Montane Mixed Chaparral (CX)

The upper montane mixed chaparral community is a mixed-species shrub type that occurs commonly between 2,200 and 8,900 feet in elevation. Chaparral species such as greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn, snowbrush (*Ceanothus velutinus*), and deerbrush (*Ceanothus integerrimus*) are indicators of this community. Whiteleaf manzanita may be present on the west slope foothills at lower elevations of this type, representing a transition between the lower montane mixed chaparral community and CX.

Mountain (Thinleaf) Alder (TF)

Mountain or thinleaf alder (*Alnus tenuifolia*) is a high-elevation small tree or tall shrub species, generally occurring in pure stands between 4,100 and 9,020 feet in elevation. TF occurs in large perennial grass and forb meadows where streams and coarse, shallow, or gravelly soils exist. These saturated or seasonally flooded sites are sometimes adjacent to white fir (*Abies concolor*), mixed conifer–fir, and red fir sites. Minor inclusions of tree or shrub willows (*Salix* spp.) or mountain maple (*Acer glabrum*) may occur in this type, but the density of mountain alder stands limits the growth of other species, aside from some aquatic grasses and forbs.

Tree-Dominated Communities

Black Oak (QK)

The black oak (*Quercus kelloggii*) community is one of the most common and wide-ranging hardwood communities in the Middle Fork American River Watershed. QK is found typically on moist soils up to approximately 7,000 feet in elevation on both west and east slopes of the Sierra Nevada. QK may occur in pure stands or in mixed stands as an understory component within several different conifer communities including Douglas-fir–pine, ponderosa pine, mixed conifer–pine, white fir, eastside pine, and mixed conifer–fir. Black oak often grows in mixed stands with canyon live oak (*Quercus chrysolepis*) creating a mixed hardwoods community. Bigleaf maple (*Acer macrophyllum*), dogwood (*Cornus* spp.), white alder (*Alnus rhombifolia*), and California bay (*Umbellularia californica*) are common associates in shaded areas and along riparian corridors.

Blue Oak Alliance (QD)

Blue oak occurs at the eastern edge of its range in pure or mixed stands in the northern Sierras. It is often found adjacent to the gray pine, ponderosa pine, and Douglas-fir–pine alliances on gentle slopes below about 3,300 feet in elevation. On steeper south aspects, interior live oak may become more abundant. In deeper soils, blue oak may be replaced with valley oak. Wedgeleaf ceanothus, whiteleaf manzanita, and poison oak are scattered throughout this alliance.

Canyon Live Oak (QC)

Canyon live oak occurs in pure or mixed stands in proximity to the Douglas–fir–pine, mixed conifer–pine, ponderosa pine, and black oak communities. QC is generally found on relatively dry soils or in steep canyons between approximately 600 and 6,500 feet in elevation in the northern Sierra Nevada. A mixture of shrubs such as wedgeleaf ceanothus, deerbrush, and whiteleaf manzanita often occur in the understory of this community.

Cottonwood–Alder (QJ)

Cottonwood–alder communities are characterized by a mixture of Fremont cottonwood (*Populus fremontii*) and white alder. QJ occurs rarely in the northern Sierra Nevada. QJ is generally found from 1,800 to 2,400 feet in elevation, on moist soils or in riparian areas adjacent to ponderosa pine, Douglas–fir–pine and blue oak (*Quercus douglasii*) communities.

Douglas-Fir–Pine (DP)

The Douglas–fir–pine community occurs below 5,900 feet in elevation, and is characterized by Douglas–fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*). The shrub community most commonly associated with the Douglas–fir–pine is lower montane mixed chaparral, including species such as wedgeleaf ceanothus, whiteleaf manzanita, and poison oak.

Gray Pine (PD)

This community, dominated by gray pine (*Pinus sabiniana*), occurs primarily in the foothills of the Sierra Nevada, on steep, dry rocky canyons with south aspects, below about 4,200 feet in elevation. These sites are typically diverse in structure, with a mixture of hardwoods such as canyon live oak, interior live oak (*Quercus wislizenii*) and blue oak, and low-elevation chaparral shrubs such as wedgeleaf ceanothus and whiteleaf manzanita, and common manzanita. Patches of annual grasses are often found adjacent to gray pine stands.

Interior Live Oak (QW)

Interior live oak communities are generally found in association with gray pine, ponderosa pine, or Douglas–fir–pine communities between approximately 700 and 3,000 feet in elevation. Other trees found in this community may include black cottonwood (*Populus balsamifer ssp. trichocarpa*) and white alder.

Interior Mixed Hardwoods (NX)

The interior mixed hardwoods community occurs below about 3,000 feet in elevation in scattered areas along the western edge in the northern Sierra Nevada. Stands are composed of several species of hardwoods with no clearly dominant species. The stands include any combinations of interior live oak, canyon live oak, valley oak

(*Quercus lobata*), or blue oak, in addition to shrubs commonly found in the lower montane mixed chaparral such as wedgeleaf ceanothus, poison oak, and whiteleaf manzanita. Trees in the montane mixed hardwoods community may be present in the mixture, but do not form the majority elements in the mixture. Overstory conifers mainly include Douglas-fir, ponderosa pine, knobcone pine (*Pinus attenuata*), and gray pine.

Mixed Conifer–Fir (MF)

The mixed conifer–fir community is the high elevation counterpart of the mixed conifer–pine community. MF occurs from approximately 3,700 to 8,800 feet in elevation. Three major species define this mixed conifer type: white fir, Jeffrey pine, and lodgepole pine. At lower elevations, mixed conifer pine associates such as Douglas-fir and ponderosa pine may occur. As elevation increases, red fir becomes more prominent. Other associates at all elevations include sugar pine (*Pinus lambertiana*) and incense cedar (*Calocedrus decurrens*). The upper montane mixed chaparral and occasionally the huckleberry oak communities are often found adjacent to MF.

Mixed Conifer–Pine (MP)

The mixed conifer–pine community occupies moist soils across a range of sites between approximately 1,900 and 7,800 feet in elevation. MP is defined by the presence of several conifer species, including ponderosa pine, incense cedar, Douglas-fir, white fir, and sugar pine, with Jeffrey pine occurring very rarely. Any one of these species may become locally dominant over small areas. Riparian habitats within this community are characterized by the presence of white alder, maple, and willow. Understory shrubs in this community include deerbrush and whiteleaf manzanita at lower elevations, and greenleaf manzanita at higher elevations.

Mixed Riparian Hardwoods (NR)

The mixed riparian hardwoods community occurs along rivers and streams and includes a mixture of riparian hardwood species with no clearly dominant species. The mixture includes combinations of quaking aspen (*Populus tremuloides*), willow, and black cottonwood.

Montane Mixed Hardwoods (TX)

Montane mixed hardwoods communities are generally found in the northern Sierra Nevada from 500 to 5,400 feet in elevation. It generally occurs on sites favorable to mid-montane conifers such as ponderosa pine and usually above the interior mixed hardwoods sites on the western edge. Species may include any combination of non-dominant black oak, pacific madrone (*Arbutus menziesii*), and/or tree chinquapin (*Chrysolepis chrysophylla*). Other species such as canyon or interior live oak may be included, but are not the main species. The principal overstory conifer associates are Douglas-fir, ponderosa pine, incense cedar, and sugar pine.

Pacific Douglas-Fir (DF)

Pacific Douglas-fir (*Pseudotsuga menziesii*) maintains dense stands on north-facing, shaded or moist sites at the same general range of the Douglas-fir–pine, approximately 660 to 4,600 feet in elevation. On the western side of northern Sierra Nevada, species include canyon live oak, black oak, tanoak (*Lithocarpus densiflorus*), and, more rarely, tree chinquapin.

Ponderosa Pine (PP)

The ponderosa pine community is defined by pure stands of ponderosa pine. It is commonly found between approximately 900 and 5,800 feet in elevation on moist western slopes in the northern Sierra Nevada. Within the Middle Fork American River Watershed, PP is associated most commonly with the canyon live oak and black oaks on south-, east- and west-facing slopes and with Douglas-fir–pine and mixed conifer–pine communities on north-facing aspects. Shrubs of lower montane areas such as whiteleaf manzanita, wedgeleaf ceanothus, and poison oak also may be commonly found within the ponderosa pine communities.

White Fir (WF)

Pure stands of white fir are found primarily on the west side of the northern Sierra Nevada from approximately 3,900 to 8,500 feet in elevation. WF occurs typically in cool, moist, shady environments on north aspects, in riparian areas and around large lakes. WF represents an intermediate zone between the mixed conifer–pine and mixed conifer–fir on south and west aspects, and between the mixed conifer–pine and red firs on north and east aspects. Montane mixed chaparral and huckleberry oaks are commonly associated shrub types, and mountain alder, black oak, willow species, and black cottonwood are commonly associated hardwoods.

White Alder (QE)

White alder communities occur in pure or mixed stands along rivers and streams, generally below about 6,200 feet in elevation. QE may include other tree species such as Pacific yew (*Taxus brevifolia*), California hazelnut (*Corylus cornuta* var. *californica*).

Willow (QO)

The willow community is wide-ranging, extending from approximately 2,100 to 8,600 feet in elevation. Species of tree and shrub willows dominate the hardwood mixture, and may include Scouler's willow (*Salix scouleriana*), shining willow (*Salix lucida*), Gooding's black willow (*Salix gooddingii*), and narrow-leaved willow (*Salix exigua*). QC may occur in pure stands along streams and moist canyon bottoms, or it may be mixed with conifers such as those in the mixed conifer–pine, mixed conifer–fir, and lodgepole pines. Willow–aspen, white alder, and black cottonwood communities may also be associated with the willow community.

Willow–Alder (QY)

This community is generally found between 3,180 and 6,950 feet in elevation. Willow species, which in this Project vicinity may include Scouler's willow, shining willow, Gooding's black willow, and narrow-leaved willow, occur together with white alder, along streams or seepage areas. Neither taxon is clearly dominant in the riparian mixture. Common associates include species of gooseberry and currant (*Ribes* spp.), blackberry (*Rubus* spp.), wild rose (*Rosa* spp.), and poison oak.

Non-vegetated areas

Barren (BA)

A barren landscape is defined generally as an area devoid of vegetative cover. BA includes exposed bedrock and cliffs, but it does not include disturbed or developed areas that currently are degraded but could support vegetation under normal circumstances.

Developed/Urban (UB)

A developed landscape includes any lands dominated by urban and other buildings or structures and may also include roads, parking lots, city parks, etc.

APPENDIX C
CRLF Habitat Site Assessment Data Sheets

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 9/24/2007
(mm/dd/yyyy)

Site Assessment Biologists Yarnell, Sarah
(Last name) (First Name) (Last name) (First Name)

Site Location: Placer County American Canyon Creek (at Middle Fork American River Mile 6.4) 10S 678261 / 4311623
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action:	
PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**

If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): ~ 6 feet

Depth (bank full): ~ 3 feet

Stream gradient (percent slope): <1 %

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: 15 to 35 feet in length

Maximum depth of stream pools: 2.5 feet

Characterize non-pool habitat: run, riffle, glide, other: Sections of cobble runs alternate with steeper bedrock cascades and pools.

Vegetation: emergent, overhanging, dominant species: Riparian vegetation is patchy along the water's edge, and was dominated by small to medium-sized willow shrubs and alder trees.
No emergent or aquatic vegetation present

Substrate: Bedrock and cobble

Bank description: The stream is confined within deep canyon walls and a bedrock channel

Perennial or **Ephemeral** (circle one) ☒ Perennial ☐ Ephemeral If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:



California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 5/17/2007, 6/5/2007, and 8/23/2007
(mm/dd/yyyy)

Site Assessment Biologists

Gonsolin, Earl	VanDellen, Chet
(Last name) (First Name)	(Last name) (First Name)
Buck, Christina (Last name) (First Name) (Last name) (First Name)	

Site Location: Placer County, Todd Creek, 10 S 679869 / 4314562
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
 If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 10 feet _____

Depth (bank full): _____ .5 to 1.5 Feet _____

Stream gradient (percent slope): _____ 5% _____

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 15-25 feet in length _____

Maximum depth of stream pools: _____ 2.5 feet _____

Characterize non-pool habitat: run, riffle, glide, other: _____ Non-pool habitats include cascades and runs _____

Vegetation: emergent, overhanging, dominant species: _____ No emergent or floating vegetation.
Riparian vegetation downstream of Driver's Flat Road was dominated by small to medium-sized willow and alder trees and shrubs. Canopy cover along the stream margins was generally less than 25%, but up to 100% in some areas

Substrate: _____ Bedrock, boulder, and cobble _____

Bank description: _____ Stream is bedrock-confined, no backwater or secondary channels _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: Dry on 8/23/2007

Other aquatic habitat characteristics, species observations, drawings, or comments:

Stream channel near the Middle Fork American was approximately 3 m wide, with an adjacent floodplain along both banks. Upstream of Drivers Flat Road, valley width decreased, and the channel was confined within steep canyon walls. Spring flows were less than 1 cfs. The creek was dry during the fall (August) surveys. Non-native aquatic predators were not observed.



California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 5/17/2007, 6/5/2007, and 8/23/2007
(mm/dd/yyyy)

Site Assessment Biologists

Graff, Peter	Freiermuth, Brian
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: Placer, Gas Canyon Creek, 10S 0679004, 4314803 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): 6 ft (32 ft)

Depth (bank full): > 1 ft

Stream gradient (percent slope): Steep (> 7%)

Are there pools (circle one): **Yes** No

If yes,

Size of stream pools: ~ 7 ft wide and 15 ft long

Maximum depth of stream pools: 2 feet (average maximum)

Characterize non-pool habitat: run, riffle, glide, other: cascades, runs

Vegetation: emergent, overhanging, dominant species: No emergent or floating vegetation.
Salix sp and Alnus sp. along bank

Substrate: bedrock, cobble, boulder

Bank description: Steep canyon walls

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: 8/23/07, this year



Other aquatic habitat characteristics, species observations, drawings, or comments:

Steep gradient, bedrock/boulder. No backwater or escape cover. No roots or vegetation for egg attachment.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 6/27/2007
(mm/dd/yyyy)

Site Assessment Biologists	Graf, Peter	VanDellen, Chet
	(Last name) (First Name)	(Last name) (First Name)
	(Last name) (First Name)	(Last name) (First Name)

Site Location: Placer County, Canyon Creek, 10S 681773, 4313650
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ ~ 35 feet

Depth (bank full): _____ 3 feet

Stream gradient (percent slope): _____ 5%

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 15 to 35 feet in length

Maximum depth of stream pools: _____ 2.5 feet

Characterize non-pool habitat: run, riffle, glide, other: _____ Non-pool habitats includes bedrock chutes and cascades.

