

Battle Creek Salmon and Steelhead Restoration Project

Draft Supplemental Environmental Impact Statement/
Revised Environmental Impact Report

Executive Summary

February 2005



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Impact Statement/
Revised Environmental Impact Report**

Executive Summary

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Acronyms and Abbreviations

Adaptive Management Plan	Battle Creek Salmon and Steelhead Restoration Project Adaptive Management Plan
AFRP	Anadromous Fish Restoration Program
AMP	Adaptive Management Plan
AMTT	adaptive management technical team
ASIP	Action Specific Implementation Plan
BA	biological assessment
BCWG	Battle Creek Working Group
BMPs	best management practices
BO	biological opinion
CALFED	CALFED Bay-Delta Program
CBDA	California Bay-Delta Authority
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
DFG	California Department of Fish and Game
Draft SEIS/REIR	Draft Supplemental EIS/Revised EIR
EFH	Essential Fish Habitat
EIS/EIR	environmental impact statement/environmental impact report
ERP	Ecosystem Restoration Program
ESA	federal Endangered Species Act
FERC	Federal Energy Regulatory Commission
Hydroelectric Project	Battle Creek Hydroelectric Project (Federal Energy Regulatory Commission Project No. 1121)
IHN	infectious hematopoietic necrosis
MLTF	Mount Lassen Trout Farm

MOU	Memorandum of Understanding
MSCS	Multi-Species Conservation Strategy
NCCP	Natural Community Conservation Plan
NCCPA	California Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NOAA Fisheries	National Marine Fisheries Service
PG&E	Pacific Gas and Electric Company
PIT	Passive Integrated Transponder
PMT	Battle Creek Project Management Team
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Restoration Project	Battle Creek Salmon and Steelhead Restoration Project
SHPO	State Historic Preservation Officer
State Water Board	California State Water Resources Control Board
TRP	technical review panel
TRP Report	Technical Review Panel Report for the Battle Creek Salmon and Steelhead Restoration Project
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
Working Group	Greater Battle Creek Watershed Working Group

Foreword

Introduction

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and the California State Water Resources Control Board (State Water Board) are proposing the Battle Creek Salmon and Steelhead Restoration Project (Restoration Project). The proposed Restoration Project presents an opportunity to reestablish approximately 42 miles of prime salmon and steelhead habitat on Battle Creek, plus an additional 6 miles of habitat on its tributaries. Restoration would be accomplished primarily through the modification of the Battle Creek Hydroelectric Project (Federal Energy Regulatory Commission [FERC] Project No. 1121) (Hydroelectric Project) facilities and operations, including instream flow releases. Any proposed changes to the Hydroelectric Project trigger the need for the Pacific Gas and Electric Company (PG&E) to seek a license amendment from FERC.

Because of the federal and state actions associated with the Restoration Project, compliance with both the National Environmental Policy Act (NEPA) (42 U.S. Code [USC] 4321–4347) and the California Environmental Quality Act (CEQA) (Public Resources Code 21000 *et seq.*) is required. A joint environmental impact statement/environmental impact report (EIS/EIR) was prepared to fulfill the requirements of both NEPA and CEQA. Because the Restoration Project is an action funded by the California Bay-Delta Authority (CBDA), which assists with the implementation of the CALFED Bay-Delta Program (CALFED), environmental review of the Draft EIS/EIR tiers from the CALFED Final Programmatic EIS/EIR (CALFED Bay-Delta Program 2000).¹

The Draft EIS/EIR was circulated for public comment from July 18 to October 16, 2003. The purpose of the Draft EIS/EIR was to disclose the impacts associated with the Restoration Project Proposed Action alternative and other project alternatives in order to reach a decision on the alternative to be implemented.

After the close of the public comment period, Reclamation and the State Water Board began responding to the comments that had been received during public

¹ CBDA, an agency that assists with the implementation of the CALFED Program, was previously known as the CALFED Bay-Delta Program. Documents published before this name change took place are identified in this Draft SEIS/REIR as being prepared by the CALFED Bay-Delta Program. In addition, the term CALFED is often used to refer to the CALFED Program, also known as the CALFED Plan.

review of the Draft EIS/EIR. As a result of this process, and subsequent reviews that were performed outside the NEPA/CEQA process, it became evident that significant new information would be added to the Draft EIS/EIR. Therefore, Reclamation and the State Water Board are recirculating portions of the Draft EIS/EIR for public comment as this Draft Supplemental EIS/Revised EIR (Draft SEIS/REIR).

New Information Presented in the Draft SEIS/REIR

Based on comments received during the public review period (July through October 2003), Reclamation and the State Water Board have made changes to the Draft EIS/EIR. Most of these changes were made for clarification and are not being recirculated for public comment in the Draft SEIS/REIR. These changes will be presented in the Final EIS/EIR. However, a subset of these changes was deemed to constitute significant new information and is being presented in this Draft SEIS/REIR. This new information includes the impacts listed in Table ES-5 from the Executive Summary, which are discussed in detail in Chapter 4 of this document, as well as the following information:

- Chapter 3, “Project Alternatives”
 - section entitled Five Dam Removal Alternative—Proposed Action, Inskip Diversion Dam/South Powerhouse, Access Road Improvements
 - section entitled Five Dam Removal Alternative—Proposed Action, Asbury Pump Station and Diversion Dam
 - section entitled Alternatives Eliminated from Further Consideration
- Chapter 4, “Affected Environment and Environmental Consequences”
 - environmental consequences discussion in Section 4.1, Fish
 - study methods for botanical, wetland, and wildlife resources; affected environment; and environmental consequences discussion in Section 4.2, Botanical, Wetland, and Wildlife Resources
 - environmental consequences discussion, including updated impact significance criteria, in Section 4.4, Water Quality
 - affected environment discussion under Agriculture in Section 4.6, Land Use
 - environmental consequences discussion in Section 4.8, Aesthetics
 - methodology, affected environment, and environmental consequences discussion in Section 4.15, Cultural Resources
 - section entitled Indirect Environmental Effects Associated with the Loss of Hydropower and Renewable Replacement Power under Power Generation and Economics in Section 4.16, Other NEPA Analyses

- affected environment and environmental consequences discussion under Socioeconomics in Section 4.16, Other NEPA Analyses
- Appendices
 - Appendix F, “Proposed Construction Areas at Restoration Project Sites”
 - Appendix K, “Optimal Water Temperature Habitat in Battle Creek”
 - Appendix L, “Biological Resources Documented at Battle Creek Project Sites”
 - Appendix M, “Waters of the United States Documented at Battle Creek Project Sites”
 - Appendix O, “Special-Status Species Accounts”.

Reclamation and the State Water Board are presenting only the new impacts listed in Table ES-5 and the new sections listed above for public comment at this time.

Readers should refer to the July 2003 Draft EIS/EIR for the remainder of the project analysis not included in this Draft SEIS/REIR. The complete report of the July 2003 Draft EIS/EIR can be found at the following Battle Creek project Web site:

<http://www.usbr.gov/mp/battlecreek/>.

Reclamation and the State Water Board will reconsider this project in light of the full Draft SEIS/REIR, including this document and the unchanged portions of the 2003 Draft EIS/EIR (Jones & Stokes 2003). Together, these documents fulfill the requirements of NEPA and CEQA for preparation, circulation, and consideration of an EIS and an EIR.

Purpose of This Document and Limit on Scope of Comments

The purpose of this document is to address new significant information; therefore, Reclamation and the State Water Board request that reviewers limit their comments on this Draft SEIS/REIR to the revisions presented in this document for public comment. Reclamation and the State Water Board are responding to comments received on the July 2003 Draft EIS/EIR, as indicated below, and are no longer accepting comments on the Draft EIS/EIR at this time.

The responses to the comments previously received on the 2003 Draft EIS/EIR will be published in the Final EIS/EIR along with the responses prepared for comments received on the Draft SEIS/REIR. Therefore, it is not necessary to restate comments previously made on portions of the Draft EIS/EIR that are not included in this Draft SEIS/REIR.

How to Use This Document

According to the Council on Environmental Quality NEPA Regulations (40 CFR 15029[c][1]), a federal agency must prepare a supplement to a Draft EIS if the federal agency makes substantial changes in the proposed action that are relevant to its environmental effects or if there are significant new circumstances or information relevant to the environmental concerns that bear on the proposed action or its impacts. The supplement to an EIS focuses on only those sections of the EIS that require updating. The supplement does not typically repeat the information from the prior version of the EIS. If the Draft EIS is being supplemented, the lead agency will refrain from responding to comments on the prior draft and will respond to comments on both the draft and supplement in the Final EIS.

State CEQA Guidelines Section 15088.5 requires that a lead agency recirculate an EIR for public review and comment when significant new information is added to that EIR. Guidelines Section 15088.5(f) provides that when only a portion of the EIR is revised, that portion may be recirculated alone.

Update on Events That Have Occurred Since the Draft EIS/EIR Was Released for Public Review

Opportunities for Public Input

The release of the Draft EIS/EIR provided the public with an opportunity to provide input on the analysis of the environmental effects of the proposed project and the action alternatives examined in the Draft EIS/EIR. The Draft EIS/EIR was released for a 90-day public review on July 18, 2003. Responses to the comments received during the review of the Draft EIS/EIR will be presented in the Final EIS/EIR.

After the Draft EIS/EIR was released for public review, the Battle Creek Project Management Team (PMT) conducted two public information workshops in Manton, California, on July 23 and August 12, 2003, which allowed stakeholders and members of the public to ask questions and learn more about the contents of the Draft EIS/EIR. The PMT also conducted a public hearing in Manton, California, on August 27, 2003, which provided the public with an opportunity to present both written and verbal comments on the Draft EIS/EIR in a public forum. Reclamation has also presented six status reports at the CBDA Ecosystem Restoration Program (ERP) Subcommittee Meetings on January 15, February 19, March 25, April 15, May 20, and June 17, 2004, during which additional public input has been received on the Restoration Project and project alternatives. On March 15, 2004, a public meeting was held in Red Bluff, California, specifically to address public questions about the incremental benefits between the proposed Restoration Project (i.e., the Five Dam Removal

Alternative) and the Eight Dam Removal Alternative, which has been eliminated from further consideration in this document. Public comments have been encouraged at all public meetings on the Restoration Project.

Action Specific Implementation Plan

Since the publication of the Draft EIS/EIR, Reclamation and the State Water Board have initiated consultation with the California Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NOAA Fisheries) for compliance with the California Endangered Species Act (CESA), the California Natural Community Conservation Planning Act (NCCPA), and Section 7 of the federal Endangered Species Act (ESA). As the Restoration Project is a CALFED project, it is necessary to prepare an Action Specific Implementation Plan (ASIP) to meet CALFED environmental planning requirements. A draft ASIP was submitted to DFG, USFWS, and NOAA Fisheries in April 2004. An addendum to the draft ASIP is currently in preparation.

An ASIP is a unique document authorized for use in compliance with CESA, NCCPA, and ESA only for CALFED projects to simplify regulatory compliance. The Restoration Project ASIP serves as the biological assessment (BA) for compliance with Section 7 of the ESA and, if requested by the lead agency(s), the Natural Community Conservation Plan (NCCP) for compliance with the CESA and the NCCPA. The ASIP tiers from the programmatic CALFED Multi-Species Conservation Strategy (MSCS), which serves as the CALFED programmatic:

- BA under Section 7 of the ESA,
- habitat conservation plan under Section 10 of the ESA, and
- NCCP under the NCCPA.

The Restoration Project ASIP is consistent with the requirements of the programmatic CALFED ESA, CESA, and NCCPA compliance documents and agreements. The purpose of the Restoration Project ASIP is to present the information necessary for:

- USFWS to issue incidental take authorization under Section 7 of the ESA for one species covered under the CALFED USFWS Programmatic biological opinion (BO) (valley elderberry longhorn beetle);
- USFWS to concur that the Restoration Project will not likely adversely affect one species (bald eagle);
- NOAA Fisheries to issue incidental take authorizations under Section 7 of the ESA for three species covered under the CALFED NOAA Fisheries Programmatic BO (Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, and Central Valley steelhead);

- pursuant to Section 305(b)(2) of the Magnuson-Stevens Act, for NOAA Fisheries to issue conservation recommendations necessary to address potential adverse effects of the Restoration Project on Essential Fish Habitat (EFH) for three anadromous fish species (Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, and Central Valley fall-/late fall–run Chinook salmon); and
- DFG will, if formally requested by the lead agency(s), issue take authorization through an NCCP determination under Section 2835 of the NCCPA for ten species covered under the CALFED Programmatic NCCP Determination (Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, Central Valley steelhead, American peregrine falcon, bald eagle, Cooper’s hawk, little willow flycatcher, osprey, yellow-breasted chat, and northwestern pond turtle), if one should become necessary.

Through the consultation process with DFG and USFWS, some mitigation measures presented in the Draft EIS/EIR for botanical, wetland, and wildlife resources were modified and expanded for use in the ASIP. A summary of ASIP-related changes made to Section 4.2, Botanical, Wetland, and Wildlife Resources, of the Draft EIS/EIR follows.

- **Impact 4.2-1. Significant—Potential Disturbance or Loss of 7.2 Acres of Woody Riparian Vegetation and Associated Wildlife Habitat.** The mitigation measures have been refined per DFG and USFWS consultation recommendations. A discussion has been added to describe the new habitat compensation approach, which will be a combination of on-site restoration and use of habitat credits from a CBDA–funded conservation easement located within the Battle Creek watershed. In addition, the minimum compensation ratio has been increased from 1:1 (1 acre restored or enhanced for every 1 acre affected) to 2:1 for temporary effects and 3:1 for permanent effects.
- **Impact 4.2-3. Significant—Potential Loss or Disturbance of 5.7 acres of Waters of the United States (including Wetlands).** The mitigation measures have been refined per DFG and USFWS consultation recommendations. A discussion has been added to describe the new habitat compensation approach, which will be a combination of on-site restoration and use of habitat credits from a CBDA–funded conservation easement located within the Battle Creek watershed. In addition, the minimum compensation ratio has been increased from 1:1 (1 acre restored or enhanced for every 1 acre affected) to 2:1. This mitigation measure is contingent upon approval by the Corps.
- **Impact 4.2-4. Significant—Potential Loss or Disturbance of Common Upland Woodland and Forest Communities and Associated Wildlife habitat.** The mitigation measures have been refined per DFG and USFWS consultation recommendations. A discussion has been added to describe the new habitat compensation approach, which will be a combination of on-site restoration and use of habitat credits from a CBDA–funded conservation

easement located within the Battle Creek watershed. In addition, the minimum compensation ratio has been increased from 1:1 (1 acre restored or enhanced for every 1 acre affected) to 2:1 for temporary effects and 5:1 for permanent effects.

- **Impact 4.2-5. Significant—Potential Disturbance to Valley Elderberry Longhorn Beetle Habitat.** The mitigation measures have been refined per DFG and USFWS consultation recommendations, which include a more detailed mitigation approach and a commitment to implement mitigation measures according to the USFWS standard valley elderberry longhorn beetle compensation guidelines.
- **Impact 4.2-8. Significant—Potential Disturbance of Breeding Habitat for Yellow-Breasted Chat.** The mitigation measures have been refined per DFG and USFWS consultation recommendations to include more detail to the mitigation approach. In addition, the impact and mitigation measures have been expanded to include the little willow flycatcher.
- **Impact 4.2-9. Significant—Potential Disturbance to Nesting Raptors.** The mitigation measures have been refined per DFG and USFWS consultation recommendations to add more detail to the surveying protocols and mitigation approach. In addition, the impact and mitigation measures have been expanded to include Cooper’s hawk, peregrine falcon, and bald eagle.
- **Impact 4.2-13. Less than Significant—Potential Disturbance of Mixed Chaparral Habitat.** A new impact and new mitigation measures for disturbance of mixed chaparral habitat have been included per DFG and USFWS consultation recommendations.
- **Impact 4.2-14. Less than Significant—Potential Disturbance of Annual Grassland Habitat.** A new impact and new mitigation measures for disturbance of annual grassland habitat have been included per DFG and USFWS consultation recommendations.

Reclamation and the State Water Board are not requesting comments on these changes at this time. The Final EIS/EIR will include the updated mitigation measures, and the ASIP Executive Summary will be included as an appendix to the Final EIS/EIR. The complete report of the Draft ASIP can be found at the Restoration Project Web site:

<http://www.usbr.gov/mp/battlecreek>

New and updated biological impacts and mitigation measures identified in this Draft SEIS/REIR will be included in an addendum to the Draft ASIP. These impacts are associated with activities at two Mount Lassen Trout Farm facilities—Jeffcoat , which includes Jeffcoat East, Jeffcoat West, and the Jeffcoat nursery, and Willow Springs—and include impacts on two species not previously identified in the Draft ASIP—the California black rail and the California red-legged frog. The ASIP addendum will be submitted to DFG, USFWS, and NOAA Fisheries in early 2005.

California Bay-Delta Authority Technical Panel Review of the Restoration Project

In addition to considering public comments received on the 2003 Draft EIS/EIR, Reclamation and the State Water Board have also thoroughly considered comments made by the CBDA technical review panel (TRP) on the merits of the Restoration Project in the *Technical Review Panel Report for the Battle Creek Salmon and Steelhead Restoration Project* (TRP Report) (Borcalli et al. 2003). This consideration has taken place outside the context of the NEPA and CEQA environmental review process at the request of the CBDA selection panel.

Technical Review Panel Evaluation of the Restoration Project

When Reclamation realized that additional funding would be required to complete the Restoration Project, they submitted a cost proposal to the CBDA selection panel in February 2003 for an additional \$38 million. Based on this request, the selection panel formed an independent TRP to provide a comprehensive evaluation of the technical merit of the Restoration Project and to strengthen the effort to restore salmon and steelhead in Battle Creek.

