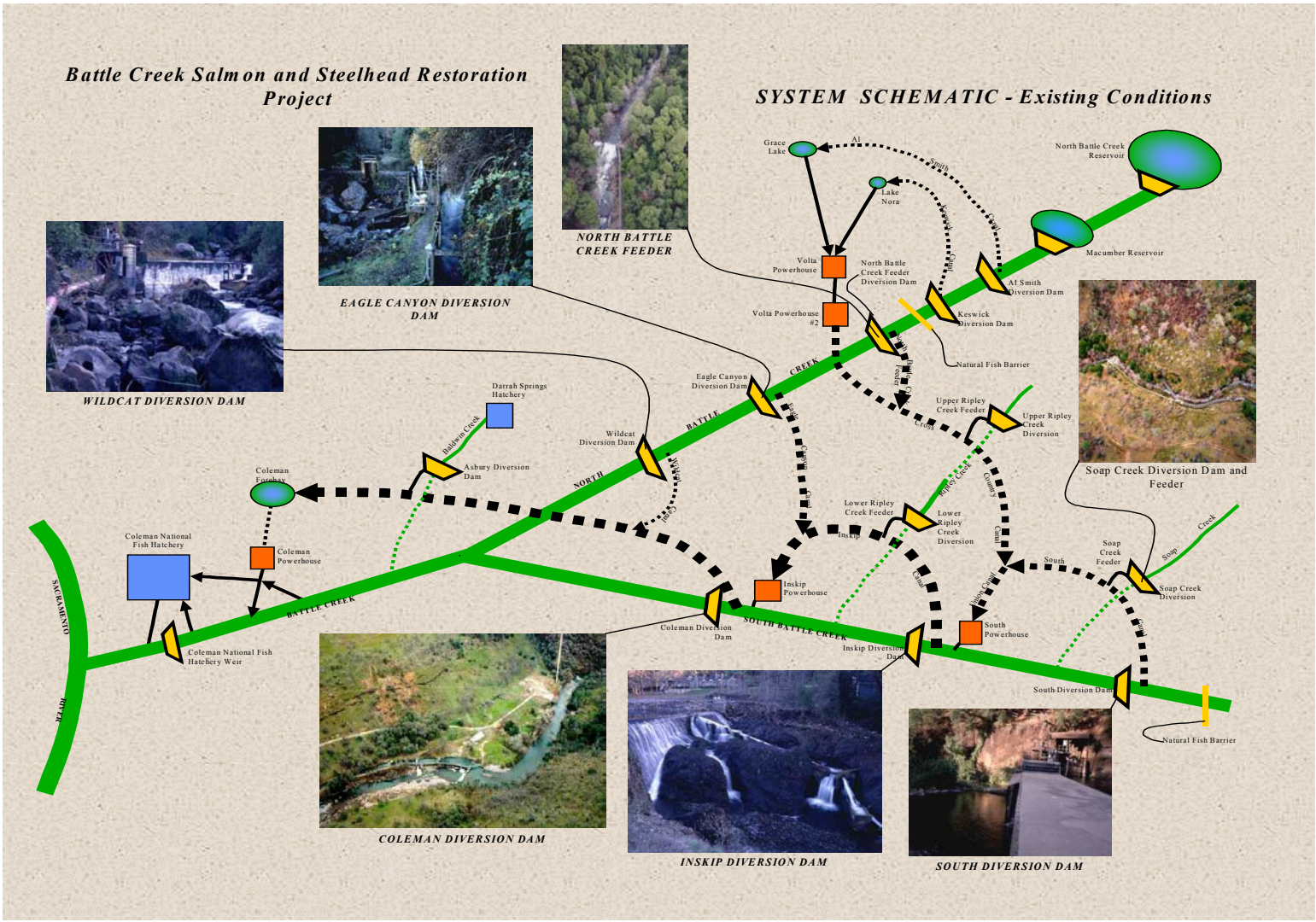
Battle Creek Salmon and Steelhead Restoration Project
CALFED Bay-Delta Program
Ecosystem Restoration Amendment
August 2003



Project Description:

The purpose of the Battle Creek Salmon and Steelhead Restoration Project (Project) is to restore and enhance approximately 42 miles of habitat in the main stem and two primary forks of Battle Creek downstream of the naturally impassible waterfalls and in about 6 miles of its tributaries, while minimizing the loss of clean and renewable energy produced by the Battle Creek Hydroelectric Project. The Project, originally funded by CALFED in 1999, stems from a Memorandum of Understanding by and among the National Marine Fisheries Service, U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, California Department of Fish and Game and Pacific Gas & Electric Company, dated June 1999 (MOU). A three-point design philosophy evolved through the coordination of the multiple signatories to the MOU to ensure the highest probability for success of the Project. The three points which established the foundation for design criteria include: 1) facilities needed to be designed to have a high probability of successfully meeting biological goals; 2) facilities needed to be designed to have a long-term functional reliability; and 3) facilities needed to be designed for ease of operation and maintenance. All of the signatories to the MOU and other participating agencies took part in establishing the design criteria and support the design decisions made to date based on this philosophy.

The Project is subject to completion of environmental compliance and Federal Energy Regulatory Commission license amendment process. Project alternatives consist of a "No Action" alternative and action alternatives. These alternatives are undergoing a National Environmental Policy Act/California Environmental Quality Act (NEPA/CEQA) analysis, which is being documented in an Environmental Impact Statement/Environmental Impact Report (EIS/EIR). Action alternatives consist of various combinations of dam decommissioning and removals, fish screen improvements, fish ladder improvements, and increased stream flow below dams. The MOU proposed action incorporates the following flow and facility features:

- Coleman Diversion Dam:
    - Install a tailrace connector from Inskip Powerhouse to Coleman Canal and a water bypass facility around Inskip Powerhouse to Coleman Canal
    - Decommission the dam and appurtenant facilities.
- Inskip Diversion Dam:
    - Install an approved Fish Screen.
    - Install an approved Fish Ladder.
    - Install a tailrace connector from South Powerhouse to Inskip Canal concurrent with, or prior to, the Inskip Diversion Dam fish screen.
- South Diversion Dam:
    - Decommission the dam, related water conveyance and appurtenant facilities.
- Wildcat Diversion Dam:
    - Decommission the dam, related water conveyance and appurtenant

facilities.

- Eagle Canyon Diversion Dam:
  - Install an approved Fish Screen.
  - Install an approved Fish Ladder.
  - Decommission spring collection facilities
- North Battle Creek Feeder Diversion Dam:
  - Install an approved Fish Screen.
  - Install an approved Fish Ladder
- Soap Creek:
  - Decommission the dam, related water conveyance and appurtenant facilities.
- Lower Ripley Creek:
  - Decommission the dam, related water conveyance and appurtenant facilities.
- Baldwin Creek:
  - Provide a means for releasing a maximum instream flow of 5 cfs from Asbury Pump Diversion.
- Prescribed Instream Flow Releases
- Water Acquisition Fund
- Adaptive Management Plan
- Adaptive Management Fund
- Water rights dedication to the environment at all dam removals.

The Project is formulated with this comprehensive suite of habitat restoration actions to achieve important conservation biology objectives for those species of salmonids in the upper Sacramento River now facing threats to their future existence; specifically, spring-run and winter-run Chinook and steelhead. A fundamental principle of conservation biology is that the probability a species will recover to a healthy status in a timely manner depends on the number of independent self-sustaining genetically viable populations that are in the river basin. By bringing the remnant populations of these species that still exist in Battle Creek back to a healthy population level (one to two thousand fish) they will be able to significantly contribute to the recovery of these species in the upper Sacramento River. The exceptional drought resistant nature of the Battle Creek watershed will make its populations extremely valuable in the years following a catastrophic drought when the entire basin's populations must rebuild. This is especially the case for winter-run Chinook populations that are predicted to have complete reproductive failure during three driest years of the century, leaving Battle Creek as the only refuge in the basin at those critical times.

In the years since the 1999 MOU was signed the resulting design and environmental effort have substantially increased in cost. This document attempts to explain the reasons for the increased Project costs and what is being requested of CALFED.