Vegetation: emergent, overhanging, dominant species: _____ Medium to small-sized alder and willow trees and shrubs were established within the channel, while oaks provided most of the overstory canopy. Canopy cover along the stream margins was typically high, although several open, bedrock areas (with no vegetation) occurred. No emergent or aquatic vegetation present.

Substrate: _____ Bedrock, boulder, and cobble

Bank description: _____ Stream is steep, confined, and bedrock-dominated. Banks are steep and rocky, not vegetated. No bullfrogs or other non-native predators observed.

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____



Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 5/21/2007, 6/6/2007, and 8/22/2007
(mm/dd/yyyy)

Site Assessment Biologists	VanDellen, Chet	Gonsolin, Earl
	(Last name) (First Name)	(Last name) (First Name)
	(Last name) (First Name)	(Last name) (First Name)

Site Location: El Dorado, Otter Creek, 10S 0686476, 4314265
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action:	
PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): 10 ft (32 ft)

Depth (bank full): 1.5 ft

Stream gradient (percent slope): 1.5%

Are there pools (circle one): ☒ **Yes** ☐ **No**

If yes,

Size of stream pools: 15 to 40 feet in length

Maximum depth of stream pools: 3 feet

Characterize non-pool habitat: run, riffle, glide, other: riffles, runs, & cascades

Vegetation: emergent, overhanging, dominant species: No floating or emergent vegetation.
Riparian vegetation was dominated by large to medium-size *Salix* sp., *Populus fremontii*, and
Alnus sp. along bank. Canopy cover along stream was greater than 50%.

Substrate: boulder/bedrock and cobble

Bank description: floodplain typically along at least one bank

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____



Other aquatic habitat characteristics, species observations, drawings, or comments:

No attachment substrate for eggs, little escape cover. No backwater pools or secondary channels. During August flows were less than 1 cfs. Crayfish and other non-native species observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 10/15/2007
(mm/dd/yyyy)

Site Assessment Biologists Addley, Craig
 (Last name) (First Name) (Last name) (First Name)

 (Last name) (First Name) (Last name) (First Name)

Site Location: El Dorado, Jesse Canyon Creek Confluence, 10S 687906 4316268
 (County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
 If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 10 ft

Depth (bank full): _____ < 1 ft

Stream gradient (percent slope): _____ Steep (~7%)

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 15 to 20 feet in length

Maximum depth of stream pools: _____ 3 ft

Characterize non-pool habitat: run, riffle, glide, other: _____ waterfalls and chutes

Vegetation: emergent, overhanging, dominant species: _____
Alnus sp. and *Rubus discolor*.

Substrate: _____ bedrock & boulder

Bank description: steep, narrow canyon: bedrock-confined, narrow stream bed with
no backwater or secondary channels

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

No amphibians observed. Very high gradient, bedrock confined, & narrow. No backwater or secondary channels. No escape cover. No roots or vegetation for egg attachment.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 10/15/2007
(mm/dd/yyyy)

Site Assessment Biologists Addley, Craig
 (Last name) (First Name) (Last name) (First Name)

 (Last name) (First Name) (Last name) (First Name)

Site Location: Placer, Pond Creek Confluence, 10S 687945 4317961 (NAD 83)
 (County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action:	
PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
 If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 10 ft

Depth (bank full): _____ .5 to 1.5 feet

Stream gradient (percent slope): _____ Steep (~7 %)

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 15 to 20 feet in length

Maximum depth of stream pools: _____ 3 ft

Characterize non-pool habitat: run, riffle, glide, other: _____ waterfalls and chutes

Vegetation: emergent, overhanging, dominant species: _____ No emergent or floating vegetation.
Salix sp. and Alnus sp. and shrubs along banks.

Substrate: _____ boulder/bedrock

Bank description: _____ steep, narrow canyon

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

No amphibians observed.
Very high gradient, bedrock confined, & narrow. No backwater or secondary channels. No escape cover. No roots or vegetation for egg attachment.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 5/24/2007, 6/11/2007, and 8/30/2007
(mm/dd/yyyy)

Site Assessment Biologists

VanDellen, Chet	Gonsolin, Earl
(Last name) (First Name)	(Last name) (First Name)
Buck, Christina (Last name) (First Name) (Last name) (First Name)	

Site Location: Placer County, Volcano Creek, 10S 691520, 4319082
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
 If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 15 feet _____

Depth (bank full): _____ .5 to 1.5 feet _____

Stream gradient (percent slope): _____ ~ 7% _____

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 15 to 20 feet in length _____

Maximum depth of stream pools: _____ 3 feet _____

Characterize non-pool habitat: run, riffle, glide, other: _____ Non-pool habitats included cascades and step-pools _____

Vegetation: emergent, overhanging, dominant species: _____ No emergent or aquatic vegetation. _____

Small to medium-sized alder and willow trees and shrubs present in and along channel. _____

Canopy cover along stream margins generally high, with sections of open bedrock. _____

Substrate: _____ Dominated by bedrock and boulders _____

Bank description: _____ Stream banks composed of rocks and boulders, some bedrock. Clumps of vegetation including *Carex* spp., and Indian rhubarb along banks. _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____



Other aquatic habitat characteristics, species observations, drawings, or comments:

Small perennial creek flowing within steep canyon walls. Flows during field surveys were less than 1 cfs. Non-native aquatic predators not observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 8/29/2007
(mm/dd/yyyy)

Site Assessment Biologists Gonsolin, Earl VanDellen, Chet
(Last name) (First Name) (Last name) (First Name)

Buck, Christina
(Last name) (First Name) (Last name) (First Name)

Site Location: Placer County, Brushy Canyon Creek, 10S 701685, 4314562
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action:	
PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

1) Is this site within the current or historic range of the CRF (circle one) Yes No

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) Yes No
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 15 feet

Depth (bank full): _____ .5 to 1.5 feet

Stream gradient (percent slope): _____ 5%

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 20 to 45 feet long

Maximum depth of stream pools: _____ 3 feet

Characterize non-pool habitat: run, riffle, glide, other: _____ High gradient cascades

Vegetation: emergent, overhanging, dominant species: _____ No emergent or aquatic vegetation.
A oak overstory shades the channel

Substrate: _____ Bedrock and boulders

Bank description: _____ Set within a steep river canyon, channel is confined to bedrock

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____



Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 8/28/2007
(mm/dd/yyyy)

Site Assessment Biologists

Buck, Christina	Gonsolin, Earl
(Last name) (First Name)	(Last name) (First Name)

VanDellen, Chet	
(Last name) (First Name)	(Last name) (First Name)

Site Location: Placer County, Pilot Creek, 10S 700716, 4316067
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): ~ 15 feet

Depth (bank full): ~ 1 foot

Stream gradient (percent slope): 5%

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: 25 to 40 feet in length

Maximum depth of stream pools: 15 feet

Characterize non-pool habitat: run, riffle, glide, other: Instream habitats primarily high-gradient cascades and plunge-pools, although several lower-gradient sections with riffles occurred.

Vegetation: emergent, overhanging, dominant species: No emergent or aquatic vegetation. Riparian vegetation dominated by small to medium willow and alder trees, with moderate canopy coverage along the stream margins.

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____



Other aquatic habitat characteristics, species observations, drawings, or comments:

Pilot Creek is a narrow (approx. 4.5 m) perennial stream confined within steep bedrock canyon walls. Flow is regulated by SMUD at Stumpy Meadows reservoir. Flows at the time of the survey were less than 2 cfs. Non-native predatory species not observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 8/30/2007
(mm/dd/yyyy)

Site Assessment Biologists

VanDellen, Chet		Buck, Christina	
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: Placer County, Wallace Canyon Creek, 10S 707906, 4317361
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 20 feet _____

Depth (bank full): _____ 3 feet _____

Stream gradient (percent slope): _____ 7% _____

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 20 to 25 feet in length _____

Maximum depth of stream pools: _____ 5 feet _____

Characterize non-pool habitat: run, riffle, glide, other: _____ High-gradient channel dominated
by large boulders and bedrock, waterfalls and chutes _____

Vegetation: emergent, overhanging, dominant species: _____ No emergent or aquatic vegetation.
Small to medium-sized alder and willow trees and shrubs were present in the channel, with oaks
providing the overstory. Canopy cover typically high. _____

Substrate: _____ Bedrock and boulder _____

Bank description: _____ River runs through a steep canyon, no flood plain. _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____



Other aquatic habitat characteristics, species observations, drawings, or comments:

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 8/24/2007
(mm/dd/yyyy)

Site Assessment Biologists

Graf, Peter	VanDellen, Chet
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: Placer County, Long Canyon Creek, 10S, 700305, 4318232
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 35 to 80 feet _____

Depth (bank full): _____ 1.4 to 3.5 feet _____

Stream gradient (percent slope): _____ 2 to 4% _____

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 10 to 220 feet long _____

Maximum depth of stream pools: _____ 6 feet _____

Characterize non-pool habitat: run, riffle, glide, other: _____ High gradient riffles, cascades, and
plunge pools _____

Vegetation: emergent, overhanging, dominant species: _____ No emergent or floating vegetation
riparian vegetation includes small to medium-sized willows and alder shrubs and trees, with
Canopy cover typically less than 50% _____

Substrate: _____ Boulder and bedrock, some cobble _____

Bank description: _____ Stream is confined within steep canyon walls _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:



California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 5/31/2007
(mm/dd/yyyy)

Site Assessment Biologists

Graf, Peter	Friermuth, Brian
(Last name)	(First Name)
(Last name)	(First Name)

Site Location: Placer County, North Fork Long Canyon Creek, 10 S 715087, 4322045
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 26 to 40 feet

Depth (bank full): _____ ~1 to 1.5 feet

Stream gradient (percent slope): _____ > 2%

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 10 to 220 feet long

Maximum depth of stream pools: _____ 2 feet

Characterize non-pool habitat: run, riffle, glide, other: _____ High-gradient riffles, cascades,
and plunge pools

Vegetation: emergent, overhanging, dominant species: _____ No emergent or floating vegetation.
Riparian cover typically greater than 50%, dominated by alders and willows. Firs and pines
contribute to overstory in some areas.

Substrate: _____ Boulder and cobble, some bedrock

Bank description: _____ River runs through a pine forest habitat. Stream banks composed of
rocks and boulders, some bedrock. Some clumps of vegetation (i.e., *Carex* spp. and Indian
rhubarb) along banks.

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

Other aquatic habitat characteristics, species observations, drawings, or comments:



No bullfrogs or other predators
observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 5/31/2007
(mm/dd/yyyy)

Site Assessment Biologists

Graf, Peter	Friermuth, Brian
(Last name)	(First Name)
(Last name)	(First Name)

Site Location: Placer County, South Fork Long Canyon Creek, 10S, 714667, 4321687
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 25 to 38 feet _____

Depth (bank full): _____ 1 to 1.5 feet _____

Stream gradient (percent slope): _____ ~ 1.5% _____

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____ 11 to 220 feet long _____

Maximum depth of stream pools: _____ 3 feet _____

Characterize non-pool habitat: run, riffle, glide, other: _____ High-gradient riffles, cascades, and plunge pools _____

Vegetation: emergent, overhanging, dominant species: _____ No emergent or floating vegetation
Riparian cover typically greater than 50%, dominated by alders and willows. Firs and pines
contribute to the overstory. _____

Substrate: _____ Boulder and cobble, some bedrock _____

Bank description: _____ Stream banks composed of rocks and boulders, some Carex and Indian
rhubarb present. _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



**Other aquatic habitat characteristics,
species observations, drawings, or
comments:**

Creek runs through a pine forest. No
bullfrogs or other predators observed.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 8/29/2007
(mm/dd/yyyy)

Site Assessment Biologists Graf, Peter
 (Last name) (First Name) (Last name) (First Name)

 (Last name) (First Name) (Last name) (First Name)

Site Location: Placer County, Duncan Creek, 10S 712456, 4323952
 (County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
 If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____ 33 to 53 feet _____

Depth (bank full): _____ 1.3 to 9.2 feet _____

Stream gradient (percent slope): _____ >3% _____

Are there pools (circle one): ☒ **Yes** ☐ **No**

If yes,

Size of stream pools: _____ 40 to 75 feet long _____

Maximum depth of stream pools: _____ 5.5 feet _____

Characterize non-pool habitat: run, riffle, glide, other: _____ Waterfalls and cascades, inter-
-rupted by plunge pools. _____

Vegetation: emergent, overhanging, dominant species: _____ No emergent or floating vegetation.
Riparian vegetation includes sparse alders and some forb species along the stream margin.
Canopy cover is approximately 25%. _____

Substrate: _____ Bedrock, boulder, and cobble _____

Bank description: _____ Stream is steep, confined, and bedrock-dominated. Banks are steep and
rocky, generally not vegetated. _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

Other aquatic habitat characteristics, species observations, drawings, or comments:



California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 08/15/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Gillespie, Sara</u>	<u>Tucker, Steve</u>
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: Placer County, South Fork Long Canyon Creek Diversion Pool
10S 718882, 4325530
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action:	
PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
- If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: .42 acres **Maximum depth:** ~ 25 ft *

Vegetation: emergent, overhanging, dominant species: The diversion pool is lined with trees including several black oaks and pines. Annual grasses/non-native herbaceous species line the banks of the diversion pool

Substrate: Mud and silt sediments have accumulated in the bottom of the diversion pool

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: July*

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

** The SF Long Canyon Creek Diversion Dam is approx. 27 feet high. Water may get as deep as the height of the dam while water is diverted through the pool. However, PCWA stops water from diverting through the diversion pool in July of each year. At the time this survey was



conducted (August), water in the pool was less than 1 foot deep, with some areas of exposed mud/dirt. Thus, water does not remain in the diversion long enough to support a breeding population of CRLF.