The TRP summarized their results in the TRP Report, dated September 2003 (Borcalli et al. 2003). The panel found that the general cost of the project elements under the Five Dam Removal Alternative (established in the 1999 Memorandum of Understanding [MOU]) were reasonable, justified, and cost-effective; however, the panel identified several elements of the project that should be reexamined based on comments provided in the TRP Report, including fish counting design, estimation of mitigation costs, and the adequacy of funding for continued monitoring. The panel also presented several recommendations that would strengthen the effort to restore anadromous fish habitat in Battle Creek. The selection panel reviewed the TRP Report and concurred with the TRP's comments.

As part of the TRP Report, the TRP made several recommendations that would strengthen the restoration effort. These recommendations are listed below.

- Include funds for monitoring the intended responses of fish, channel geomorphology, water quality and temperature, and sediment dynamics as part of the Restoration Project.
- Strengthen the Battle Creek Restoration Project Adaptive Management Plan (AMP) and identify an explicit process for reviewing responses of salmon and sediment routing after dam removal.
- Include provisions for fish traps in the new ladders so that fish can be collected, examined, and marked.

- Design the fish ladders to include an alternative for insertion of an adult fish trap where possible.
- Include radio telemetry in the monitoring of adult fish passage to confirm that adults do not delay below ladders and consider Passive Integrated Transponder (PIT) tag technology as a long-term monitoring tool.
- Account for remote sensing locations and construction requirements (e.g., PIT tag sensors) in newly constructed fish ladders.
- Plan and schedule the Coleman Powerhouse tailrace barrier as an integral feature of the Restoration Project.

The selection panel requested that the PMT address the TRP's comments by responding to the selection panel and explaining how the PMT would modify project designs, planning and environmental documents, and implementation of the Restoration Project. The PMT was encouraged to address comments on monitoring and adaptive management, including modifying project features to enhance the ability to monitor fish. The selection panel also encouraged the PMT to explain how the following issues would be addressed.

- Consider a more comprehensive decommissioning of the Hydroelectric Project as a project alternative to determine whether increased benefit could be achieved.
- Reintroduce winter-run Chinook salmon to Battle Creek.
- Coordinate Coleman National Fish Hatchery Operations with restoration efforts.

Responding to the Technical Review Panel Report

In response to the comments presented in the TRP Report, the PMT and the adaptive management technical team (AMTT) prepared a series of responses to address the issues raised in the TRP Report. Responses to the TRP Report were submitted to the CBDA ERP selection panel between January and May 2004. To address the concerns and comments of the TRP, the PMT responded in the following manner.

- An additional alternative, the Eight Dam Removal Alternative, was analyzed in comparison with the Five Dam Removal Alternative outside the context of the environmental review process. While the Eight Dam Removal Alternative and the Five Dam Removal Alternative were found to substantially increase habitat benefits compared with baseline conditions, the habitat benefit differences between the two alternatives are not significant. In addition, the Eight Dam Removal Alternative was determined to be more costly than the Five Dam Removal Alternative and lacks a willing participant (PG&E), which is a requirement of any CALFED project. Therefore, the Eight Dam Removal Alternative was not selected for further analysis.

- To ensure a thorough and systematic review of the project design features, a review of the draft plans and specifications is scheduled for July 2005. FERC will take part in this review.
- The PMT/AMTT recognize the need to prioritize the restoration of winter-run Chinook salmon. The need to address this target species and the need for a feasibility analysis consistent with the Draft Recovery Plan for the Sacramento River Winter-Run Chinook (National Marine Fisheries Service 1997) were addressed in the CALFED ASIP for the Battle Creek Restoration Project.
- Design flaws or areas of improvement suggested by the TRP were considered, and changes to the facilities were made when possible. The PMT/AMTT attempted to address the TRP's comments when no changes could be made.
- To improve the AMP as a long-term tool for successful monitoring and management of the Restoration Project, it was substantially changed to reflect the comments of the TRP, including the use of radio tagging for fish passage monitoring.

The PMT submitted their final response to the selection panel on May 6, 2004. The selection panel is expected to present a final funding recommendation to the CBDA Board in time for their meeting in August 2005. A funding decision for the Restoration Project will be determined at this meeting.

Comparing the Removal of Five Diversion Dams (MOU Alternative) with the Removal of Eight Diversion Dams (Alternative B)

While the PMT prepared a formal response to the TRP Report (Borcalli et al. 2003), California Resources Agency requested that the Battle Creek PMT also conduct a cost analysis of the MOU Alternative (i.e., the Five Dam Removal Alternative) in comparison with other additional alternatives. The CBDA Selection Panel asked that this analysis take place outside the context of this NEPA/CEQA process.

In response to California Resources Agency's request and the CBDA Selection Panel, the PMT organized an independent group to conduct a cost review of other additional alternatives in comparison with the MOU Alternative. Three additional alternatives were identified by the cost review team and include:

- Alternative A (decommissioning the entire Hydroelectric Project, including PG&E's facilities upstream of the natural fish passage barriers on Battle Creek);

- Alternative B (the Eight Dam Removal Alternative, i.e., decommissioning of all diversion dams below the natural fish passage barriers on Battle Creek and its tributaries); and
- Alternative C (Alternative 6, i.e., decommissioning the entire Hydroelectric Project, including the removal of all hydroelectric dams and appurtenant facilities [except the two Volta Powerhouses], below the natural fish passage barriers on Battle Creek).

The cost review team presented their preliminary findings at the CBDA ERP subcommittee meeting on January 15, 2004. An independent consultant refined the energy production estimates in April 2004, and updated construction costs became available from Reclamation in May 2004. The preliminary cost review indicated that the MOU Alternative (the Five Dam Removal Alternative) and Alternative B (the Eight Dam Removal Alternative) were similar in cost. However, the final cost review shows the Five Dam Removal Alternative is expected to be less costly than the Eight Dam Removal Alternative (\$113 million and \$116 million, respectively). Because the remaining alternatives, Alternatives A and C, were significantly more expensive than the MOU Alternative, they were excluded from further consideration. Based on the preliminary results, it was decided at the January 2004 ERP subcommittee meeting that the PMT would further compare the potential incremental habitat benefits Alternative B and the MOU Alternative. A comparison of both alternatives is presented in Chapter 3 of this Draft SEIS/REIR.

Revisions to the Draft Adaptive Management Plan

A comprehensive AMP was developed by the Battle Creek AMTT for the Restoration Project pursuant to the 1999 MOU. The purpose of the Battle Creek AMP is to act as a tool to monitor results and refine the actions implemented by the Restoration Project where there are likely to be unanticipated influences on fishery restoration, or when initial actions may not produce expected results because of unforeseen factors. The Draft AMP was evaluated as an appendix to the Draft EIS/EIR (Jones & Stokes 2003), which was released for public review from July 18 to October 16, 2003. The Draft AMP was also reviewed by the TRP (Borcalli et al. 2003). Comments received from the TRP, as well as some comments received during public review of the Draft EIS/EIR, expressed concern about adaptive management funding, monitoring, project success, technical analysis, design specifications, and sedimentation. As a result of these comments, the AMP was substantially modified to include more details pertaining to these issues.

The executive summary of the AMP will be included as Appendix C in the Final EIS/EIR. The complete report of the Revised Draft AMP, dated April 2004, can be found at the following Restoration Project Web site:

<http://www.usbr.gov/mp/battlecreek>.

Potential Effects of Coleman National Fish Hatchery Operations on Restoration Project Success

The Coleman National Fish Hatchery, constructed in 1942, is located on the north side of Battle Creek approximately 6 miles upstream of the confluence of Battle Creek and the Sacramento River. Because of its location on Battle Creek, facility operations at the hatchery are intimately linked to the Battle Creek watershed. The Coleman National Fish Hatchery is part of a complex federal and state hatcheries system instated in the Central Valley in order to mitigate the loss of habitat that resulted when upstream dams blocked access to historical salmonid spawning grounds. The authorized purpose of this hatchery is to mitigate the effects of Shasta Dam on salmonid populations. Shasta Dam resulted in the loss of approximately 187 miles of spawning and rearing habitat for anadromous salmonids (approximately 50% of the Chinook salmon and steelhead spawning and rearing habitats) (Skinner 1958). Coleman National Fish Hatchery operation is funded by Reclamation and is guided by USFWS policy and other state and federal laws.

Comments on the Draft EIS/EIR stated that the document did not adequately address potentially adverse effects of Coleman National Fish Hatchery operations on the Restoration Project. Specifically, the commentors stated that Coleman National Fish Hatchery operations should be coordinated with Restoration Project operations so the Coleman National Fish Hatchery barrier weir, as well as other hatchery operations, would not interfere with the migration of wild anadromous fish (spring-run and winter-run Chinook salmon and steelhead) in Battle Creek thereby compromising the success of the Restoration Project. Commentors explained that the USFWS's intention to "integrate" Coleman National Fish Hatchery operations with the Restoration Project is not enough and that a legally binding agreement among the relevant agencies would be appropriate. Additionally, commentors felt that the best means to address concerns related to Coleman National Fish Hatchery operations would be to develop and implement an adaptive management plan for the hatchery.

Since nearly the inception of the Restoration Project, the local community has expressed concern about how Coleman National Fish Hatchery operations could affect its success. Reclamation understands and acknowledges this concern. Beginning in 1997, the public has been invited to and involved in monthly meetings (e.g., meetings of the Battle Creek Working Group and its successor, the Greater Battle Creek Watershed Working Group [Working Group]) with agenda items and discussions including operations of Coleman National Fish Hatchery, monitoring of fish populations, and hydropower project operations. Since release of the Draft EIS/EIR for public review, Reclamation, USFWS, DFG, NOAA Fisheries, and the CBDA have taken measures to address the public's concerns regarding Coleman National Fish Hatchery operations.

On October 7 and 8, 2003, the California Bay-Delta Science Program convened a technical workshop to review some key issues involving the restoration of salmonid habitat in Battle Creek. The CBDA established an independent

science panel, the Coleman National Fish Hatchery Science Panel (Coleman Science Panel), to investigate the Restoration Project and its relationships with operations of Coleman National Fish Hatchery. The Coleman Science Panel concluded that the operation of Coleman National Fish Hatchery may pose uncertainties and significant risk to the recovery of anadromous salmonids in Battle Creek (Technical Review Panel 2004). The Coleman Science Panel stated that an adaptive management plan for Coleman National Fish Hatchery operations is essential and that the adaptive process should be capable of changing management priorities, including those at Coleman National Fish Hatchery, to ensure the success of the Restoration Project.

In February 2004, the Battle Creek Watershed Conservancy prepared a letter proposing development and implementation of an adaptive management plan for Coleman National Fish Hatchery as one of four tasks necessary to formalize their support of the Restoration Project. As a result of this letter, in April 2004 the Battle Creek PMT drafted the *Proposal to Facilitate and Develop an Adaptive Management Plan for Coleman National Fish Hatchery for Consideration by Greater Battle Creek Watershed Working Group*. This proposal identified Reclamation as the lead agency for the Coleman National Fish Hatchery adaptive management plan, and the final draft version of the Coleman National Fish Hatchery adaptive management plan is scheduled to be completed within 18 months of contract initiation.

Additional workshops were organized by the CBDA and held on June 14 and August 4, 2004, to explore strategies for managing the adult hatchery-origin steelhead returning to Coleman National Fish Hatchery and potential steelhead supplementation activities in Battle Creek. The Coleman Science Panel independently evaluated scientific issues related to steelhead supplementation in Battle Creek and produced a report titled “Review of the Steelhead Supplementation Program in Battle Creek” (Coleman National Fish Hatchery Science Panel 2004). In addition, a comment letter dated June 23, 2004, was submitted by the Battle Creek Watershed Conservancy, and a Battle Creek Working Group meeting was held July 8, 2004, that included agenda items derived from the public workshop and the Coleman National Fish Hatchery Science Panel report on the meeting agenda.

Although the USFWS previously had committed to ensuring that Coleman National Fish Hatchery operations would be consistent with conservation of listed species (White et al. pers. comm.), the USFWS has furthered this commitment by suspending supplementation of steelhead above the Coleman National Fish Hatchery barrier weir until supplementation activities can be reassessed through a process involving stakeholder participation. All comments that have been developed through public workshops, letters, and other public meetings will be considered in developing a long-term program for the disposition of adult hatchery-origin steelhead that return to Coleman National Fish Hatchery. Restoration Project goals for steelhead can be found in the Restoration Project’s revised Adaptive Management Plan.

The USFWS has committed to support development of an adaptive management plan for the Coleman National Fish Hatchery to ensure hatchery operations are compatible with the Restoration Project (proposals for diagnostic studies and adaptive management were submitted to CBDA in May 2004). The Coleman National Fish Hatchery Adaptive Management Plan, as well as the future Fisheries Management Strategy to be developed by DFG and the Working Group, may contribute to decisions on future Coleman National Fish Hatchery operations.

As required by the federal Endangered Species Act (ESA), the USFWS has submitted a biological assessment (U.S. Fish and Wildlife Service 2001b) to NOAA Fisheries for consultation on current operations at Coleman National Fish Hatchery, and has agreed to reinstate consultation with NOAA Fisheries for potential effects of hatchery operations on listed anadromous fish following completion of the Restoration Project and enhancement of salmonid populations (White et al. pers. comm.).

Potential Effects Related to the Infectious Hematopoietic Necrosis Virus on Mount Lassen Trout Farm Facilities and Darrah Springs Fish Hatchery

Some public comment letters received on the 2003 Draft EIS/EIR raised a concern that the potential effects of the Restoration Project on MLTF operations were not adequately analyzed or addressed in the Draft EIS/EIR.

MLTF is an aquaculture operation consisting of 12 small facilities in the Battle Creek watershed that raise rainbow trout for sale as stock for lakes and ponds. Two of these facilities, Jeffcoat and Willow Springs, use spring water in their trout ponds that could potentially come in part from seepage from two PG&E canals that carry Battle Creek water: the Eagle Canyon Canal and the Inskip Canal².

MLTF has certain restrictions regarding the ability to sell “disease-free” fish, although there is some risk of disease currently in the Battle Creek system. The goal of the Restoration Project is to restore populations of anadromous fish to Battle Creek, which increases the potential to carry the infectious hematopoietic necrosis (IHN) virus into the upper reaches of Battle Creek. Because of the extremely porous volcanic soils in the Battle Creek watershed, increasing the numbers of anadromous fish in Battle Creek could potentially increase the risk of the IHN virus seeping from PG&E’s canals into the groundwater and resurfacing at the MLTF source springs. If fish raised at MLTF facilities become exposed to the IHN virus through contaminated water, MLTF would experience economic losses as a result of fish mortality and regulations against selling diseased stock.

² Reclamation is currently conducting studies to confirm the hydrologic connection between PG&E facilities and MLTF’s Willow Springs site.

This adverse effect was identified in the Draft EIS/EIR, along with the assurance that Reclamation is working with MLTF to develop mutually agreeable compensation measures. However, many commentors requested a detailed description of these compensation measures in the Final EIS/EIR, and an analysis of IHN virus effects in Section 4.1, Fish; Section 4.4, Water Quality; and Section 4.6, Land Use. Concurrently, DFG expressed concern about the spread of the IHN virus from MLTF facilities, through stocking of these fish, to fish that reside in other waters of California where such diseases do not occur and, therefore, do not have as much immunity from the disease. Although the State of California has several regulatory planning processes intended to protect fish communities from the spread of diseases categorized as serious or catastrophic, DFG may not be able to implement these measures because of limited testing and enforcement capability (Rectenwald pers. comm.).

In addition to the concern that the IHN virus could be spread through stocking with MLTF fish, there is also a concern that fish at the Darrah Springs State Fish Hatchery could be affected with the IHN virus. This is because, similar to MLTF fish, fish from Darrah Springs State Fish Hatchery are planted in waters throughout the state of California, especially in northern California. The concern is that anadromous fish infected with the IHN virus could possibly infect fish from Darrah Springs if the anadromous fish were able to pass above Asbury Diversion Dam at high flows. If the disease is not detectable in the hatchery fish at the time they are transported off site, the disease could be conveyed to other fish communities where the hatchery stocking occurs.

Thus, Reclamation and the State Water Board proposed mitigation measures to ensure that MLTF and the Darrah Springs State Fish Hatchery fish will not be exposed to the IHN virus, thus avoiding any socioeconomic impacts on MLTF as well as avoiding risk of spreading the disease to other uninfected fish populations and waters of California. With respect to MLTF, these measures include diverting Eagle Canyon Canal water into a new watertight pipeline at a point along the canal that is sufficiently far enough upstream of the spring area to prevent canal water from mixing with MLTF spring water and would discharge back into Eagle Canyon Canal at a point downstream of the spring area. Several options are under consideration for the Willow Springs facility. These include installing a disinfection facility at MLTF's Willow Springs facility, relocating Willow Springs to raise trout at an off-site facility, modifying operations at Willow Springs so that farm-raised trout are not distributed to other state waters, and acquiring the Willow springs aquaculture business. Mitigation options under consideration for the Darrah Springs State Fish Hatchery include either structural or operational modifications at the Asbury Diversion Dam or waterfall modifications farther downstream of the dam.

Chapter 4, "Affected Environment and Environmental Consequences," of this Draft SEIS/REIR, presents the new impacts and mitigation measures identified above in Section 4.1, Fish, and Section 4.4, Water Quality. No impacts related to land use were identified; however, the affected environment discussion under Section 4.6, Land Use, has been modified to define aquaculture as a form of agriculture. Additionally, a modified discussion of project-related effects on

MLTF as described under Socioeconomics in Section 4.16, Other NEPA Analyses, is included for review in this document. All new impacts associated with the mitigation measures are presented in this Draft SEIS/REIR in Section 4.2, Botanical, Wetland, and Wildlife Resources, and in Section 4.8, Aesthetics.

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Rectenwald, Harry. Environmental Scientist. California Department of Fish and Game. June 18, 2004—memorandum to Erin Vandehey of Jones & Stokes.

White, Wayne S., Field Supervisor, U.S. Fish and Wildlife Service; Lowell F. Ploss, Deputy Regional Director, U.S. Bureau of Reclamation; Donald B. Koch, Regional Manager, California Department of Fish and Game; and Michael Aceituno, Sacramento Area Office Supervisor, National Marine Fisheries Service. September 20, 2001—letter from the Four Agencies to Leland Davis, President of the Battle Creek Watershed Conservancy regarding a problem solving approach to address concerns voiced by the local community.