1. Exactly what is being requested?

The Project was initially funded under CALFED Direct Action No. 1999-B01 ($28 million). This proposal requests supplemental funding to complete construction of all features associated with the Project.

a. **Budget change** (detail budget table by task)

Task Under Original CALFED Proposal	Funding Allocations Under Original CALFED Proposal	Current Anticipated Costs	Difference (Original – Current Anticipated Cost)	Comments
Task 1 – Wildcat Diversion Dam				Refinements in estimates for other designed features of the Project have resulted in an increase of the reconnaissance level cost estimate for the Wildcat Diversion Dam removal.
Wildcat Diversion Dam Removal	$2,751,000	$3,818,000	-$1,067,000	
Task 2 – Eagle Canyon Diversion Dam				Reconnaissance level design efforts that provided the basis for the original cost proposal assumed standard design criteria. Based on MOU commitments calling for high reliability screens and ladders a reassessment of design criteria was made for ladder designs. Modified flow criteria for ladder design resulted from this assessment, thereby resulting in increased costs. Refinements in the design of the screen led to cost increases in that feature. Constructability issues related to extremely difficult access were further refined in later designs.
Fish Screen	$1,007,000	$1,894,000	-$887,000	
Fish Ladder	$942,000	$3,767,000	-$2,825,000	
Task 3 – North Battle Creek Diversion				Reconnaissance level design efforts that provided the basis for the original cost proposal assumed standard design criteria. Based on MOU commitments calling for high reliability screens and ladders a reassessment of design criteria was made for ladder designs. Modified flow criteria for ladder design resulted from this assessment, thereby resulting in increased costs. Refinements in the design of the screen led to cost increases in that feature. A change in concept also occurred related to access to this feature. Under original concept all construction was to occur via helicopter. Based on commitments for high reliability in the MOU, it was determined that an access road provides greater long-term reliability for carrying out operation and maintenance activities. Consequently, this feature is included.
Fish Screen	$535,400	$1,090,000	-$554,600	
Fish Ladder	$576,500	$2,754,000	-$2,177,500	
Access Road and Footbridge	$0	$899,000	-$899,000	
Task 4 – South Diversion Dam				Revisions and refinements to reconnaissance level cost estimates led to a small increase.
South Dam Removal	$3,026,000	$3,984,000	-$958,000	
Tasks 5A and 5B– Inskip Diversion Dam				Reconnaissance level design efforts that provided the basis for the original cost

Task Under Original CALFED Proposal	Funding Allocations Under Original CALFED Proposal	Current Anticipated Costs	Difference (Original – Current Anticipated Cost)	Comments
Task 5A – Fish Screen	$1,375,000	$2,440,000	-$1,065,000	proposal assumed standard design criteria. Based on MOU commitments calling for high reliability screens and ladders a reassessment of design criteria was made for ladder designs. Modified flow criteria for ladder design resulted from this assessment, thereby resulting in increased costs. Refinements in the design of the screen led to cost increases in that feature. Costs associated with incorporation of an access road at this site also contributed to higher costs. Refinement in design costs also resulted from further analysis of detailed design data.
Task 5A – South Powerhouse Bypass Tunnel and Tailrace Connector	$3,668,000	$9,164,000	-$5,496,000	
Task 5B – Fish Ladder	$963,000	$6,977,000	-$6,014,000	
Tasks 6A and 6B – Coleman Diversion Dam				Reconnaissance level design efforts that provided the basis for the original cost proposal assumed standard design criteria. Refinements in the design of the Tailrace Connector and material removal led to cost increases in these features.
Task 6A – Tailrace Connector Inskip Powerhouse to Coleman Canal	$2,384,000	$3,128,000	-$744,000	
Task 6B – Coleman Dam Removal	$853,000	$853,000	$0	
Task 7 – Coleman Diversion Dam				At the time of the original proposal the nature of this proposed facility was in question because of the complexity of the facility. Eleven different alternatives means of achieving the goals of this bypass facility were evaluated. Complex engineering questions arose in the design of this structure. Extensive conceptual design effort went into determining the most feasible means of providing bypass capabilities while meeting biological and reliability goals. Significant hydraulic challenges arose in the design of this feature.
Inskip Powerhouse Bypass	$917,000	$5,180,000	-$4,263,000	
Task 8 – Environmental Permitting and Monitoring				An original allocation of $1 million is dedicated to monitoring subsequent to completion of the project. Costs associated with preparation of the NEPA/CEQA document and permitting through a contractor are estimated at roughly $3.3 million. Additional costs ($4 million) are associated with post construction biological monitoring of mitigation implementation. Other costs are associated with environmental coordination/ project management, coordination with FERC in the license amendment process, cultural resources requirements, coordination with the Fish and Wildlife Service in the preparation in the Coordination Act Report, and coordination with NMFS in endangered species compliance. Pathogen problem included at $2.3 million.
Anadromous Fish Environmental Monitoring	$1,000,000	$1,000,000	$0	
Compliance NEPA/CEQA	$2,020,000	$3,254,700	-$1,234,700	
Mitigation & Monitoring for Construction	$570,000	$4,000,000	-$3,430,000	
Pathogen Problem	$0	$2,329,200	-$2,329,200	

Task Under Original CALFED Proposal	Funding Allocations Under Original CALFED Proposal	Current Anticipated Costs	Difference (Original – Current Anticipated Cost)	Comments
Lower Ripley Creek	$92,000	$62,000	$30,000	No significant change from the original Proposal.
Soap Creek Feeders	$183,000	$269,000	-$86,000	No significant change from the original Proposal.
Water Acquisition Fund	$3,000,000	$3,000,000	$0	No change from the 1999 MOU.
Cost of Forgone Power During Construction	$54,400	$54,400	$0	No change from the 1999 MOU.
Net Present Value of Forgone Power	$2,082,700	$2,082,700	$0	No change from the 1999 MOU.
Total	$28,000,000	$62,00,000	**-$34,000,000**	**Additional Budget Change Requested**

Footnote: The collaborative team approach used throughout this project has required extensive coordination of design efforts and has led to consideration of multiple design variations for various sub-features associated with each element. This has added time and effort to the engineering work.

b. Scope change - No change in scope.

c. Time extension - No additional time requested.

2. Provide a complete but brief summary of the history of the contract and previous amendments.

The Project stems from the Memorandum of Understanding, dated June 1999 and originally funded by CALFED that same year. The need for supplemental funding is primarily associated with two factors: 1) Conservative design philosophies established at the outset of the implementation process stemming from provisions of the MOU; and 2) More detailed understanding of site conditions and design parameters. There have been no previous amendments granted concerning this Project for either money or time.

3. Reasons for request (justification).

Justification for supplemental funding is based upon an increase in project reliability (expected benefits) in relation to the request for additional funding. To fully appreciate the reasons for increased costs it is important to understand the background leading to the original funding for the Project. Estimated costs for the proposed Battle Creek Salmon and Steelhead Restoration Project that provided the basis for the conditional funding approved in February 1999 were developed through a series of appraisal/reconnaissance level studies completed between 1998 and early 1999. In February 1999 CALFED conditionally approved these funding levels contingent upon the development of a formal Memorandum of Understanding between PG&E Company, Reclamation, and the various Resource Agencies. In June 1999 a formal agreement (MOU) was entered into between the various parties. The appraisal level cost estimates developed in 1998 and 1999 continued to provide the basis for the proposed funding that was ultimately approved in June 1999. No traditional feasibility design phase was ever completed on the proposed

project prior to funding. Design of the project went directly from the recon level to final design.

Through the negotiation process, the MOU included provisions that the screen and ladder facilities that would be incorporated at various sites under the overall plan would be designed to be "failsafe." A "Fail-Safe Fish Ladder" was defined (MOU, Section 2.10) as, "features inherent in the design of the ladder that ensure the structure will continue to operate to facilitate the safe passage if fish under the same performance criteria as designed under anticipated sources of failure." A "Fail-Safe Fish Screen" was defined (MOU, Section 2.11) as, "a fish screen that is designed to automatically shut off the water diversion whenever the fish screen fails to meet design or performance criteria until the fish screen is functioning again." As the Project moved into the final design phase these provisions of the MOU were instituted by adopting a 3-point design philosophy that stressed the need to design structural features that 1) had a high probability of successfully meeting biological goals; 2) had a long term functional reliability; and 3) included features that facilitated ease of operation and maintenance activities.

This 3-point design philosophy was also carried through the other features of the proposed Project. As detailed designs proceeded this design philosophy led to several modifications to the reconnaissance/appraisal designs used as the basis for funding. These changes have ultimately led to net increased estimated costs to complete the proposed Project. Some of these changes are outlined below. Cost increases are described in comparison to the tasks as originally outlined in the February 1999 CALFED proposal that formed the basis for the current funding levels. A Vicinity Map, (Figure 1) has been included to guide the reader of this document through the many locations of construction work.

