Summary Information

California Department of Fish and Game

Merced River Restoration Project Monitoring, Crocker−Huffman Dam to Gallo Ranch

Amount sought: $2,051,106

Duration: 36 months

Lead investigator: Mr. Dean Marston, California Department of Fish and Game

Short Description

This project is located in the Merced County and includes 17.0 miles of the Merced River from Crocker Huffman Dam (RM 52.0) to Gallo Apple Ranch (RM 35.0). Tasks involved with this proposal include monitoring geomorphic and revegetation development on the Robinson Reach of the Merced River Salmon Habitat Enhancement Project. Fisheries monitoring will also evaluate salmonid production, survival and rearing habitat on the entire study reach but focusing on past restoration actions.

Executive Summary

Project Description: The study is located in the Merced County and includes 17.0 miles of the Merced River from Crocker Huffman Dam (RM 52.0) to Gallo Apple Ranch (RM 35.0).

The study focuses on restoration projects and their benefit to the river. The Robinson Reach restoration activities included channel reconfiguration, increased spawning habitat, improved channel dynamic/sediment transport, and creation of a large flood plain with native vegetation. Other actions being evaluated on the river include gravel infusion projects and diversion screening.

Recommendations from the adaptive management forum in 2001 indicated that increased commitment to monitoring, investigation rearing habitat and continuation of juvenile production assessments along with other improvements would enhance the value of restoration projects for learning and improve adaptive management of newer restoration projects.

Tasks involved with this proposal include monitoring geomorphic and revegetation development on the Robinson Reach of the Merced River Salmon Habitat Enhancement

Project. Fisheries monitoring will also evaluate salmonid production, survival and rearing habitat on the entire study reach but focusing on past restoration actions.

Ecosystem Restoration Importance:

The proposed project addresses several of the Central Valley anadromous fish and habitat restoration goals identified in the DFG Central Valley Action Plan, USFWS Anadromous Fish Restoration Plan, and the CALFED Ecosystem Restoration Plan. Specifically, the proposed project addresses the Central Valley restoration goals:

Ecosystem Restoration Strategic Goals

• Goal 1: At Risk Species – San Joaquin fall−run chinook salmon; several State and Federal threatened and endangered species and habitat types;

• Goal 2: Ecosystem Processes and Biotic Communities – riverine wetland, floodplain, and native riparian restoration activities;

• Goal 4: Habitats – riverine floodplain, seasonal wetland, and native riparian;

• Goal 5: Non−native Invasive Species – reduce the negative predation impact of introduced recreational warmwater fish species on outmigrating juvenile Chinook salmon fish passage.

MSCS/ERP Actions

Improved Salmonid Spawning and Rearing Habitats – reconfigured salmon spawning area and long−term spawning gravel replenishment. Specifically, the project has been identified in the 2004 CALFED Bay−Delta Program “Reinitiation of Consultation: Assessing Progress Towards Milestones and the Efficacy of the Environmental Water Account” to address the following milestones:

• Program to reduce erosion and maintain gravel (86G),

• Flood plain management (87F),

• Cooperative Program to restore salmonid populations (88I),

• Reconstruction and fill gravel extraction sites (88J),

• Restore natural channel configuration and improve corridor (88L),

• Establish and restore riparian habitat (94C),

• Remove salmonid passage impediments (97F).

Address Scientific Uncertainties

• Decline in Productivity − Project objectives include increased spawning success by providing better quality spawning area; increased juvenile salmon survival by reducing predation by nonnative warmwater fish species during smolt outmigration.

• Channel Dynamics, Sediment Transport, Riparian Vegetation − Project technology utilizes reconfigured channel dynamics and augmented sediment transport manipulation to achieve intended habitat benefits. Native riparian and wetland vegetation is a part of the required stream corridor reconstruction effort.

• Beyond the Riparian Corridor − Habitat easements which will address future land use, such as purchasing mining rights and cattle grazing, will be obtained.

Expected Outcomes:

Besides the annual reports there will be at least one presentation at a CDBA science conference and one peer−reviewed journal article.

A. Project Description: Project Goals and Scope of Work

1. Problem, Goals, and Objectives

1.1. Problem Addressed

The actions addressed in this document are in large part an extension of monitoring activities in Phase III of the Merced River Salmon Habitat Enhancement Project (known as MRSHEP Phase III, Robinson Reach) located on the Merced River near Snelling, California (Figure 1). This description of the project comes from the engineering report (DWR, 2001):

> "The Merced River Salmon Habitat Enhancement Project (MRSHEP) consists of approximately 4 miles of the Merced River centered on the Highway 59 bridge near Snelling, California. Originally titled the Robinson/Gallo Project, the reach was identified in the Comprehensive Needs Assessment report (DWR, 1994) as having a high restoration priority for much of its length, and preliminary design work was begun in 1995.
>
> "Prior to flood flows in 1997, as much as 25 percent of the Merced River's Chinook salmon spawning took place in the project reach. During the 1997 flood, the river breached the mining berms which had confined it to the historic channel; as a result, the river abandoned the historic channel in favor of a gravel pit with an invert approximately six feet lower. When the river abandoned the channel, all of the spawning riffles and much of the existing nursery habitat were lost.
>
> "Since the river breached most of the berms during the 1997 flood, it now travels for much of the reach through a wide, flat area and then flows into a series of broad shallow ponds. The flat area lacks a defined channel and adequate alluvium in the bed, both of which are important elements in any functional alluvial stream. This situation interferes with the natural processes of the stream and creates many barriers to salmon survival. The wide, flat, shallow area presents both stranding issues during flow fluctuation as well as increased avian predation of smolts. The in-stream ponds provide habitat for predatory fish species and result in lower flow velocities. Young salmon may be forced to expend more energy to travel through the areas than they would if carried by the current. To some extent, the ponds also increase water temperature, particularly under low flow conditions. This temperature rise adversely affects the success of migrating adults and smolts."