Executive Summary

The following executive summary is included in this Draft Supplemental EIS/Revised Draft EIR (Draft SEIR/REIR) to provide a context for the portions of the Draft EIS/EIR that are being recirculated in this document for public comment; however, the U.S. Department of the Interior, Bureau of Reclamation, and the State Water Resources Control Board are not soliciting comments on the executive summary or any sections from the Draft EIS/EIR that are not being recirculated as part of the Draft SEIS/REIR at this time.

Introduction

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and the California State Water Resources Control Board (State Water Board) are proposing the Battle Creek Salmon and Steelhead Restoration Project (Restoration Project). The proposed Restoration Project presents an opportunity to reestablish approximately 42 miles of prime salmon and steelhead habitat on Battle Creek, plus an additional 6 miles of habitat on its tributaries (Figure ES-1). Restoration would be accomplished primarily through the modification of the Battle Creek Hydroelectric Project (Federal Energy Regulatory Commission [FERC] Project No. 1121) (Hydroelectric Project) facilities and operations, including instream flow releases. Any proposed changes to the Hydroelectric Project trigger the need for the Pacific Gas and Electric Company (PG&E) to seek a license amendment from FERC.

Because of the federal and state actions associated with the Restoration Project, compliance with both the National Environmental Policy Act (NEPA) (42 U.S. Code [USC] 4321–4347) and the California Environmental Quality Act (CEQA) (Public Resources Code 21000 *et seq.*) is required. This joint environmental impact statement/environmental impact report (EIS/EIR) has been prepared to fulfill the requirements of both NEPA and CEQA. Because the Restoration Project is an action funded by the California Bay-Delta Authority (CBDA), which assists with the implementation of the CALFED Bay-Delta Program (CALFED), environmental review of the Draft EIS/EIR tiers from the CALFED Final Programmatic EIS/EIR (CALFED Bay-Delta Program 2000)¹. A table

¹ CBDA, an agency that assists with the implementation of the CALFED Program, was previously known as the CALFED Bay-Delta Program. Documents published before this name change took place are identified in this Draft SEIS/REIR as being prepared by the CALFED Bay-Delta Program (CALFED). In addition, the term CALFED is often used to refer to the CALFED Program also known as the CALFED Plan.

summarizing those impacts and their levels of significance can be found at the end of this document.

The purpose of the EIS/EIR is to disclose the impacts associated with the Restoration Project Proposed Action alternative and other project alternatives in order to reach a decision on the alternative to be implemented.

Reclamation, the lead federal agency, is responsible for ensuring overall NEPA compliance, and FERC, a cooperating federal agency, is responsible for ensuring that proposed changes to the Hydroelectric Project comply with NEPA prior to issuing a license amendment for the Hydroelectric Project. Because this FERC license requires Clean Water Act (CWA) (33 USC 1251 *et seq.*) Section 401 water quality certification from the State Water Board, the State Water Board is the state lead agency responsible for ensuring CEQA compliance.

Battle Creek Significance

In recent decades, California has experienced a statewide decline in its salmon and steelhead populations, particularly wild stocks. The decline has been attributed to multiple causes, most notably the development of federal, state, municipal, and private water projects to meet growing societal demands. In the Sacramento River drainage, large projects that provide domestic water supplies, irrigation, flood control, and power generation have in some cases irretrievably blocked anadromous fish access to natal streams. Actions to offset permanent stream habitat loss, such as establishing hatchery facilities, have maintained adequate stocks of some species. However, these actions have not been able to mitigate fully the loss of habitat used by species such as winter-run Chinook salmon, spring-run Chinook salmon, and steelhead that evolved life strategies to make use of the headwaters of major river systems in the Central Valley where natural barriers were absent.

The continuing decline in numbers of several runs of Chinook salmon and steelhead has resulted in their listing under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA) as threatened or endangered. Before the species' listing, resource agencies and interest groups were aware of the declines and had initiated efforts aimed at arresting the decline and rebuilding these populations to levels above thresholds of concern set by ESA and CESA. While a number of those efforts broadly address the issues, specific actions significant to the restoration of Battle Creek include the Upper Sacramento River Fisheries and Riparian Habitat Management Plan, the Central Valley Project Improvement Act (CVPIA), and the Ecosystem Restoration Program (ERP) of the CALFED Bay-Delta Accord.

A common strategy to arrest the decline of the various anadromous salmonid stocks has been to recognize that some habitat has been permanently lost and to focus on finding other suitable habitat that is, or could be, accessible to these species and that could be restored to offset the permanent losses. In pursuit of

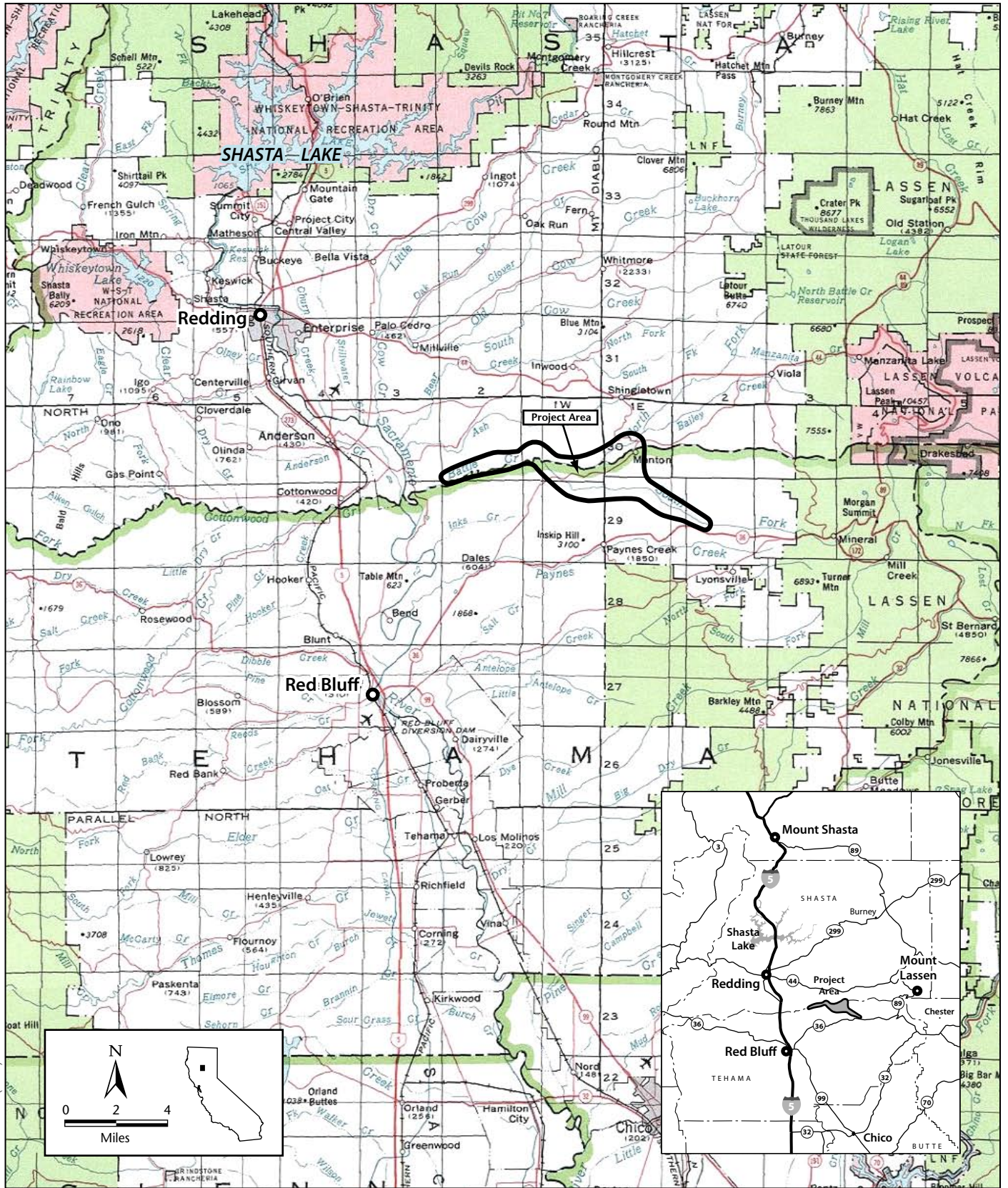


Figure ES-1
Location of the Battle Creek Salmon
and Steelhead Restoration Project

that strategy, the use of partnerships among governmental agencies, stakeholders, and the private sector is viewed as the most efficacious and timely means to identify these restoration opportunities and share the costs necessary to bring them to fruition. This approach has led to the identification of Battle Creek as an extraordinary opportunity and initiated a partnership to affect a comprehensive restoration project for the watershed.

When compared to other upper Sacramento River tributaries, Battle Creek offers an extraordinary restoration opportunity because of its geology, hydrology, habitat suitability for several anadromous species, historical water allocation, and land uses compatible with a restored stream environment. The geology of the Battle Creek watershed, located at the southern end of the Cascades, is primarily volcanic in nature. This type of terrain provides deeply incised, shaded, cool stream corridors. Its ruggedness limits the extent of human activities that typically occur around more readily accessible streams. While substantial quantities of water have been diverted for hydroelectric production since the early 1900s, other activities that could have potentially detrimental impacts on the stream and surrounding riparian environment have been effectively precluded by the nature of the terrain.

Perhaps the most important feature of Battle Creek supporting its potential for restoration is its hydrology, which results from the volcanic nature of the drainage. Seasonal precipitation does not rapidly run off the watershed as with streams situated farther south in the Sierra Nevada. Instead, a large portion of the annual water charge percolates through the underlying volcanic strata and emerges throughout the watercourse as cold springs that ensure a relatively high and stable base flow throughout the year. The naturally regulated stable base flow and cold water temperature offer drought resistance not found elsewhere in the present range of anadromous fish and ensure that the watershed can provide refugia for species when they may become distressed in other watersheds more vulnerable to drought conditions. These hydrologic and geologic attributes of Battle Creek are representative of streams permanently blocked by water development projects. In terms of a restoration opportunity, Battle Creek offers the natural habitat conditions conducive to the recovery of species no longer able to access all of their ancestral streams.

Other factors that contribute to the unique Battle Creek restoration opportunity include those below.

- Because of the lack of large on-stream storage reservoirs, creek geomorphic processes have not been affected substantially.
- Habitat suitable to support naturally occurring anadromous salmonid species exists in the watershed and will improve with the Restoration Project.
- Private ownership of lands bordering Battle Creek discourages potential human impacts on recovered species.

Development of a Memorandum of Understanding

The compatibility of continuing existing land uses and the limited impact on the Hydroelectric Project have facilitated the formation of partnerships supportive of restoration activities throughout the watershed. In particular, the formal partnership among federal and state agencies and PG&E to modify and reoperate the Hydroelectric Project is the key element in the restoration of stream reaches. The collaboration among these partners and the other stakeholders has been the hallmark in the development of the widely supported Restoration Project involving the hydroelectric facilities.

In early 1999 this cooperative effort led to the signing of an Agreement in Principle by Reclamation, the National Marine Fisheries Service (NOAA Fisheries), the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Game (DFG), and PG&E to pursue a restoration project for Battle Creek. In mid-1999, the parties signed a detailed, formal memorandum of understanding (MOU) (Appendix A of the Draft EIS/EIR) in conformance with the Agreement in Principle, allowing the release of \$28 million in CBDA funding for the agencies' responsibilities in the partnership. Since the signing of the MOU in 1999, costs have increased to \$62 million.²

The MOU called for contributions from PG&E in the form of forgone energy generation, pursuit of an amendment to the Hydroelectric Project's FERC license, transfers of certain water rights to the DFG, and a variety of other requirements. Flow determinations for the Restoration Project used in the MOU were initially developed by the Battle Creek Working Group (BCWG) biological technical team. The MOU also provided for the partial funding of adaptive management through a separate third-party funding agreement for an additional \$3 million. The plan discussed in the MOU is the Proposed Action alternative, which is evaluated along with other action alternatives in the Draft EIS/EIR. If an alternative other than the Proposed Action were selected, a new MOU must be negotiated. The ability to negotiate a new agreement for a restoration effort, and the amount of time that would be required to prepare a new MOU, would be uncertain.

Social Context

The Restoration Project has been supported in the community and is consistent and compatible with other related restoration initiatives in the watershed. The BCWG³ has served as a catalyst to explore various actions to carry forth the Restoration Project. The Battle Creek Watershed Conservancy supports the

² Additional CALFED funding is being sought. If additional funds are not made available for physical implementation of the project, it will be suspended until said additional funds are made available.

³ Since commencement of the Restoration Project, the BCWG has evolved to become the Greater Battle Creek Watershed Working Group; however, it is referred to as the BCWG throughout this document because the referenced activities took place before this change.

Restoration Project, pending the appropriate consideration and resolution of four agency issues:

- that USFWS convene and lead an emergency workshop to revisit the steelhead supplementation plan;
- that DFG reconsider the documented record and lead an effort to more clearly identify the goals, objectives, and priorities of the Restoration Project and make sure that those objectives are consistent with existing Restoration Project documentation, with the CALFED Programmatic Record of Decision, and that they are consistent throughout all elements of the final funding request to CBDA;
- that the winter-run recovery team complete the winter-run recovery plan or at least develop a stream-specific strategy for reestablishing a winter-run Chinook salmon population in Battle Creek and that reintroduction strategies are developed for other ESA-listed species (e.g., spring-run Chinook salmon and steelhead) in Battle Creek that can be implemented in anticipation of the Restoration Project Record of Decision; and
- that Reclamation facilitate the development and implementation of an adaptive management plan for Coleman National Fish Hatchery facilities and operations (Battle Creek Watershed Conservancy 2004).

Coordination of Restoration Project measures with broader local watershed management initiatives and those of a basinwide nature would ensure that restoration of the anadromous fishery in Battle Creek is maintained and would contribute significantly to population recovery goals.

Ecological Restoration Considerations

With partnerships coalescing, stakeholders pursued an evaluation of habitat needs in Battle Creek to restore the anadromous fishery through various forums. This evaluation focused on minimum instream flow requirements, management of those instream flows, upstream and downstream fish passage, restoration of stream function to mimic the natural hydrography in its undeveloped state, and adaptive management to monitor and refine restoration actions.

Power Production Considerations

To minimize the loss of clean, renewable power production from the Hydroelectric Project, careful consideration has been given to power production issues while meeting habitat needs. Key among these are instream flow requirements, maintaining existing system operating flexibility, designing new highly reliable facilities, ensuring that operating and maintenance requirements are reasonable, and achieving regulatory certainty to the extent feasible in light of the sensitivity of the anadromous species inhabiting the watershed.

Enhanced Benefits

The Restoration Project includes a number of other measures (beyond the physical issues discussed above) that would enhance and ensure environmental benefits. Among these are:

- transferring water rights at removed diversion dams to DFG,
- supporting the dedication of those rights for instream use,
- creating a Water Acquisition Fund to facilitate additional instream flows should the adaptive management process determine that it would be appropriate, and
- using funds from a third party to create an Adaptive Management Fund to accommodate modifications to hydroelectric production facilities or the acquisition of additional water for increased instream flow determined by the *Battle Creek Salmon and Steelhead Restoration Project Adaptive Management Plan* (Adaptive Management Plan) (Appendix D of the Draft EIS/EIR) protocols.

A total of \$6 million is funded for adaptive management through scheduled use of funds derived from a third party and the CBDA water acquisition program.

Purpose and Need

The purpose of the Restoration Project is to restore approximately 42 miles of habitat in Battle Creek and an additional 6 miles of habitat in its tributaries while minimizing the loss of clean and renewable energy produced by the Hydroelectric Project.

The Restoration Project will be accomplished through the modification of Hydroelectric Project facilities and operations, including instream flow releases. Habitat restoration would enable safe passage for naturally produced salmonids and would facilitate their growth and recovery in the Sacramento River and its tributaries. These salmonids include Central Valley spring-run Chinook salmon, state- and federally listed as threatened; Sacramento River winter-run Chinook salmon, state- and federally listed as endangered; and Central Valley steelhead, federally listed as threatened.

The timely restoration of a drought-resistant, spring-fed system like Battle Creek is especially important to species such as winter-run and spring-run Chinook salmon and steelhead, which are dependent on cool water stream habitats. Winter-run Chinook salmon is actually obligated to habitats like Battle Creek that have reaches kept constantly cool year-round by springs. Historically, winter-run Chinook salmon populations occurred in the creek, but at present, the only significant population of winter-run Chinook salmon occurs in the mainstem of the Sacramento River below Shasta Dam (Yoshiyama et al. 1998). This

section of the river is kept cool by releases from the reservoir. However, periods of extended drought could exhaust Shasta Lake's coldwater reserve, leaving the fish susceptible to reproductive failure. Because it is inevitable that serious drought conditions will again affect Shasta Lake, it is necessary to have drought resistant refugia available in the upper Sacramento River system for populations sensitive to drought conditions like winter-run and spring-run Chinook salmon.

The Restoration Project facilitates a timely restoration of the stream compared with waiting until 2026 for the expiration of the existing FERC license of the Hydroelectric Project. One of the most valuable aspects of hydropower is that it is renewable through annual snowmelt and rainfall. Hydropower's fuel, water, is replenished with precipitation. Unlike fossil fuel technologies, hydropower's fuel is reused because it is not consumed in the production of electricity. Hydropower produces no greenhouse gases or other air pollutants. The use of hydropower makes it possible to avoid the additional burning of natural gas or other fossil fuels, which in turn avoids the release of the air emissions carbon dioxide, nitrogen oxide, and carbon monoxide and the production of ozone or smog.