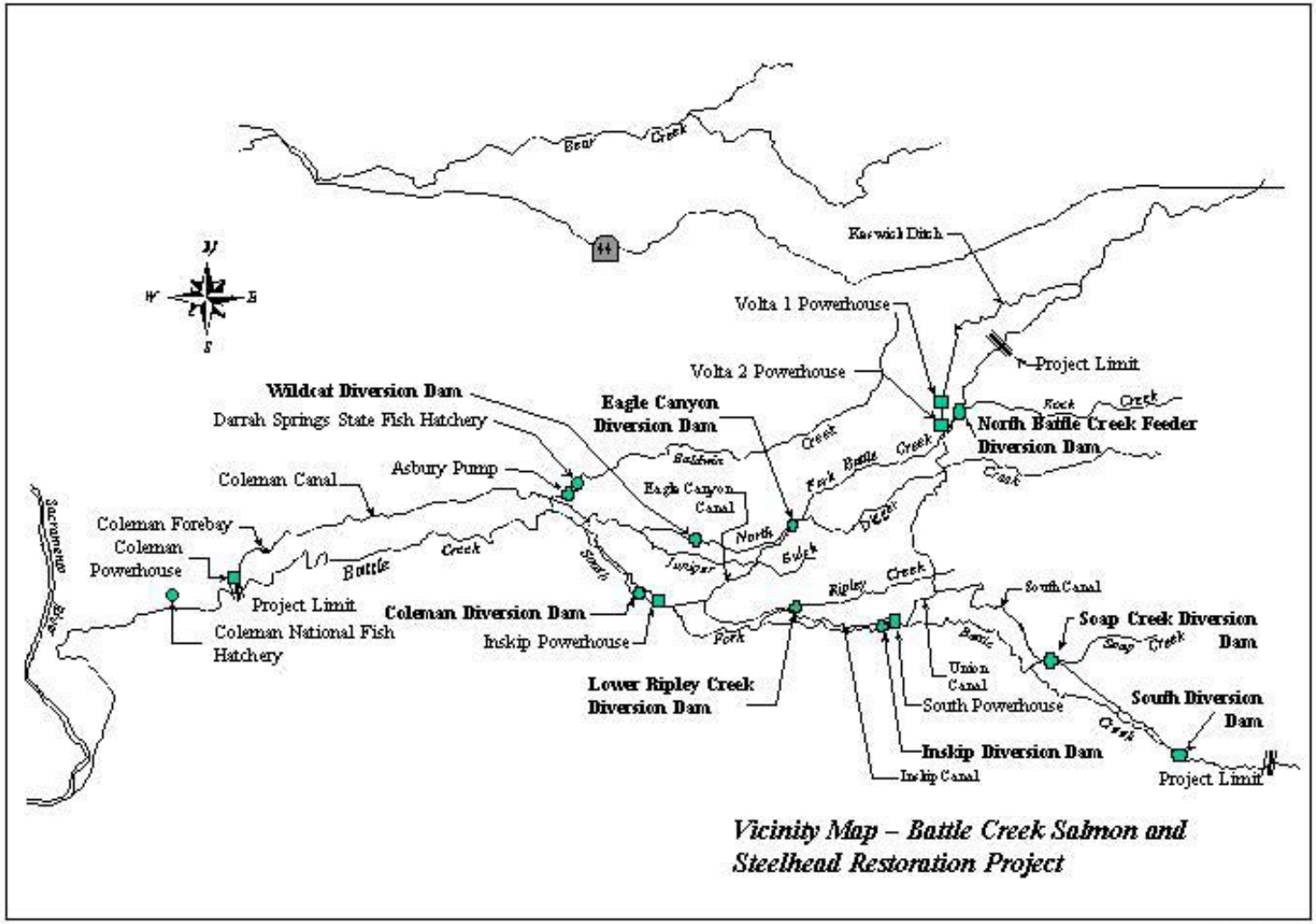

Bear Creek
Kerwick Ditch
Volta 1 Powerhouse
Project Limit
Volta 2 Powerhouse
Wildcat Diversion Dam
Darrah Springs State Fish Hatchery
Eagle Canyon Diversion Dam
North Battle Creek Feeder Diversion Dam
Rock Creek
Baldwin Creek
Asbury Pump
Coleman Canal
Eagle Canyon Canal
Coleman Forebay
Coleman Powerhouse
Battle Creek
South Fork
North Fork
Juniper Gulch
Deer Creek
Project Limit
Coleman National Fish Hatchery
Coleman Diversion Dam
Inskip Powerhouse
Ripley Creek
South Canal
Soap Creek Diversion Dam
Soap Creek
Lower Ripley Creek Diversion Dam
Union Canal
South Powerhouse
South Diversion Dam
Inskip Diversion Dam
Inskip Canal
Project Limit
Vicinity Map – Battle Creek Salmon and Steelhead Restoration Project

Figure 1

Task 1. Wildcat Diversion Dam Removal

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Wildcat Diversion Dam Removal	$2,751,000	$3,818,000	-$1,067,000

Refinements in estimates for other designed features of the Project have resulted in an increase of the reconnaissance level cost estimate for the Wildcat Diversion Dam removal. Until designs are completed on this feature, the anticipated costs are subject to revision up or down.

Task 2. Eagle Canyon Fish Screen and Ladder

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Fish Screen	$1,007,000	$1,894,000	-$887,000
Fish Ladder	$942,000	$3,767,000	-$2,825,000

A description of design changes leading to cost increases follows:

Fish Screen and Ladder Features

Civil Features

1. Fish ladder design flow capacity – Original recon design identified design flow in ladder of 50 cfs. Final design analysis identified design flow of 60 cfs.
2. Fish monitoring – fish monitoring not clearly defined in Preliminary Design Technical Report (PTR). As a result, extra design work was required to prepare fish monitoring proposals in order to reach a design consensus among project team members. Once a consensus was reached, final designs were prepared.
3. Spring collection system – spring collection system modifications not well defined in PTR. Field trips and meetings were required to document the collection system and prepare an improvement plan.
4. Length of fish screen – length of fish screen was increased to 64 feet to provide adequate screen area to meet required approach velocity.
5. Fish screen hoist – fish screen structure modified to include an overhead support for a hoist.
6. Alignment of fish screen – horizontal alignment of fish screen changed to increase work area of east-end concrete abutment.
7. Fish bypass weir – changed angle of fish bypass weir to allow for better fish passage.

8. Diversion canal weir – weir added in Eagle Canyon diversion canal to regulate water surface elevation across fish screen.
9. Diversion canal water elevation – discovered that the design water surface elevation in the diversion canal was approximately 1 foot higher than that reported in the PTR. As a result, the following changes were incorporated:
10. Added a 12 inch plate above the fish screen
11. Raised the fish screen platform and concrete abutments 12 inches
12. Increased height of dam lip
13. Increased size of slide gate at fish screen intake

Mechanical Features

14. Hoist – a 1 Ton manual hoist was added to install and remove the fish screens. The hoist will convey the screens to a lay down area at the east end of the fish screen structure.
15. Flow control louvers – the louver configuration was changed from vertical to inclined at 30 degrees, parallel to fish screen panels, to provide better flow control.
16. Fish screen intake – gate size revised to accommodate a change in water surface elevation at the diversion canal. See civil item above.
17. Fish screen structure – raised structure and appurtenances12 inches to accommodate a change in water surface elevation at the diversion canal. See civil item above.
18. Primary trashrack – added upstream of the main entrance to protect the gates.
19. Secondary trashrack – design was modified when NMFS added more fish passage ports.
20. Hydraulic lubricant – changed from food grade oil to biodegradable oil, required research and numerous discussions with participants to resolve.

Electrical Features

21. System operation logic was developed to meet operational criteria acceptable to PG&E, DFG, NMFS and FWS. Five stage sensors will monitor water levels in the fish ladder and fish screen to ensure minimum instream flow requirements are met and ensure proper operation of the fish passage facility. A stage sensor will be installed on each side of the fish screen. When the sensors detect a specified differential, the sweeper will be activated to clear any obstructions on the screen. If the differential increases, a warning alert will be sent to PG & E's Manton office and the canal gate will be closed to compensate for the higher level. If the differential gets to high, the canal gate will be closed, an alarm sent, and an on-site reset will be required to resume operation.
22. Stage sensors at the intake gates, along the fish ladder and at the diversion will relay water level information to a controller, which will monitor the sensor data and adjust the intake gates and the diversion canal gates to meet minimum instream flow requirements.

If flood conditions are detected, all gates will be closed, an alarm sent to the Manton office, and system lockout initiated. System will require on-site reset after flood condition passes.

23. Programmable Logic Controller (Geomation) and water level sensors will be specified to match existing equipment, as requested by PG&E and agreed at Ladder and Screen technical meetings. These will be sole source items.
24. Fish monitoring - a cabinet was added to house the fish monitoring equipment and electrical power and conduit were added for the video cameras.
25. Trail lighting – lighting was added along the trail to enable PG&E staff to access the site at night if necessary.

Task 3. North Battle Creek Feeder Diversion Fish Screen and Ladder

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Fish Screen	$535,400	$1,090,000	-$554,600
Fish Ladder	$576,500	$2,754,000	-$2,177,500
Access Road	$0	$899,000	-$899,000

A description of design changes leading to cost modifications follows:

Fish Screen and Ladder Features

Civil Features

1. Ladder design flow capacity- recon level identified a design capacity of 80 cfs. Detailed flow criteria analysis in final design increased design flow of ladder to 110 cfs.
2. Raise left dam abutment – the height of the dam specified in the preliminary design report was not sufficient to protect the facility for a 100-year event. The dam was raised an additional 5 feet and required additional analysis of the dam structure and the adjacent headwork's and fish screen structure.
3. Headwork's – preliminary design called for the headwork's structure to be left as is; in final design, the decision was made to replace it. The new structure will better accommodate the raised dam abutment and fish screen structure. A new structure will also facilitate construction.
4. The electrical and mechanical panels on the existing headworks were relocated. An equipment room was created in the larger and more voluminous headwork's structure to better protect the panels. This change also impacted and required coordination with mechanical and electrical engineers.
5. Fish screen realignment – Fish screen structure alignment was revised to move structure away from right bank, to minimize cuts into the hillside. Excavation of large cobbles and boulders with original alignment might prove difficult and unsafe during construction.
6. Fish ladder walkway – a sturdy, rolling walkway across the ladder was added. After initially pursuing a configuration that would be removable by one person, yet sturdy enough to support 2 persons lifting heavy stoplogs, participants agreed on a heavier,

movable walkway that could be left in place over the winter at the downstream end of the ladder, out of the reach of storm flows.
7. Footbridge – a footbridge was added during final design. The bridge will be designed by USBR but additional DWR design time was required to coordinate the bridge location and details with USBR and ensure that the bridge alignment did not interfere with the layout of the fish screen, ladder and headwork's structure.
8. Participants also decided to remove screen panels, screen cleaner motors, and other equipment, from the site by raising them onto the footbridge. Designing a cable system and series of hoists to lift the items about 15 feet to the top of the bridge posed a number of logistical problems and required civil/mechanical/electrical time to evaluate alternatives and resolve problems.
9. Video monitoring - two alternatives to the camera and light mounting system were discussed with participants and designed to allow NMFS appropriate access to the required bay in the fish ladder. Modifications to the mounting system required changes to drawings and specifications.
10. Sump pipe - After supports and a pipe had already been designed, participants decided to delete the sump pipe altogether.
11. Fish screen structure – at NMFS request, the louver configuration was changed from vertical to inclined at 30 degrees, parallel to fish screen panels, to provide better flow control; this required structural modifications to the steel support structure.
12. Flow straightening vanes were added but were subsequently eliminated when the alignment of the fish screen structure was straightened and moved away from the right bank.

