

Appendix F

**Habitat Compensation Approach for the
Battle Creek Salmon and Steelhead
Restoration Project: A Program View**

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**Battle Creek Environmental Team
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Background

Construction activities of the proposed Battle Creek Salmon and Steelhead Restoration Project will have incidental adverse effects on fish and wildlife habitat. Mitigative measures have been developed by the Restoration Project to avoid and minimize these adverse effects to the extent practicable, but compensation must be addressed for unavoidable adverse effects on several habitats. For the purpose of this discussion, “mitigation” is broadly defined as any action to avoid, minimize, or compensate for adverse effects; whereas, “compensation” is replacing lost environmental values.

Preliminary estimates of riparian and upland habitat impacts are provided in Table 1. These estimates are taken from the Restoration Project’s Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (USBR and SWRCB 2003) and were made conservatively to represent the greatest perceived impact scenario. New estimates are presently being developed with updated information on project designs, and it is expected that projected impact areas will be reduced, especially for oak woodland habitats. Wetlands are not included in this proposal, as the section 404 permitting process will ultimately determine mitigation needs for wetlands.

General mitigation standards for CALFED Bay-Delta Program (CALFED) related projects are contained in the Program’s Programmatic Record of Decision (ROD) (CALFED 2000a) and Multi-Species Conservation Strategy (MSCS) (CALFED 2000b). Preliminary recommendations for mitigation of habitats also have been prepared by the Fish and Wildlife Service (FWS) specifically for the Restoration Project in its Draft Fish and Wildlife Coordination Act (FWCA) Report (USFWS 2001, 2003). These standards and recommendations include compensation ratios (Table 1) for adverse effects on habitats, whereby, the Restoration Project would restore or enhance additional area specified by the compensation ratio to offset the adverse effects. However in light of escalating Restoration Project costs for both construction and mitigation, other mitigation options might be developed that would consider Restoration Project benefits, and benefits of other CALFED-funded actions within the Battle Creek watershed.

A conference call among the Bureau of Reclamation, NOAA Fisheries, FWS, Department of Fish and Game (DFG), Pacific Gas and Electric Company (PG&E), and Metropolitan Water District was held on December 17, 2003, to discuss riparian and oak woodland mitigation. With consideration to goals of the CALFED Bay-Delta Program and Restoration Project, and expected adverse effects and benefits of the Restoration Project, conference call participants agreed that a reasonable compensation ratio for riparian forest/scrub would be 3:1, given that supporting criteria could be met.

Table 1. Preliminary estimates of potential impacts to riparian and upland habitats presented in the Restoration Project Draft EIS/EIR and presently recommended compensation ratios.

Habitat Type	Potential Impacts (acres)	Compensation Ratios (acres)	
		CALFED MSCS	Draft FWCA Report*
Riparian Forest/Scrub	7.2	2:1 to 5:1	5:1
Blue Oak Woodland/Savanna	49.6	2:1 to 5:1	5:1
Live Oak Woodland	25.9	2:1 to 5:1	5:1
Gray Pine/Oak Woodland	3.4	2:1 to 5:1	5:1
Mixed Chaparral	3.4	2:1 to 5:1	3:1
Annual Grassland	11.2	1:1 to 3:1	1:1

*FWCA Report ratios assume permanent loss of all habitat value at impact sites

Specific compensation ratios were not proposed for oak woodland habitats during the conference call because the Restoration Project would not benefit oak woodlands. It was noted, however, that opportunities for oak woodland compensation within the Battle Creek watershed might be limited. It was decided that opportunities for oak woodland compensation should be further investigated, including use of conservation easements to protect oak woodland habitat. Further investigation of oak woodland compensation options did not identify any opportunities for restoring degraded oak woodland habitats in the Battle Creek watershed; however, several properties were identified in the Battle Creek watershed that were protected, or proposed for protection, through conservation easements funded, or partly funded by the CALFED Program.

A second conference call among FWS, DFG, PG&E, and The Nature Conservancy (TNC) was held on January 22, 2004, to discuss riparian monitoring needs for the Restoration Project's Adaptive Management Plan and the potential for conservation easements to serve as compensation for Adverse effects the Restoration Project. The discussion addressed size of existing and potential conservation easement properties in the Battle Creek watershed, habitat types present, and risk of harmful future land uses that the easements might avert. These factors, considered together, appeared to support the concept of crediting easement benefits as compensation for adverse effects of the Restoration Project, when viewed in the context of the broader CALFED Program.