Project Objectives

Specific project objectives were developed to expand on the purposes of the Restoration Project and to help develop project alternatives. A variety of alternatives that propose various combinations of steps to be taken to improve fish habitat and fish passage (e.g., dam removal, flow increases) are described in this document. The project objectives are consistent with recovery plans for listed anadromous fish species. The alternatives evaluated in the Draft EIS/EIR are consistent with the following specific objectives:

- restore self-sustaining populations of Chinook salmon and steelhead by restoring their habitat in the Battle Creek watershed and access to it through a voluntary partnership with state and federal agencies, a third party donor(s), and PG&E;
- establish instream flow releases that restore self-sustaining populations of Chinook salmon and steelhead;
- remove selected dams at key locations in the watershed where the hydroelectric values were marginal as a result of increased instream flow;
- dedicate water diversion rights for instream purposes at dam removal sites;
- construct tailrace connectors and install failsafe⁴ fish screens and fish ladders to increase certainty about restoration components;

⁴ The MOU defines failsafe as a level of performance and reliability. Those standards are specified in Sections 2.10 and 2.11 of the MOU (Appendix A).

- restore stream function by structural improvements in the transbasin diversion to provide a stable habitat and guard against false attraction of anadromous fish away from their migratory destinations;
- avoid Restoration Project impacts on species of wildlife and native plants and their habitats to the extent practicable, minimize impacts that are unavoidable, and restore or compensate for impacts;
- minimize loss of clean and renewable energy produced by the Battle Creek Hydroelectric Project;
- implement restoration activities in a timely manner;
- develop and implement a long-term adaptive management plan with dedicated funding sources to ensure the continued success of restoration efforts; and
- avoid impacts on other established water users/third parties.

The Restoration Project is a proactive, cooperative undertaking among the public, interested parties, the BCWG, state and federal agencies, and PG&E to help restore the anadromous fishery in the Sacramento River watershed, where funding and restoration potential are uniquely promising.

Proposed Action and Alternatives

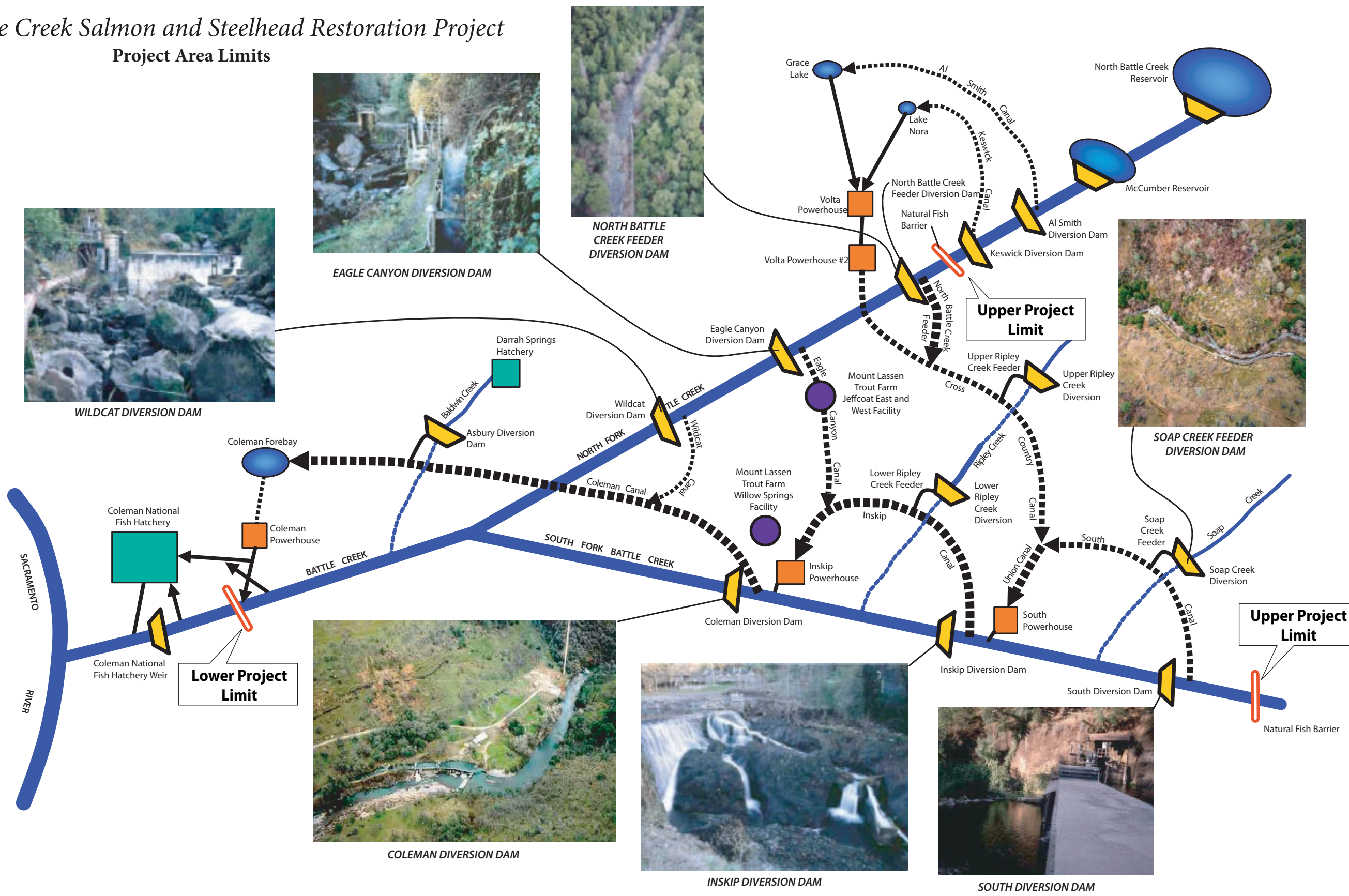
The Restoration Project consists of the portion of the Hydroelectric Project below the natural fish barriers (Figure ES-2). The upper project limit on North Fork Battle Creek is the absolute natural fish barrier above North Battle Creek Feeder Diversion Dam, 14 miles upstream of the confluence of North Fork and South Fork Battle Creek. The upper project limit on South Fork Battle Creek is the natural fish barrier above South Diversion Dam. The lower project limit is 9 miles upstream of the confluence of Battle Creek and the Sacramento River at a location just below the confluence of Coleman Powerhouse tailrace channel and the mainstem of Battle Creek.

Restoration efforts would occur at Hydroelectric Project sites along North Fork and South Fork Battle Creek and their tributaries, including North Battle Creek Feeder, Eagle Canyon, Wildcat, Coleman, Lower Ripley Creek Feeder, Inskip, Soap Creek Feeder, and South Diversion Dams; the Eagle Canyon, Wildcat, Inskip, and South Canals; and the Inskip and South Powerhouses. A means to access each project site (i.e., an existing or new access road or trail) would be needed during and after construction. Complete descriptions of each Restoration Project alternative are provided in Chapter 3 of the Draft EIS/EIR.

The Restoration Project provides the following modifications to the Hydroelectric Project that would achieve the restoration of ecological processes important to anadromous fish:

Battle Creek Salmon and Steelhead Restoration Project

Project Area Limits



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Figure ES-2
Restoration Project Facilities and Project Area Limits

- adjustments to Hydroelectric Project operations, including allowing cold spring water to reach natural stream channels, decreasing the amount of water diverted from streams, and decreasing the rate and manner in which water is withdrawn from the stream and returned to the canals and powerhouses following outages;
- modification of facilities such as fish ladders, fish screens and bypass facilities, diversion dams, and canals and powerhouse discharge facilities; and
- changes in the approach used to manage the Hydroelectric Project to balance hydroelectric energy production with habitat needs, using ecosystem-based management that protects and enhances fish and wildlife resources and other environmental values using adaptive management, reliable facilities, and water rights transfers, among other strategies.

The Restoration Project intends to restore the ecological processes that would allow the recovery of steelhead and Chinook salmon populations in Battle Creek and minimize the loss of clean and renewable electricity through modifications to the Hydroelectric Project.

Restoration Project Alternatives were evaluated and selected for further analysis in the Draft EIS/EIR by a multidisciplinary team of agencies and stakeholders, as noted above. The four action alternatives represent a reasonable range of alternatives that meet the purpose and need and objectives of the Restoration Project, are feasible, and avoid significant environmental impacts.

No Action Alternative

The No Action Alternative is required by NEPA (42 USC 4321–4347) and used as a baseline against which the action alternatives are compared. The No Action Alternative represents conditions under a “no salmon or steelhead restoration project” or “future without salmon and steelhead restoration project” alternative. The No Action Alternative is defined by the existing FERC license conditions for the Hydroelectric Project and other existing environmental and resource conditions. Instream flow releases under the No Action Alternative are the license-required continuous minimum flows of 3 cfs below dams in North Fork Battle Creek and 5 cfs below dams in South Fork Battle Creek. Existing fish ladders would be operated according to the conditions set forth in the Hydroelectric Project’s FERC license. It is assumed that fish screens would not be installed in existing diversion canals under the No Action Alternative. PG&E would continue to maintain license-required stream gages, documentation, and operations criteria consistent with the license requirements. PG&E also would continue to be responsible for all costs associated with this alternative.

Since 1995, Reclamation has maintained interim flow agreements⁵ with PG&E to maintain higher minimum instream flows until such time as a long-term restoration project can be implemented on Battle Creek. Terms of these agreements include increasing instream releases at Eagle Canyon and Coleman Diversion Dams to 30 cfs, suspending diversions at Wildcat Diversion Dam, and blocking downstream entrances to the fish passage facilities at Eagle Canyon and Coleman Diversions Dams. A major portion of the increased release at the Eagle Canyon site would be accomplished by bypassing the Eagle Canyon Springs collection facilities that discharge to the Eagle Canyon Canal. The interim flow agreements represent a short-term set of resource conditions that are not guaranteed to continue and are not conditions of the existing FERC license. Therefore, resource conditions established under the interim flow agreements are not included as part of the No Action Alternative. The resource conditions include reopening fish ladders now closed at Eagle Canyon and Coleman Diversion Dams under the interim agreement conditions. Wildcat Canal would be rewatered to convey water from North Fork Battle Creek to Coleman Canal, and minimum instream flow releases from the diversion dams would be returned to FERC license conditions.

Five Dam Removal Alternative—Proposed Action

The Five Dam Removal Alternative is the Proposed Action that modifies both facilities and operations to provide water management consistent with the descriptions in the MOU (Appendix A of the Draft EIS/EIR). Table ES-1 lists the individual components of the Five Dam Removal Alternative.

Table ES-1. Five Dam Removal Alternative Components

Site Name	Component
North Battle Creek Feeder Diversion Dam	55-cfs fish screen*
	Fish ladder*
	Minimum instream flow set for North Battle Creek Feeder reach ranges from 47 to 88 cfs
	Access road construction and improvements
Eagle Canyon Diversion Dam	70-cfs fish screen*
	Fish ladder*
	Removal of a segment of the Eagle Canyon Spring Collection Facility
	Minimum instream flow set for Eagle Canyon reach ranges from 35 to 46 cfs
	Improvement of existing access trail

⁵ The interim agreements between PG&E and Reclamation are discussed in greater detail in Chapter 6, “Related Projects,” of the Draft EIS/EIR.

Site Name	Component
Wildcat Diversion Dam	Dam and appurtenant facilities removed Improvement of access roads and trail
South Diversion Dam	Dam and appurtenant facilities removed Access road improvements
Soap Creek Feeder Diversion Dam	Dam and appurtenant facilities removed Access road improvements
Inskip Diversion Dam and South Powerhouse	220-cfs fish screen* Fish ladder* Construction of South Powerhouse and Inskip Canal connector (tunnel) Minimum instream flow set for Inskip reach ranges from 40 to 86 cfs Access road construction and improvements
Lower Ripley Creek Feeder Diversion Dam	Dam and appurtenant facilities removed Access road improvements
Coleman Diversion Dam and Inskip Powerhouse	Dam removed Construction of Inskip Powerhouse and Coleman Canal connector Inskip Powerhouse bypass replaced Access road improvements
Asbury Diversion Dam	Reoperate Modified to prevent upstream fish passage Minimum instream flow set for Baldwin Creek at 5 cfs

Notes:

cfs = cubic feet per second.

* Reliability and performance standards for fish ladders and fish screens are generally described in the 1999 MOU, Sections 2.10 and 2.11, respectively (Appendix A of the Draft EIS/EIR). More specific information on fish ladders and fish screens is presented in Table 21 and Table 22, respectively, in the Adaptive Management Plan (Terraqua, Inc. 2004).

Under the Five Dam Removal Alternative, Wildcat, South, Soap Creek Feeder, Lower Ripley Creek Feeder, and Coleman Diversion Dams would be removed. In addition, fish screens and fish ladders would be installed at North Battle Creek Feeder, Eagle Canyon, and Inskip Diversion Dams. At each site, access roads would be constructed or existing roads and trails would be improved to provide access for construction and maintenance activities. Tailrace connectors would be installed to convey water directly from the Inskip and South Powerhouses to downstream canals to meet several fishery restoration goals. A penstock bypass facility would be replaced at the Inskip Powerhouse, as well. Springs at Eagle Canyon, Soap Creek/Bluff, Lower Ripley, and Darrah Springs areas would release to adjacent stream sections under this alternative. Asbury Diversion Dam

would be modified to prevent upstream fish passage, and a low-level outlet would be left open to meet the minimum instream flow requirements.

The new tailrace connectors directing water from Inskip and South Powerhouses to downstream canals would maintain stable stream habitat, which would improve the ability of spawning fish to return to the streams where they were hatched. Water leaving the South Powerhouse would be conveyed through a new connector (a free-flow tunnel) and outlet works to the Inskip Canal. Water leaving the Inskip Powerhouse would be conveyed through a new connector (a full-flow buried pipe) and outlet works to the Coleman Canal. The current bypass facilities at both the South and Inskip Powerhouses do not prevent the mixing of North Fork and South Fork Battle Creek waters. The South Powerhouse bypass would be integrated with the new tailrace connector to prevent the mixing of these waters. The Inskip Powerhouse bypass would be replaced with a new pipeline and chute system that would prevent the mixing of these waters and ensure full-flow delivery of water to the Coleman Canal.

Construction Schedule

Construction of the Proposed Action is anticipated to begin in spring 2006 and end by summer 2009. The construction schedule for each project site follows:

- North Battle Creek Feeder Diversion Dam—Begin construction in May 2006 and end by August 2007.
- Eagle Canyon Diversion Dam—Begin construction in May 2006 and end by August 2007.
- Wildcat Diversion Dam—Begin construction in July 2006 and end by November 2006.
- South Diversion Dam—Begin construction in August 2008 and complete construction during January 2009.
- Soap Creek Feeder—Begin construction in August 2008 and end by October 2008.
- Inskip Diversion Dam/South Powerhouse—Begin construction in May 2006 and end by July 2009.
- Lower Ripley Creek Feeder Diversion Dam—Complete construction during June 2007.
- Coleman Diversion Dam/Inskip Powerhouse—Begin construction in May 2006 and end by July 2009.

Adaptive Management Plan

Adaptive management is an integral component of the Five Dam Removal Alternative. Adaptive management is a process that (1) uses monitoring and research to identify and define problems; (2) examines various alternative strategies and actions for meeting measurable biological goals and objectives; and (3), if necessary, makes timely adjustments to strategies and actions based on best scientific and commercial information available.

The primary reason for using an adaptive management process is to allow changes to restoration strategies or actions that may be needed to achieve the long-term goals and/or biological objectives and to ensure the likelihood of the survival and recovery of naturally spawning Chinook salmon and steelhead. Under adaptive management, restoration activities would be monitored and analyzed to determine whether they are producing the desired results (i.e., properly functioning habitats).

As implementation proceeds, results would be monitored and assessed. If the anticipated goals and objectives are not being achieved, adjustments in the restoration strategy or actions would be considered through the final Adaptive Management Plan (Appendix D of the Draft EIS/EIR), which has been developed consistent with relevant CBDA guidelines (Chapter 3 in CALFED Bay-Delta Program 1999) and the MOU (Appendix A of the Draft EIS/EIR). The Water Acquisition Fund and Adaptive Management Fund, which are elements of adaptive management, would provide funding for potential changes to Restoration Project actions that result from the application of the Adaptive Management Plan.

Facility Monitoring Plan

A detailed facility monitoring plan, prepared by PG&E in consultation with the other parties to the MOU, will be submitted to FERC as part of the license amendment application for the Five Dam Removal Alternative; the draft plan may be found in Appendix B of the Action Specific Implementation Plan (ASIP) (Jones & Stokes 2004) prepared for the Restoration Project. The monitoring plan delineates a program related to the Proposed Action's components that expands on typical FERC license monitoring requirements. PG&E would perform and assume the costs for the following facility monitoring:

- Verifying compliance with the FERC license at the various outlet and spillway works for North Battle Creek Feeder, Eagle Canyon, Inskip, and Asbury (Baldwin Creek) Diversion Dams by operating properly calibrated remote sensing devices that continuously measure and record total flow and the fluctuation of stage immediately below each dam during all operations.
- Identifying debris problems at the fish ladders at North Battle Creek Feeder, Eagle Canyon, and Inskip Diversion Dams by operating properly calibrated remote sensing devices that continuously monitor water surface elevations at

the tops and bottoms of the ladders. In addition, PG&E would continuously operate a calibrated automated fish counter or an underwater video camera to document fish movement through the ladder during the first 3 years of operation or as otherwise agreed upon by the parties to the MOU.

- Identifying instances of plugging at the fish screens at North Battle Creek Feeder, Eagle Canyon, and Inskip Diversion Dams by operating properly calibrated remote sensing devices that continuously monitor water surface elevation differences on the inlet and outlet sides of the screens. If monitoring reports a critical malfunction on the screen, the failsafe feature would shut down the inlet to the canal until the situation has been remedied.
- Recording operation of waste gates, overpours, and spillways during dewatering of the conveyance for maintenance or to release excess water during emergencies.

PG&E will perform all the necessary maintenance and replacement on the fish screens, fish ladders, and stream gates as indicated by the monitoring, once Reclamation has released these structures for operation.