Mechanical Features

13. Headwork's – mechanical and electrical panels were relocated to new headwork's structure. See civil item above.
14. Hoist and cable rail system – a 1 Ton manual hoist was added to install and remove the fish screens and move equipment. Participants subsequently agreed to remove fish screens and other equipment by hoisting up to the new footbridge and a more elaborate hoist and cable rail system was needed to accomplish this. See civil item above.
15. Flow control louvers – the louver configuration was changed from vertical to inclined at 30 degrees, parallel to fish screen panels, to provide better flow control.
16. Fish ladder orifice gates – changed from slide gates to custom flap gates, to accommodate concerns from PG&E and NMFS that slide gate handles would bend and that a flap gate with cable actuation would be better.
17. Headwork's slide gate - Original design called for recycling of the original head gate but during final design participants decided to replace with new gate because not enough information was available for the old gate. Also, change in headwork's design altered the head gate layout.
18. Dam sluice gate – revised design due to changes in sluiceway design and relocation of mechanical panels.
19. Hydraulic lubricant – changed from food grade oil to biodegradable oil, required research and discussion with participants, primarily NMFS, to resolve.

Electrical Features

20. System operation logic was developed to meet operational criteria acceptable to PG&E, DFG, NMFS and FWS. Five stage sensors will monitor water levels in the fish ladder and fish screen to ensure minimum instream flow requirements are met and ensure proper operation of the fish passage facility. A stage sensor will be installed on each side of the fish screen. When the sensors detect a specified differential, the sweeper will be activated to clear any obstructions on the screen. If the differential increases, a warning alert will be sent to PG & E's Manton office and the canal gate will be closed to compensate for the higher level. If the differential gets to high, the canal gate will be closed, an alarm sent, and an on-site reset will be required to resume operation.
21. Three stage sensors along the fish ladder and at the canal will monitor water levels to ensure minimum instream and ladder flow requirements are met. The controller will monitor sensor data and adjust the intake and canal gates to maintain minimum instream flow requirements. If the canal water level is approaching the canal capacity, the canal gates will throttle to prevent overtopping in the canal.
22. If flood conditions are detected, all gates will be closed, an alarm sent to the Manton office, and system lockout initiated. System will require on-site reset after flood condition passes.
23. Programmable Logic Controller (Geomation) and water level sensors will be specified to match existing equipment, as requested by PG&E and agreed at Ladder and Screen technical meetings. These will be sole source items.
24. Fish monitoring - a cabinet was added to house the fish monitoring equipment and electrical power and conduit were added for the video cameras.

Task 4. South Diversion Dam Removal

Task Under Original February 1999 CALFED Proposal	**Funding Allocations Under Original February 1999 CALFED Proposal**	**Current Anticipated Costs**	**Difference (Original Allocation – Current Anticipated Cost)**
South Dam Removal	$3,026,000	$3,984,000	-$958,000

Revisions and refinements to reconnaissance level cost estimates led to a small increase.

Task 5A and B. Inskip Diversion Dam - South Powerhouse Tailrace and Fish Screen (Task 5A) and Fish Ladder (Task 5B)

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Fish Screen	$1,375,000	$2,440,000	-$1,065,000
South Powerhouse Bypass Tunnel and Tailrace Connector	$3,668,000	$9,164,000	-$5,496,000
Fish Ladder	$963,000	$6,977,000	-$6,014,000

A description of design changes leading to cost modifications follows:

South Powerhouse Bypass Tunnel and Tailrace Connector

1. Bypass tunnel alignment was shifted slightly to accommodate geologic conditions. This slightly lengthened the tunnel compared to the recon estimates.
2. Access to the Inskip Diversion Dam and associated screen and ladder facilities during the recon phase was estimated to consist of a 2000 foot road, 12 foot wide, with the use of a 40 foot railway flatcar bridge. During final design examination of topography at the Union Canal wasteway and the hydraulics of the flow in this wasteway it was determined that the railway car configuration would not work because it was too short to safely provide passage for wasteway flows and debris beneath the bridge. Four alternative road concept alignments were examined. Concept alignment alternative 3 was ultimately selected. Three variations of the Alternative 3 concept were considered to assess ways to minimize visual impacts at stream level for as great as distance as possible) associated with road. Original road assumed to be 12 foot wide. In final design for safety and drainage reasons road was widened to 16 feet with an additional 4 feet of width to accommodate drainage ditch and guardrail. In addition, rock-aging compounds are to be applied to newly exposed road cuts to reduce visual impacts associated with the road.
3. Length of double box culvert at peninsula doubled when all features required at peninsula for tailrace connector were considered.
4. Estimated slide gate costs for tunnel inlet portal increased.
5. Need for additional canal wasteway at tunnel outlet portal identified and included in design. Need was identified based on closer examination of tunnel and canal diversion operations. Examinations of operations of the tunnel and canal diversion during outages identified possibility for surcharging canal, thereby requiring a new wasteway to prevent uncontrolled overtopping of the canal embankment.
6. Bringing the new road alignment across peninsula required examination of the elevations of the peninsula and the frequency at which floodwaters could potentially overtop peninsula road and prevent access during critical flood periods. Established design criteria that road should be established at 100-year flood elevation. Requires rising of the height of the peninsula.

7. Original design of necked down portion of peninsula was based on a riprap slope protection concept. Raised elevation of peninsula to 100-year flood elevation and confined space using original design required design change (roller compacted concrete) to accommodate near vertical wall.
8. Determined need to include sediment trap in front of tunnel inlet portal and an operation and maintenance access ramp to inlet portal/sediment trap area.
9. New access road determined necessary leading from public road to existing road leading down off of the plateau down to South Powerhouse. Existing access road goes in front of landowners home. Determined that it was appropriate to have construction traffic traveling right in front of landowners home.

Fish Screen and Ladder Features

Civil Features

1. Design Flow - The reconnaissance /appraisal level design used as the basis for the original CALFED funding had a ladder design capacity of up to 80 cfs. Design flow criteria is now based on not allowing more than a three day delay, on average, with a 1:10 year frequency. This resulted in a design flow of 1,700 cfs which translates to a ladder flow design capacity of 170 cfs (including auxiliary water supply). Consideration was given to a design flow of 1000 cfs (100 cfs ladder design flow including auxiliary water supply, i.e. more in line with original design flow). A design flow of 1000 cfs would allow 3-day delays to occur, on average with a 1:3.1 year frequency and a 6-day delay to occur, on average, with a 1:9.3 year frequency. Average daily flows greater than 1700 cfs have occurred 51 times in the 36 period of record for an average 1.4 days per year (yielding 0.39% exceedance). Average daily flows greater than 1000 cfs have occurred 181 times in the 36 year period of record for an average of 5 days per year (yielding 1.39% exceedance). Given this analysis, the fish screen and ladder design team (including all fishery resource agencies) decided that it was still appropriate to maintain the three-day delay criteria with a 1:10 year frequency (1700 cfs design flow).
2. Fish ladder bridge - A cover over the upper end of the ladder was added to serve as a bridge for vehicle access to the area south of the fish screen. The bridge is 16 feet wide and the clearance between the high weir and the underside of the bridge is 2.5 feet.
3. Upper and lower access roads - A short upper access road, from the fish ladder bridge to the area north of the entrance chamber, was added for maintenance. Where the road crosses the sluiceway, sliding wall panels will be opened to provide vehicles access over the sluiceway floor. A short, unpaved road was also added south of the ladder, between the ladder and the stream, for maintenance access to the entrance chamber.
4. Fish Screen Bypass Channel - The fish screen bypass channel was changed to a 4-foot wide, rectangular concrete channel rather than using the existing canal profile. The addition of the upper access road, and associated grading changes in the area south of the bypass channel, dictated this change.
5. Ladder Structure Drainage - Surface and subsurface drainage within the "C" shaped Fish Ladder Structure, between the bypass channel, the parallel portion of the fish screen and the fish ladder entrance, was changed/added as a result of adding the upper access road (Item 2). Collection ditches were added to collect and direct surface flow.