(Photo provided here was taken in spring of 2007, while there was water in the diversion pool)

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 8/15/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Gillespie, Sara</u>	<u>Tucker, Steve</u>
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: Placer County, North Fork Long Canyon Diversion Pool, 10S 717940, 4325461
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: .72 acres **Maximum depth:** ~ 10 feet*

Vegetation: emergent, overhanging, dominant species: Banks and floor of pool are lined with annual grasses and other weedy herbaceous species. There are several small willow shrubs in the diversion itself.

Substrate: Mud and silt sediments have accumulated in the bottom of the diversion pool

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: July*

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): ☒ Yes ☐ No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:



** The NF Long Canyon Creek Diversion Dam is approx. 10 feet high. Water may get as deep as the height of the dam while water is diverted through the pool. However, PCWA stops water from diverting through the diversion pool in July of each year. At the time this survey was conducted (August), water in the pool was less than 1 foot deep, with some areas of exposed mud/dirt. Thus, water does not remain in the diversion long enough to support a breeding population of CRLF.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 08/24/2007
(mm/dd/yyyy)

Site Assessment Biologists

Barry, Sean	Hendrickson, Ann
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: El Dorado, Pond "A", Auburn SRA, 10S 0671188, 4306389 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: 80 ft x 80 ft **Maximum depth:** 15 ft

Vegetation: emergent, overhanging, dominant species: _____
Floating vegetation: *Potamogeton* sp., Emergent vegetation: *Typha* sp. *Rubus discolor* along west edge.

Substrate: Silt

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: N/A

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

Other aquatic habitat characteristics, species observations, drawings, or comments:



Man-made pond, possibly for cattle. Dam at west edge of pond. Many bullfrog tadpoles and first year metamorphs detected. *Gambusia* sp. and bass present. American kestrel, acorn woodpecker, mallard, pied-billed grebe, bobcat observed in area.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 08/24/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Nolan-Summers, Janelle</u>	<u>Barry, Sean</u>
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: El Dorado, Pond "B" Sliger Mine Rd, Summit Hill Ranch 1461 Sliger Mine Rd., Greenwood, CA 95635
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action:	
PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
- If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT: Private Property – not granted permission to access pond.

Size: _____ **Maximum depth:** _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:

Private Property – unable to obtain access



Summit Hill Ranch
Rod Williams Highland
Cattle
1461 Sliger Mine Rd.
Greenwood, CA 95635

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 08/24/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Nolan-Summers, Janelle</u>	<u>Barry, Sean</u>		
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: El Dorado, Pond "C", Horseshoe Bar, 10S 0693375, 4319879 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: 15 ft X 50 ft **Maximum depth:** 2 ft

Vegetation: emergent, overhanging, dominant species: _____

No floating or emergent vegetation visible – pond not accessible by foot.

Substrate: Unknown

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: N/A

STREAM HABITAT:

Width (bank full):

Depth (bank full):

Stream gradient (percent slope):

Are there pools (circle one): Yes No

If yes,

Size of stream pools:

Maximum depth of stream pools:

Characterize non-pool habitat: run, riffle, glide, other:

Vegetation: emergent, overhanging, dominant species:

Substrate:

Bank description:

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:



Wide spot in seasonal drainage, pond developed in last year or two by beaver. Bordered by canyon wall on one side. Unable to access pond on ground trail on opposite side of pond (trail goes along the canyon wall). Visible from canyon wall only.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 08/24/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Nolan-Summers, Janelle</u>	<u>Barry, Sean</u>		
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: El Dorado, Pond "D", Horseshoe Bar, 10S 0693943, 4319370 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: ~1 acre **Maximum depth:** 20 ft

Vegetation: emergent, overhanging, dominant species: No floating or overhanging vegetation. *Salix* spp. including button and gray willow (dominant), *Rubus discolor*, *Eriodictyon angustifolium*, *Cephalanthus occidentalis*, *Vitis californica*.

Substrate: Silt

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: N/A

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

Old mining pond. Vertical edge.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

12/08/2007

Date of Site Assessment:

(mm/dd/yyyy)

Site Assessment Biologists

Nolan-Summers, Janelle

Gillespie, Sara

(Last name)

(First Name)

(Last name)

(First Name)

(Last name)

(First Name)

(Last name)

(First Name)

Site Location:

El Dorado, Pond "D", Horseshoe Bar, 10S 0693943, 4319370 (NAD 83)

(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

1) Is this site within the current or historic range of the CRF (circle one)

Yes

No

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)

Yes

No

If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: 35 feet wide x 375 feet

Maximum depth: 5-6 feet

Vegetation: emergent, overhanging, dominant species: No floating vegetation.

Salix sp. (dominant), Rubus discolor, Eriodictyon angustifolium, Vitis californica.

Cephalanthus occidentalis,

Substrate: Silt and organic matter

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

Other aquatic habitat characteristics, species observations, drawings, or comments:



Sheer cliff face on south side.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 08/24/2007
(mm/dd/yyyy)

Site Assessment Biologists Nolan-Summers, Janelle Barry, Sean
(Last name) (First Name) (Last name) (First Name)

(Last name) (First Name) (Last name) (First Name)

Site Location: El Dorado County, Pond "E", Horseshoe Bar, 10S 0694051 4319686
(NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: 25 ft wide x 25 ft long **Maximum depth:** 10 ft

Vegetation: emergent, overhanging, dominant species: No emergent or overhanging
Vegetation. Potamogeton sp., indication of cooler water (per S. Barry). Riparian vegetation,
dominated by willows.

Substrate: silt and organic matter

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: in dry years only

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

Man-made mining pond. Bullfrog tadpoles observed. Mallard and green heron observed. During winter hydrologically connected to Pond "D"

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 12/08/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Nolan-Summers, Janelle</u>	<u>Gillespie, Sara</u>
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: El Dorado County, Pond "E", Horseshoe Bar, 10S 0694051 4319686 (NAD 83); culvert, 10S 0693976 4319615 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
- If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: 30 ft wide x 450 ft long **Maximum depth:** Current = 3–4 ft ; Max Rainy Season = 6–7 ft

Vegetation: emergent, overhanging, dominant species: No emergent or overhanging vegetation; *Rubus discolor*, *Vitis californica* sp., *Verbascum thapsus* , *Rumex* sp.

Substrate: silt and organic matter

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: in dry years only

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

Man-made mining pond. Pond is narrow on either end, widest (~ 30 ft) in the middle. Hydrologically connected in winter (per John Close) at east end to Pond D, by a culvert that runs under dirt road.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 12/08/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Nolan-Summers, Janelle</u>	<u>Gillespie, Sara</u>
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action:	
PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: 45 ft x 129 ft **Maximum depth:** ~ 1 ft

Vegetation: emergent, overhanging, dominant species: Salix sp., Rubus discolor, Vitis sp., annual grass, Calocedrus decurrens.

Substrate: mud – very muddy water

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: Late June

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:

Other aquatic habitat characteristics, species observations, drawings, or comments:



Cliff borders west side of pond.
Per John C., the pond dries up in
summer (late June). Area is
characterized by canyon live oak,
which is replaced by a pine
community at the top of the
ridge.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 08/24/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Nolan-Summers, Janelle</u>	<u>Barry, Sean</u>		
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: El Dorado, Pond "G", Horseshoe Bar, 10S 0693678, 4319863 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: ~20 ft wide average	Maximum depth: 2 ft now; 8 ft. after rainy season, connected to river in high flows. Gets blown out in floods.
Vegetation: emergent, overhanging, dominant species: <u>No overhanging vegetation.</u> <u>Sedges (very small & bushy), Salix sp., Muhlenbergia rigens</u>	

Substrate: sand and granite

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: N/A

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry:



Other aquatic habitat characteristics, species observations, drawings, or comments:

Granite cliff face one side of pond, sandy on far side of pond. Pond 2 ft deep at time of survey, up to 8 feet when water levels are high (rainy). Connected the river in high flows, gets “blown out” during flood events.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 12/08/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Nolan-Summers, Janelle</u>	<u>Gillespie, Sara</u>		
(Last name)	(First Name)	(Last name)	(First Name)
(Last name)	(First Name)	(Last name)	(First Name)

Site Location: El Dorado, Pond "G", Horseshoe Bar, 10S 0693678, 4319863 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: ~20 ft wide average **Maximum depth:** ~ 2 feet

Vegetation: emergent, overhanging, dominant species: _____
No emergent or overhanging veg. _____

Substrate: sandy

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

Other aquatic habitat characteristics, species observations, drawings, or comments:

Backwater area that is connected to river. Granite walls and bottom (of pond)

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

California Red-Legged Frog Habitat Site Assessment Data Sheet

Site Assessment reviewed by:		
(FWS Field Office)	(Date)	(Biologist)

Date of Site Assessment: 08/24/2007
(mm/dd/yyyy)

Site Assessment Biologists

<u>Nolan-Summers, Janelle</u>	<u>Barry, Sean</u>
(Last name) (First Name)	(Last name) (First Name)
(Last name) (First Name)	(Last name) (First Name)

Site Location: El Dorado, South Lake and attached backwater area, Horseshoe Bar, 10S 0693601, 4320012 (NAD 83)
(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	<u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action:	
PCWA owns and operates the MFP, a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the and Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses and supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

- 1) Is this site within the current or historic range of the CRF (circle one) **Yes** **No**
- 2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one) **Yes** **No**
If yes, attach a list of all known CRF records with a map showing all locations.

GENERAL AQUATIC HABITAT CHARACTERIZATION

(If multiple ponds or streams are within the proposed action area, fill out one data sheet for each)

POND HABITAT:

Size: LAKE- 1- 2 acres **Maximum depth:** 60 ft

Vegetation: emergent, overhanging, dominant species: _____
No emergent or overhanging vegetation. Some willow spp. _____

Substrate: silt

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____

STREAM HABITAT:

Width (bank full): _____

Depth (bank full): _____

Stream gradient (percent slope): _____

Are there pools (circle one): Yes No

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Bank description: _____

Perennial or **Ephemeral** (circle one) If ephemeral, date it goes dry: _____



Other aquatic habitat characteristics, species observations, drawings, or comments:

Lake located at end of MFAR tunnel chute. Beaver and otter occupy the lake (per caretaker John C.). Some willow at edge of lake, on the opposite side. Granite cliffs.

CONFIDENTIAL

APPENDIX D, MAP 3

Known Locations of California Red-Legged Frog in the American River Watershed

APPENDIX E

California Red-Legged Frog Protocol-Level Survey Report

**Placer County Water Agency
Middle Fork American River Project
(FERC No. 2079)**

FINAL

**AQ 12 – SPECIAL-STATUS AMPHIBIAN AND
AQUATIC REPTILE SUPPLEMENTAL REPORT**

**CALIFORNIA RED-LEGGED FROG
PROTOCOL-LEVEL SURVEY REPORT**



**Placer County Water Agency
P.O. Box 6570
Auburn, CA 95604**

February 2010

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Appendix B. Biologist Resumes.
Appendix C. California Red-legged Frog Protocol-level Survey Datasheets.
Appendix D. California Red-legged Frog Survey Photographs.

1.0 INTRODUCTION

This report provides the results of California red-legged frog (CRLF) (*Rana draytonii*) protocol-level presence/absence surveys conducted for the relicensing of Placer County Water Agency's (PCWA's) Middle Fork American River Project (MFP or Project). Specifically, this report provides a detailed description of the methods and results of U.S. Fish and Wildlife Service (USFWS) protocol-level presence/absence surveys completed in 2009.

In 2008, a protocol-level site assessment was prepared in accordance with the USFWS *Revised Guidance on Site Assessments and Field Surveys for California Red-legged Frogs* (Guidance) (USFWS 2005) and with the study approach for CRLF site assessment surveys described in PCWA's AQ 12 – Special-Status Amphibian and Aquatic Reptile Technical Study Plan (TSP). The study area for the CRLF Site Assessment encompassed one mile around all existing Project facilities and features, Project recreation facilities, stakeholder-identified dispersed concentrated use areas, and river/stream reaches potentially affected by the MFP within the historic range of the species (below 5,000 feet in elevation) (PCWA 2008). The study area also included one mile around potential Project betterments/improvements (less than 5,000 feet in elevation), including proposed new facilities, roads, trails; staging and disposal sites; as well as potential new inundation areas.

On March 27, 2008, USFWS provided a letter to PCWA stating that following review of the CRLF Site Assessment Report (PCWA 2008), USFWS determined that protocol-level presence/absence surveys of four aquatic features that appeared to provide suitable habitat for the CRLF were required for relicensing of the MFP. The four aquatic features identified by USFWS as potential breeding habitat for CRLF included the Ralston Ridge Pond and three Horseshoe Bar ponds (C, E, and F; Map AQ 12 CRLF-1). Refer to Appendix A for a copy of this letter (PCWA 2008).

2.0 STUDY OBJECTIVES

The objectives of the CRLF protocol-level surveys as described in the AQ 12 – TSP are:

- Document the distribution and abundance of CRLF populations in the study area, as required by USFWS.

3.0 STUDY IMPLEMENTATION

Study elements described in the AQ 12 – TSP were initiated in 2007 and completed in 2009. A summary of the study elements that have been completed for this report, any deviations from the TSP, outstanding study elements, and proposed modifications to the TSP are described below.

3.1. STUDY ELEMENTS COMPLETED

Following submittal of the CRLF Site Assessment Report to USFWS in 2008, USFWS determined that protocol-level presence/absence CRLF surveys were required at four aquatic features. The following describes the study elements completed for the CRLF protocol-level presence/absence surveys.

- Completed CRLF surveys in accordance with the USFWS Guidance (USFWS 2005). USFWS decontamination guidelines were implemented during the surveys.
- Completed CRLF surveys in areas requested by USFWS that were accessible and could be safely surveyed by a qualified biologist. Protocol-level surveys consisted of up to eight visits (two day visits and four night visits during the breeding season and one day and one night visit during the non-breeding season).
- Prepared a CRLF survey report that included the following:
 - o Copies of datasheets;
 - o Copies of field notes;
 - o GPS data for all surveyed sites;
 - o Photographs of individual CRLFs observed during surveys and habitats where the individual was observed; and
 - o GIS map documenting the location of each individual CRLF observed during the surveys.
- Notified USFWS within three working days if a CRLF was detected at any location.
- Prepared and submitted a California Native Species Field Survey Form for all CRLF recorded to the California Natural Diversity Database (CNDDDB).
- Recorded any incidental sightings of CRLF during implementation of any aquatic technical studies.