Water Rights

PG&E's water diversion rights associated with all five dams removed in this alternative would be transferred to DFG. For example, when the rights for the Soap Creek diversion are transferred, all rights and obligations associated with that diversion would be transferred, including but not limited to, PG&E's Bluff Springs rights and obligations, which are subject to an agreement regarding senior water rights for Hazen Ditch (Bluff Springs-Hazen Ditch Water Users Agreement, dated May 31, 1988). PG&E would execute the necessary documents to transfer these water diversion rights when it receives the associated portions of the funding specified in the MOU. DFG agrees that the transferred water rights would not be used to increase prescribed instream flow releases above the amounts specified in the MOU or developed pursuant to the Adaptive Management Plan. It further agrees that the rights would not be used adversely against remaining Hydroelectric Project upstream or downstream diversions until the FERC license is abandoned, at which time the limitation regarding transferred water rights would no longer apply.

Under this alternative, PG&E agrees that it will not use its riparian rights tied to lands associated with components of this alternative to decrease prescribed instream flow releases below the amounts specified in this alternative or developed pursuant to the Adaptive Management Plan. PG&E agrees that any deed transferring such riparian land or rights will contain this restriction.

PG&E and DFG would jointly file a petition with the State Water Board pursuant to Section 1707 of the California Water Code to dedicate to instream uses the water diversion rights associated with all removed dams in this alternative.

Water Acquisition Fund

An important component of this alternative is the Water Acquisition Fund. Its purpose is to establish a ready source of money that may be needed for any future purchases of additional instream flow releases in Battle Creek. These releases may be recommended under the Adaptive Management Plan during the 10-year period following the initiation of prescribed instream flow releases. The fund shall be used solely to purchase additional environmentally beneficial instream flow releases.

The Water Acquisition Fund account would be funded with CBDA–approved federal funds administered by the resource agencies, following consultation with appropriate interested parties. Reclamation would commit \$3 million to an account or subaccount for the Water Acquisition Fund.

Protocols would be developed by the adaptive management technical team to identify environmentally beneficial flow changes for anadromous fish under the Adaptive Management Plan. If the adaptive management technical team or the adaptive management policy team cannot reach a consensus regarding flow changes, the resource agencies (collectively) and PG&E would each choose a person, and together those two persons would choose a single third party to act as mediator. If consensus through mediation still were not achieved, the resource agencies and PG&E would reserve their rights to petition FERC to resolve the subject action. The resource agencies and PG&E would assume their respective costs for any FERC process.

Biological and Environmental Monitoring Fund

In the 1999 MOU, Reclamation, NOAA Fisheries, USFWS, DFG, and PG&E agreed that USFWS and/or DFG, or their designated representatives, will perform biological and environmental monitoring in the Battle Creek watershed and Restoration Project area to address the overall status of anadromous fish populations and related ecosystem health. This monitoring will be performed using available funding from Central Valley fishery restoration funding sources, including, but not limited to, the \$1,000,000 federal funding allocation for the Restoration Project described in Section 10.2, CALFED’s Comprehensive Monitoring Assessment Research Program, and CVPIA’s Comprehensive Assessment and Monitoring Program. Reclamation, NOAA Fisheries, USFWS, DFG, and PG&E understand and agree that if sufficient funding is not available through the above sources, they will jointly pursue other appropriate funding sources.

Adaptive Management Fund

The Adaptive Management Fund would implement actions developed under the Adaptive Management Plan. The purpose of the Adaptive Management Fund is

to provide a readily available source of money to be used for possible future changes in the Restoration Project. The fund shall be used only for Restoration Project purposes directly associated with the Hydroelectric Project, including compensation for prescribed instream flow release increases after the Water Acquisition Fund has been exhausted or terminated. The Adaptive Management Fund shall not be used to fund monitoring or construction cost overruns.

The Adaptive Management Fund, in the amount of \$3 million, will be made available to PG&E and the resource agencies by a third-party donor to fund those actions developed pursuant to the Adaptive Management Plan. The third-party donor shall deposit that amount in an interest-bearing account pursuant to a separate agreement to be developed jointly by the resource agencies, PG&E, and the third-party donor. These three parties jointly will develop account disbursement instructions.

The three parties agree that (1) interest on the funds in the Adaptive Management Fund will accrue to the account and shall be applied to changes in the Restoration Project adopted pursuant to the Adaptive Management protocols and (2) all uncommitted funds in the Adaptive Management Fund will revert to the third-party donor at the end of the current term of the license for the Hydroelectric Project. USFWS shall request disbursements from the Adaptive Management Fund in writing, based on identified protocols.

Protocols to designate environmentally beneficial adaptive management actions to be funded from the Adaptive Management Fund pursuant to the Adaptive Management Plan are detailed in the plan.

The protocols for funding prescribed instream flow increases will be the same as for the Water Acquisition Fund described in Section 9.2 A 3 of the MOU (Appendix A of the Draft EIS/EIR). The protocols for funding facility modifications will also be the same as that described in Section 9.2 A 3, with two exceptions: (1) no interim action will be implemented prior to any required FERC approval of a license amendment or other necessary action by FERC, and (2) for all actions resolved by FERC in which PG&E is in the minority opinion (opposing a proposed action expenditure), the Adaptive Management Fund will contribute 60% of any resulting facility modification cost; if PG&E is in the majority opinion (in support of a proposed action expenditure), the Adaptive Management Fund will contribute 100% of any resulting facility modifications.

No Dam Removal Alternative

The No Dam Removal Alternative would provide new fish screens and fish ladders and include access road/trail construction or improvements at each project site at North Battle Creek Feeder, Eagle Canyon, Wildcat, South, Inskip, and Coleman Diversion Dams. The final facility configurations and instream flows for this alternative were derived from the Anadromous Fish Restoration Program (AFRP) (U.S. Fish and Wildlife Service 2001a) and were developed

specifically for the restoration of Battle Creek fall- and late fall–run Chinook salmon and steelhead, but not specifically for Battle Creek winter-run or spring-run Chinook salmon. Table ES-2 summarizes the components of the No Dam Removal Alternative.

Table ES-2. No Dam Removal Alternative Components

Site Name	Component
North Battle Creek Feeder Diversion Dam	55-cfs fish screen Fish ladder Monthly minimum flow release ranges from 30 to 40 cfs Access road construction and improvements
Eagle Canyon Diversion Dam	70-cfs fish screen Fish ladder Monthly minimum flow release ranges from 30 to 50 cfs Improvement of existing access trail
Wildcat Diversion Dam	20-cfs fish screen Fish ladder Monthly minimum flow release ranges from 30 to 50 cfs Improvement of access roads and trail
South Diversion Dam	90-cfs fish screen Fish ladder Monthly minimum flow release ranges from 20 to 30 cfs Access road improvements
Inskip Diversion Dam	220-cfs fish screen Fish ladder Monthly minimum flow release ranges from 30- 40 cfs Access road construction and improvements
Coleman Diversion Dam	340-cfs fish screen Fish ladder Monthly minimum flow release ranges from 30 to 50 cfs Access road improvements
Instream Flows	Minimum instream flows below selected dams would be increased
<p>Note: cfs = cubic feet per second.</p>	

Under this alternative, facility improvements would occur at North Battle Creek Feeder, Eagle Canyon, Wildcat, South, Inskip, and Coleman Diversion Dams.

No modifications would be made to Lower Ripley Creek Feeder, Soap Creek Feeder, or Asbury Pump Diversion Dam facilities, and no diversion dams would be removed. No powerhouse tailrace connectors or penstock bypass facilities, which prevent mixing of North Fork and South Fork Battle Creek flows, would be constructed. Springs at Eagle Canyon, Soap Creek/Bluff, Lower Ripley, and Darrah Springs areas would not release to adjacent stream sections under this alternative.

This alternative would also include elements of adaptive management consistent with the overarching principles of adaptive management set forth by the CBDA Science Program. This alternative does not include an adaptive management fund, facilities monitoring and maintenance plan, dedicated water rights, or a water acquisition fund as established in the Five Dam Removal Alternative.

Six Dam Removal Alternative

The Six Dam Removal Alternative would include the facility changes shown in Table ES-3.

Table ES-3. Six Dam Removal Alternative Components

Site Name	Component
North Battle Creek Feeder Diversion Dam	55-cfs fish screen
	Fish ladder
	Monthly minimum flow release ranges from 47 to 88 cfs
	Access road construction and improvements
Eagle Canyon Diversion Dam	Dam and appurtenant facilities removed
	Improvement of existing access trail
Wildcat Diversion Dam	Dam and appurtenant facilities removed
	Improvement of access roads and trail
South Diversion Dam	Dam and appurtenant facilities removed
	Access road improvements
Inskip Diversion Dam and South Powerhouse	220-cfs fish screen
	Fish ladder
	Monthly minimum flow release ranges from 40 to 86 cfs
	Construction of South Powerhouse and Inskip Canal connector (tunnel)
	Access road construction and improvements

Site Name	Component
Coleman Diversion Dam and Inskip Powerhouse	Dam removed Construction of Inskip Powerhouse and Coleman Canal connector Inskip Powerhouse bypass replaced Access road improvements
Lower Ripley Creek Feeder Diversion Dam	Dam and appurtenant facilities removed Access road improvements
Soap Creek Feeder Diversion Dam	Dam and appurtenant facilities removed Access road improvements
Asbury Diversion Dam	Reoperate Modified to prevent upstream fish passage Minimum instream flow set for Baldwin Creek at 5 cfs

Note:

cfs = cubic feet per second.

The major physical difference between this alternative and the Five Dam Removal Alternative is that this alternative includes the removal of Eagle Canyon Diversion Dam and its appurtenant facilities. New tailrace connectors at South and Inskip Powerhouses, and a new bypass facility at the Coleman Diversion Dam/Inskip Powerhouse site would be constructed similar to that described for the Five Dam Removal Alternative to prevent the mixing of North Fork and South Fork Battle Creek flows. Springs at Eagle Canyon, Soap Creek/Bluff, Lower Ripley, and Darrah Springs areas would release to adjacent stream sections under this alternative. Minimum instream flow requirements are consistent with the 1999 MOU (Appendix A of the Draft EIS/EIR). This alternative would also include elements of adaptive management consistent with the overarching principles of adaptive management set forth by the CBDA Science Program. This alternative does not include a facility monitoring and maintenance plan, dedicated water rights, water acquisition fund, or an adaptive management fund, as established in the Five Dam Removal Alternative.

Three Dam Removal Alternative

The Three Dam Removal Alternative would include the facility changes shown in Table ES-4.

Table ES-4. Three Dam Removal Alternative Components

Site Name	Component
North Battle Creek Feeder Diversion Dam	55-cfs fish screen Fish ladder Monthly minimum flow release ranges from 30 to 40 cfs Access road construction and improvements
Eagle Canyon Diversion Dam	Dam and appurtenant facilities removed Improvement of existing trail
Wildcat Diversion Dam	Dam and appurtenant facilities removed Improvement of access roads and trail
South Diversion Dam	90-cfs fish screen Fish ladder Monthly minimum flow release ranges from 20 to 30 cfs Access road improvements
Inskip Diversion Dam and South Powerhouse	220-cfs fish screen Fish ladder Monthly minimum flow release ranges from 30 to 40 cfs Construction of South Powerhouse and Inskip Canal connector (flow separator channel) Access road construction and improvements
Coleman Diversion Dam and Inskip Powerhouse	Dam removed Construction of Inskip Powerhouse and Coleman Canal connector Inskip Powerhouse Bypass replacement Access road improvements
Asbury Diversion Dam	Reoperate Modified to prevent upstream fish passage Minimum instream flow set for Baldwin Creek at 10 cfs

Note:
cfs = cubic feet per second.

The major physical differences between this alternative and the Five Dam Removal Alternative are the removal of Eagle Canyon Diversion Dam and its appurtenant facilities; the retention of South, Lower Ripley Creek Feeder, and Soap Creek Feeder Diversion Dams and their appurtenant facilities; the addition of a fish screen and ladder facility at South Diversion Dam; and elimination of the penstock bypass facility at Inskip Powerhouse. New tailrace connectors at South and Inskip Powerhouses and a new bypass facility at the Coleman

Diversion Dam/Inskip Powerhouse site would be constructed similar to that described for the Five Dam Removal Alternative to prevent the mixing of North Fork and South Fork Battle Creek flows. Springs at Eagle Canyon and Darrah Springs areas would release to adjacent stream sections under this alternative. Minimum instream flow requirements are consistent with AFRP requirements for Battle Creek. This alternative will also include elements of adaptive management consistent with the overarching principles of adaptive management set forth by the CBDA Science Program. This alternative also does not include facility monitoring and maintenance plan, dedicated water rights, water acquisition fund, or an adaptive management fund, as described for the Five Dam Removal Alternative.

Summary of Impacts

A list of impacts associated with each alternative as presented in this Draft SEIS/REIR is provided in Table ES-5. For the list of impacts associated with each alternative as presented in the July 2003 Draft EIS/EIR, please see Table ES-5 in that document (Jones & Stokes 2003).

No Action Alternative

Implementation of the No Action Alternative would not result in new environmental impacts in the Restoration Project study area. This alternative assumes that hydroelectric facilities, including fish ladders, would be operated in accordance with FERC regulations and the existing minimum flows. The existing project operations under the No Action Alternative would continue to limit the recovery of anadromous species in Battle Creek as identified in the Purpose and Need. Beneficial effects on fish habitat and populations would not occur under this alternative, and construction-related impacts on fish, terrestrial biological resources, wetlands and historic resources associated with Restoration Project alternatives would not occur in the Battle Creek watershed.

Implementing the No Action Alternative would reduce the need to upgrade access roads to hydroelectric facilities and would avoid visual resource effects of the Restoration Project between South Powerhouse and Inskip Diversion Dam. No impacts on land use, recreation, local traffic or transportation systems, noise, or air quality would result under this alternative.

Five Dam Removal Alternative—Proposed Action

Implementation of the Proposed Action would result in substantial increases in spawning and rearing habitat and production of fry and juvenile life stages for Chinook salmon and steelhead. For most life stages of steelhead, spring-run Chinook salmon, winter-run Chinook salmon, and late fall-run Chinook salmon, capacity and production indices for the Proposed Action are several times greater

than the corresponding indices for the No Action Alternative (Section 4.1, Fish, in the Draft EIS/EIR). The higher indices indicate the potential for a substantial increase in the number of fry and juvenile fish potentially supported by the higher minimum flow requirements and cooler water temperature conditions.

Additional benefits would result from improvements in fish passage from dam removal and more effective fish ladders and intake screens on remaining dams and diversions. The Proposed Action would also eliminate discharge of North Fork Battle Creek water to South Fork Battle Creek and reduce the number of Hydroelectric Project facilities in the stream channel. The restored hydrologic function would facilitate passage of adult and juvenile anadromous fish and reestablish the natural continuity of habitat use.

Construction of Proposed Action improvements could result in some short-term impacts on habitat and fish survival that would be mitigated with standard construction period mitigation measures. In addition, it was determined that implementation of the Proposed Action could potentially adversely affect fish populations by increasing their risk of exposure to the infectious hematopoietic necrosis (IHN) virus as a result of stocking California waters with potentially infected fish from Mount Lassen Trout Farm's (MLTF's) Jeffcoat and Willow Springs facilities, as well as the Darrah Springs State Fish Hatchery. Similarly, implementation of the Proposed Action could potentially adversely affect the beneficial uses of California waters by increasing risk of contamination with the IHN virus. However, mitigation at MLTF's Jeffcoat and Willow Springs facilities and the Asbury Diversion Dam site will be implemented to reduce these impacts to a less-than-significant level.

The Proposed Action would also provide substantial benefits to amphibian habitat by reducing adverse effects of flow fluctuations and by increasing minimum instream flows. Significant construction-related impacts on riparian and wetland habitat would result from Proposed Action improvements that could be reduced by avoiding habitat during construction and replacing temporarily removed habitat on site. Potential habitat disturbances to a number of special-status wildlife species, including valley elderberry longhorn beetle, foothill yellow-legged frog, California red-legged frog, northwestern pond turtle, yellow-breasted chat, nesting raptors, black rails, and bats, are considered significant. These significant impacts would be reduced to less-than-significant levels by identifying habitat, avoiding occupied habitat areas during construction, and implementing appropriate mitigation measures to minimize impacts when occupied habitat cannot be avoided.

Construction and operation of the Proposed Action associated with South Powerhouse and Inskip Diversion Dam improvements would result in a significant and unavoidable aesthetic impact on the Oasis Springs Lodge and the Rocky Springs Ranch. Mitigation measures are recommended to partially reduce the aesthetic effect on these facilities. Similarly, recreational use and public access to Battle Creek in the vicinity of construction zones could be affected during the construction period. Mitigation measures are recommended to reduce construction-period effects on recreation resources.