Perforated drainage piping running alongside the bottom exterior of the ladder was added to collect subsurface water and direct it into the creek.
6. Railcar Bridge - A bridge across the canal will be located just downstream of the tilting weir structure, to provide vehicle access to the fish ladder and the entrance chamber, for maintenance.
7. Parking lot - A paved parking lot was added at the north side of the new facilities, at the terminus of the main access road. The east end of the parking lot was extended to allow access to the instrumentation and intermediate control structure. The parking lot is still 120± feet from the headwork's but a large mobile crane may be able to reach the headwork's valves and equipment.
8. Radial gates - A plate was added to the top of each radial gate to prevent fish from falling back over the gate when water is spilling during maximum flow. The steel plate assemblies are oriented vertically and are anchored to the sides of the structures; they are not connected to the gates. A rubber seal is used to block the gap between the gate and the plate while allowing normal gate travel.
9. Fish monitoring - The fish monitoring station was moved from the south to the north side of the canal, adjacent to the tilting weir structure. Conduit and hardware will be installed for mounting and connecting cameras and lights. A slot at the opening of the recess will enable clear plexiglass panels to be removed for cleaning without dewatering. A white plexiglass panel mounted on the opposite sidewall will serve as background for the cameras. The cameras and lights will be purchased and installed separately later, near the end of construction, to take advantage of any technological advances in the equipment. Automated fish counters are not included; they may be installed later if deemed necessary.
10. Ladder sluiceway and drain pipe - Sluice water will be discharged into a 27-inch drainage pipe terminating approximately 70 feet away from the ladder, near South Fork Battle Creek. The pipe will now be able to convey the full ladder flow of 39 cfs so that the flow can be diverted around the entrance chamber for periodic maintenance. The weir downstream of the ladder sluiceway will be revised to accommodate flashboards for when flow must be diverted.
11. Stream Channel Excavation - The excavation across from the entrance chamber, on the south side of the creek, was eliminated. The excavation may be done in the future, if access to the south side is obtained and if hydraulic problems arise that require the excavation.
12. Auxiliary water pipe size - The size of this pipe was increased from 36 to 42 inches to be able to reduce velocity at the diffuser and also extend the service life of the cement mortar-lined pipe.
13. Auxiliary water pipe flow control – The control gate was located at the entrance during preliminary design; however, the pipe does not flow and under certain conditions a hydraulic jump will occur. The control gate was moved to the pipe outlet, to ensure the pipe always flows full, eliminating the hydraulic jump.
14. Auxiliary water pipe diffuser - Although the size estimated during preliminary design satisfies published fishery guidelines, at DFG's request, the diffuser size was increased, dissipator "blocks" were added, and the floor was tapered to reduce water velocity through the grating and to make it as uniform as possible. At DFG's request, a steel "false wall" was also added in front of the slide gate, to provide a flush surface for the fish.

15. Entrance chamber - The acute angle at the entrance chamber, near the downstream opening, was eliminated. A transverse wall was added near the downstream opening and the triangular void was replaced with mass concrete. The change, made to eliminate debris accumulating at the corner, also required modifications to the service platform and relocating an access ladder.
16. Entrance chamber - A chamfer was added at the southeast corner of the entrance chamber, to minimize flow turbulence. The change required modifications to the service platform and relocating an access ladder.
17. Diversion canal - The invert surface of the transition canal, between the sediment basin and the top of the fish ladder, was raised by one foot, to limit the maximum allowable head loss at the headworks gate structure to 1 foot during high flow conditions (a fishery requirement). Other changes required by the slight increase in water surface elevation:
18. Ladder pools - Another pool was added at the top of the fish ladder, to provide the necessary incremental drop in water surface elevation along the length of the ladder. The lower weir of this new pool will include flashboards, to provide operational flexibility.
19. Screen panels - One more section of fish screen (2 stacked panels) was added, to maintain the minimum required wetted area in spite of the reduced water depth. Also, as screen details evolved, the base of the screen begins 4"± above the invert, higher than estimated during preliminary design.

Mechanical Features

20. Hoist – a 1 Ton manual hoist was added to install and remove the fish screens. The hoist will convey the screens to a lay down area at the south edge of the parking lot.
21. Swing gate - Swing gate (a custom item) was changed to a slide gate to reduce fabrication costs.
22. Hydraulic lubricant – changed from food grade oil to biodegradable oil, required research and numerous discussions with participants to resolve.
23. Ladder entrance gate operators – changed from manual to auto hydraulic operation so gates could be automated based on water level measured at several locations.
24. Flow control louvers – the louver configuration was changed from vertical to inclined at 30 degrees, parallel to fish screen panels, to provide better flow control.
25. Auxiliary water control gate – pipe size changed from 36" to 42" and pipe was moved to the entrance chamber, as noted in Civil notes above.

Electrical Features

26. System operation logic - System operation logic was developed to meet operational criteria acceptable to PG&E, DFG, NMFS and FWS. Seven stage sensors will monitor water levels in the fish ladder and fish screen to ensure minimum instream flow requirements are met and ensure proper operation of the fish passage facility.
27. Fish screen stage sensors - A stage sensor will be installed on each side of the fish screen. When the sensors detect a specified differential, the sweeper will be activated to clear any obstructions on the screen. If the differential increases, a warning alert will be sent to PG & E's Manton office and the canal gate will be closed to compensate for the higher level. If the differential gets to high, the canal gate will be closed, an alarm sent, and an on-site reset will be required to resume operation.

28. Other stage sensors - Five stage sensors at the headworks, along the fish ladder and Inskip Canal will relay water level information to a controller, which will monitor the sensor data and adjust gates at the headworks, auxiliary water pipe and canal to maintain minimum instream flow requirements.
If flood conditions are detected, all gates will be closed, an alarm sent to the Manton office, and system lock-out initiated. System will require on-site reset after flood condition passes.
29. Logic controllers - Programmable Logic Controller (Geomation) and water level sensors will be specified to match existing equipment, as requested by PG&E and agreed at Ladder and Screen technical meetings. These will be sole source items.
30. Monitoring equipment - A cabinet was added to house the fish monitoring equipment.

Task 6A and B. Coleman Diversion Dam - Inskip Powerhouse Tailrace Connector (Task 6A) and Coleman Diversion Dam Removal (Task 6B)
Task 7. Coleman Diversion Dam - Inskip Powerhouse Bypass

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Inskip Powerhouse Tailrace Connector	$2,384,000	$3,128,000	-$744,000
Coleman Dam Removal	$853,000	$853,000	$0
Inskip Powerhouse Bypass	$917,000	$5,180,000	-$4,263,000

Reasons for cost increases include:

1. At the time of the original proposal the nature of this proposed facility was in question because of the complexity of the facility. Eleven different alternative means of achieving the goals of this bypass facility were evaluated. Complex engineering questions arose in the design of this structure. Extensive conceptual design effort went into determining the most feasible means of providing bypass capabilities while meeting biological and reliability goals. Significant hydraulic challenges arose in the design of this feature.
2. Original concept was to develop relatively inexpensive “natural channel” drainage similar to the existing bypass system along a relatively erosion resistant alignment. Geologic investigations determined that proposed alignments were not erosion resistant

thereby making any inexpensive solution infeasible. Led to the selection of a pipeline alternative.
3. Slopes on upper plateau where bypass pipeline alignment was identified are steeper than appear. Hydraulically, velocities of water flowing in the bypass pipe reach on the order of 50 feet per second even before dropping down into the river canyon. Required the development of an energy dissipator on top of the plateau prior to sending the water over the edge of the upper plateau down to the river terrace. Chute conveying bypassed flows down to the river terrace develops velocities approaching 70 feet per second. Requires substantial energy dissipator at the bottom of the slope.
4. Chute bringing bypass flows down into the South Fork Canyon must cross Mt. Lassen Trout Farms water supply line. This water supply line cannot be taken out of service so construction of a bypass for this water supply line must be done without interruption to water supply.

Task 8. Environmental Permitting and Monitoring

Task Under Original February 1999 CALFED Proposal	Funding Allocations Under Original February 1999 CALFED Proposal	Current Anticipated Costs	Difference (Original Allocation – Current Anticipated Cost)
Anadromous Fish Environmental Monitoring	$1,000,000	$1,000,000	$0
Compliance NEPA/CEQA	$2,020,000	$3,254,700	-$1,234,700
Mitigation & Monitoring for Construction	$570,000	$4,000,000	-$3,430,000
Pathogen Problem	$0	$2,329,200	-$2,329,200

Reasons for cost increases:

1. The cost of preparation of the NEPA/CEQA document perpared through a contractor was more expensive than anticipated. Increased time and effort was required to coordinate with the private consultant to complete preparation of the NEPA/CEQA document. Issues not anticipated that needed to be addressed but were not anticipated included: 1) issues associated with potential introduction of IHN and other diseases as a result of reintroduction of salmonids into watershed and potential effect on private trout hatcheries; 2) development of much expanded related projects section in the environmental compliance documents to address fishery management issues at Coleman Hatchery and other issues raised by local Battle Creek watershed Conservancy; 3) Increased number of biological surveys required than anticipated for raptor and bat surveys.

2. More coordination time was spent between the environmental compliance team and the engineering team to avoid impacts as much as possible in the design of the project.
3. No costs associated with biological monitoring of mitigation implementation were included in original proposal.
4. Cost increases not specifically related to Task 8 but spread throughout Tasks 1 - 7 are related to mitigations costs. In the original proposal a 3 percent factor was applied to appraisal level cost estimates to identify an amount of mitigation costs. Actual mitigation costs will be higher than that.
5. Mitigation & Monitoring for construction now estimated to be higher due to the fact that the project has increased potential damage to riparian habitat.
6. Pathogen problem the potential introduction of IHN into the upper watershed was not anticipated at the time of award of this directed action and thus no funding provided.