The proposed mitigation approach presented herein includes 1) consideration of project benefits for setting compensation ratios for impacts to riparian habitat and 2) consideration of other CALFED-funded actions in the watershed for meeting compensation needs for riparian and upland habitats. The following sections describe programmatic conservation measures provided

by the CALFED Program, compensation views presented in the Draft FWCA Report, and rationale for reconciling these guidelines into a balanced compensation approach.

CALFED Programmatic Conservation Measures

CALFED's MSCS has incorporated conservation measures (CALFED 2000b:Attachment D) into the CALFED Program to avoid, minimize, and compensate for adverse effects of CALFED actions on natural communities covered by the Natural Community Conservation Planning Act. Accordingly, appropriate compensation commitments for NCCP habitats are presently being developed for inclusion in the Restoration Project's Natural Community Conservation Plan (NCCP). MSCS guidance states that "conservation measures for NCCP communities are primarily directed at conserving the quality and quantity of natural habitats... Where CALFED actions would result in the permanent loss of natural NCCP habitats, restoration, enhancement, or protection of in-kind habitat would typically be required to compensate for the loss" (CALFED 2000b:4-7).

The MSCS provides ranges of compensation ratios for restoring or enhancing in-kind habitat acreage for natural plant communities covered in the MSCS that are lost or degraded from actions taken under the CALFED program, such as Ecosystem Restoration Program (ERP) actions. All habitats affected by the Restoration Project are covered in the MSCS; compensation ratios are provided in Table 1. The MSCS does not provide direction for selecting a precise level of compensation for an NCCP habitat, but it might be assumed that the greater the degradation of habitat, the higher the compensation ratio should be.

However, the MSCS further provides that "ERP actions to restore or enhance habitats that are implemented concurrently and in proximity to one another will be considered together for purposes of assessing their impacts on species and habitats and imposing compensatory measures. If the restoration and enhancement actions culminate in an increase or improvement in a particular NCCP community, compensatory measures may not be required even if there is a temporary or limited adverse modification of the community or habitat type. Ultimately, the need for compensatory conservation measures for CALFED restoration and enhancement actions will depend on the type, location, timing, and success of the related actions" (CALFED 2000b: 4-7).

Draft FWCA Report Mitigation Recommendations

Mitigation recommendations provided by USFWS in its Draft FWCA Report were made pursuant to the FWS Mitigation Policy (Federal Register 46(15):7644-7663). Compensation ratios considered the quantity and quality of habitats over a period of time representing the life of the project, as conceptualized in USFWS's Habitat Evaluation Procedures (HEP). It was assumed that impacts on the estimated acreage would be "total" impacts (i.e., entire vegetation structure is removed on impact sites). The ratios represent the break-even points, where average annual habitat values lost are replaced with equal average annual habitat values from compensatory actions. A HEP study was not performed for the Restoration Project, but the recommended compensation ratios were adopted from HEP assessments from other projects having similar habitats and impacts (primarily the proposed Auburn Dam and Spring Creek Debris Dam projects).

The Draft FWCA Report further recommended that Restoration Project benefits not be considered toward compensation of adverse effects. This view favored maximizing Restoration Project benefits by fully compensating for adverse effects on habitats in order to restore the biological baseline, so that all project benefits would contribute to increasing the baseline. This view, which assumed sufficient project funding, would provide for the greatest contribution to CALFED Ecosystem Restoration Program goals and milestones. However, FWS recognizes realities of financial constraints and is not opposed to other mitigation approaches if appropriate criteria to justify them can be developed and met.