3.2. DEVIATIONS FROM THE AQ 12 – TSP

There were no deviations from the AQ 12 – TSP.

3.3. OUTSTANDING STUDY ELEMENTS

There are no outstanding study elements.

3.4. PROPOSED MODIFICATIONS TO THE AQ 12 – TSP

There are no proposed modifications to the AQ 12 – TSP.

4.0 EXTENT OF STUDY AREA

Four aquatic features were identified by USFWS as potential breeding habitat for CRLF in the study area—the Ralston Ridge Pond and three Horseshoe Bar ponds (Ponds C, E, and F; Map AQ 12 CRLF-1). These aquatic features are: (1) within the current range of the CRLF; (2) within one mile of the MFP Project; and (3) for the Ralston Ridge Pond, is the location of a documented CRLF occurrence.

5.0 STUDY APPROACH

Protocol-level presence/absence surveys for CRLF were conducted in accordance with USFWS Guidance (USFWS 2005). Surveys were conducted by qualified biologists by kayak, float tube, and by foot. Refer to Appendix B for copies of the biologists' resumes. Surveys were lead by Jeff Alvarez, a recognized CRLF biologist who holds a valid 10(a)1(A) permit.

During all surveys, weather conditions were suitable for collecting accurate and reliable field data. At all times during surveys air temperatures were warmer than 50° F and wind speed was less than 5 miles per hour. No surveys were conducted in rain, fog, or heavy clouds.

5.1. CRLF BREEDING SEASON SURVEYS

The USFWS Guidance recommends conducting two day surveys and four night surveys during the CRLF breeding season, which begins April 15 and ends on June 30 in the Sierra Nevada Mountains and other high-elevation locations (USFWS 2005). Breeding season surveys for this study were conducted from April 28 through June 24, 2009. Provided below is a description of the day and night breeding survey methods.

5.1.1. Day Surveys

Two day surveys were conducted during the CRLF breeding season to locate CRLF larvae, metamorphs, and egg masses. The surveys took place at least seven days apart. Surveys were conducted at least one hour after sunrise and one hour before sunset.

At all survey locations the banks of the ponds were scanned with binoculars. At the Ralston Ridge Pond, two biologists walked the perimeter of the pond. Both the near and far banks were scanned with binoculars. Due to thick vegetation present along the perimeter of the Horseshoe Bar ponds (C, E, and F), the banks were surveyed from the water. Two qualified biologists searched the shoreline and aquatic habitat by kayak or float tubes. Field observations and notes on conditions during surveys were recorded on datasheets developed by USFWS (Appendix C).

5.1.2. Night Surveys

Four night surveys were conducted to locate adult and metamorphosed CRLF. The surveys took place at least seven days apart. Night surveys were conducted at least one hour after sunset.

During night surveys, a Maglite 4D Cell flashlight was held at eye-level and used to search for eye shine and individuals along banks and within the ponds. Field observations and notes on conditions during surveys were recorded on datasheets developed by USFWS (Appendix C).

5.2. CRLF NON-BREEDING SEASON SURVEYS

The USFWS Guidance recommends conducting one day and one night survey during the CRLF non-breeding season, which occurs July 1 through September 30. At least one survey must be conducted prior to August 15. Non-breeding season surveys for this study were conducted on July 14, 2009. Provided below is a description of the day and night non-breeding survey methods.

5.2.1. Day Surveys

One day survey took place during the non-breeding season. The survey was conducted during July to locate metamorphosing sub-adult and non-breeding adult CRLF. The survey was conducted at least one hour after sunrise and one hour before sunset. Refer to Section 5.1.1 for a detailed description of survey methods.

5.2.2. Night Surveys

One night survey was also conducted during the non-breeding season. Night surveys were conducted during July to locate adult and metamorphosed CRLF. The survey was conducted at least one hour after sunset. Refer to Section 5.1.2 for a detailed description of survey methods.

6.0 STUDY RESULTS

This section provides a summary of the results of CRLF breeding and non-breeding surveys. All observations, survey dates, and weather conditions during surveys were recorded on datasheets developed by the USFWS and are provided in Appendix C. A summary of the survey results is provided in Table AQ 12 CRLF-1. A detailed description of CRLF habitat at the survey sites is provided in the CRLF Site Assessment Report included as Attachment A of the AQ 12 – TSR – 2007 (PCWA 2008).

The following briefly describes each of the ponds included in the protocol-level presence/absence surveys. Detailed descriptions and assessments for all four ponds are provided in the CRLF Site Assessment Report (PCWA 2008). Representative photographs of the ponds are provided in Appendix D.

Ralston Ridge

The Ralston Ridge Pond is an ephemeral pool north of Pennsylvania Point, on the western end of Ralston Ridge. The site, which is on a right-of-way below a PG&E transmission line, was almost completely burned in the Ralston Ridge Wildfire of 2006 and remains almost completely denuded. The pond appears to have been formed in a depression caused by ground disturbance and erosion resulting from logging operations. The only known CRLF record within the Site Assessment study area was from this site. In June 2001, a single adult CRLF was observed by biologists conducting surveys for the Pacific Gas and Electric Company (PG&E) (CNDDDB 2007, PG&E 2004). Refer to Map AQ 12 CRLF-1 for the location of this pond.

Horseshoe Bar (C, E, and F)

The land at Horseshoe Bar was dewatered in the 1850s when gold miners rerouted the original course of the Middle Fork American River (MFAR) through what is now called the Tunnel Chute. Several ponds at this location represent impoundments that were created in the widening of old mining excavations. Three ponds were surveyed at this location based on guidance from USFWS. There are no recorded CRLF occurrences documented in these ponds. Specifically, protocol-level surveys were conducted at Ponds C, E, and F. Refer to the Horseshoe Bar inset in Map AQ 12 CRLF-1 for the location of these ponds in relation to the site.

6.1. CRLF BREEDING SEASON SURVEYS

Day breeding surveys were conducted on April 28 and May 5, 2009. Night breeding surveys were conducted on May 5, May 19, June 16, and June 24, 2009. No CRLF egg masses or individuals of any life stage were observed during day or night CRLF breeding season surveys at the Ralston Ridge Pond or the Horseshoe Bar ponds (C, E, and F).

Egg masses as well as all life stages of Pacific treefrog (*Pseudacris regilla*) were observed during surveys at the Ralston Ridge Pond. Other species observed include predaceous diving beetle and sign of raccoon (*Procyon lotor*), skunk (*Mephitis mephitis*), bobcat (*Lynx rufus*), and black bear (*Ursus americanus*).

All life stages of bullfrog (*Lithobates catesbeianus*) as well as adult Pacific treefrog were observed during surveys at the Horseshoe Bar ponds (C, E, and F). Other species observed include crayfish, minnow, western toad (*Bufo boreas*), western pond turtle (*Actinemys marmorata*), green heron (*Butorides virescens*), and river otter (*Lontra canadensis*).

6.2. CRLF NON-BREEDING SEASON SURVEYS

The day and night non-breeding survey was conducted on July 14, 2009. No CRLF were observed during the day or night CRLF non-breeding season surveys at the Ralston Ridge Pond or the Horseshoe Bar ponds (C, E, and F).

Larval and metamorph Pacific treefrog were observed at the Ralston Ridge pond. Other species observed include Sierra gartersnake (*Thamnophis couchii*). All life stages of bullfrogs were observed at the Horseshoe Bar ponds (C, E, and F). Other species observed include adult western toad and sign of river otter.

7.0 LITERATURE CITED

California Department of Fish and Game (CDFG). 2007. California Natural Diversity Database. RareFind 3.0.5. Rancho Cordova, CA.

Placer County Water Agency (PCWA). 2008. FINAL AQ 12 – Special-Status Amphibian and Aquatic Reptile Technical Study Report. PCWA Middle Fork American River Project (FERC Project No. 2079). June 2008.

Pacific Gas and Electric Company (PG&E), 2004. California Red-Legged Frog Surveys Report, Ralston Ridge Pond, Placer County, California. San Ramon, CA.

United States Fish and Wildlife Service (USFWS). 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-Legged Frog. August 2005.

TABLES

Table AQ 12 CRLF-1. California Red-legged Frog Protocol-Level Survey Results Summary.

Site	Date	Survey Type Breeding/ Non-breeding	Day/ Night Survey	Survey Conditions					Observations		
				Cloud Cover/ Precipitation/ Humidity	Air/Water Temperature (°F)	Wind Speed (mph)	Visibility	Moon Phase	CRLF	Other Amphibians	Potential Threats/ Incidental Species
Ralston Ridge Pond	4/28/2009	Breeding	Day	10% / None / Low	60 / 50	2 - 3	Good	Waxing crescent	None	Pacific treefrog (<i>Pseudacris regilla</i>)	black bear (<i>Ursus americanus</i>) (tracks), racoon (<i>Procyon lotor</i>) (tracks), predaceous diving beetle
	5/5/2009	Breeding	Night	Mostly clear / None / Low	50 / 55	1 - 2	Good	Waxing gibbous	None	Pacific treefrog	
	5/19/2009	Breeding	Day	Clear / None / High	76 / 60	2 - 3	Good	Waning crescent	None	Pacific treefrog	
		Breeding	Night	Mostly clear / None/ High	70 / 60	1 - 2	Good	Waning crescent	None	Pacific treefrog	
	6/16/2009	Breeding	Night	20% / None / High	60 / 62	1 - 2	Good	Waning crescent	None	Pacific treefrog	black bear (tracks), skunk (<i>Mephitis mephitis</i>) (tracks), bobcat (<i>Lynx rufus</i>) (tracks)
	6/24/2009	Breeding	Night	Mostly clear / None / Low	78 / 65	1 - 2	Good	Waxing crescent	None	Pacific treefrog	
	7/14/2009	Non-breeding	Day	Clear / None / Low	94 / 71	3	Good	Waning gibbous	None	Pacific treefrog	Sierra gartersnake (<i>Thamnophis couchii</i>), cattle grazing
		Non-breeding	Night	Clear / None / Low	80 / 71	1	Good	Waning gibbous	None	Pacific treefrog	Sierra gartersnake
Horseshoe Bend Pond C	4/28/2009	Breeding	Day	10% / None / Low	64-69 / 50	3 - 4	Good	Waxing crescent	None	bullfrog (<i>Lithobates catesbeianus</i>)	bullfrog
	5/5/2009	Breeding	Night	Mostly clear / None / Low	55 / 55	1 - 2	Good	Waxing gibbous	None	bullfrog , western toad (<i>Bufo boreas</i>)	bullfrog
	5/19/2009	Breeding	Day	Mostly clear / None / High	76 / 60	3	Good	Waning crescent	None	bullfrog	bullfrog
		Breeding	Night	Mostly clear / None / High	68 / 60	1 - 2	Good	Waning crescent	None	bullfrog	bullfrog , crayfish, hardhead minnow/pikeminnow
	6/16/2009	Breeding	Night	20% / None / High	56 / 62	< 1	Good	Waning crescent	None	bullfrog	bullfrog
	6/24/2009	Breeding	Night	Mostly clear / None / Low	72 / 65	1	Good	Waxing crescent	None	bullfrog	bullfrog
	7/14/2009	Non-breeding	Day	Clear / None / Low	96 / 70	2 - 3	Good	Waning gibbous	None	bullfrog	bullfrog
		Non-breeding	Night	Clear / None / Low	80 / 70	< 1	Good	Waning gibbous	None	bullfrog	bullfrog

Table AQ 12 CRLF-1. California Red-legged Frog Protocol-Level Survey Results Summary (continued).

Site	Date	Survey Type Breeding/ Non-breeding	Day/ Night Survey	Survey Conditions					Observations		
				Cloud Cover/ Precipitation/ Humidity	Air/Water Temperature (°F)	Wind Speed (mph)	Visibility	Moon Phase	CRLF	Other Amphibians	Potential Threats/ Incidental Species
Horseshoe Bend Pond E	4/28/2009	Breeding	Day	10% / None / Low	64-69 / 50	4	Good	Waxing crescent	None	bullfrog	bullfrog, river otter (<i>Lontra canadensis</i>) observed nearby at Pond D, Western pond turtle (<i>Actinemys marmorata</i>)
	5/5/2009	Breeding	Night	Mostly clear / None / Low	60 / 55	1 - 2	Good	Waxing gibbous	None	bullfrog , Pacific treefrog	bullfrog
	5/19/2009	Breeding	Day	Mostly clear / None / High	78 / 60	3	Good	Waning crescent	None	bullfrog	bullfrog
		Breeding	Night	Mostly clear / None / High	67 / 60	1 - 2	Good	Waning crescent	None	bullfrog , western toad	bullfrog
	6/16/2009	Breeding	Night	20% / None / High	57 / 62	1 - 2	Good	Waning crescent	None	bullfrog , western toad	bullfrog
	6/24/2009	Breeding	Night	Mostly clear / None / Low	74 / 65	1 - 2	Good	Waxing crescent	None	bullfrog , western toad	bullfrog, crayfish, green heron (<i>Butorides virescens</i>)
	7/14/2009	Non-breeding	Day	Clear / None / Low	97 / 70	2 - 3	Good	Waning gibbous	None	bullfrog	bullfrog
		Non-breeding	Night	Clear / None / High	73 / 70	< 1	Good	Waning gibbous	None	bullfrog	bullfrog
Horseshoe Bend Pond F	4/28/2009	Breeding	Day	10% / None / Low	64-69 / 50	4	Good	Waxing crescent	None	bullfrog	bullfrog
	5/5/2009	Breeding	Night	Mostly clear / None / Low	60 / 55	4	Good	Waxing gibbous	None	bullfrog , Pacific treefrog	bullfrog
	5/19/2009	Breeding	Day	Mostly clear / None / High	78 / 60	3	Good	Waning crescent	None	bullfrog	bullfrog
		Breeding	Night	Mostly clear / None / High	65 / 60	1 - 2	Good	Waning crescent	None	bullfrog	bullfrog
	6/16/2009	Breeding	Night	Clear / None / High	58 / 63	< 1	Good	Waning crescent	None	bullfrog	bullfrog , mallard hen (<i>Anas platyrhynchos</i>) nesting
	6/24/2009	Breeding	Night	Mostly clear / None / Low	74 / 65	< 1	Good	Waxing crescent	None	bullfrog	bullfrog , crayfish
	7/14/2009	Non-breeding	Day	Clear / None / Low	97 / 70	4	Good	Waning gibbous	None	bullfrog	bullfrog , river otter (scat)
		Non-breeding	Night	Clear / None / Low	72 / 70	1 - 2	Good	Waning gibbous	None	bullfrog	bullfrog , green heron, mallard hen nesting

MAPS

APPENDIX A
USFWS March 28, 2008 Letter



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846



In Reply Refer To:
81420-2008-TA-0986-1

MAR 27 2008

Mr. Mal Toy
Director of Resource Development
Placer County Water Agency
P.O. Box 6570
Auburn, California 95604

Subject: Review of California Red-Legged Frog Site Assessment for the
Middle Fork American River Project (FERC No. 2079), Placer County,
California.