In Summary

Much of the increased final design costs are attributable to the fact that design efforts went directly from appraisal level to final design. More time and effort was spent early on in final design concept phases to evaluate conditions that normally would have been done in planning phases in a more traditional process. The number of alternatives looked at for the Inskip Powerhouse Bypass facilities and the number of alternative access roads at the South Powerhouse site are indicative of this type of cost increase. This comment is not a criticism of the process used, only a comment that engineering costs as a percentage of construction costs appear high because they include costs that would more traditionally have been considered as project planning costs.

In addition, engineering and design was carried out in a collaborative manner. PG&E Company, CDFG, NMFS, and FWS all participated in the engineering/design process. Multiple design team meetings were held where specific design details and approaches were discussed in great detail. In many cases this led to consideration of multiple design variations for various sub-features associated with facilities at each site.

In many cases design data costs were higher than anticipated. For example, to acquire geologic data for the South Powerhouse Bypass Tunnel drill rigs had to be helicoptered to drill hole locations. Extensive time was also spent mapping trees at the Inskip Diversion Dam/South Powerhouse and Coleman Diversion Dam/Inskip Powerhouse sites to allow designs that avoided impacts as much as possible. More design data was required related to addressing design issues associated with the Mount Lassen Trout Farms water supply line. More geologic design data was required when the decision was made to develop the proposed North Battle Creek Feeder Access Road versus doing all helicopter work at this site. More geologic investigations associated with rock fall potential at the Eagle Canyon and Wildcat sites was required to assess potential safety hazards during construction at these sites.

4. Is there any cost share associated with this amendment? If so, please briefly describe including the amount and contributing agency(s).

A complete delineation of responsibilities of other agencies and PG&E Company for the Restoration Project Proposed Action is found in the June 1999 MOU.

Iron Mountain Mine Trustee Council (IMMTC) potentially could contribute to the funding of two dam removals concerning Battle Creek. These two Dams are the Wildcat Diversion Dam and the South Diversion Dam for a total cost of $7,802,000. ($3,818,000 and $3,984,000 respectively) It has been learned however that a sum in the amount of $6 million is all that could be offered if the work paid for by the IMMTC meet their charter for expending funds. In any case, the offer would be conditional upon CALFED being able to provide additional funding for the Battle Creek Salmon and Steelhead Restoration Project, and that the funds be expended for construction only. If these conditions are meet the funds would not be transferred to Reclamation until such time as actually needed so that the Trust can maximize the interest return on their account.

5. If a change of scope, please explain why the requested amendment falls within the parameters of the approved project and is not a new project.

As previously stated under paragraph 1.b. in the being of this paper there are no changes in the scope for the Battle Creek Salmon and Steelhead Restoration Project.

6. What is the current project status?

Project expenditures to date are shown in Table 1. Table 2 shows the current proposed environmental and construction schedule for completion of this project. Table 3 shows the current status of funding and anticipated costs. Below is a general description of the status, funding, and implementation issues.

To date, design work is fully underway. Design coordination continues with the environmental compliance team. Biological surveys have been done and are scheduled as necessary to maintain a continuous assessment of the presence of various species. Permitting actions have been initiated. The Final Public Draft EIS/EIS will be released by October 22, 2003.

Currently four construction specifications are to be awarded for the implementation of this project. These four specifications are:

- Specification 1: All facilities at Inskip Diversion Dam/South Powerhouse, Coleman Diversion Dam/Inskip Powerhouse, Soap Creek, and Lower Ripley Creek
- Specification 2: Wildcat Dam Removal
- Specification 3: All facilities at Eagle Canyon Dam and North Battle Creek feeder Dam
- Specification 4: South Diversion Dam Removal

Specification 1 and 3 are essentially complete and are being held pending completion of environmental and FERC compliance activities. This and other specifications are subject

to change pending any modifications or changes that may occur as a result of these environmental compliance activities. The remaining specifications are at various stages of development.

Construction sequencing and delineation of construction specifications will be governed by five main assumptions:

- Additional funding is provided.
- Environmental documentation completed and permits obtained as currently scheduled.
- FERC license determination obtained.
- Sequence construction to minimize power outages.
- Sequence construction to attain benefits to aquatic resources as early as possible and to minimize adverse impacts associated with construction.
- Sequence construction to minimize stream flow diversion requirements at each dam site during dam removal and for other instream construction.

Table 1. Expenditures to Date

Fiscal Year	Engineering	Environmental	Project Management	Total
1999	$401,572.51	$36,199.15	$27,113.77	$464,885.43
2000	$1,407,109.63	$415,413.38	$241,490.83	$2,064,013.84
2001	$1,444,051.70	$478,025.52	$486,911.60	$2,417,988.82
2002	$4,630,126.58	$365,039.40	$328,254.81	$5,323,420.79
1st Half 03	$784,090.04	$47,493.50	$116,089.46	$947,673.00
Total	**$8,666,950.46**	**$1,342,170.95**	**$1,199,860.47**	**$11,217,981.88**

Table 2. Current Schedule

Date	Environmental Compliance / FERC Licensing Process	Engineering Design/Construction
July 3, 2003	Release of NEPA/CEQA Public review Draft EIS/EIR	
August 4, 2003		Complete Final Specifications 1 and 3[1]
September 16, 2003	Public Comment Period Ends	
October 10, 2003		Initiate Construction Procurement Process for Specifications 1 and 3
March 1, 2004		Complete Final Specifications 2 and 4
September 29, 2003	Final Adaptive Management Plan	
November 19, 2003	Filing of Final EIS/EIR	
November 19, 2003	PG&E submits Final License Amendment to FERC	
December 22, 2003	30-Day No Action Period Ends	
April 1, 2004		Initiate Construction Procurement Process for Specifications 2 and 4
February 4, 2004	CEQA Findings/Notices and NEPA ROD	
February 13, 2004	Issuance of CWA 404 and 402 permits and 401 Water Quality Certification	
March 8, 2004	FERC Determination	
March 8, 2004		Award Construction Contracts 1 and 3[2].
May 1, 2004		Award Construction Contracts 2 and 4[3]
June 25, 2005		Complete Construction Contract 2.
November 20, 2005		Complete Construction Contract 3 and 4.
June 1, 2006		Complete Construction Contract 1.

[1] Specification 1: All facilities at Inskip Diversion Dam/South Powerhouse, Coleman Diversion Dam/Inskip Powerhouse, Soap Creek, and Lower Ripley Creek
Specification 2: Wildcat Dam Removal
Specification 3: All facilities at Eagle Canyon Diversion and North battle Creek Feeder Diversion
Specification 4: South Diversion Dam Removal

[2] Specification 3 must be awarded no later than March 2004 to allow minimally sufficient time for fabrication of screens for installation during low flow period in 2004.

[3] Specification 4 must be awarded no later than May 2004 to allow completion of instream removal work during low flow period of 2004. Early Award of Specification 4 allows completion of project in late 2004 or early 2005 rather than late 2005.

Table 3	Element Cost Update for each Feature of the Project						
FEATURE	CONTRACT COST	CONT'CY (20%)	FIELD COSTS	ENGINEER'G COSTS	PLANNING COSTS	CONTRACT ADMIN.	TOTAL BUDGET
Coleman Diversion Dam							
Dam Decommissioning	$428,000	$86,000	$514,000	$195,000	$67,000	$77,000	$853,000
Tailrace Connector - Inskip Powerhouse to Coleman Canal	$1,570,000	$314,000	$1,884,000	$716,000	$245,000	$283,000	$3,128,000
Inskip Powerhouse Bypass	$2,600,000	$520,000	$3,120,000	$1,186,000	$406,000	$468,000	$5,180,000
Inskip Diversion Dam							
Fish ladder	$3,800,000	$760,000	$4,560,000	$1,733,000		$684,000	$6,977,000
Fish Screen (220 cfs)	$1,329,000	$266,000	$1,595,000	$606,000		$239,000	$2,440,000
South Powerhouse Bypass Tunnel & Tailrace Connector to Inskip Canal	$4,600,000	$920,000	$5,520,000	$2,098,000	$718,000	$828,000	$9,164,000
South Diversion Dam							
Dam Decommissioning	$2,000,000	$400,000	$2,400,000	$912,000	$312,000	$360,000	$3,984,000
Lower Ripley Creek Feeder							
Dam Decommissioning	$31,000	$6,000	$37,000	$14,000	$5,000	$6,000	$62,000
Soap Creek Feeder							
Dam Decommissioning	$135,000	$27,000	$162,000	$62,000	$21,000	$24,000	$269,000
Wildcat Diversion Dam							
Dam Decommissioning	$1,900,000	$380,000	$2,300,000	$874,000	$299,000	$345,000	$3,818,000
Eagle Canyon Diversion Dam							
Fish Screen (70 cfs)	$1,032,000	$206,000	$1,238,000	$470,000		$186,000	$1,894,000
Fish Ladder	$2,052,000	$410,000	$2,462,000	$936,000		$369,000	$3,767,000
North Battle Creek Feeder Diversion Dam							
Fish Screen (55 cfs)	$593,000	$119,000	$712,000	$271,000		$107,000	$1,090,000
Fish Ladder	$1,500,000	$300,000	$1,800,000	$684,000		$270,000	$2,754,000
Access Road and Footbridge	$490,000	$98,000	$588,000	$223,000		$88,000	$899,000
SUBTOTAL	**$24,060,000**	**$4,812,000**	**$28,892,000**	**$10,980,000**	**$2,073,000**	**$4,334,000**	**$46,279,000**
Anadromous Fish Environ'l Monit'g, MOU Sect. 7.3							$1,000,000
Environ'l Compliance (NEPA/CEQA/ESA/CWA, etc) & Surveys							$3,254,700
MLTF Pathogen Problem							$2,329,200
Environ'l Mit'n & Monit'g for Constr.							$4,000,000
Water Acquisition Fund							$3,000,000
Adaptive Management Fund							$0
Net Present Value of O&M Impacts							$0
Cost of Forgone Power During Construction							$54,400
Net Present Value of Annual Forgone Power							$2,082,700
Total Project Cost							**$62,000,000**

7. For projects requiring environmental review and/or permits, what review and approvals have occurred to date? Does the requested amendment impact the ongoing review and approval process or timeline?