Table ES-5. Summary of New Impacts, Levels of Significance, and Recommended Mitigation Measures Presented in This Draft Supplemental EIS/Revised EIR for the No Action Alternative, Five Dam Removal Alternative (Proposed Action), No Dam Removal Alternative, Six Dam Removal Alternative, and Three Dam Removal Alternative Page 1 of 10

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
FISH				
Five Dam Removal Alternative (Proposed Action)				
Impact 4.1-8. Increased risk of a serious or catastrophic fish disease spreading from Battle Creek to fish communities throughout the state through stocking with MLTF and Darrah Springs State Fish Hatchery fish.	Significant	<p><i>Jeffcoat:</i></p> <p>A pipeline will be installed to bypass the Jeffcoat facilities to prevent the potential contamination of MLTF’s farmed trout with serious or catastrophic fish disease from Battle Creek water that is conveyed in Eagle Canyon Canal. Four pipeline alignment alternatives are proposed in this Draft SEIS/REIR.</p> <p><i>Willow Springs:</i></p> <p>Option A—A water treatment facility will be installed at the Willow Springs facility.</p> <p>Option B—Willow Springs will be relocated to raise trout at an off-site facility where the water source is not hydrologically connected to anadromous waters.</p> <p>Option C—MLTF will modify their operations at the Willow Springs facility to ensure that farmed trout are not distributed offsite.</p> <p>Option D—The Willow Springs aquaculture business will be acquired and the leasehold interest considered.</p> <p><i>Asbury Diversion Dam:</i></p> <p>Option A—An appropriate fish barrier will be constructed at Asbury Diversion Dam by structural or operational modification.</p> <p>Option B—An existing waterfall located downstream of Asbury Diversion Dam will be modified to prevent fish passage up to the dam.</p>	Less than significant	4-2 through 4-13

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
No Dam Removal Alternative				
Impact 4.1-27. Increased risk of a serious or catastrophic fish disease spreading from Battle Creek to fish communities throughout the state through stocking with MLTF and Darrah Springs State Fish Hatchery fish (similar to Impact 4.1-8).	Significant	Same mitigation measures as recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs MLTF facilities and Asbury Diversion Dam.	Less than significant	4-18
Six Dam Removal Alternative				
Impact 4.1-45. Increased risk of a serious or catastrophic fish disease spreading from Battle Creek to fish communities throughout the state through stocking with MLTF and Darrah Springs State Fish Hatchery fish (similar to Impact 4.1-8).	Significant	Same mitigation measures as recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs MLTF facilities and Asbury Diversion Dam.	Less than significant	4-18
Three Dam Removal Alternative				
Impact 4.1-65. Increased risk of a serious or catastrophic fish disease spreading from Battle Creek to fish communities throughout the state through stocking with MLTF and Darrah Springs State Fish Hatchery fish (similar to Impact 4.1-8).	Significant	Same mitigation measures as recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs MLTF facilities and Asbury Diversion Dam.	Less than significant	4-19

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
BOTANICAL, WETLAND, AND WILDLIFE RESOURCES				
Five Dam Removal Alternative (Proposed Action)				
Impact 4.2-5. Potential disturbance to valley elderberry longhorn beetle habitat.	Significant	Reclamation will mitigate impacts on valley elderberry longhorn beetle according to standard valley elderberry longhorn beetle compensation guidelines (U.S. Fish and Wildlife Service 1999) through Section 7 consultation with the U.S. Fish and Wildlife Service. In general, the guidelines require compensation for direct and indirect impacts in the form of transplanting shrubs and planting seedling elderberry shrubs at a secure mitigation site. Avoidance of impacts requires a 100-foot no-disturbance buffer between the shrub and construction activities.	Less than significant	4-27
Impact 4.2-6. Potential disturbance to California red-legged frogs and their habitat.	Significant	Reclamation will conduct U.S. Fish and Wildlife Service protocol-level surveys before construction begins to determine the presence of California red-legged frogs. If protocol-level surveys do not detect the presence of California red-legged frogs, Reclamation will implement the following mitigation measures at the Asbury Diversion Dam project site and the Jeffcoat and Willow Springs mitigation sites to avoid and minimize impacts on the species and its habitat: request a qualified biologist to conduct preconstruction surveys and instruct all project personnel in worker awareness training, limit activities to after October 15 or the onset of the rainy season, confine vehicles to existing roadways, request a qualified biologist to ensure that the route for any backhoe equipment is clear, cease construction activities until any red-legged frogs are relocated, and restore any disturbed habitat.	Less than significant	4-29

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
Impact 4.2-11. Potential disturbance to nesting California black rails in emergent marsh.	Significant	A qualified biologist will conduct a tape-playback survey to determine presence of California black rails in the emergent marsh near the proposed Eagle Canyon pipeline mitigation; construction activities will be seasonally restricted to avoid disturbance during the rails' nesting season.	Less than significant	4-31
Impact 4.2-13. Possible loss of woody riparian vegetation along PG&E canals.	Less than Significant	None required.	Not applicable	4-32
Impact 4.2-15. Potential disturbance of annual grassland habitat.	Less than significant	None required.	Not applicable	4-32
No Dam Removal Alternative				
Impact 4.2-24. Potential disturbance to valley elderberry longhorn beetle habitat (similar to Impact 4.2-5).	Significant	Same mitigation measure as recommended for Impact 4.2-5.	Less than significant	4-32
Impact 4.2-25. Potential disturbance to California red-legged frogs and their habitat (similar to Impact 4.2-6).	Significant	Same mitigation measure as recommended for Impact 4.2-6.	Less than significant	4-33
Impact 4.2-30. Potential disturbance to California black rails in emergent marsh (similar to Impact 4.2-11).	Significant	Same mitigation measure as recommended for Impact 4.2-11.	Less than significant	4-33
Impact 4.2-32. Possible loss of woody riparian vegetation along PG&E canals (similar to Impact 4.2-13).	Less than significant	None required.	Not applicable	4-33
Impact 4.2-34. Potential disturbance of annual grassland habitat (similar to Impact 4.2-15).	Less than significant	None required.	Not applicable	4-33

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
Six Dam Removal Alternative				
Impact 4.2-42. Potential disturbance to California red-legged frogs and their habitat (similar to Impact 4.2-6).	Significant	Same mitigation measure as recommended for Impact 4.2-6.	Less than significant	4-34
Impact 4.2-47. Potential disturbance to nesting California black rails in emergent marsh (similar to Impact 4.2-11).	Significant	Same mitigation measure as recommended for Impact 4.2-11.	Less than significant	4-34
Impact 4.2-49. Possible loss of woody riparian vegetation along PG&E canals (similar to Impact 4.2-13).	Less than Significant	None required.	Not applicable	4-34
Impact 4.2-51. Potential disturbance of annual grassland habitat (similar to Impact 4.2-15).	Less than significant	None required.	Not applicable	4-34
Three Dam Removal Alternative				
Impact 4.2-61. Potential disturbance to California red-legged frogs and their habitat (similar to Impact 4.2-6).	Significant	Same mitigation measure as recommended for Impact 4.2-6.	Less than significant	4-35
Impact 4.2-66. Potential disturbance to nesting California black rails in emergent marsh (similar to Impact 4.2-11).	Significant	Same mitigation measure as recommended for Impact 4.2-11.	Less than significant	4-35
Impact 4.2-68. Potential loss of woody riparian vegetation along PG&E canals (similar to Impact 4.2-13).	Less than Significant	None required.	Not applicable	4-35
Impact 4.2-70. Potential disturbance of annual grassland habitat (similar to Impact 4.2-15).	Less than significant	None required.	Not applicable	4-35

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
WATER QUALITY				
Five Dam Removal Alternative (Proposed Action)				
Impact 4.4-3. Potential reduction in beneficial uses of waters used at MLTF and Darrah Springs State Fish Hatchery.	Significant	Same mitigation measure as recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs MLTF facilities and Asbury Diversion Dam.	Less than significant	4-37
Impact 4.4-4. Potential reduction in beneficial uses of California waters from the distribution of infected MLTF and Darrah Springs State Fish Hatchery fish.	Significant	Same mitigation measure as recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs MLTF facilities and Asbury Diversion Dam.	Less than significant	4-39
No Dam Removal Alternative				
Impact 4.4-10. Potential reduction in beneficial uses of waters used at MLTF and Darrah Springs State Fish Hatchery (similar to Impact 4.4-3).	Significant	Same mitigation measure as recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs MLTF facilities and Asbury Diversion Dam.	Less than significant	4-40
Impact 4.4-11. Potential reduction in beneficial uses of California waters from the distribution of infected MLTF and Darrah Springs State Fish Hatchery fish (similar to Impact 4.4-4).	Significant	Same mitigation measure as recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs MLTF facilities and Asbury Diversion Dam.	Less than significant	4-40
Six Dam Removal Alternative				
Impact 4.4-14. Potential reduction in beneficial uses of waters used at MLTF (similar to Impact 4.4-3).	Significant	Same mitigation measure as recommended for Impact 4.1-8 for the Willow Springs MLTF facility and Asbury Diversion Dam.	Less than significant	4-40
Impact 4.4-15. Potential reduction in beneficial uses of California waters from the distribution of infected MLTF fish (similar to Impact 4.4-4).	Significant	Same mitigation measure as recommended for Impact 4.1-8 for the Willow Springs MLTF facility and Asbury Diversion Dam.	Less than significant	4-41

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
Three Dam Removal Alternative				
Impact 4.4-21. Potential reduction in beneficial uses of waters used at MLTF (similar to Impact 4.4-3).	Significant	Same mitigation measure as recommended for Impact 4.1-8 for the Willow Springs MLTF facility and Asbury Diversion Dam.	Less than significant	4-41
Impact 4.4-22. Potential reduction in beneficial uses of California waters from the distribution of infected MLTF fish (similar to Impact 4.4-4).	Significant	Same mitigation measure as recommended for Impact 4.1-8 for the Willow Springs MLTF facility and Asbury Diversion Dam.	Less than significant	4-41
AESTHETICS				
Five Dam Removal Alternative (Proposed Action)				
Impact 4.8-4. Potential reduction in scenic resources visible from canals caused by closure of PG&E canals.	Less than significant	None.	Not applicable	4-43
Impact 4.8-5. Temporarily reduced scenic resources along the Eagle Canyon Canal as a result of construction of Eagle Canyon pipeline.	Less than significant	None.	Not applicable	4-44
No Dam Removal Alternative				
Impact 4.8-9. Potential reduction in scenic resources visible from canals caused by closure of PG&E canals	Less than significant	None.	Not applicable	4-44
Impact 4.8-10. Temporarily reduced scenic resources along the Eagle Canyon Canal as a result of construction of Eagle Canyon pipeline (similar to Impact 4.8-5).	Less than significant	None.	Not applicable	4-44
Six Dam Removal Alternative				
Impact 4.8-14. Potential reduction in scenic resources visible from canals caused by closure of PG&E canals (similar to Impact 4.8-4).	Less than significant	None.	Not applicable	4-45

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
Three Dam Removal Alternative				
Impact 4.8-19. Potential reduction in scenic resources visible from canals caused by closure of PG&E canals (similar to Impact 4.8-4).	Less than significant	None.	Not applicable	4-45
CULTURAL RESOURCES				
Five Dam Removal Alternative (Proposed Action)				
Impact 4.15-4. Potential impact on cultural resources at the Jeffcoat aquaculture facility.	Significant	Reclamation will consult with the SHPO and the Advisory Council on Historic Preservation and any other consulting parties in the Section 106 review process. An MOA will be developed between Reclamation, the SHPO, and any identified consulting parties if eligible cultural resources would be adversely affected by the proposed undertaking. The MOA will describe methods to mitigate the adverse effects. Mitigation measures may include data recovery excavations and avoidance through project design.	Less than significant	47
No Dam Removal Alternative				
Impact 4.15-7. Potential impact on cultural resources at the Jeffcoat aquaculture facility (similar to Impact 4.15-4).	Significant	Same mitigation measure as recommended for Impact 4.15-4 for the Willow Springs facility and Asbury Diversion Dam.	Less than significant	48
Six Dam Removal Alternative				
<i>New cultural resources were not identified at the sites applicable to the Six Dam Removal Alternative.</i>	Not applicable	None.	Not applicable	Not applicable
Three Dam Removal Alternative				
<i>New cultural resources were not identified at the sites applicable to the Three Dam Removal Alternative.</i>	Not applicable	None.	Not applicable	Not applicable

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
OTHER NEPA ANALYSES				
SOCIOECONOMICS				
Five Dam Removal Alternative (Proposed Action)				
Effect 4.16-5. Potential socioeconomic risk to MLTF fish marketing program.	Not applicable	Implementing the mitigation measures recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs facilities will address socioeconomic effects on MLTF's fish marketing program.	Not applicable	4-55
Effect 4.16-6. Potential construction-related loss in revenue at Oasis Springs Lodge.	Not applicable	Measures developed in consultation with the lodge operators may be implemented to further reduce socioeconomic effects associated with construction-related activities near Oasis Springs Lodge.	Not applicable	4-56
Effect 4.16-7. Potential long-term loss in revenue at Oasis Springs Lodge.	Not applicable	None.	Not applicable	4-56
No Dam Removal Alternative				
Effect 4.16-10. Potential socioeconomic risk to MLTF fish marketing program (similar to Effect 4.16-5).	Not applicable	Same mitigation measures as recommended for Impact 4.1-8 for the Jeffcoat and Willow Springs facilities	Not applicable	4-58
Effect 4.16-11. Potential construction-related loss in revenue at Oasis Springs Lodge (similar to Effect 4.16-6).	Not applicable	Same measure as recommended for Effect 4.16-6.	Not applicable	4-58
Effect 4.16-12. Potential long-term loss in revenue at Oasis Springs Lodge (similar to Effect 4.16-7).	Not applicable	None.	Not applicable	4-58

Impact	Level of Significance	Recommended Mitigation Measure(s)	Level of Significance after Mitigation	Page Number in the Draft SEIS/REIR
Six Dam Removal Alternative				
Effect 4.16-15. Potential socioeconomic risk to MLTF fish marketing program (similar to Effect 4.16-5).	Not applicable	Same mitigation measures as recommended for Impact 4.1-8 for the Willow Springs facility.	Not applicable	4-58
Effect 4.16-16. Potential construction-related loss in revenue at Oasis Springs Lodge (similar to Effect 4.16-6).	Not applicable	Same measure as recommended for Effect 4.16-6.	Not applicable	4-59
Effect 4.16-17. Potential long-term loss in revenue at Oasis Springs Lodge (similar to Effect 4.16-7).	Not applicable	None.	Not applicable	4-59
Three Dam Removal Alternative				
Effect 4.16-20. Potential socioeconomic risk to MLTF fish marketing program (similar to Effect 4.16-5).	Not applicable	Same mitigation measures as recommended for Impact 4.1-8 for the Willow Springs facility.	Not applicable	4-59
Effect 4.16-21. Potential construction-related loss in revenue at Oasis Springs Lodge (similar to Effect 4.16-6).	Not applicable	Same measure as recommended for Effect 4.16-6.	Not applicable	4-60
Effect 4.16-22. Potential long-term loss in revenue at Oasis Springs Lodge (similar to Effect 4.16-7).	Not applicable	None.	Not applicable	4-60
Notes:				
Draft SEIS/REIR = Draft Supplemental Environmental Impact Statement/Revised Environmental Impact Report.				
MLTF = Mount Lassen Trout Farm.				
PG&E = Pacific Gas and Electric Company.				

Temporary construction nuisances for transportation, noise, and air quality that are considered significant impacts could result at various construction sites during the construction period. Construction area noise-reducing measures and best management practices (BMPs) for emissions controls are recommended to reduce these impacts to a less-than-significant level. Potential impacts related to construction area safety have been identified that would be reduced to a less-than-significant level by standard construction area safety precautions.

Wildcat, Eagle Canyon, Coleman, and Inskip Diversion Dams are considered to be historic properties under Section 106 and historical resources for the purposes of CEQA. Under the Proposed Action, Wildcat and Coleman Diversion Dams would be removed, and Eagle Canyon and Inskip Diversion Dams would be modified by installing fish screens and fish ladders. The removal and modifications proposed for these historic properties are considered significant impacts. Reclamation has consulted with the State Historic Preservation Officer (SHPO) with respect to the removal and modification of these facilities, and a memorandum of agreement between Reclamation and the SHPO identifies appropriate measures to implement for these impacts.

Implementation of the Proposed Action would not substantially affect the costs of hydroelectric power generation. The increased annual total and going-forward cost of Hydroelectric Project power, with the cost-sharing agreement, would still be less than the annual power benefits, demonstrating that the Hydroelectric Project would continue to be a low-cost source of electricity. See Section 4.16, Other NEPA Analyses, for additional information on power generation and economics.

No Dam Removal Alternative

Implementation of the No Dam Removal Alternative would result in substantial increases in spawning and rearing habitat and production of fry and juvenile life stages for Chinook salmon and steelhead. Fish production would be less than identified for the Proposed Action. For most life stages of steelhead, spring-run Chinook salmon, winter-run Chinook salmon, and late fall-run Chinook salmon, capacity and production indices for the No Dam Removal Alternative are several times greater than the corresponding indices for the No Action Alternative (Section 4.1, Fish, in the Draft EIS/EIR). The higher indices indicate the potential for a substantial increase in the number of fry and juvenile fish potentially supported by the higher minimum flow requirements and cooler water temperature conditions.

Additional benefits would result from improvements in fish passage from more effective fish ladders and new intake screens at all existing diversion structures. Although the No Dam Removal Alternative would provide substantial benefits relative to the No Action Alternative, the level of benefits would be less than that realized under the Proposed Action (i.e., Five Dam Removal Alternative). The lower benefits could occur in response to:

- lower minimum flow requirements (i.e., AFRP minimum flow requirements under the No Dam Removal Alternative versus MOU minimum flow requirements under the Proposed Action);
- potential impedance of passage associated with movement of adult and juvenile steelhead and Chinook salmon over the dams (i.e., all dams and diversions remain in place); and
- maintenance of unnatural continuity associated with mixing of North Fork Battle Creek flow with South Fork Battle Creek flow that may affect attraction of adult Chinook salmon and an increased potential for adverse warm water temperatures during facility outages.

Some short-term impacts on habitat and fish survival could result from construction of fish ladders and diversion screens, similar to those identified for the Proposed Action. These impacts would be mitigated with standard construction period mitigation measures. Also similar to the Proposed Action, the No Dam Removal Alternative could potentially adversely affect fish populations by increasing their risk of exposure to the IHN virus as a result of stocking California waters with potentially infected fish from MLTF's Jeffcoat and Willow Springs facilities, as well as the Darrah Springs State Fish Hatchery. Similarly, implementation of the No Dam Removal Alternative could potentially adversely affect the beneficial uses of California waters by increasing risk of contamination with the IHN virus. However, mitigation at MLTF's Jeffcoat and Willow Springs facilities and the Asbury Diversion Dam site have been identified to reduce these impacts to a less-than-significant level.