Dear Mr. Toy:

This is in response to the February 19, 2008, *California Red-legged Frog Site Assessment Report* that was submitted to the U.S. Fish and Wildlife Service (Service) for review. Placer County Water Agency is in the process of obtaining a new license to operate the existing hydroelectric power generation project along the Middle Fork of the American River, Placer County, California. At issue are the potential effects of the project on the threatened California red-legged frog (*Rana aurora draytonii*) (frog). This letter is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

The nearest known California red-legged frog population is approximately 2 miles north of the project near Michigan Bluff, California, and an additional known frog occurrence is located within 1 mile of the project boundary on Ralston Ridge. Because no frogs have been identified as occupying the Ralston Ridge site in the years following its 2001 discovery, it is possible that this site represents dispersal habitat for the frog. Searches of areas surrounding the Ralston Ridge site have not located a source California red-legged frog population. Given the lack of barriers between Ralston Ridge and Michigan Bluff, the individual located in 2001 could have dispersed from the known Michigan Bluff population. A frog dispersing from the Michigan Bluff site to Ralston Ridge would cross the Middle Fork of the American River in a reach affected by this proposed project. Therefore, the Service concludes this project may affect this listed species.

Furthermore, in order to adequately assess the effects of the project on the frog, additional areas of suitable habitat should be surveyed for this listed species. While no frogs have been detected at Ralston Pond since 2001, the pond was last surveyed in 2004. Since 2001, no protocol level surveys have been conducted at this site. Because the Ralston Ridge pond appears to provide

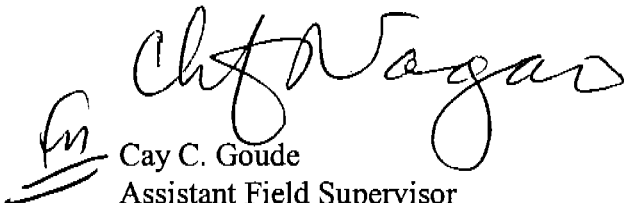
TAKE PRIDE
IN AMERICA 

suitable habitat for the California red-legged frog, we recommend protocol level surveys of this aquatic feature be conducted following the Service's 2005, *Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog* (Guidelines), and the results of these surveys be submitted to the Service for review

The area identified in the site assessment as Horseshoe Bar contains suitable breeding habitat for the California red-legged frog. Given that Horseshoe bar is located approximately 2.8 miles from the known Michigan Bluff frog population, is within the same watershed, and maintains connectivity with the known population, it is probable that the ponds at Horseshoe Bar contain this listed frog. Therefore since three ponds located at Horseshoe Bar (ponds C, E, and F) appear to provide suitable breeding habitat for the frog, we recommend protocol level surveys of these aquatic features be conducted following the Service's 2005, Guidelines. Since the Horseshoe Bar ponds are located on private property, we understand that access to conduct surveys may be an issue. If permission to conduct surveys is not granted, based on connectivity with, and proximately to, a known frog population, Placer County Water Agency should assume presence of this listed amphibian and analyze the effects that the proposed project may have on a California red-legged frog population at Horseshoe Bar.

Please address any questions or concerns regarding this response on the Middle Fork American River Project to Jeremiah Karuzas, or Amy Fesnock, acting Forest and Foothills Branch Chief, at (916) 414-6600.

Sincerely,


Cay C. Goude
Assistant Field Supervisor

cc:

Service List – Middle Fork American River Project

APPENDIX B
Biologist Resumes

JEFF ALVAREZ-WILDLIFE BIOLOGIST

P.O. Box 579805
Modesto, California 95357
(209) 815-5660
Jeff@thewildlifeproject.com

RESEARCH POSITIONS:

The Wildlife Project (7/90-date)

Wildlife Biologist: Designed, developed and tested wildlife management techniques and equipment. Prepared grant proposals for various research projects for reptiles, amphibians, bats, and rodents. Sought and received funding for proposed projects. Implemented, managed, and collected data, for various research projects. Documented findings and published results.

Smithsonian Institution - Department of Zoological Research (2/93-8/95)

Research Biologist: Designed and implemented a study to determine the habitat suitability and distribution of San Joaquin Kit Fox in Alameda and Contra Costa Counties, CA. Also determined habitat suitability for San Joaquin Kit Fox in Fresno, Madera, Mariposa, Merced, Stanislaus, and Tuolumne Counties, CA, and assisted in the development of management goals. Analyzed data; wrote, submitted and defended a report to the Calif. Dept. of Fish and Game.

PUBLICATIONS:

- Fellers, G. M., A Launer, G. Rathbun, S. Bobzien, J. Alvarez, D. Sterner, R. Seymour, and M, Westphal. 2001. Overwintering tadpoles in the red-legged frog (*Rana aurora draytonii*). Herpetological Review 32:156–157.
- Alvarez, J. A. 2004. Use of artificial egg laying substrate to detect California tiger salamanders (*Ambystoma californiense*). Herpetological Review 35: 45–46.
- Alvarez, J. A. 2004. An easily constructed Tuttle trap for bats. Wildlife Society Bulletin 32:264–266.
- Alvarez, J. A., C. Dunn, and A. Zuur. 2004. Response of California red-legged frogs to predatory fish removal. Transactions of the Western Section of the Wildlife Society 38/39:9–12.
- Alvarez, J. A. 2004. *Rana aurora draytonii* (California red-legged frog) Microhabitat. Herpetological Review 35:162–163.
- Alvarez, J. A. 2004. Overwintering larvae in the California tiger salamander (*Ambystoma californiense*). Herpetological Review 35:344.
- Alvarez, J. A. 2005. Unanticipated predation of California red-legged frog at constructed wetlands (California). Ecological Restoration 21:66-67.
- Alvarez, J. A. 2005. A compilation of observations of Alameda Whipsnake outside of typical habitat. Transactions of the Western Section of the Wildlife Society 41:21-25.
- Alvarez, J. A. 2006. Use of artificial basking substrate to detect and monitor western pond turtles (*Emmys marmorata*). Western North American Naturalist 66:129-131.

- Alvarez, J. A. 2006. *Masticophis lateralis euryxanthus* (Alameda whipsnake) Habitat. Herpetological Review 37:233.
- Alvarez, J. A. 2006. *Actinemys marmorata*. (Pacific Pond Turtle) Habitat. Herpetological Review 37:339-340.
- Alvarez, J. A. 2008. *Complete List of the Vertebrates of California, 6th edition*. 24 pp. The Wildlife Project Press. 23 pp.
- Alvarez, J. A., M. A. Shea, J. L. Alvarez. *In Press*. California tiger salamander and California red-legged frog sympatry in eastern Contra Costa County, CA. California Fish and Game.
- Alvarez, J., C. Dunn, and M. A. Shea. *In Press*. Colonization and use of constructed wetlands by California red-legged frogs. Journal of Herpetology.

PERMITS

Recovery permit [10(a)1(A)].

VERTEBRATES: California tiger salamander, Alameda Whipsnake, California red-legged frog; and named as a permittee for San Francisco garter snake

INVERTEBRATES: conservancy fairy shrimp, longhorn fairy shrimp, San Diego fairy shrimp, Riverside fairy shrimp, and vernal pool tadpole shrimp.

RESEARCH PROJECTS IN PROGRESS:

Colonization and use of constructed wetlands by California tiger salamanders.

Removing mosquito fish from ponds utilized by threatened amphibians.

Collateral impacts to threatened amphibians using mitigation wetlands; recommendations for improvement.

Microhabitat characteristics at oviposition sites of California red-legged frogs.

A parsimonious key to California garter snakes: a simplified method for identifying California *Thamnophis*.

Alvarez, J. A. The fairy shrimps of western North America. The Wildlife Project Press, Modesto, CA.

PRESENTATIONS:

Response of California red-legged frogs to predatory fish removal. Western Section of the Wildlife Society Conference, 2000.

Colonization and use of constructed wetlands by California red-legged frogs. Western Section of the Wildlife Society Conference, 2000.

Review of five years of California red-legged frog (*Rana aurora draytonii*) survey results at the Los Vaqueros watershed: is there an optimal time to survey? Western Section of the Wildlife Society Conference, 2004.

Foods of Bullfrogs in Kellogg Creek, California. Western Section of the Wildlife Society Conference, 2004.

Extirpation as a management tool: can controlling bullfrogs benefit a population of red-legged frogs? A preliminary report. Western Section of the Wildlife Society Conference, 2007.

INVITED PRESENTATIONS AND WORKSHOPS:

Mammals: a review of the worldwide orders. Oakland Zoological Society, annually 1997-2005.

California tiger salamander management at the Los Vaqueros Watershed. San Francisco Bay Chapter of The Wildlife Society, 1999.

Managing California tiger salamanders in a drinking water watershed—a five-year update. San Francisco Bay Chapter of The Wildlife Society, 2003.

Western pond turtle management: lessons learned and recommendations for the future. San Francisco Bay Chapter of The Wildlife Society, 2005.

Rare pond species survey techniques: California red-legged frog, California tiger salamander, western pond turtle. Laguna Foundation and The Wildlife Project, Rohnert Park, CA

WORK EXPERIENCE:

The Wildlife Project - *Self-employed*. (7/90-date).

Biological Consultant: Determined the status of common and listed species including listed fairy shrimp; Tehachapi slender, yellow-blotched, and California tiger salamanders; California red-legged, mountain yellow-legged, and foothill yellow-legged frogs, Alameda whipsnake, desert tortoise, western pond turtle, black rail, clapper rail, California least tern, western burrowing owl, pallid bat, Townsend's big-eared bat, San Joaquin kit fox, and many other species on various sites throughout central California. Assessed the biotic component (plants and animals) of proposed development sites for conservation organizations, private industry, and governmental agencies within California and west-central Nevada.

Offered wildlife survey techniques workshops for the general public and colleagues. Developed and tested new techniques and equipment for surveying wildlife. Conducted environmental education programs for civic and peer groups with an emphasis towards vertebrate natural history, endangered and threatened species conservation, and career choices in biological fields.

Prepared various documents including EIRs, BAs, NESs, EAs and site-specific documentation from field surveys. Offered oral presentations in support of findings.

Contra Costa Water District – (9/98-5/00).

Wildlife Biologist: Implemented mitigation monitoring for California tiger salamander, California red-legged frog, western pond turtle, San Joaquin kit fox, Alameda whipsnake, western burrowing owl, golden eagle, bald eagle, long-horned fairy shrimp and other species within the upper Kellogg Creek Watershed. Monitored and managed small mammal and raptor populations. Designed and implemented a recreational fisheries program for public recreation in the Los Vaqueros Reservoir. Monitored, managed, and maintained native and non-native fish stock in the reservoir and watershed. Assessed and monitored other special status wildlife, plants and artificial wetlands. Suppressed fires and enforced ordinances under water district jurisdiction. Analyzed data and assembled various documents and reports

Jones and Stokes Associates, Inc. - (10/94-8/00).

Biological Consultant: Implemented mitigation plans for California tiger salamander and monitored and assessed several (PIT-tagged) populations over a several year period. Captured, marked, relocated, and monitored California red-legged frogs, and western pond turtles in the upper Kellogg Creek Watershed. Maintained salamander, frog, and turtle traps and exclusion fence lines.

Assisted in the assessment of habitat suitability for San Joaquin kit fox in Alameda, and Contra Costa Counties. Assessed habitat suitability and presence of protected bat species on various State, Federal, and private properties. Assessed habitat suitability and status of red-legged frogs in 11 different Counties. Conducted presence/absence surveys for red-legged frogs, spadefoot toad, arroyo toad, California tiger salamander, pond turtle, giant garter snake, Alameda whipsnake, two-striped garter snake, desert tortoise, western burrowing owl, golden eagle, pallid bat, Townsend's big-eared bat, kit fox, and fairy shrimp species.

INTENSIVE LISTED-SPECIES SURVEYS:

California Tiger Salamander (*Ambystoma californiense*) - 2105 hours of intensive surveys including trapping and marking salamanders in 5 different counties.

California Red-legged Frog (*Rana draytonii*) - 2745 hours of intensive surveys including long-term monitoring all life stages, presence absence surveys, in 12 different counties throughout California.

Alameda Whipsnake (*Masticophis lateralis euryxanthus*) - 1940 hours protocol level surveys including trapping and marking snakes in 2 different counties.

San Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*) - 1170 hours protocol level surveys including trapping and marking snakes in 1 county.

Desert Tortoise (*Gopherus agassizii*) - 552 hours protocol level surveys in 3 different counties.

San Joaquin Kit Fox (*Vulpes macrotis mutica*) - 830 hours of protocol levels kit fox surveys in 11 different counties throughout California.

EDUCATION AND ON-GOING TRAINING:

Undergraduate education - *Wildlife*, Humboldt State University, Arcata, California - emphasis on understanding the natural history and management of vertebrates. 1988-1990.

1994. Natural history and handling of western bats. *Bat Conservation International*. Strong emphasis on trapping and handling techniques, and identification of bats and their habitat.

1998. Conservation and identification of fairy shrimp. *Denton Belk, PhD*. Emphasis on identification of fairy shrimp and their habitat.

2006. Biology and Conservation of the Alameda Whipsnake. *Karen Swaim*. Emphasis on the identification of Alameda Whipsnake and its habitat.