The January 1999 Restoration Plan formed the foundation for entering into a long-term agreement with PG&E Company (reference June 1999 MOU) for the restoration of anadromous fishery habitat in Battle Creek and its tributaries to facilitate the goals of the Central Valley Project Improvement Act. As part of the design of the project detailed assessments of the project's constructability have been completed and detailed construction schedules are being prepared. No exigencies have been identified that would prevent implementation of the project in times allotted. The proposed Restoration Project is, at the time of this writing, undergoing NEPA/CEQA compliance as well as a full range of other required permits. The environmental schedule is as follows:

Environmental Schedule

EIS/EIR:

Reclamation and the SWRCB distributes Draft EIS/EIR for public review	7-3-03
60 day Public Comment period ends	9-16-03
Environmental Technical Team Review Draft of the Final EIS/EIR	10-21-03
Filing of Final EIS/EIR	11-19-03
30 day No-Action period ends	12-22-03
CEQA Findings/Notices and NEPA ROD	2-09-04

ASIP:

ASIP sent to FWS and NMFS to initiate formal consultation	9-26-03
End of 135 day consultation process, anticipate receipt of BO by	2-9-04

CWA Permitting

Final (field-verified) wetlands delineation report	10-3-03
404, and 401 CWA permit applications submitted to Corps/SWRCB/RWQCB	10-17-03
Issuance of CWA 404 and 401 Water Quality Certification	2-13-04

Adaptive Management Plan

Environmental Team Review of the Final Adaptive Management Plan	9-19-03
Final Adaptive Management Plan	9-29-03

8. How does the project as amended continue to fall within the CALFED Program goals?

The purpose of the Restoration Project is to restore and enhance approximately 42 miles of habitat in the mainstem and two primary forks of Battle Creek downstream of the naturally impassible waterfalls and in about 6 miles of its tributaries, while minimizing the loss of clean and renewable energy produced by the Battle Creek Hydroelectric Project.

The underlying scientific concepts underlying the goals and objectives of restoration on Battle Creek are founded in principles of conservation biology. The Restoration Project is structured to achieve important conservation biology objectives for species of salmonids in the upper Sacramento River now facing threats to their future existence, specifically, spring-run and winter-run Chinook and steelhead. A fundamental principle of conservation biology is that the probability a species will recover to a healthy status in a timely manner depends on the number of independent self-sustaining genetically viable populations of these species that are in the river basin. By bringing the remnant populations of these species that still exist in Battle Creek back to a healthy population level they will be able to significantly contribute to the recovery of these species in the upper Sacramento River. The exceptional drought resistant nature of the Battle Creek watershed will make its populations extremely valuable in the years following a catastrophic drought when the entire basin's populations must rebuild. This is especially the case for winter-run Chinook populations that are predicted to have complete reproductive failure during three driest years of the century, leaving Battle Creek as the only refugia in the basin at those critical times. General goals associated with the Restoration Project Proposed Action include:

- Restoration of self-sustaining populations of Chinook salmon and steelhead and of their habitat in the Battle Creek watershed through a voluntary partnership with state and federal agencies, a third-party donor, and PG&E Company.
- Up-front certainty regarding specific restoration components, including Resource Agency-recommended in-stream flow releases, selected removal or decommissioning of dams at key locations in the watershed, dedication of water diversion rights for in-stream purposes at decommissioned sites, construction of tailrace connectors, and installation of state-of-the-art fish screens and fish ladders meeting contemporary state and federal criteria.

The restoration in Battle Creek of anadromous fish populations also plays a part in meeting the broader goals of the Central Valley Project Improvement Act (CVPIA). This Act mandated the development of a program that makes all reasonable efforts to increase the natural production of anadromous fish to levels not less than twice the

average level attained during the period of 1967-1991. Finally, many of the goals and objectives of the CALFED Ecosystem Restoration Program (ERP) are addressed in the Restoration Project. Strategic goals identified in the "Ecosystem Restoration Program Draft Stage 1 Implementation Plan – August 2001" which apply to the proposed Restoration Project include 1) Goal 1 – At-Risk Species; 2) Goal 2 – Ecosystem Processes and Biotic Communities; and 3) Goal 4 – Habitats. Restoration priorities for the Sacramento Region identified in the Draft Stage 1 Implementation Plan which apply to the Restoration Project include: 1) Develop and implement habitat management and restoration actions in collaboration with local groups; 2) Restore fish habitat and fish passage particularly for spring-run Chinook salmon and steelhead trout and conduct passage studies; 3) Conduct adaptive management experiments in regard to natural and modified flow regimes to promote ecosystem functions of otherwise support restoration actions; and 4) Develop conceptual models to support restoration of river, stream, and riparian habitat.

9. If applicable, discuss any adaptive management aspects of the proposed amendment, e.g., review or assessment by an advisory committee.

The proposed Project incorporates a multifaceted adaptive management approach to restoration that uses the best available science to develop a comprehensive solution to meet fisheries restoration goals and objectives. Combining structural and non-structural measures with an institutional framework and funding that provides for both the long-term assessment of how well the project is achieving restoration goals and a means for making any necessary on-the-ground adjustments provides the greatest reliability that the investment in the Battle Creek watershed will be a success. Once construction of the physical features is completed and the institutional adaptive management framework is established, an approach is set in place that monitors the effectiveness of the restoration measures taken and allows for modification. Key in the post-construction approach is the establishment of specific criteria that test the underlining scientific hypotheses forming the basis of the Project. These criteria are used to assess the validity of the underlying assumptions and provide a means to evaluate success in meeting individual goals and objectives.

The formulation and proposed implementation of the Project has, and is, following a passive adaptive management process. The passive adaptive management process has been adopted based upon comments received from the CALFED Independent Science Program (Healy 2001) on the draft Adaptive Management Plan that has been prepared for the Project. An extended discussion of the passive adaptive management process is found in the "Draft Battle Creek Salmon and Steelhead Restoration Project Adaptive Management Plan – March 2001 (as revised September 2001)."

The adaptive management restoration approach then builds on these criteria. The approach makes use of detailed monitoring and data assessment approaches for each objective, identified timelines, trigger events, responses, response limits, response evaluations, and end points. The scientific methods and criteria used to test the hypothesis are developed into a monitoring and data assessment approach and are

comprised of established and routine procedures, surveys, analysis, and modeling. These scientific methods will comply with all contemporary standard methods and reporting practices that are adopted by CALFED and Resource Agencies as they are developed, with provisions for updating methods based on contemporary scientific norms. This approach is graphically depicted in Attachment 2.

10. If the amendment request involves a land acquisition project please address the following.

- **Provide maps showing any changes in parcels to be acquired or not acquired.**
- **For change in property to be acquired please indicate total acreage involved, current land use, e.g., is it currently in active agriculture, current zoning designation and proposed use for acreage**

Most access to be carried out for implementing the proposed Project is being obtained in cooperation with PG&E Company. Where sufficient existing PG&E Company rights-of-way are being used for implementing this project. Specific agreements with individual landowners may also be needed. Construction agreements will be worked jointly by PG&E Company and Reclamation with individual landowners as necessary. The existing MOU between PG&E Company and the various agency representatives for the Project contractually obligates PG&E Company in the role of land acquisition.

11. If the requested amendment ultimately gets denied, how will the project be changed to work within the existing budget or time, i.e., what are the consequences of not granting the amendment?

Before addressing the consequences of not granting this request for additional funding, we first have to look at what's at stake if the project was to be terminated prematurely. This Project removes the lowest hydroelectric dams located in the North and South Forks (Wildcat Diversion Dam and Coleman Diversion Dam), the so called "gateway" dams to the watershed, thereby providing the greatest level of reliability for fish passage to the upper reaches of the watershed. Where fish screen and ladder facilities are included as project features, these structural fish passage facilities are being designed to higher-level criteria standards to ensure reliable long-term operation and maintenance access. Other dam removals are proposed at key locations (e.g. Soap and Lower Ripley Diversion Dam removals ensure the release of cold spring water resources to the South Fork). All dam removals are then tied to the transfer of hydropower diversion water rights to the California Department of Fish and Game for dedication to instream uses under established State Water Resources Control Board processes. Finally, hydropower facilities are being modified in other ways so as to eliminate false attraction concerns (mixing of North and South Fork water) and flow fluctuations in the natural channels.