Determination of Mitigation Ratios for Riparian Habitat

Considering CALFED guidance, Draft FWCA Report recommendations, and the goals and expected benefits of the Restoration Project, the Environmental Team proposes that a 3:1 mitigation ratio would be appropriate for compensating riparian woodland adversely affected by the Restoration Project. The following criteria are provided to support this view:

1. Restoration Project is Expected to Benefit Riparian Vegetation. Increased minimum instream flows from the Restoration Project would be expected to benefit riparian vegetation. To assume a benefit, present flow regimes must be assumed to limit the area and/or quality of riparian habitat. This would be a reasonable assumption because riparian ecosystems are maintained, in part, by groundwater (Ewing 1978). Higher minimum instream flows provided by the Restoration Project should increase levels of groundwater on Battle Creek, and enable establishment of riparian vegetation at higher elevations than at present. Because newly established vegetation in seedbeds must keep contact with groundwater as instream flows naturally recede in the summer, higher elevations of groundwater also should increase survival of newly established vegetation.

In addition, research suggests that riparian vegetation is especially sensitive to minimum and maximum instream flows (Auble et al. 1994). Although maximum instream flows occurring in Battle Creek would not be affected by the Restoration Project, minimum flows, which would occur during the primary growing season of riparian vegetation, would be increased up to 10 times, depending on location. Because positive correlations between rate of instream flow and rate of tree ring growth have been observed for riparian vegetation in California (Stromberg and Patten 1990), increased minimum flows would be expected to increase growth rates of riparian habitat.

However, effects of removing dams on riparian vegetation may not all be positive. Pulses of sediment stored behind removed dams can create new alluvial surfaces downstream that can be colonized by riparian vegetation, but also can bury existing riparian vegetation, which can die right away or over time due to anoxic soils and excessive nutrients (Shafroth et al. 2002). Dominant species of late seral stages are likely to be less tolerant to burial by sediment than pioneering species. Eliminating the water pool behind dams can reduce groundwater levels in those zones stranding riparian vegetation, and downcutting of the stream through dam sediment and channel aggradation from sediment pulses can both create terraces that may not be immediately suitable for riparian vegetation. To assume a riparian habitat benefit from increased minimum flows combined with dam removal, it must be assumed that the net effect on

riparian habitat over time would be positive due to large areas of increased instream flow provided by the Restoration Project and small areas affected by dam removal.

2. Spatial Extent of Expected Benefit is Large. Increased minimum instream flows that are expected to re-establish and/or enhance riparian habitat would occur over a substantial spatial area. The linear extent of increased instream flows would be about 33 miles of Battle Creek, plus reaches of Soap Creek, lower Ripley Creek, and Baldwin Creek (reaches below uppermost diversion dams affected by Restoration Project).

The distance that riparian habitat would be benefited perpendicular to the creeks is unknown, but would vary depending on geologic composition and topography (some creek reaches occur in narrow rocky canyons, while others occur in less steep areas with more substantial soil banks and wider flood plains). The land area that would be affected by increased groundwater and have suitable slopes and soils for establishing riparian vegetation also is unknown, but a positive correlation might exist between this area and wetted habitat Area. Minimum instream flows proposed by the Restoration Project would be 12 to 29 times greater in the North Fork and 8 to 17 times greater in the South Fork, depending on reach and time of year (USBR and SWRCB 2003:Fig. 3-2). This is expected to result in wetted area increases of about 61% (increase from 108.9 acres to 175.3 acres) (USBR and SWRCB 2003:Table 4.1-10).

3. Expected Benefit Would Occur in Proximity to Adverse Effects. The location of expected habitat benefits is within the Restoration Project area.
4. Expected Habitat Benefits Are In-kind. Benefits from the Restoration to riparian habitat would be in-kind with riparian habitat values lost. It is expected that riparian habitats that are re-established and/or enhanced due to increased instream flows would have similar plant composition and be used by similar assemblages of animal species as riparian habitats lost.
5. Expected Benefits to Riparian Habitat Would Benefit Fish and Wildlife. Establishment of new riparian habitat areas and enhanced growth of existing riparian vegetation would be expected to benefit fish and wildlife species affected by, or using, the riparian zone. The multiple layers of riparian vegetation along Battle Creek, in association with edges of adjacent plant communities and streams, create a diverse physical structure that provides food, water, cover, and shade for a diversity of amphibians, reptiles, birds, mammals, and invertebrates, including neotropical migrant birds, special status bats, and the valley elderberry long-horn beetle (USFWS 2003). Riparian communities also function as dispersal and migration corridors for many wildlife species.