DISCIPLINE/SPECIALTY

- Aquatic Ecology
- Fisheries Biology
- Instream Flow Surveying
- Data Analysis
- Special Status Species Surveys

EDUCATION

- M.S., Biology, University of Nevada, Reno, 2006
- B.S., Environmental Science, University of Colorado, 2001

TRAINING/CERTIFICATIONS

- Protocol-level CRLF Surveys
- EPA Ambient Water Quality Monitoring
- MatLab Statistical Modeling
- ArcView GIS
- Program MARK
- S-Plus Statistics
- ENVI 3.2 (Remote Imagery)

SUMMARY OF QUALIFICATIONS

Mr. Graf has a strong interdisciplinary background in aquatic ecology and environmental sciences. For 10 years he has been involved in field-based fisheries studies. His primary focus has been on aquatic issues related to hydroelectric licensing including fisheries, amphibians, and instream flow studies. Specifically, Mr. Graf has lead habitat mapping studies, fish population studies, hardhead distribution surveys, entrainment studies, and foothill yellow-legged and California red-legged protocol-level surveys. Mr. Graf also has experience conducting hydraulic and instream flow surveys.

RELEVANT EXPERIENCE

HYDROELECTRIC LICENSING

Aquatic Studies Senior Scientist – Middle Fork American River Integrated Hydroelectric Licensing Project (Placer County Water Agency), Western Slope Sierra Nevada

Mr. Graf played a leading role in the design and implementation of the aquatic studies associated with the hydroelectric re-licensing process on the Middle Fork American River. The studies implemented on the project included:

- Fisheries population and distribution
- Foothill yellow-legged frog habitat use and distribution
- Instream flow surveys and modeling
- Protocol-level California red-legged frog surveys
- Benthic and drift macroinvertebrate collection
- Hydraulic modeling
- Fish entrainment

Senior Staff Biologist – Big Creek Strategic Alternative Licensing Project, Central Sierra Nevada, California

Mr. Graf assisted in the monitoring of spawning activity and radio-tagged adult hardhead along key stream reaches of the San Joaquin River. Mr. Graf also assisted in the monitoring of stream temperatures and reservoir temperature profiles.

FISHERIES BIOLOGY

Fisheries Biologist – Road Condition and Stream Crossing Habitat, Prince of Wales, Alaska

This project assessed the stream habitat and water quality in the vicinity of road crossing. Mr. Graf was responsible for identifying anadromous fish rearing streams and the condition of culverts in relation to fish passage. Duties included surveying, electrofishing, data management, planning and organizing field work in remote field stations.

Fisheries Biologist – Road Condition Surveys, Seward, Alaska

Mr. Graf trained USFS employees on to perform road survey and stream habitat assessments.

Fisheries Biologist – USDA Forest Service, Sitka, AK

Mr. Graf operated and maintained a remote fish wier, provided daily updates of salmon population status, collected water quality data, and assessed the condition of spawning habitat.

Research Assistant – National Geographic/Mekong, Wetland Biodiversity Project, Thailand

Mr. Graf was a field assistant and lead surgeon for Giant catfish movement and conservation project. Mr. Graf assisted in the implementation of acoustic telemetry planning and data collection.

Ecologist – Point Reyes and Golden Gate NP, Coastal, CA

In this study Mr. Graf assisted in data collection related to stream restoration and hydrology projects in Point Reyes NP and the Golden Gate NP.

EMPLOYMENT HISTORY

- ENTRIX, Inc., Staff Senior Scientist, Aquatic Ecology, 2007-to date
- ENTRIX, Inc., Staff Scientist, Aquatic Ecology, 8/2006-2007
- University of Nevada at Reno, Graduate Research Assistant, 8/2003-5/2005
- PBS Environmental, Fish Biologist, 4/2002-8/2002
- US Forest Service, Field Technician, 4/2001-10/2001

Ann M. Crisp

Project Biologist

Ms. Ann M. Crisp is a terrestrial biologist with more than 6 years of experience. Ms. Crisp is experienced in conducting a wide range of biological surveys, including special-status plants and noxious weeds, bald eagle nesting and wintering surveys, and vegetation community mapping. Ann has conducted vegetation surveys throughout the Central Valley and Sierra regions of California, as well as northwest Oregon. Ann conducted field studies and drafted biological assessments for various projects. She assisted in the development of the technical study reports for Placer County Water Agency Middle Fork American River Hydroelectric Project Relicensing.

EDUCATION B.S., Wildlife Biology, 2004, University of California, Davis

REPRESENTATIVE PROJECT EXPERIENCE **LOS VAQUEROS WATERSHED—CCWD, CONTRA COSTA COUNTY**

Ms. Crisp attended a field visit/training at several stock ponds at the Los Vaqueros Watershed in July 2009. Ms. Crisp, under the supervision of permitted biologist, Jeff Alvarez, dip-netted for California tiger salamander and California red-legged frog larvae in stock ponds. As part of the field work, 33 California tiger salamander larvae and over 480 California red-legged frog larvae were captured and released. Ms. Crisp also observed 17 adult California red-legged frogs.

NEVADA IRRIGATION DISTRICT LOWER CASCADE CANAL—BANNER/CASCADE PIPELINE PROJECT

Ms. Crisp completed special-status plant surveys to comply with measures in the Lower Cascade Canal—Banner/Cascade Pipeline Project Final Environmental Impact Report.

PLACER COUNTY WATER AGENCY MIDDLE FORK AMERICAN RIVER HYDROELECTRIC RELICENSING PROJECT

Project biologist for the Middle Fork American River Project (MFP) Integrated Licensing Process (ILP) for the Placer County Water Agency (PCWA). Researched and compiled information on existing biological resources for the Preliminary Application Document. Coordinated and executed technical studies in the Sierra (1,100 feet to 5,300 feet in elevation) for biological resources, including special-status plants, noxious weeds, and special-status wildlife such as bald eagle. Conducted data management and assisted in the development of technical study reports and presentations based on the conclusions of field studies.

BIG CREEK SYSTEM HYDROELECTRIC RELICENSING PROJECT

Project biologist for the Big Creek System Alternative Licensing Process (ALP) for Southern California Edison Company (SCE). This project has submitted applications to the Federal Energy Regulatory Commission

(FERC) for four projects: Big Creek Nos. 1 & 2 (FERC No. 2175); Big Creek Nos. 2A, 8, and Eastwood (FERC No. 67); Big Creek No. 3 (FERC No. 120); and Mammoth Pool (FERC No. 2085). Assisted in field studies in preparation of the biological resources component of the FERC license, including wildlife and botanical—special-status plant species, noxious weeds and plants of cultural concern for Native Americans—for a nearly 1,500-square-mile watershed in the Upper San Joaquin River.

BIG CREEK NO. 4 HYDROELECTRIC ENVIRONMENTAL TRAINING AND COMPLIANCE PROJECT

Project biologist for the Big Creek No. 4 Traditional Licensing Process (TLP) for SCE. Assisted in the preparation of the documents supporting various management plans, including yearly monitoring reports for the Noxious Weed Management Plan and Valley Elderberry Longhorn Beetle Management Plan. Assisted in the development and implementation of compliance-related products for Big Creek No. 4.

KAWEAH HYDROELECTRIC PROJECT

Project biologist for the SCE Kaweah Hydroelectric Project (Federal Energy Regulatory Commission Project No. 298). Completed a Biological Assessment (BA) that evaluated to what extent, if any, maintenance activities of the Project may affect valley elderberry longhorn beetle (VELB).

NEVADA IRRIGATION DISTRICT COLE SIPHON REPLACEMENT PROJECT BIOLOGICAL RESOURCES ASSESSMENT

The Cole Siphon Replacement Project Biological Resources Assessment was completed for a proposed pipeline replacement. The project, located in Grass Valley, involved the replacement and rerouting of an existing pipeline to a new alignment. As project biologist, completed a literature review, reconnaissance survey and prepared a biological assessment and CEQA compliance documentation.

NEVADA IRRIGATION DISTRICT ELIZABETH GEORGE WATER TREATMENT PLANT

Ms. Crisp was a member of the team that conducted CEQA compliance and documentation for the Nevada Irrigation District's expansion of the E. George WTP to meet future community potable water demands associated with planned and approved development envisioned in the City of Grass Valley 2020 General Plan and the Nevada County General Plan. Ann's tasks included assisting in the preparation of the biological resources section of the Initial Study / Mitigated Negative Declaration. Concurrent with the expansion of the water treatment plant, NID proposes to construct improvements to the existing facility to reliably meet state and federal drinking water standards.

Ann M. Crisp

NEVADA IRRIGATION DISTRICT WATER LINE EXTENSION AND AD/CFD PROJECTS

Ms. Crisp is currently working with NID to complete biological resource surveys and prepare necessary documentation for over 15 water line extension and other infrastructure improvement projects in the NID Service Area. Following completion of necessary surveys, agency consultation, and reporting, NID will have necessary documentation and permitting approvals to streamline project design and construction.

CALIFORNIA DEPARTMENT OF FISH AND GAME RESOURCE ASSESSMENT PROGRAM

Research technician for the Resource Assessment Program of the California Department of Fish and Game (CDFG). Conducted long-term reptile and amphibian surveys on various CDFG Wildlife Areas and Ecological Reserves. Conducted small mammal mark-recapture surveys using live traps, California tiger salamander larval dipnet surveys, and burrowing owl nesting surveys. One objective of these studies was to investigate species response to seasonal flood events. Ms. Crisp collaborated in the design of vegetation sampling protocol and implemented the protocol at all wildlife survey areas.

Ms. Crisp also conducted field-based vegetation sampling to classify vegetation types to alliance level on multiple Wildlife Areas and Ecological Reserves, and was responsible for data management and preparation for inclusion in a statewide database.

TRAINING Rare Pond Species Workshop (western pond turtle, California red-legged frog, and California tiger salamander), Laguna de Santa Rosa Foundation, Rohnert Park, California, 2009.

Ecology and Conservation of California Bats, San Francisco State University Sierra Nevada Field Campus, Sattley, California, 2007.

PROFESSIONAL AFFILIATIONS The Wildlife Society

APPENDIX C
California Red-legged Frog Protocol-level Survey Datasheets

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Ralston Ridge Pond Field Survey Datasheets

Survey results reviewed by:		
	(FWS Field Office)	(date) (biologist)
Date of Survey:	<u>04/28/2009</u> (mm/dd/yyyy)	Survey Biologist: <u>Alvarez, Jeff</u> (last name, first name)
		Survey Biologist: <u>Graf, Peter</u> (last name, first name)
Site Location:	<u>Placer, Ralston Ridge Pond, 10S 698480, 4319611 (NAD 83)</u> (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)	
ATTACH A MAP (include habitat types, important features, and species location)		

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action:	
PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

Type of Survey (circle one):	<u>DAY</u>	NIGHT	<u>BREEDING</u>	NON-BREEDING				
Survey Number (circle one):	<u>1</u>	2	3	4	5	6	7	8
Begin Time:	<u>~ 5:30 PM</u>	End Time:	<u>~ 5:45 PM</u>					
Cloud Cover:	<u>10%</u>	Precipitation:	<u>None</u>					
Air Temp:	<u>60°F</u>	Water Temp:	<u>~ 50°F</u>					
Wind Speed:	<u>2-3 mph</u>	Visibility Conditions:	<u>Good</u>					
Moon Phase:	<u>Waxing crescent</u>	Humidity:	<u>Low</u>					
Description of weather conditions:	<u>Clear and sunny w/scattered clouds, breezy.</u>							
Brand name and model of light used to conduct surveys: <u>n/a</u>								
Were binoculars used for the surveys (circle one): <u>YES</u> NO								
Brand, model, and power of binoculars: <u>Steiner, 8x42</u>								

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Pseudacris regilla</i>	1000s	O	larvae		100%
<i>Pseudacris regilla</i>	8	O	adult		100%
<i>Pseudacris regilla</i>	100s	O	egg mass		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Black bear (*Ursus americanus*) (tracks), raccoon (*Procyon lotor*) (tracks), predaceous diving beetle

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:			
	(FWS Field Office)	(date)	(biologist)
Date of Survey:	<u>05/05/2009</u> (mm/dd/yyyy)	Survey Biologist:	<u>Alvarez, Jeff</u> (last name, first name)
		Survey Biologist:	<u>Graf, Peter</u> (last name, first name)
Site Location:	<u>Placer, Ralston Ridge Pond, 10S 698480, 4319611 (NAD 83)</u> (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)		

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action:	
PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

Type of Survey (circle one):	DAY	NIGHT	BREEDING	NON-BREEDING
Survey Number (circle one):	1	2	3	4
Begin Time:	<u>10:30 PM</u>	End Time:	<u>10:50 PM</u>	
Cloud Cover:	<u>Mostly clear</u>	Precipitation:	<u>None</u>	
Air Temp:	<u>50°F</u>	Water Temp:	<u>55°F</u>	
Wind Speed:	<u>1-2 mph</u>	Visibility Conditions:	<u>Good</u>	
Moon Phase:	<u>Waxing gibbous</u>	Humidity:	<u>Low</u>	
Description of weather conditions:	<u>Clear, cool.</u>			

Brand name and model of light used to conduct surveys:	<u>Maglite, 4D Cell</u>
Were binoculars used for the surveys (circle one):	YES NO
Brand, model, and power of binoculars:	<u>Steiner 8x42</u>

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Pseudacris regilla</i>	1	O	larvae		100%
<i>Pseudacris regilla</i>	20	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 05/19/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: Placer, Ralston Ridge Pond, 10S 698480, 4319611 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one):DAY

NIGHT

BREEDING

NON-BREEDING

Survey Number (circle one):

1

2

3

4

5

6

7

8

Begin Time: 4:30 PM**End Time:**4:45 PM**Cloud Cover:** Clear**Precipitation:**None**Air Temp:** 76°F**Water Temp:**60°F**Wind Speed:** 2-3 mph**Visibility Conditions:**Good**Moon Phase:** Waning crescent**Humidity:**High**Description of weather conditions:** Warm, clear, breezy.**Brand name and model of light used to conduct surveys:** n/a**Were binoculars used for the surveys (circle one):** YES NO**Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Pseudacris regilla</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 05/19/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: Placer, Ralston Ridge Pond, 10S 698480, 4319611 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one):**DAY****NIGHT****BREEDING****NON-BREEDING****Survey Number (circle one):****1****2****3****4****5****6****7****8****Begin Time:** 8:50 PM**End Time:**9:05 PM**Cloud Cover:** Mostly clear**Precipitation:**None**Air Temp:** 70°F**Water Temp:**60°F**Wind Speed:** 1-2 mph**Visibility Conditions:**Good**Moon Phase:** Waning crescent**Humidity:**High**Description of weather conditions:****Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** YES NO**Brand, model, and power of binoculars:** Steiner 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Pseudacris regilla</i>	100s	O	larvae		100%
<i>Pseudacris regilla</i>	4	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 06/16/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Crisp, Ann

(last name, first name)

Site Location: Placer, Ralston Ridge Pond, 10S 698480, 4319611 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING****Survey Number (circle one):** **1** **2** **3** **4** **5** **6** **7** **8****Begin Time:** 8:49 PM**End Time:** 9:05 PM**Cloud Cover:** 20%**Precipitation:** None**Air Temp:** 60°F**Water Temp:** 62°F**Wind Speed:** 1-2 mph**Visibility Conditions:** Good**Moon Phase:** Waning crescent**Humidity:** High**Description of weather conditions:** Mostly clear, calm evening.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** **YES** **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Pseudacris regilla</i>	10-20	O	metamorph		100%
<i>Pseudacris regilla</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

black bear (tracks), skunk (*Mephitis mephitis*) (tracks), bobcat (*Lynx rufus*) (tracks).