The Project as formulated also combines the establishment of a Water Acquisition Fund enabling the purchase of additional flows in the future if deemed necessary, funds for monitoring, an Adaptive Management Fund, and an Adaptive Management Plan and implementation process. These features, triggered after completion of the construction of

the physical measures, enable long-term adaptations to the Project based on future monitoring of the Project's actual performance. Even though all of this project work is presented individually by site name, they are all linked together by the hydrology of the area. Therefore, any consideration to reduce costs by the elimination of any one site will stop all progress for the entire project.

Members of the Battle Creek Watershed Conservancy (BCWC) and the Battle Creek Working Group (BCWG) have been meeting to discuss technical and policy issues relating to restoration in the watershed. Numerous working sessions have addressed upstream watershed concerns, hatchery and natural fish interaction, and other environmental and Endangered Species Act regulatory concerns and assurances. As watershed issues and issues specific to the Project have evolved the importance of a total watershed and ecosystem approach to dealing with resource issues has been recognized as well as the importance of fully vested stakeholder participation in resource management decisions has been recognized. Again any elimination of one site in the interest of saving costs could result in these groups not supporting the Project.

Compatibility of Coleman National Fish Hatchery operations with Battle Creek watershed restoration is a major concern of stakeholders engaged in planning and implementing restoration activities in the Battle Creek watershed. The CALFED Science Program has formed a Science Panel to address these and other technical questions from a science perspective. This Panel is currently working with the BCWG and others to organize and schedule a workshop related to selected Battle Creek watershed technical issues. Continued collaboration and partnering with stakeholders is critical to implementing restoration actions in the watershed. Any reduction in the project scope could result in questions concerning the ability of the CALFED Science Program to address concerns from a scientific perspective.

Finally the sunk cost of this project thus far is approximately $11 million. This equates to approximately 18% of the new estimated final cost of this Project. With the remaining funds currently available all work related to the environmental documentation, engineering/construction specifications can and will be completed by the end of this calendar year. However, no construction would be able to go forward until such time as all of the construction funding is provided. All work associated with this Project will be stopped and the Project will be on hold until the funds are made available. Due to the construction window limitations, the next critical date for funding this project would be October of 2003 and each October there after.

Table 1. Summary of prescribed instream flow releases from dams in the anadromous reaches of the North and South Forks

Dam	Fork	Monthly Minimum Flow (cfs) to be Released From Dam											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Keswick	North	3[A]	3[A]	3[A]	3[A]	3[A]	3[A]	3[A]	3[A]	3[A]	3[A]	3[A]	3[A]
NBCF	North	88[F]	88[F]	88[F]	67[F]	47[F]	47[F]	47[F]	47[F]	47[F]	47[F]	47[F]	88[F]
Eagle	North	46[S]	46[S]	46[S]	46[S]	35[S]	35[S]	35[S]	35[S]	35[S]	35[S]	35[S]	46[S]
Wildcat	North	Facility decommissioned; no instream flow requirement											
South	South	Facility decommissioned; no instream flow requirement											
Inskip	South	86[P1]	86[P1]	86[P1]	61[P1]	40[P1]	40[P1]	40[P1]	40[P1]	40[P1]	40[P1]	40[P1]	86[P1]
Coleman	South	Facility decommissioned; no instream flow requirement											

[A] Accretion flows downstream of the Keswick Dam can exceed 100% of maximum weighted useable area (WUA) for steelhead spawning in the portion of the Keswick reach available to anadromous fish and can exceed predictive capability of the IFIM model. Accretion flows downstream of the Keswick Dam provide greater than 90% of maximum WUA for steelhead rearing in the portion of the Keswick reach available to anadromous fish.

[F] On occasion the release is not available due to quantity of inflow reaching North Battle Creek Feeder Diversion. Additional inflows to the North Battle Creek Feeder reach are occasionally received form the junction box of Volta 2 Powerhouse tailrace and Cross Country Canal a short distance downstream.

[S] Eagle Canyon Dam releases reported in this table include releases from Eagle Canyon Springs (those springs located downstream of Eagle Canyon Dam that were included in the "interim flow agreement" between PG&E and USBR; USBR 1998a).

[P1] The prescribed instream flow will be the total available inflow in the South Fork upstream of the South Powerhouse at times when the available inflow is less than the prescribed flow.

Table 2. Summary of prescribed instream flow releases from diversions in tributaries affecting anadromous reaches of Battle Creek and tributaries based on best available information.

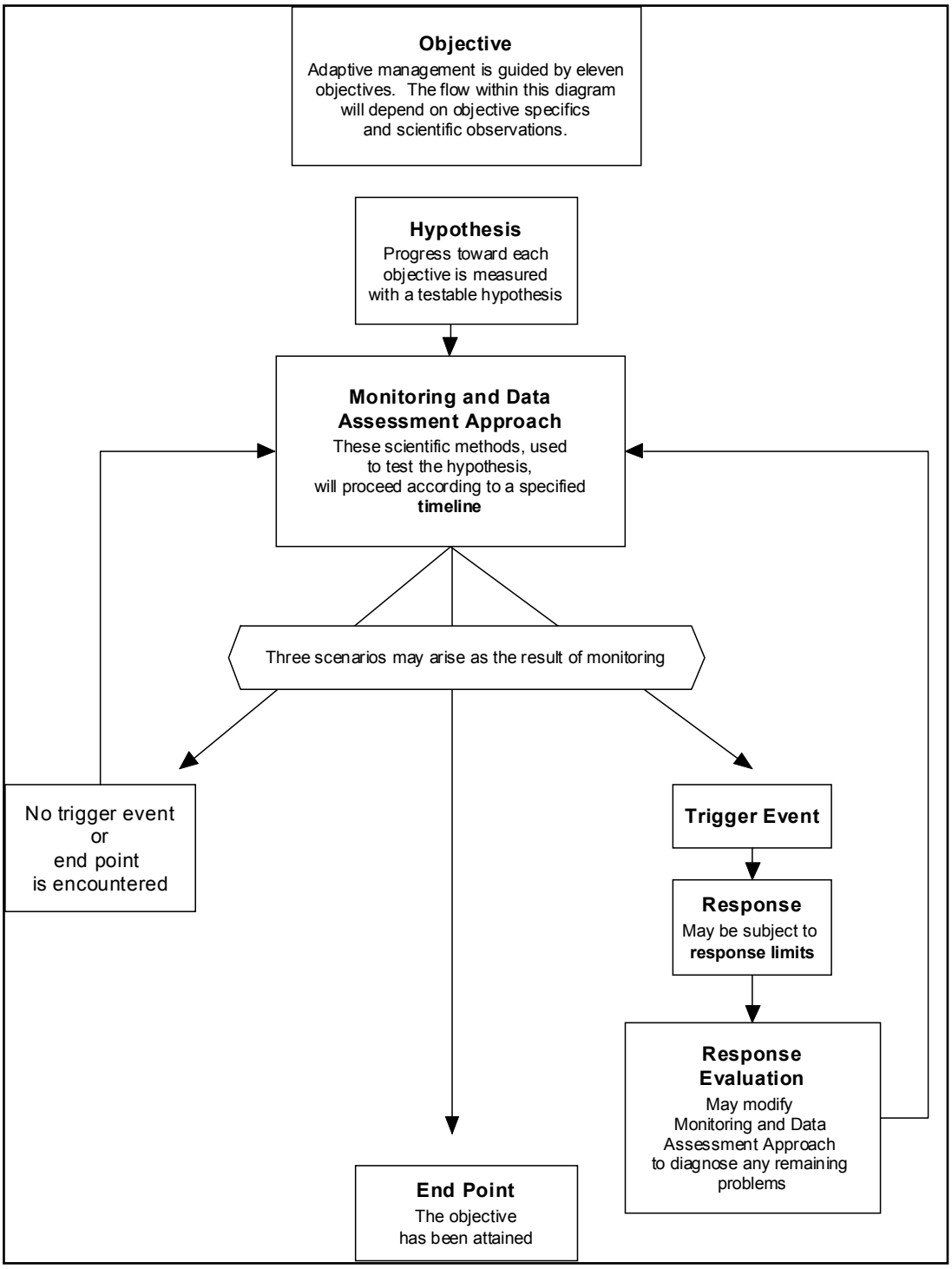
Diversion	Monthly Minimum Flow (cfs) To Be Released from Tributary Diversions											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Eagle Canyon Spring	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]
Soap Creek	Facility Decommissioned; no instream flow requirement											
Lower Ripley Creek	Facility Decommissioned; no instream flow requirement											
Baldwin	5[C]	5[C]	5[C]	5[C]	5[C]	5[C]	5[C]	5[C]	5[C]	5[C]	5[C]	5[C]

Creek												

[D] Flow from Eagle Canyon Springs enters Battle Creek in the vicinity of Eagle Canyon Dam and is included in Eagle Canyon Dam releases shown in Table 1. These springs are limited to those that were included in the "interim flow agreement" between PG&E and USBR will be released to maximize cooling of Battle Creek.

[C] The flow value reported for Baldwin Creek represents the maximum instream flow release.

Attachment 1



Attachment 2