An important associate of riparian habitat is shaded riverine aquatic (SRA) cover, which has ecosystem-level values. This near shore aquatic area occurring at the stream-riparian habitat interface consists of vegetation that either overhangs or protrudes into the water; instream woody debris, such as leaves, logs, branches and roots; and often substantial amounts of detritus (USFWS 1992). SRA cover provides high quality food and cover for fish, amphibians, and terrestrial wildlife that use riparian and stream edge habitat

(USFWS 1992). The amount of SRA cover present on Battle Creek has not been inventoried, but because of the relatively narrow width of Battle Creek, compared to the height and density of adjacent riparian vegetation, a high proportion of Battle Creek could probably be considered to have SRA cover. Because SRA cover is largely associated with riparian vegetation and wetted habitat area, higher minimum instream flows from the Restoration Project would be expected to enhance SRA cover.

6. The Restoration Project is Expected to Benefit Riparian Ecological Processes. Dam removal and changes in flow regime may not restore riparian ecosystems to pre-dam conditions (Shafroth et al. 2002), but may restore valuable components of riparian ecosystems. Enhanced SRA cover would be expected to provide greater input of leaves, woody material, and insects into the stream ecosystem. Increased minimum flows should better transport and distribute these materials downstream.

Lastly, increased minimum flows could also help sustain wetlands and associated riparian vegetation in side channels and backwater areas associated with the more alluvial floodplain reaches of Battle Creek. These habitats, combined with other riparian habitats on Battle Creek, could provide better connectivity of riparian habitat, and more effective filtering of sediment in runoff entering the creek.

7. Expected Riparian Benefits Would Begin Immediately. Minimum instream flows would be increased immediately following Restoration Project construction.
8. Expected Riparian Habitat Benefits Would be Monitored. The Restoration Project would develop a strategy to monitor riparian habitat for both benefits and adverse effects from the Restoration Project. This strategy would become part of the Restoration Project's Adaptive Management Plan.

During the January 22, 2004, conference call it was proposed that monitoring should include 3 components: 1) aerial photograph analyses of riparian habitat throughout the project area for existing conditions and at 5- and 10-year intervals following Restoration Project construction; 2) on the ground monitoring of the riparian vegetation community (to be combined with sediment monitoring); and 3) monitoring of riparian tree growth using tree ring analysis. Specific parameters that could be monitored include:

- Area of new riparian vegetation establishment on reaches with increased flows;
- Area of riparian vegetation established at higher elevations than at present;
- Survival and growth rates of seedlings established on new seedbeds, including any occurring at higher elevations than present;
- Measurement of structure of new riparian habitat (e.g., cover and height of trees, shrubs, and herbaceous vegetation and species composition);
- Area of SRA cover compared to area compared to that at pre-Restoration Project minimum instream flows; and
- Possible indirect effects from dam removal, such as excessive sedimentation on nearby riparian habitat.

Results of monitoring would be used by the Restoration Project agencies to determine whether additional mitigative measures should be taken. Potential additional mitigative measures might include:

- Remove invasive plant species in project area riparian zones;
- Exclude cattle from riparian zones through use of conservation easements;
- Construct structures to reduce bank erosion, if needed;
- Planting and nurturing riparian vegetation in areas of degraded condition.

Program View for Determining Compensation

The Environmental Team proposes that the balance of environmental compensation needs of the Restoration Project that remain following implementation of other mitigative measures should be considered offset by environmental benefits of CALFED-funded conservation easements in the watershed. The Environmental Team believes that this approach would be valid in view of the following criteria:

1. Restoration Project Is Making Extensive Efforts to Avoid and Minimize Adverse Effects. The Restoration Project committed to mitigation measures early in planning to avoid and minimize adverse effects at construction sites, such as fencing off sensitive habitat areas and providing an on-site biologist to monitor construction activities. The estimated area of impacts that could not be avoided are shown in Table 1. However, subsequent to these estimates, further assessment of project designs determined that projected areas of impact might be reduced by decreasing the projected width and length of the construction footprint along the South Canal. Additional project revisions being considered for reducing construction footprints include replacing the proposed new road to the North Battle Creek Feeder with an inclined elevator, not grading and filling some or all sections of the South Canal, and avoiding removal of some of the largest oak trees at Inskip Diversion Dam. These footprint reductions would substantially reduce impacts, primarily to oak woodland habitats, although the amount is not yet known.
2. Unavoidable Adverse Effects of the Restoration Project Are Incidental to Restorative Actions for Other Ecosystem Components. As an activity of CALFED's ERP, the purpose and objectives of the Restoration Project are for restoration of significant components of the Battle Creek ecosystem. Adverse effects are only incidental to the Restoration Project, which means to restore about 48 miles of stream habitat and self-sustaining populations of chinook salmon and steelhead in the watershed.
3. Loss of Habitat Will Be Mitigated On-site to the Extent Possible. Adverse effects to habitats that are not within the footprints of permanent project features will be restored following construction.
4. The Restoration Project Looked First for Habitat Compensation Opportunities Within the Project Area. The Environmental Team investigated opportunities for habitat compensation, both within and outside of the Battle Creek watershed, which would be needed in addition to on-site compensation. No candidate sites for compensation (e.g., degraded sites suitable for restoration), including mitigation banks, have been found for

the most-affected habitat type Boak woodland. Opportunities for compensating other habitat types are still being investigated, although none are known at this time. Other approaches, if available, would probably require a new conservation easement with a private landowner.

5. Consideration of CALFED-funded Easements Within the Watershed to Offset Restoration Project Impacts Would Be Consistent with Programmatic Conservation Measures in the CALFED MSCS. There are 3 habitat conservation easements (completed or in progress) in the Battle Creek watershed in which the CALFED ERP has taken part: the Transuniversal property (a.k.a., Wildcat Ranch) owned in fee title by TNC, McCampbell Ranch, and Burton Ranch (a.k.a., Miller Ranch). A fourth potential easement is being investigated, which also could be partly funded by CALFED. However, the Transuniversal property and McCampbell easement were funded through the ERP with funds from the Iron Mountain Mine fund; therefore, protected habitat values on these lands are already spoken for by impacts at Iron Mountain Mine, and are not available for the Restoration Project. The Burton conservation easement was funded by the ERP and is held by TNC. This property's conservation easement will protect biological values for fish and wildlife species and NCCP communities on lands totaling about 1,500 acres.

As described above under *CALFED Programmatic Conservation Measures*, The MSCS states that "ERP actions to restore or enhance habitats that are implemented concurrently and in proximity to one another will be considered together for purposes of assessing their impacts on species and habitats and imposing compensatory measures." Depending on the type, location, timing, and success of the related actions, compensatory measures may not be required (CALFED 2000b:4-7).

The Environmental Team proposes that the Burton conservation easement, considered together with the Restoration Project, should culminate with sufficient net benefits to preclude additional compensation from the Restoration Project beyond on-site restoration of temporary impacts. This view is further supported by the following additional criteria:

6. The Restoration Project and CALFED Conservation Easement Occur in Proximity to One Another in the Same Watershed. The Burton conservation easement property is situated within the Restoration Project area on the mainstem Battle Creek. Therefore, the Restoration Project and Burton conservation easement are not only geographically linked in the watershed sense, but functionally linked in the interactive riverine-upland ecosystem sense. In this way, the Restoration Project and Burton conservation easement complement one another and expand the total area of ecosystem benefit.
7. The CALFED Conservation Easement Provide Gains Biological Value by Averting Probable Future Land Development. Lands within the Battle Creek watershed are at risk of land development that would adversely affect biological values of associated natural habitats. Biological gains from the easement are realized by maintaining present values over time, relative to assumed degraded conditions in the future without the easements.

The easements provide protection of biological values through restrictions on land use that are attached to the property in perpetuity.

Under the Burton conservation easement, TNC has rights to preserve, protect, identify, monitor enhance, and restore in perpetuity the property's conservation values (TNC 2003). "Any activity on or use of the property that is inconsistent with the conservation purposes (including, without limitation, any activity or use that diminishes or imparits the conservation values) is prohibited" (TNC 2003). Example restricted uses of the property include use of hazardous materials; construction of structures, roads, levees, or ditches; dividing, partitioning, or resale as separate parcels; use of motorized vehicles off designated roadways; removal or destruction of native vegetation; establishment of commercial or industrial uses, such as orchards and vineyards; and intensity and location of livestock grazing. In addition, compliance monitoring and reporting is conducted by TNC to ensure the terms of the conservation easement are met.