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 06/24/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: Placer, Ralston Ridge Pond, 10S 698480, 4319611 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING****Survey Number (circle one):** **1** **2** **3** **4** **5** **6** **7** **8****Begin Time:** 9:00 PM**End Time:** 9:15 PM**Cloud Cover:** Mostly clear**Precipitation:** None**Air Temp:** 78°F**Water Temp:** 65°F**Wind Speed:** 1-2 mph**Visibility Conditions:** Good**Moon Phase:** Waxing crescent**Humidity:** Low**Description of weather conditions:** Mostly clear and still.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** **YES** **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Pseudacris regilla</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:			
	(FWS Field Office)	(date)	(biologist)

Date of Survey: 07/14/2009 **Survey Biologist:** Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Crisp, Ann
 (last name, first name)

Site Location: Placer, Ralston Ridge Pond, 10S 698480, 4319611 (NAD 83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 7:27 PM **End Time:** 7:44 PM

Cloud Cover: Clear **Precipitation:** None

Air Temp: 94°F **Water Temp:** 71°F

Wind Speed: 3 mph **Visibility Conditions:** Good

Moon Phase: Waning gibbous **Humidity:** Low

Description of weather conditions: Clear and warm.

Brand name and model of light used to conduct surveys: n/a

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Pseudacris regilla</i>	100s	O	larvae		100%
<i>Pseudacris regilla</i>	100s	O	metamorph		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Sierra garter snake (*Thamnophis couchii*) (adult) in water and along edge. Recent cattle grazing removed much of aquatic vegetation.

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 07/14/2009
(mm/dd/yy)**Survey Biologist:** Alvarez, Jeff
(last name, first name)**Survey Biologist:** Crisp, Ann
(last name, first name)**Site Location:** Placer, Ralston Ridge Pond, 10S 698480, 4319611 (NAD 83)
(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name: Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING**Survey Number (circle one):** 1 2 3 4 5 6 7 8**Begin Time:** 9:00 PM**End Time:** 9:10 PM**Cloud Cover:** Clear**Precipitation:** None**Air Temp:** 80°F**Water Temp:** 71°F**Wind Speed:** 1 mph**Visibility Conditions:** Good**Moon Phase:** Waning gibbous**Humidity:** Low**Description of weather conditions:** Clear, calm, and warm.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** YES NO**Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Pseudacris regilla</i>	27	O	metamorph		100%
<i>Pseudacris regilla</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Sierra gartersnake (1) observed along shore and in pond.

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Horseshoe Pond C Field Survey Datasheets

Survey results reviewed by: _____		
(FWS Field Office)	(date)	(biologist)

Date of Survey: 04/28/2009 **Survey Biologist:** Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Graf, Peter
 (last name, first name)

Site Location: El Dorado, Pond "C" Horseshoe Bar, 10S 0693375, 4319879 (NAD83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY **NIGHT** BREEDING **NON-BREEDING**

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: ~ 3 PM **End Time:** ~ 4 PM

Cloud Cover: 10% **Precipitation:** None

Air Temp: 64° – 69° F **Water Temp:** 50° F

Wind Speed: 3-4 mph **Visibility Conditions:** Good

Moon Phase: Waxing crescent **Humidity:** Low

Description of weather conditions: Clear, sunny day with scattered clouds, light wind.

Brand name and model of light used to conduct surveys: n/a

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	18	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by: _____
 (FWS Field Office) (date) (biologist)

Date of Survey: 05/05/2009 **Survey Biologist:** Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Graf, Peter
 (last name, first name)

Site Location: El Dorado, Pond "C" Horseshoe Bar, 10S 0693375, 4319879 (NAD83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 9:15 PM **End Time:** 9:45 PM

Cloud Cover: Mostly clear **Precipitation:** None

Air Temp: 55°F **Water Temp:** 55°F

Wind Speed: 1-2mph **Visibility Conditions:** Good

Moon Phase: Waxing gibbous **Humidity:** Low

Description of weather conditions: Clear, cool, calm.

Brand name and model of light used to conduct surveys: Maglite, 4D Cell

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	1	O	adult		100%
<i>Lithobates catesbeianus</i>	1	O	subadult		100%
<i>Lithobates catesbeianus</i>	11	O	larvae		100%
<i>Bufo boreas</i>	1	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 05/19/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: El Dorado, Pond "C" Horseshoe Bar, 10S 0693375, 4319879 (NAD83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name: Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one):

DAY

NIGHT

BREEDING

NON-BREEDING

Survey Number (circle one):

1

2

3

4

5

6

7

8

Begin Time: 3:35 PM

End Time:

4:05 PMCloud Cover: Mostly clear

Precipitation:

NoneAir Temp: 76°F

Water Temp:

60°FWind Speed: 3 mph

Visibility Conditions:

GoodMoon Phase: Waning crescent

Humidity:

HighDescription of weather conditions: Clear, slight breeze.Brand name and model of light used to conduct surveys: n/aWere binoculars used for the surveys (circle one): YES NOBrand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	2	O	subadult		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Approx. 5 minnow/pikeminnow, possibly hardhead.

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 05/19/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: El Dorado, Pond "C" Horseshoe Bar, 10S 0693375, 4319879 (NAD83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name: Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one):

DAY

NIGHTBREEDING

NON-BREEDING

Survey Number (circle one):

1

2

3

4

5

6

7

8

Begin Time: 9:55 PM

End Time:

10:20 PMCloud Cover: Mostly clear

Precipitation:

NoneAir Temp: 68°F

Water Temp:

60°FWind Speed: 1-2 mph

Visibility Conditions:

GoodMoon Phase: Waning crescent

Humidity:

HighDescription of weather conditions: Clear, slight breeze.Brand name and model of light used to conduct surveys: Maglite, 4 D-CellWere binoculars used for the surveys (circle one): YES NOBrand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	2	O	adults		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Crayfish, minnow/pikeminnow – possibly hardhead.

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 06/16/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Crisp, Ann

(last name, first name)

Site Location: El Dorado, Pond "C" Horseshoe Bar, 10S 0693375, 4319879 (NAD83)

(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name: Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDINGSurvey Number (circle one): 1 2 3 4 5 6 7 8Begin Time: 11:40 PMEnd Time: 11:55 PMCloud Cover: 20%Precipitation: NoneAir Temp: 56°FWater Temp: 62°FWind Speed: <1 mphVisibility Conditions: GoodMoon Phase: Waxing crescentHumidity: HighDescription of weather conditions: Partly cloudy, calm evening.Brand name and model of light used to conduct surveys: Maglite, 4D CellWere binoculars used for the surveys (circle one): YES NOBrand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	14	O/H	adult		100%
<i>Lithobates catesbeianus</i>	24	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 06/24/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: El Dorado, Pond "C" Horseshoe Bar, 10S 0693375, 4319879 (NAD83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name: Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 11:00 PMEnd Time: 11:25 PMCloud Cover: Mostly clearPrecipitation: NoneAir Temp: 72°FWater Temp: 65°FWind Speed: 1 mphVisibility Conditions: GoodMoon Phase: Waxing crescentHumidity: LowDescription of weather conditions: Warm and calm.Brand name and model of light used to conduct surveys: Maglite, 4D Cell

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	16	O/H	adult		100%
<i>Lithobates catesbeianus</i>	1	O	subadult		100%
<i>Lithobates catesbeianus</i>	26	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:			
	(FWS Field Office)	(date)	(biologist)

Date of Survey: 07/14/2009 **Survey Biologist:** Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Crisp, Ann
 (last name, first name)

Site Location: El Dorado, Pond "C" Horseshoe Bar, 10S 0693375, 4319879 (NAD83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: <u>Placer County Water Agency – Middle Fork American River Project</u>
Brief description of proposed action: PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 6:22 PM **End Time:** 6:45 PM

Cloud Cover: Clear **Precipitation:** None

Air Temp: 96°F **Water Temp:** 70°F

Wind Speed: 2-3 mph **Visibility Conditions:** Good

Moon Phase: Waning gibbous **Humidity:** Low

Description of weather conditions: Clear and sunny.

Brand name and model of light used to conduct surveys: n/a

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	47	O	larvae		100%
<i>Lithobates catesbeianus</i>	4	O	metamorph		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 07/14/2009
(mm/dd/yyyy)**Survey Biologist:** Alvarez, Jeff
(last name, first name)**Survey Biologist:** Crisp, Ann
(last name, first name)**Site Location:** El Dorado, Pond "C" Horseshoe Bar, 10S 0693375, 4319879 (NAD83)
(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name: Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING**Survey Number (circle one):** 1 2 3 4 5 6 7 8**Begin Time:** 10:20 PM**End Time:** 10:37 PM**Cloud Cover:** Clear**Precipitation:** None**Air Temp:** 80°F**Water Temp:** 70°F**Wind Speed:** <1 mph**Visibility Conditions:** Good**Moon Phase:** Waning gibbous**Humidity:** Low**Description of weather conditions:** Calm and warm.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** YES NO**Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	18	O	larvae		100%
<i>Lithobates catesbeianus</i>	3	O	metamorph		100%
<i>Lithobates catesbeianus</i>	2	O	subadult		100%
<i>Lithobates catesbeianus</i>	9	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

unknown fish

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Horseshoe Pond E Field Survey Datasheets

Survey results reviewed by:		
(FWS Field Office)	(date)	(biologist)

Date of Survey: 04/28/2009 **Survey Biologist:** Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Graf, Peter
 (last name, first name)

Site Location: El Dorado, Pond "E", Horseshoe Bar, 10S 0694051, 4319686 (NAD 83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action:	
PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

Type of Survey (circle one): DAY **NIGHT** BREEDING **NON-BREEDING**

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: ~ 12 PM **End Time:** ~ 1 PM

Cloud Cover: 10% **Precipitation:** None

Air Temp: 64°F–69°F **Water Temp:** ~ 50°F

Wind Speed: 4 mph **Visibility Conditions:** Good

Moon Phase: Waxing crescent **Humidity:** Low

Description of weather conditions: Clear, sunny day with scattered clouds, light wind.

Brand name and model of light used to conduct surveys: n/a

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%
<i>Lithobates catesbeianus</i>	2	O	subadult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

sculpin (riffle?), river otter (*Lontra canadensis*) observed nearby at Pond D

Other notes, observations, comments, etc.:

Western pond turtle (*Actinemys marmorata*) (6) adults basking.

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by: _____
 (FWS Field Office) (date) (biologist)

Date of Survey: 05/05/2009
 (mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff
 (last name, first name)

Survey Biologist: Graf, Peter
 (last name, first name)

Site Location: El Dorado, Pond "E", Horseshoe Bar, 10S 0694051, 4319686 (NAD 83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 8:50 PM **End Time:** 9:10 PM

Cloud Cover: Mostly clear **Precipitation:** None

Air Temp: 60°F **Water Temp:** 55°F

Wind Speed: 1 - 2 **Visibility Conditions:** Good

Moon Phase: Waxing gibbous **Humidity:** Low

Description of weather conditions: Clear, calm.

Brand name and model of light used to conduct surveys: Maglite, 4D Cell

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	1	O	adult		100%
<i>Lithobates catesbeianus</i>	3	O	subadult		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%
<i>Pseudacris regilla</i>	6	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 05/19/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: El Dorado, Pond "E", Horseshoe Bar, 10S 0694051, 4319686 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name: Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDINGSurvey Number (circle one): 1 2 3 4 5 6 7 8Begin Time: 3:05 PMEnd Time: 3:25 PMCloud Cover: Mostly clearPrecipitation: NoneAir Temp: 78°FWater Temp: 60°FWind Speed: 3 mphVisibility Conditions: GoodMoon Phase: Waning crescentHumidity: HighDescription of weather conditions: Clear, slight breeze.Brand name and model of light used to conduct surveys: n/aWere binoculars used for the surveys (circle one): YES NOBrand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 05/19/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: El Dorado, Pond "E", Horseshoe Bar, 10S 0694051, 4319686 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING****Survey Number (circle one):** **1** **2** **3** **4** **5** **6** **7** **8****Begin Time:** 10:30 PM**End Time:**10:45 PM**Cloud Cover:** Mostly clear**Precipitation:**None**Air Temp:** 67°F**Water Temp:**60°F**Wind Speed:** 1-2 mph**Visibility Conditions:**Good**Moon Phase:** Waning crescent**Humidity:**High**Description of weather conditions:** Clear, calm.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** **YES** **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	8	O	adult		100%
<i>Lithobates catesbeianus</i>	2	O	subadult		100%
<i>Bufo boreas</i>	1	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 06/16/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Crisp, Ann

(last name, first name)

Site Location: El Dorado, Pond "E", Horseshoe Bar, 10S 0694051, 4319686 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING****Survey Number (circle one):** **1** **2** **3** **4** **5** **6** **7** **8****Begin Time:** 10:55 PM**End Time:** 11:15 PM**Cloud Cover:** 20%**Precipitation:** None**Air Temp:** 57°F**Water Temp:** 62°F**Wind Speed:** 1-2 mph**Visibility Conditions:** Good**Moon Phase:** Waning crescent**Humidity:** High**Description of weather conditions:** Clear, light breeze.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** **YES** **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	13	O/H	adult		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%
<i>Bufo boreas</i>	1	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 06/24/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: El Dorado, Pond "E", Horseshoe Bar, 10S 0694051, 4319686 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING****Survey Number (circle one):** **1** **2** **3** **4** **5** **6** **7** **8****Begin Time:** 10:35 PM**End Time:** 10:55 PM**Cloud Cover:** Mostly clear**Precipitation:** None**Air Temp:** 74°F**Water Temp:** 65°F**Wind Speed:** 1-2 mph**Visibility Conditions:** Good**Moon Phase:** Waxing crescent**Humidity:** Low**Description of weather conditions:** Clear, calm.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** **YES** **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	5	O/H	adult		100%
<i>Lithobates catesbeianus</i>	5	O	subadult		100%
<i>Lithobates catesbeianus</i>	3	O	metamorph		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%
<i>Bufo boreas</i>	1	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Crayfish, green heron (*Butorides virescens*).