The No Dam Removal Alternative would also provide benefits to amphibian habitat by increasing minimum instream flows. Significant construction-related impacts on riparian and wetland habitat would result from this alternative that could be reduced by avoiding habitat during construction and replacing temporarily removed habitat on site. Potential habitat disturbances to a number of special-status wildlife species, including valley elderberry longhorn beetle, foothill yellow-legged frog, California red-legged frog, northwestern pond turtle, yellow-breasted chat, nesting raptors, black rail, and bats, are similar to those identified for the Proposed Action and are considered significant. These significant impacts would be reduced to less-than-significant levels by identifying habitat, avoiding occupied habitat areas during construction, and implementing appropriate mitigation measures to minimize impacts when occupied habitat cannot be avoided.

Construction and operation of this alternative associated with the Inskip Diversion Dam fish ladder and diversion improvements would result in a significant and unavoidable aesthetic impact on the Oasis Springs Lodge. Impacts would be slightly less than under the Proposed Action because no powerhouse tailrace connector is proposed under this alternative. Mitigation measures are recommended to partially reduce the aesthetic effect of these facilities. Recreational use and public access to Battle Creek in the vicinity of construction zones could be affected in a manner similar to the Proposed Action

during the construction period. Mitigation measures are recommended to reduce construction-period effects on recreation resources.

Temporary construction nuisances for transportation, noise, and air quality and potential construction site-safety impacts would be similar to those identified for the Proposed Action and would be reduced to a less-than-significant level by implementing mitigation measures similar to those recommended for the Proposed Action.

The Wildcat, Eagle Canyon, Coleman, and Inskip Diversion Dams are considered to be historic properties under Section 106, and historical resources for the purposes of CEQA. Under the No Dam Removal Alternative, Wildcat, Eagle Canyon, Inskip, and Coleman Diversion Dams would be modified by installing fish screens and fish ladders. The modifications proposed for these historic properties are considered significant impacts. Reclamation has consulted with the SHPO with respect to the modification of these facilities, and a memorandum of agreement between Reclamation and the SHPO identifies appropriate measure to implement for these impacts.

Implementation of the No Dam Removal Alternative would create an adverse effect on the cost of hydroelectric power generation. The increased annual going-forward cost of Hydroelectric Project power is estimated to be more than the annual power benefits, demonstrating that the Hydroelectric Project would not be a source of low-cost electricity. In addition, the increased annual total cost of Hydroelectric Project power would be more than annual power benefits (i.e., PG&E would not recover all of its past capital investments).

Six Dam Removal Alternative

Implementation of the Six Dam Removal Alternative would result in substantial increases in spawning and rearing habitat and production of fry and juvenile life stages for Chinook salmon and steelhead. For most life stages of steelhead, spring-run Chinook salmon, winter-run Chinook salmon, and late-fall-run Chinook salmon, capacity and production indices for the Six Dam Removal Alternative are several times greater than the corresponding indices for the No Action Alternative (Section 4.1, Fish, in the Draft EIS/EIR). The higher indices indicate the potential for a substantial increase in the number of fry and juvenile fish potentially supported by the higher minimum flow requirements and cooler water temperature conditions.

Additional benefits would result from improvements in fish passage from dam removal and more effective fish ladders and new intake screens on remaining dams and diversions. The Six Dam Removal Alternative would also eliminate discharge of North Fork Battle Creek water to South Fork Battle Creek and reduce the number of Hydroelectric Project facilities in the stream channel. The restored hydrologic function would facilitate passage of adult and juvenile anadromous fishes and reestablish the natural continuity of habitat use. These

beneficial effects would be similar to those described for the Proposed Action. The most important difference under this alternative would be removal of Eagle Canyon Diversion Dam.

Facility removal and improvements under this alternative could result in some short-term impacts on habitat and fish survival during construction, similar to those identified for the Proposed Action. These impacts would be mitigated with standard construction period mitigation measures. Similar to the Proposed Action, implementation of the Six Dam Removal Alternative could potentially adversely affect fish populations by increasing their risk of exposure to the IHN virus as a result of stocking California waters with potentially infected fish from MLTF's Willow Springs facilities and the Darrah Springs State Fish Hatchery. Similarly, implementation of the Six Dam Removal Alternative could potentially adversely affect the beneficial uses of California waters by increasing risk of contamination with the IHN virus. However, mitigation at MLTF's Willow Springs facilities and the Asbury Diversion Dam site have been identified to reduce these impacts to a less-than-significant level.

The Six Dam Removal Alternative would also provide benefits to amphibian habitat by reducing adverse effects of flow fluctuations and by increasing minimum instream flows in a manner similar to the Proposed Action. Significant construction-related impacts on riparian and wetland habitat that would result from this alternative could be reduced by avoiding habitat during construction and replacing temporarily removed habitat on site. Potential habitat disturbances to a number of special-status wildlife species, including valley elderberry longhorn beetle, foothill yellow-legged frog, California red-legged frog, northwestern pond turtle, yellow-breasted chat, nesting raptors, and bats, are similar to those identified for the Proposed Action and are considered significant. These significant impacts would be reduced to less-than-significant levels by identifying habitat, avoiding occupied habitat areas during construction, and implementing appropriate mitigation measures to minimize impacts when occupied habitat cannot be avoided.

Construction and operation of this alternative associated with the South Powerhouse and Inskip Diversion Dam improvements would result in a significant and unavoidable aesthetic impact on the Oasis Springs Lodge in the same manner as the Proposed Action. Similarly, recreational use and public access to Battle Creek in the vicinity of construction zones could be affected during the construction period. Mitigation measures are recommended to reduce construction-period effects on recreation resources.

Temporary construction nuisances for transportation, noise, and air quality, and potential construction site-safety impacts would be similar to those identified for the Proposed Action and would be reduced to a less-than-significant level by implementing mitigation measures similar to those recommended for the Proposed Action.

The Wildcat, Eagle Canyon, Coleman, and Inskip Diversion Dams are considered to be historic properties under Section 106, and historical resources

for the purposes of CEQA. Under the Six Dam Removal Alternative, Wildcat, Eagle Canyon, and Coleman Diversion Dams would be removed, and Inskip Diversion Dam would be modified by installing fish screens and fish ladders. The removal and modifications proposed for these historic properties are considered significant impacts. Reclamation has consulted with the SHPO with respect to the removal and modification of these facilities, and a memorandum of agreement between Reclamation and the SHPO identifies appropriate measure to implement for these impacts.

Implementation of the Six Dam Removal Alternative would create an adverse effect on the cost of hydroelectric power generation. The increased annual going-forward cost of Hydroelectric Project power is estimated to be more than the annual power benefits, demonstrating that the Hydroelectric Project would not be a source of low-cost electricity. In addition, the increased annual total cost of Hydroelectric Project power would be more than annual power benefits (i.e., PG&E would not recover all of its past capital investments).

Three Dam Removal Alternative

Implementation of the Three Dam Removal Alternative would result in substantial increases in spawning and rearing habitat and production of fry and juvenile life stages for Chinook salmon and steelhead. For most life stages of steelhead, spring-run Chinook salmon, winter-run Chinook salmon, and late-fall-run Chinook salmon, capacity and production indices for the Three Dam Removal Alternative are several times greater than the corresponding indices for the No Action Alternative (Section 4.1, Fish, in the Draft EIS/EIR). The higher indices indicate the potential for a substantial increase in the number of fry and juvenile fish potentially supported by the higher minimum flow requirements and cooler water temperature conditions.

Additional benefits would result from improvements in fish passage from dam removal and more effective fish ladders and new intake screens on remaining dams and diversions. The Three Dam Removal Alternative would also eliminate discharge of North Fork Battle Creek water to South Fork Battle Creek and reduce the number of Hydroelectric Project facilities in the stream channel. The restored hydrologic function would facilitate passage of adult and juvenile anadromous fishes and reestablish the natural continuity of habitat use. Although the Three Dam Removal Alternative would provide substantial benefits relative to the No Action Alternative, the level of benefits would be less than those realized under the Proposed Action (i.e., Five Dam Removal Alternative). The lower benefits could occur in response to:

- lower minimum flow requirements (i.e., AFRP minimum flow requirements under the Three Dam Removal Alternative versus MOU minimum flow requirements under the Proposed Action);

- potential impedance of passage associated with movement of adult and juvenile steelhead and Chinook salmon over the dams (i.e., fewer dams and diversions are removed); and
- increased potential for temporary exposure of Chinook salmon and steelhead to variable flow and water temperature conditions during outages at Inskip Powerhouse.

Facility removal and improvements under this alternative could result in some short-term impacts on habitat and fish survival during construction, similar to those identified for the Proposed Action. These impacts would be mitigated with standard construction-period mitigation measures. Similar to the Proposed Action, implementation of the Three Dam Removal Alternative could potentially adversely affect fish populations by increasing their risk of exposure to the IHN virus as a result of stocking California waters with potentially infected fish from MLTF's Willow Springs facilities and the Darrah Springs State Fish Hatchery. Similarly, implementation of the Six Dam Removal Alternative could potentially adversely affect the beneficial uses of California waters by increasing risk of contamination with the IHN virus. However, mitigation at MLTF's Willow Springs facilities and the Asbury Diversion Dam site have been identified to reduce these impacts to a less-than-significant level.

The Three Dam Removal Alternative would also provide substantial benefits to amphibian habitat by reducing adverse effects of flow fluctuations and by increasing minimum instream flows in a manner similar to the Proposed Action. Significant construction-related impacts on riparian and wetland habitat would result from this alternative that could be reduced by avoiding habitat during construction and replacing temporarily removed habitat on site. Potential habitat disturbances to a number of special-status wildlife species, including valley elderberry longhorn beetle, foothill yellow-legged frog, California red-legged frog, northwestern pond turtle, yellow-breasted chat, nesting raptors, and bats, are similar to those identified for the Proposed Action and are considered significant. These significant impacts would be reduced to less-than-significant levels by identifying habitat, avoiding occupied habitat areas during construction, and implementing appropriate mitigation measures to minimize impacts when occupied habitat cannot be avoided.

Construction and operation of this alternative associated with the South Powerhouse and Inskip Diversion Dam improvements would result in a significant and unavoidable aesthetic impact on the Oasis Springs Lodge in the same manner as the Proposed Action, as well as an additional significant and unavoidable aesthetic impact from the armoring or revetment for the tailrace connector between the South Powerhouse and the Inskip Canal. Similarly, recreational use and public access to Battle Creek in the vicinity of construction zones could be affected during the construction period. Mitigation measures are recommended to reduce construction-period effects on recreation resources.

Temporary construction nuisances for transportation, noise, and air quality, and potential construction site-safety impacts would be similar to those identified for

the Proposed Action and would be reduced to a less-than-significant level by implementing mitigation measures similar to those recommended for the Proposed Action.

The Wildcat, Eagle Canyon, Coleman, and Inskip Diversion Dams are considered to be historic properties under Section 106, and historical resources for the purposes of CEQA. Under the Three Dam Removal Alternative, Wildcat, Eagle Canyon, and Coleman Diversion Dams would be removed, and Inskip Diversion Dam would be modified by installing fish screens and fish ladders. The removal and modifications proposed for these historic properties are considered significant impacts. Reclamation has consulted with the SHPO with respect to the removal and modification of these facilities, and a memorandum of agreement between Reclamation and the SHPO identifies appropriate measure to implement for these impacts.

Implementation of the Three Dam Removal Alternative would create an adverse effect on the cost of hydroelectric power generation. The increased annual going-forward cost of Hydroelectric Project power is estimated to be more than the annual power benefits, demonstrating that the Hydroelectric Project would not be a source of low-cost electricity. In addition, the increased annual total cost of Hydroelectric Project power would be more than annual power benefits (i.e., PG&E would not recover all of its past capital investments).

Key Issues and Areas of Potential Controversy

The Restoration Project was developed using a collaborative approach among the federal and state lead agencies, various resource agencies, and the public. Despite this shared approach, several issues have arisen during the development of the Restoration Project and are considered to be potentially controversial. One of these key issues includes the compatibility of the Proposed Action and the other action alternatives with ongoing and planned operations at the Coleman National Fish Hatchery, especially with respect to fish restoration upstream of the hatchery. Other key issues include the focus of the adaptive management process being used for Battle Creek fish restoration, the level of community involvement, long-term impacts on land use as they relate to potential restrictions associated with ESA and CESA compliance, potential effects on trout farming at the MLTF facilities, and the decision not to analyze Alternative 6 and the Eight Dam Removal as action alternatives in this EIS/EIR.

Environmentally Preferred/Superior Alternative

According to Reclamation's NEPA Handbook, the alternative or alternatives considered to be environmentally preferred should be specified in an EIS. The *environmentally preferred alternative* under NEPA is defined as "the alternative that will promote the national environmental policy as expressed in NEPA's

Section 101.” Ordinarily, the environmentally preferred alternative refers to the alternative that causes the least damage to the physical environment; it also refers to the alternative that best protects, preserves, and enhances historic, cultural, and natural resources. It is implicit in NEPA that the environmentally preferred alternative is a reasonable and feasible alternative.

Section 15126.6(e) of the State CEQA Guidelines also requires the state lead agency (State Water Board) to identify the environmentally superior alternative. If the No Action Alternative is also the environmentally superior alternative, the EIR will also identify an environmentally superior alternative from among the other alternatives.

In this EIS/EIR for the Restoration Project, the environmentally superior alternative is referred to as the *environmentally preferred* alternative (NEPA terminology).

In addition to the No Action Alternative, four alternatives are considered for the Restoration Project: the Five Dam Removal Alternative (the Proposed Action), No Dam Removal Alternative, Six Dam Removal Alternative, and the Three Dam Removal Alternative. Table ES-6 presents those environmental impacts that are different among the alternatives. Impacts that are shared by all alternatives are not listed in this table.

Based on the comparison presented in Table ES-6, both the Five Dam Removal (Proposed Action) and Six Dam Removal Alternatives would result in the greatest number of beneficial effects among all the alternatives. The Five Dam and Six Dam Removal Alternatives would have more benefits to fish, amphibians, and riparian species than the other alternatives. In addition, decommissioning South Canal under the Five Dam Removal and Six Dam Removal Alternatives would provide potential habitat in the canal tunnels for special-status bat species. Improvements under both alternatives would substantially improve the reliability and effectiveness of upstream and downstream fish passage. In addition, powerhouse tailrace connectors are proposed under the Five Dam Removal and Six Dam Removal Alternatives. These connectors would prevent North Fork Battle Creek water from mixing with South Fork Battle Creek water, which would prevent false attraction of anadromous fish to South Fork Battle Creek.

The Five Dam Removal (Proposed Action) and Six Dam Removal Alternatives would also result in similar environmental impacts. However, one difference between the two alternatives is that the Five Dam Removal Alternative would include environmental impacts associated with the mitigation that is proposed for the MLTF Jeffcoat site. Implementing mitigation at the Jeffcoat site would result in additional significant impacts associated with the potential disturbance to or the loss of habitat for special-status species, including valley elderberry longhorn beetle, California red-legged frog, foothill yellow-legged frog, northwestern pond turtle, and California black rail. Additionally, mitigation at Jeffcoat would affect waters of the United States and sensitive plant communities and associated wildlife habitats (e.g., riparian forest and scrub plant community). Impacts

Table ES-6. Comparison of Benefits and Impacts Associated with Each Action Alternative¹

Impact/Effect	Five Dam Removal Alternative	No Dam Removal Alternative	Six Dam Removal Alternative	Three Dam Removal Alternative
Section 4.1, Fish				
<i>Draft EIS/EIR</i>				
Increased survival of adults and increased spawning success because removal of five dams and the construction of more reliable, effective fish ladders would facilitate passage of Chinook salmon and steelhead (migration habitat).	Impact 4.1-14 Beneficial		Impact 4.1-48 Beneficial	Impact 4.1-66 Beneficial
The construction of more effective fish ladders on North Battle Creek Feeder, Eagle Canyon, Wildcat, South, Inskip, and Coleman Diversion Dams would facilitate passage of Chinook salmon and steelhead, which would increase survival of adults and increase spawning success.		Impact 4.1-31 Beneficial		
Potentially increased spawning success and fry production because separating the powerhouse water discharge from the normal stream channel would facilitate the return of adult Chinook salmon and steelhead to natal spawning habitat in South Fork and North Fork Battle Creek (migration and habitat stability).	Impact 4.1-15 Beneficial		Impact 4.1-49 Beneficial	Impact 4.1-67 Beneficial
Substantially increased survival of juvenile steelhead and Chinook salmon during downstream movement and migration as a result of eliminating some diversions and constructing fish screens at the remaining diversions from North Fork and South Fork Battle Creek (entrainment).	Impact 4.1-16 Beneficial		Impact 4.1-50 Beneficial	Impact 4.1-68 Beneficial
Constructing fish screens at the remaining diversions from North Fork and South Fork Battle Creek would substantially increase the survival of juvenile steelhead and Chinook salmon during downstream movement and migration.		Impact 4.1-32 Beneficial		
Reduction of predation-related mortality as a result of removing dams and improving fish ladders (predation, pathogens, and food).	Impact 4.1-17 Beneficial		Impact 4.1-52 Beneficial	Impact 4.1-69 Beneficial
Reduction of predation-related mortality as a result of improving fish ladders (predation, pathogens, and food).		Impact 4.1-33 Beneficial		

¹ This table lists only those impacts that are different among the alternatives. Impacts that are shared by all alternatives are not listed in this table.