The pertinent portion of the watershed lies within the transition zone of the Central Valley, one of the fastest growing areas of the state. It is estimated that by the year 2040, an additional 1.6 million acres of agricultural land will be lost to outlying development and growth (American Farmland Trust 1995). Residential and commercial development in the Manton area has exponentially increased in the last five years, a trend that is expected to continue in the future. Recreational development in seasonal camping, hunting, and fishing resorts is expanding. Creek-side properties are particularly attractive for human uses. Habitat fragmentation due to subdivisions or other development is a primary threat to this area. Lands within the watershed have been subdivided into ranchettes, while other lands have gone into vineyards. Analyses for risk of development conducted by TNC concluded that the subject easement properties were vulnerable.

8. The CALFED Conservation Easement Would Provide In-Kind Benefits to Offset Habitat Values Lost. The Burton Ranch, adjacent to the mainstem Battle Creek midway between the confluence of the Battle Creek forks and Coleman National Fish Hatchery. This property totals about 1,500 acres and contains the following habitats: foothill woodland, foothill savannah, riparian woodland/scrub, groundwater seep wetland, foothill annual grassland, and irrigated pasture. The property also contains other wetland types, but they are not yet mapped.

Classification of habitats mapped on the subject easement property is not entirely compatible with that used in the Restoration Project EIS/EIR, but given the similarity of habitat classifications and the size (1,500 acres) and location (adjacent to Battle Creek) of the conservation easement property, it is expected that each property has a mosaic of habitat types that includes those projected to be adversely affected by the Restoration Project (Table 1).

9. The CALFED Conservation Easement Would Provide the Magnitude of Benefits Needed to Offset Habitat Values Lost. Projected habitat losses provided in Table 1 are the best estimates presently available. The Environmental Team is presently working to refine the estimates based on new project design/footprint information. It is expected that

estimated losses will be reduced, with oak woodland having the highest probability for significant reductions. Based on existing information, Table 2 provides compensation needs using compensation ratios provided in Table 1, and the acreage of corresponding natural habitats protected (or to be protected) by the Burton conservation easement.

The compensation scenario in Table 1 that requires the greatest amounts of compensation is represented by the Draft FWCA Report, which is equivalent to the high end of the range from the MSCS (except for chaparral and annual grassland). If it is assumed that existing habitat values protected from future detrimental land uses by a conservation easement is equivalent to values gained by restoration of degraded habitat, then compensation acreage needed can be equally satisfied by either a conservation easement or habitat restoration. This is the view proposed by the Environmental Team, and means that the average annual value of a conservation easement acre is equal to the average annual value of a restored acre, for all habitat types. Given that the easement property has a greater area of protected habitat than is needed for the proposed compensation, there should still be a net benefit remaining from the easement following offsets for the Restoration Project.

Table 2. Estimates of compensation needed for adverse effects of the Restoration Project and amount of riparian and upland habitat protected by CALFED-funded conservation easement.

Habitat Type	Potential Impacts (acres)	Compensation Needed* (acres)		CALFED (Burton Ranch) Conservation Easement acreage**
		CALFED MSCS	Draft FWCA Report	
Riparian Forest/Scrub	7.2	21.6	21.6	57
Blue Oak Woodland/Savanna	49.6	99.2 to 248.0	248.0	591
Live Oak Woodland	25.9	51.8 to 129.5	129.5	588
Gray Pine/Oak Woodland	3.4	6.8 to 17.0	17.0	
Mixed Chaparral	3.4	6.8 to 17.0	10.2	unknown
Annual Grassland	11.2	11.2 to 33.6	11.2	310
Total	100.7	197.4 to 466.7	437.5	1,546

*Based on presently considered compensation ratios from the CALFED MSCS and Draft FWCA Report, except for riparian forest/scrub, which the Environmental Team recommends should have 3:1. The ratio for riparian forest/scrub will be reduced to 3:1 in Final FWCA Report

**Acreage represents the best fit possible from cross-walking the original easement habitat classification with that of the Restoration Project Draft EIS/EIR. Other habitat types present but not listed in table, include non-seep emergent wetlands and irrigated pasture.

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