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(Date)

(Biologist)

Date of Survey: 07/14/2009
(mm/dd/yyyy)**Survey Biologist:** Alvarez, Jeff
(last name, first name)**Survey Biologist:** Crisp, Ann
(last name, first name)**Site Location:** El Dorado, Pond "E", Horseshoe Bar, 10S 0694051, 4319686 (NAD 83)
(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name: Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY **NIGHT** **BREEDING** NON-BREEDING**Survey Number (circle one):** 1 **2** **3** **4** **5** **6** 7 **8****Begin Time:** 5:45 PM**End Time:** 6:14 PM**Cloud Cover:** Clear**Precipitation:** None**Air Temp:** 97°F**Water Temp:** 70°F**Wind Speed:** 2-3 mph**Visibility Conditions:** Good**Moon Phase:** Waning gibbous**Humidity:** Low**Description of weather conditions:** Clear and sunny.**Brand name and model of light used to conduct surveys:** n/a**Were binoculars used for the surveys (circle one):** YES **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	15	O	adult		100%
<i>Lithobates catesbeianus</i>	10	O	subadult		100%
<i>Lithobates catesbeianus</i>	75	O	metamorph		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:	
	(FWS Field Office) (date) (biologist)

Date of Survey: 07/14/2009 **Survey Biologist:** Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Crisp, Ann
 (last name, first name)

Site Location: El Dorado, Pond "E", Horseshoe Bar, 10S 0694051, 4319686 (NAD 83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

Survey Number (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

Begin Time: 10:50 PM **End Time:** 11:12 PM

Cloud Cover: Clear **Precipitation:** None

Air Temp: 73°F **Water Temp:** 70°F

Wind Speed: Calm **Visibility Conditions:** Good

Moon Phase: Waning gibbous **Humidity:** High

Description of weather conditions: Clear, calm, and warm.

Brand name and model of light used to conduct surveys: Maglite, 4D Cell

Were binoculars used for the surveys (circle one): **YES** **NO**

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	17	O	adult		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%
<i>Lithobates catesbeianus</i>	87	O	metamorph		100%
<i>Lithobates catesbeianus</i>	5	O	subadult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Horseshoe Pond F Field Survey Datasheets

Survey results reviewed by:		
(FWS Field Office)	(date)	(biologist)

Date of Survey: 04/28/2009 Survey Biologist: Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Graf, Peter
 (last name, first name)

Site Location: El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action:	
PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: ~ 11 AM End Time: ~ 12 PM

Cloud Cover: 10% Precipitation: None

Air Temp: 64°F–69°F Water Temp: ~ 50°F

Wind Speed: 4 mph Visibility Conditions: Good

Moon Phase: Waxing crescent Humidity: Low

Description of weather conditions: Clear, sunny day with scattered clouds, light wind.

Brand name and model of light used to conduct surveys: n/a

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	1	O	adult		100%
<i>Lithobates catesbeianus</i>	1	O	subadult		100%
<i>Lithobates catesbeianus</i>	84	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:		
(FWS Field Office)	(date)	(biologist)

Date of Survey: 05/05/2009 **Survey Biologist:** Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Graf, Peter
 (last name, first name)

Site Location: El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name:	Placer County Water Agency – Middle Fork American River Project
Brief description of proposed action:	
PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.	

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 8:15 PM **End Time:** 8:45 PM

Cloud Cover: Mostly clear **Precipitation:** None

Air Temp: 60°F **Water Temp:** 55°F

Wind Speed: 4 mph **Visibility Conditions:** Good

Moon Phase: Waxing gibbous **Humidity:** Low

Description of weather conditions: Clear, cool, slight breeze.

Brand name and model of light used to conduct surveys: Maglite, 4D Cell

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	1	O	adult		100%
<i>Lithobates catesbeianus</i>	1	O	subadult		100%
<i>Lithobates catesbeianus</i>	27	O	larvae		100%
<i>Pseudacris regilla</i>	4	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 05/19/2009
(mm/dd/yyyy)**Survey Biologist:** Alvarez, Jeff
(last name, first name)**Survey Biologist:** Graf, Peter
(last name, first name)**Site Location:** El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)
(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY **NIGHT** BREEDING **NON-BREEDING****Survey Number** (circle one): 1 2 3 4 5 6 7 8**Begin Time:** 2:45 PM**End Time:** 3:00 PM**Cloud Cover:** Mostly clear**Precipitation:** None**Air Temp:** 78°F**Water Temp:** 60°F**Wind Speed:** 3 mph**Visibility Conditions:** Good**Moon Phase:** Waning crescent**Humidity:** High**Description of weather conditions:** Clear, slight breeze.**Brand name and model of light used to conduct surveys:** n/a**Were binoculars used for the surveys** (circle one): YES **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	2	H	adult		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 05/19/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING****Survey Number (circle one):** **1** **2** **3** **4** **5** **6** **7** **8****Begin Time:** 10:50 PM**End Time:**11:10 PM**Cloud Cover:** Mostly clear**Precipitation:**None**Air Temp:** 65°F**Water Temp:**60°F**Wind Speed:** 1-2 mph**Visibility Conditions:**Good**Moon Phase:** Waning crescent**Humidity:**High**Description of weather conditions:** Clear, calm.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** **YES** **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	4	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 06/16/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Crisp, Ann

(last name, first name)

Site Location: El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)

(County, general location name, GPS coordinates)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING****Survey Number (circle one):** **1** **2** **3** **4** **5** **6** **7** **8****Begin Time:** 10:20 PM**End Time:** 10:43 PM**Cloud Cover:** Clear**Precipitation:** None**Air Temp:** 58°F**Water Temp:** 63°F**Wind Speed:** <1 mph**Visibility Conditions:** Good**Moon Phase:** Waning crescent**Humidity:** High**Description of weather conditions:** Clear, calm evening.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** **YES** **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	9	O/H	adult		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.: Mallard (*Anas platyrhynchos*) hen nesting along shore.

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:

(FWS Field Office)

(date)

(biologist)

Date of Survey: 06/24/2009

(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff

(last name, first name)

Survey Biologist: Graf, Peter

(last name, first name)

Site Location: El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)

(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)******Proposed project name:** Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING****Survey Number (circle one):** **1** **2** **3** **4** **5** **6** **7** **8****Begin Time:** 10:05 PM**End Time:** 10:30 PM**Cloud Cover:** Mostly clear**Precipitation:** None**Air Temp:** 74°F**Water Temp:** 65°F**Wind Speed:** <1 mph**Visibility Conditions:** Good**Moon Phase:** Waxing crescent**Humidity:** Low**Description of weather conditions:** Clear, calm.**Brand name and model of light used to conduct surveys:** Maglite, 4D Cell**Were binoculars used for the surveys (circle one):** **YES** **NO****Brand, model, and power of binoculars:** Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Individ.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	23	O/H	adult		100%
<i>Lithobates catesbeianus</i>	5	O	subadult		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

crayfish

Other notes, observations, comments, etc.:

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:			
	(FWS Field Office)	(date)	(biologist)

Date of Survey: 07/14/2009 **Survey Biologist:** Alvarez, Jeff
 (mm/dd/yyyy) (last name, first name)

Survey Biologist: Crisp, Ann
 (last name, first name)

Site Location: El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)
 (County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: **Placer County Water Agency – Middle Fork American River Project**

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY **NIGHT** **BREEDING** NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 5:10 PM **End Time:** 5:30 PM

Cloud Cover: Clear **Precipitation:** None

Air Temp: 97°F **Water Temp:** 70°F

Wind Speed: 4 mph **Visibility Conditions:** Good

Moon Phase: Waning gibbous **Humidity:** Low

Description of weather conditions: Sunny, clear.

Brand name and model of light used to conduct surveys: n/a

Were binoculars used for the surveys (circle one): YES **NO**

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	21	O	adult		100%
<i>Lithobates catesbeianus</i>	2	O	subadult		100%
<i>Lithobates catesbeianus</i>	67	O	metamorph		100%
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Other notes, observations, comments, etc.:

River otter (*Lontra canadensis*) scat along “trail” to pond.

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

Survey results reviewed by:			
	(FWS Field Office)	(Date)	(Biologist)

Date of Survey: 07/14/2009
(mm/dd/yyyy)

Survey Biologist: Alvarez, Jeff
(last name, first name)

Survey Biologist: Crisp, Ann
(last name, first name)

Site Location: El Dorado, Pond "F", Horseshoe Bar, 10S 0693905, 4319632 (NAD 83)
(County, general location name, UTM Coordinates or Lat./Long. or T-R-S)

****ATTACH A MAP (include habitat types, important features, and species location)****

Proposed project name: Placer County Water Agency – Middle Fork American River Project

Brief description of proposed action:

PCWA owns and operates the Middle Fork Project (MFP), a multi-purpose water supply and hydroelectric project designed to control and conserve waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams. The MFP system consists of two major storage reservoirs, five smaller regulating reservoirs and diversion pools, and five powerhouses. The MFP supplies water for homes, industry, and agriculture within western Placer County. PCWA operates the MFP under the terms of the FERC License No. 2079. The current license will expire on February 28, 2013, and PCWA will be seeking a new license for the MFP pursuant to the FERC's ILP regulations.

Type of Survey (circle one): DAY NIGHT BREEDING NON-BREEDING

Survey Number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 11:20 PM **End Time:** 11:40 PM

Cloud Cover: Clear **Precipitation:** None

Air Temp: 72°F **Water Temp:** 70°F

Wind Speed: 1-2 mph **Visibility Conditions:** Good

Moon Phase: Waning gibbous **Humidity:** Low

Description of weather conditions: Clear, warm, and calm.

Brand name and model of light used to conduct surveys: Maglite, 4D Cell

Were binoculars used for the surveys (circle one): YES NO

Brand, model, and power of binoculars: Steiner, 8x42

AMPHIBIAN OBSERVATIONS

Species	# of Indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
<i>Lithobates catesbeianus</i>	100s	O	larvae		100%
<i>Lithobates catesbeianus</i>	24	O	metamorph		100%
<i>Lithobates catesbeianus</i>	1	O	subadult		100%
<i>Lithobates catesbeianus</i>	19	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons:

Green heron (*Butorides virescens*) (2) flushed from willows.

Other notes, observations, comments, etc.:

Mallard (*Anas platyrhynchos*) hen nesting along shore.

Necessary Attachments:

1. All field notes and other supporting documents.
2. Site photographs.
3. Maps with important habitat features and species locations.

APPENDIX D
California Red-legged Frog Survey Photographs

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Representative Habitat Photographs at CRLF Survey Ponds

Ralston Ridge Pond



Representative Habitat Photographs at CRLF Survey Ponds

Ralston Ridge Pond



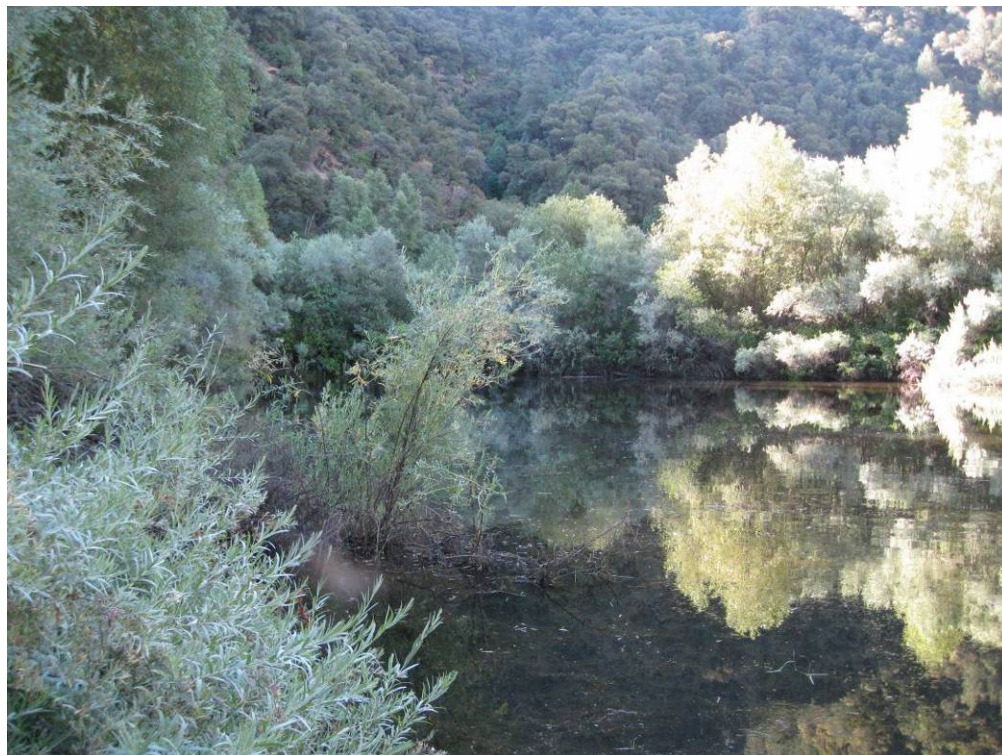
Representative Habitat Photographs at CRLF Survey Ponds

Horseshoe Bar Pond C



Representative Habitat Photographs at CRLF Survey Ponds

Horseshoe Bar Pond E



Representative Habitat Photographs at CRLF Survey Ponds

Horseshoe Bar Pond F