Table ES-6. Continued

Impact/Effect	Five Dam Removal Alternative	No Dam Removal Alternative	Six Dam Removal Alternative	Three Dam Removal Alternative
Substantially increased production of food for fish resulting from increased minimum instream flows (predation, pathogens, and food).	Impact 4.1-18 Beneficial	Impact 4.1-34 Beneficial	Impact 4.1-51 Beneficial	Impact 4.1-70 Beneficial
<i>Supplemental EIS/Revised EIR</i>				
None identified				
Section 4.2, Botanical, Wetland, and Wildlife Resources				
<i>Draft EIS/EIR</i>				
Substantial increase in quantity of bat roosting habitat in the South Canal tunnels due to termination of water flow through the tunnels.	Impact 4.2-15 Beneficial		Impact 4.2-42 Beneficial	
<i>Supplemental EIS/Revised EIR</i>				
None identified				
Section 4.3, Hydrology				
<i>Draft EIS/EIR</i>				
Coleman Diversion Dam removal could reduce the 10-, 25-, and 50-year floodwater surface profiles at Inskip Powerhouse.	Impact 4.3-2 Beneficial		Impact 4.3-6 Beneficial	Impact 4.3-8 Beneficial
<i>Supplemental EIS/Revised EIR</i>				
None identified				
Total number of beneficial impacts from each alternative	7	4	7	6

Impact/Effect	Five Dam Removal Alternative	No Dam Removal Alternative	Six Dam Removal Alternative	Three Dam Removal Alternative
Section 4.1, Fish				
<i>Draft EIS/EIR</i>				
Mortality of fish eggs and larvae and reduced reproductive success of fish and other aquatic species as a result of removing South, Coleman, and Eagle Canyon Diversion Dams, which would release currently stored fine sediment to the stream channel.	Impact 4.1-3 Significant (Coleman and South Diversion Dams)		Impact 4.1-37 Significant (Eagle Canyon, Coleman, and South Diversion Dams)	Impact 4.1-55 Significant (Eagle Canyon and Coleman Diversion Dams)
<i>Supplemental EIS/Revised EIR</i>				
Increased risk of a serious or catastrophic fish disease spreading from Battle Creek to fish communities throughout the state through stocking with MLTF and Darrah Springs State Fish Hatchery fish.	Impact 4.1-8 Significant (Jeffcoat, Willow Springs, and Asbury Diversion Dam)	Impact 4.1-28 Significant (Jeffcoat, Willow Springs, and Asbury Diversion Dam)	Impact 4.1-47 Significant (Willow Springs and Asbury Diversion Dam)	Impact 4.1-68 Significant (Willow Springs and Asbury Diversion Dam)
<i>Note: Mitigation at the Jeffcoat mitigation site is not required for the Six Dam Removal and Three Dam Removal Alternatives.</i>				
Section 4.2, Wildlife Resources				
<i>Draft EIS/EIR</i>				
Potential disturbance or loss of woody riparian vegetation and associated wildlife habitat ² .	Impact 4.2-1 Significant (7.2 acres)	Impact 4.2-16 Significant (4.1 acres)	Impact 4.2-28 Significant (7.2 acres)	Impact 4.2-43 Significant (6.0 acres)
Potential disturbance of breeding habitat for yellow-breasted chat and little willow flycatcher.	Impact 4.2-8 Significant	Impact 4.2-23 Significant	Impact 4.2-35 Significant	Impact 4.2-50 Significant (only yellow-breasted chat)
<i>Note: Breeding habitat for little willow flycatcher would not be affected under the Three Dam Removal Alternative.</i>				
Potential loss or disturbance of waters of the United States (including wetlands) ³ .	Impact 4.2-3 Significant (12.1 acres)	Impact 4.2-18 Significant (11.6 acres)	Impact 4.2-30 Significant (12.1 acres)	Impact 4.2-45 Significant (11.6 acres)

² Acreage values listed here for affected habitat were calculated for the July 2003 Draft EIS/EIR; acreage values will be updated for the Final EIS/EIR.

Impact/Effect	Five Dam Removal Alternative	No Dam Removal Alternative	Six Dam Removal Alternative	Three Dam Removal Alternative
<i>Supplemental EIS/Revised EIR</i>				
Possible loss of woody riparian vegetation along PG&E canals.	Impact 4.2-13 Less than significant (includes Wildcat, South, and a portion of Eagle Canyon Canals)	Impact 4.2-32 Less than significant (includes a portion of Eagle Canyon Canal)	Impact 4.2-49 Less than significant (includes Wildcat, South, and Eagle Canyon Canals)	Impact 4.2-68 Less than significant (includes Wildcat and Eagle Canyon Canals)
Section 4.3, Hydrology				
<i>Draft EIS/EIR</i>				
Removal of Eagle Canyon Diversion Dam could result in minor increases to downstream bed elevations.			Impact 4.3-4 Less than significant	Impact 4.3-7 Less than significant ⁴
<i>Supplemental EIS/Revised EIR</i>				
None identified				
Section 4.4, Water Quality				
<i>Draft EIS/EIR</i>				
Removal of South and Coleman Diversion Dams could cause erosion of minor amounts of sediment from behind the dam.	Impact 4.4-3 Less than significant		Impact 4.4-10 Less than significant	Impact 4.4-15 Less than significant (only Coleman Diversion Dam)
Minor amounts of sediment released by the removal of Coleman Diversion Dam would be deposited at the County Road Bridge.	Impact 4.4-4 Less than significant		Impact 4.4-11 Less than significant	Impact 4.4-16 Less than significant

³ Acreage values listed here for affected waters of the United States were calculated for the July 2003 Draft EIS/EIR; acreage values will be updated for the Final EIS/EIR.

⁴ This impact was unintentionally left out of the 2003 Draft EIS/EIR and will be included in the Final EIS/EIR. This impact is similar to Impact 4.3-4 as discussed in the 2003 Draft EIS/EIR.

Impact/Effect	Five Dam Removal Alternative	No Dam Removal Alternative	Six Dam Removal Alternative	Three Dam Removal Alternative
Short-term increased turbidity and settleable material load on the Coleman National Fish Hatchery water treatment plant as a result of removing Coleman Diversion Dam.	Impact 4.4-5 Less than significant		Impact 4.4-12 Less than significant	Impact 4.4-17 Less than significant
<i>Supplemental EIS/Revised EIR</i>				
None identified				
Section 4.8, Visual Resources				
<i>Draft EIS/EIR</i>				
Construction of the channel with armoring or revetment would alter views of the South Fork creek bank.				Impact 4.8-11 Significant and unavoidable
<i>Supplemental EIS/Revised EIR</i>				
Potential reduction in scenic resources visible from canals caused by closure of PG&E canals.	Impact 4.8-4 Less than significant (Includes Wildcat, South, and a portion of Eagle Canyon Canals)	Impact 4.8-9 Less than significant (Includes a portion of Eagle Canyon Canal)	Impact 4.8-14 Less than significant (Includes Wildcat, South, and Eagle Canyon Canals)	Impact 4.8-18 Less than significant (Includes Wildcat, South, and Eagle Canyon Canals)
Temporarily reduced scenic resources along the Eagle Canyon Canal as a result of construction of Eagle Canyon pipeline.	Impact 4.8-5 Less than significant	Impact 4.8-10 Less than significant		
Section 4.15, Cultural Resources				
<i>Draft EIS/EIR</i>				
Removal of historic properties.	Impact 4.15-1 Significant and unavoidable		Impact 4.15-6 Significant and unavoidable	Impact 4.15-9 Significant and unavoidable

Impact/Effect	Five Dam Removal Alternative	No Dam Removal Alternative	Six Dam Removal Alternative	Three Dam Removal Alternative
<i>Supplemental EIS/Revised EIR</i>				
Potential impact on cultural resources at the Jeffcoat aquaculture facility.	Impact 4.15-4 Significant	Impact 4.15-7 Significant		
Section 4.16, Other NEPA Analyses				
<i>Draft EIS/EIR</i>				
Power Generation and Economics: Increased cost of project power ⁵ .	Effect 4.16-1 (\$3.6 million)	Effect 4.16-2 (\$2.2 million)	Effect 4.16-3 (\$4.8 million)	Effect 4.16-4 (\$3.7 million)
<i>Supplemental EIS/Revised EIR</i>				
Power Generation and Economics: Indirect environmental effects associated with the loss of hydropower and renewable replacement power.	Effect	Effect <i>(some degree of magnitude less than the Five Dam Removal Alternative)</i>	Effect <i>(some degree of magnitude greater than the Five Dam Removal Alternative)</i>	Effect <i>(some degree of magnitude less than the Five Dam Removal Alternative)</i>
Socioeconomics: Potential socioeconomic risk to MLTF fish marketing program.	Effect 4.16-5	Effect 4.16-10	Effect 4.16-15 <i>(some degree of magnitude less than the Five Dam Removal Alternative)</i>	Effect 4.16-20 <i>(some degree of magnitude less than the Five Dam Removal Alternative)</i>
Total number of impacts under each alternative	16	11	15	16

⁵ The cost information listed here was calculated for the July 2003 Draft EIS/EIR; the cost of project power will be updated for the Final EIS/EIR.

associated with erosion, noise, air quality, and general public health and safety may also occur as a result of implementing the mitigation proposed for the Jeffcoat site. As described in this document, measures will be implemented to mitigate these significant impacts.

With respect to cultural resources, Eagle Canyon Diversion Dam, which was determined to be eligible for inclusion in the National Register of Historic Places (NRHP) in the Draft EIS/EIR (Jones & Stokes 2003), would be removed under the Six Dam Removal Alternative; however, the dam would not be removed under the Five Dam Removal Alternative. Conversely, mitigation activities proposed at the Jeffcoat site under the Five Dam Removal Alternative could potentially disturb historic-era cultural resources and archeological sites, if these sites are found to be eligible and cannot be avoided.

Both the Five Dam Removal Alternative and the Six Dam Removal Alternative would also require replacing lost hydropower with a renewable resource. The likely renewable resource to replace lost hydropower would be wind power. Environmental impacts typically associated with wind power production include impacts to biological resources (particularly raptors), aesthetics and visual resources, and noise (see Power Generation and Economics in Section 4.16, Other NEPA Analyses in this Draft SEIS/REIR). Because more hydropower is lost under the Six Dam Removal Alternative compared to the Five Dam Removal Alternative (Table 4.16-9 in this Draft SEIS/REIR), environmental impacts associated with replacement power under the Six Dam Removal Alternative would also be of greater magnitude than under the Five Dam Removal Alternative. However, these impacts are difficult to quantify because not enough information is known about where the windfarm would be located, how the wind turbines would be designed, and how long the wind turbines would be in operation.

In relation to power generation, the annual power benefits associated with the Five Dam Removal Alternative would be greater than the increased annual total and going-forward cost of Hydroelectric Project power (Section 4.16, Other NEPA Analyses in the Draft EIS/EIR [Jones & Stokes 2003]). The No Dam Removal, Six Dam Removal, and Three Dam Removal Alternatives would have greater project costs and fewer power generation benefits.

In summary, the Six Dam Removal Alternative and the Five Dam Removal Alternative are nearly equal because they both have the most environmental benefits and a similar number of impacts compared to the other Action Alternatives. The main difference between the Five Dam Removal and Six Dam Removal Alternatives is that the Five Dam Removal Alternative would result in additional significant impacts to the physical environment associated with the Jeffcoat mitigation site. Although the Six Dam Removal Alternative would result in indirect environmental impacts associated with replacement power at a greater magnitude compared to the Five Dam Removal Alternative, the magnitude of difference between the two alternatives is difficult to quantify. For these reasons, the Six Dam Removal Alternative is identified as the environmentally preferred alternative.

Under NEPA, the federal lead agency is not obligated to select the environmentally preferred alternative as the Proposed Action but must identify it in the Record of Decision and should, if possible, identify it in the final EIS. Similarly, CEQA does not require the state lead agency to select the environmentally superior alternative as the Proposed Action in its EIR, as long as the significant impacts of the proposed project are otherwise avoided or mitigated without implementation of the environmentally superior alternative. No significant impacts associated with the Five Dam Removal Alternative (i.e., the Proposed Action) would in fact be avoided by implementation of the Six Dam Removal Alternative.

Indian Trust Assets

Indian trust assets are legal interests in assets held in trust by the federal government for Indian tribes or individuals. The trust relationship usually stems from a treaty, executive order, or act of Congress. Assets are anything that holds monetary value and can be real property, physical assets, or intangible property rights. Examples of trust assets are lands, minerals, hunting and fishing rights, and water rights. Indian rancherias, reservations, and public domain allotments are frequently placed in trust status.

Reclamation's Indian trust asset policy states that Reclamation will carry out its activities in a manner that protects Indian trust assets and avoids adverse impacts when possible. When Reclamation cannot avoid adverse impacts, it will provide appropriate mitigation or compensation.

A search of the geographical information system coverage for California Indian reservations and public domain allotments failed to show any tribal or Indian lands in the vicinity of the Restoration Project area (Bureau of Reclamation and U.S. Fish and Wildlife Service 1999). Given the absence of Indian lands within or near the Restoration Project area, there will be no impacts on Indian trust assets from the Restoration Project.

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires each federal agency to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities. It requires federal agencies to adopt strategies to address environmental justice concerns within the context of agency operations.

The California Government Code (Section 65040.12) defines environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of

environmental laws, regulations and policies.” This statute obligates the State Water Board as state lead agency for CEQA to do the following:

- conduct all programs, policies, and activities in a manner that ensures the fair treatment of people of all races, cultures, and income levels, including minority populations and low-income populations of the state;
- promote enforcement of all health and environmental statutes within its jurisdiction in a manner that ensures the fair treatment of all Californians, irrespective of race, culture, and income;
- ensure greater public participation from environmental justice stakeholders in the development, adoption, and implementation of environmental regulations and policies; and
- identify among people of different socioeconomic classifications any differential patterns of consumption of natural resources.

The dams to be removed and the fish screens, ladders, and related water conveyance facilities to be improved as part of the Restoration Project are located on lands managed for grazing, fisheries restoration, and hydropower generation. Construction, operation, and maintenance activities associated with the Restoration Project are not expected to result in substantial changes to, or conflict with, existing land uses or result in substantial change in the socioeconomic characteristics of the study area. The Restoration Project could benefit employment and income in the study area by enhancing the anadromous fishery. Conversely, the Restoration Project could adversely affect employment and income in the study area by reducing or eliminating production from the MLTF, a privately owned fish hatchery with some operations located within the study area.

The Restoration Project study area does not have a high minority or low-income population. Most workers commute outside the study area to their places of employment, and income levels are similar to county averages. Construction, operation, and maintenance of the Restoration Project would not result in a disproportionate effect on a minority and/or low-income communities. In addition, the lead agencies have engaged stakeholders for input at all levels of the project decision-making process to ensure early, accessible, and meaningful participation. By stakeholders’ participation in ongoing local watershed efforts, the agencies have included them in the decision-making process and have explored opportunities to address environmental justice within current statutory and regulatory structure (refer to Chapter 4, Section 4.16, for additional analysis).

Public and Agency Involvement Process

Public involvement is a vital and required component of the NEPA and CEQA processes. Scoping is a process to gather input from the public, including their issues and concerns and, together with technical input and agency considerations, to define the significant issues to be addressed in the environmental document.

NEPA regulations (40 CFR 1500 *et seq.*) define *scoping* as “an early and open process for determining the scope of issues to be addressed, and for identifying the significant issues related to the proposed action.” The State CEQA guidelines (Title 14 CCR §§15000 *et seq.*) require scoping meetings under limited circumstances and encourage scoping activities.

Reclamation placed a Notice of Intent to prepare an EIS/EIR and notice of a public scoping meeting in the *Federal Register* on January 12, 2000. A brief description of the proposed Restoration Project, a request for written comments, and details on the public scoping meeting were included in the notice.

A joint federal and state public scoping meeting was held on January 31, 2000, at the Manton School Gymnasium in Manton, California. During this meeting, the public was presented with an overview of the Restoration Project, including the purpose of and need for the project, a project description, and the current project alternatives. In addition, written and oral comments were received from the public at this meeting.

The State Water Board issued a Notice of Preparation of a draft EIS/EIR for the Restoration Project on April 12, 2000. The notice was circulated through the State Clearinghouse for agency review and comment on April 13, 2000.

The Scoping Report⁶ provides an overview of the Restoration Project; describes the environmental compliance process associated with the Restoration Project, including the role of public scoping; discusses the public scoping meeting; describes Restoration Project alternatives; and contains comments received throughout the scoping process.

In addition to the public scoping process, public participation has been encouraged and has occurred at Restoration Project meetings. The public input received at Restoration Project meetings, including the Greater Battle Creek Watershed Working Group (Working Group), Environmental and Design Technical Team, and Battle Creek Project Management Team (PMT) meetings, was used throughout the development of the EIS/EIR.

Preparation of the Restoration Project documents, including the Draft EIS/EIR, Adaptive Management Plan, and Draft FERC license amendment, has also involved active participation by coordinated teams of federal and state agency staff and other stakeholders. Members of the teams included Reclamation, USFWS, NOAA Fisheries, FERC, DFG, the State Water Board, California Department of Water Resources, PG&E, BCWG, Battle Creek Watershed Conservancy, Friends of the River, and others. Most of the teams met monthly; meetings were open to the public. In addition, email notices of meetings were distributed to the team participants. Anyone could ask to be included on the email list.

⁶ The Scoping Report is available on Reclamation’s web site at <http://www.usbr.gov/mp/battlecreek/>.

The release of the Draft EIS/EIR provided the public with an opportunity to provide input on the analysis of the environmental effects of the proposed project and the action alternatives examined in the Draft EIS/EIR. The Draft EIS/EIR was released for a 90-day public review on July 18, 2003. Responses to the comments received during the review of the Draft EIS/EIR will be presented in the Final EIS/EIR.

After the Draft EIS/EIR was released for public review, the PMT conducted two public information workshops in Manton, California, on July 23 and August 12, 2003, which allowed stakeholders and members of the public to ask questions and learn more about the contents of the Draft EIS/EIR. The PMT also conducted a public hearing in Manton, California, on August 27, 2003, which provided the public with an opportunity to present both written and verbal comments on the Draft EIS/EIR in a public forum. Reclamation has also presented six status reports at the CBDA ERP Subcommittee Meetings on January 15, February 19, March 25, April 15, May 20, and June 17, 2004, during which additional public input has been received on the Restoration Project and project alternatives. On March 15, 2004, a public meeting was held in Red Bluff, California, specifically to address public questions about the incremental benefits between the proposed Restoration Project (i.e., the Five Dam Removal Alternative) and the Eight Dam Removal Alternative, which has been eliminated from further consideration in this document. Public comments have been encouraged at all public meetings on the Restoration Project.

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