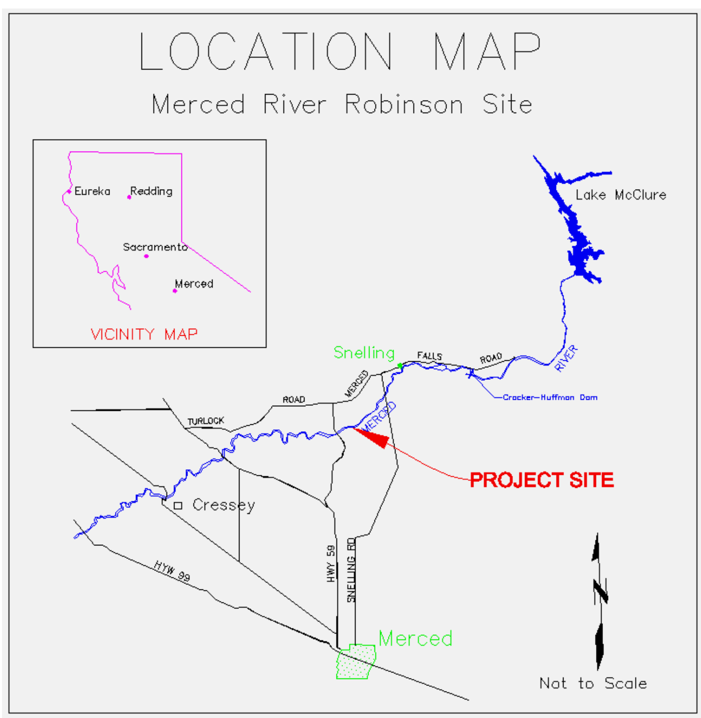


Figure 1. Project Location Map

The Robinson Reach is a part of several large channel projects that are completed or in the process of being planned (Table 1). Another is the Merced River Ranch pilot restoration project, which is a CalFed funded project, to restore the river and floodplain in a mile long reach of the Merced River while supplying spawning gravel material for addition to the top 7 miles of river below Crocker-Huffman Dam (CHD). Gravel additions are currently being performed (over the past 10 years) immediately below CHD using funding from the 4-Pumps Agreement. A CDWR 4-Pumps project is currently placing screens that meet NOAA criteria on four open ditch diversions in the Merced River from CHD to Gallo Ranch.

Planning for restoration and the monitoring associated with such restoration has occurred in various arenas including a CalFed funded Corridor Restoration Plan (Stillwater, 2002), an AFRP/CalFed sponsored Adaptive Management Forum(AMF,2002), a Merced River stakeholders group and a recent MOU between Merced Irrigation District and CDFG that describes a salmon and steelhead monitoring program. All of these efforts have included extensive communication among the parties with numerous organizations represented in all planning arenas. These projects involve funding from a variety of sources including CDWR's 4-Pumps program, CDFG's Salmon Stamp program, AFRP and CalFed. This restoration effort on the Merced River involves a large number of organizations and groups. Monitoring of these restoration efforts has been difficult due to shortages of funds for monitoring, but information has been gained from the monitoring that was supported.

CDFG's SJVSSR and DWR's ESO have been involved in the monitoring of salmon and their response to these projects. Previously funded monitoring includes: adult spawning surveys, juvenile survival and passage evaluations and spawning and rearing habitat quality. Although there have been only a few years of evaluation, this work has shown that the restoration projects are effective at improving the use of areas for spawning by Chinook adults and movement of juveniles through the restored reaches (Guignard, 2004). Survival estimates indicate some improvement at least under a moderate flow regime, although the low flow tests indicate little to no improvement in the survival when streamflow is low.

These results indicate that the restoration actions are indeed improving the quality of the river for salmon, however the length of monitoring has not been sufficiently long to evaluate and give definite results for some aspects of the monitoring (survival). Monitoring in the longer timeframe is also needed as there are continuing actions that will restore additional sections on the river, and these need to be evaluated for success in a similar manner. The current proposal seeks funding to continue monitoring that has shown improved habitat conditions in previously completed projects and to continue to improve monitoring of the more difficult elements such as juvenile survival.

Merced River Restoration Funding Ratzlaff Reach	Budget or Expended	Status
Delta Fish Protection Agreement - DWR	$3,000,000	
CALFED USBR	$1,580,000	
CVPIA - AFRP (USFWS)	$250,000	
Robinson Phase		
Delta Fish Protection Agreement - DWR	$3,230,000	
CALFED (USFWS)	$2,440,000	
DFG - Proposition 70 Funding	$250,000	
CVPIA - AFRP (USFWS)	$1,000,000	
CALFED	$699,000	
Wildlife Conservation Board (easement)	$355,000	
CALTRANS (in-kind contribution)	$800,000	Not yet constructed
Robinson Cattle Company (in-kind contribution)	$667,500	
Delta Fish Protection Agreement - DWR (monitoring)	$896,404	Not fully Expended
ISI FPIP	$50,000	
USFWS-CVPIA	$132,268	Not fully Expended
*CALFED monitoring (proposed)	$0	
Western Stone Reach		
Delta Fish Agreement (Lump Sum)	$1,104,529	Not fully Expended
Delta Fish Agreement (Annual account)	$721,895	Not fully Expended
Diversion Screens		
Delta Fish Protection Agreement - DWR	$306,339	Not fully Expended/Screens
Delta Fish Protection Agreement - DWR	$73,747	Not fully Expended/WingDams
CVPIA - AFRP (USFWS)	$98,000	
Merced River Ranch Purchase		
CALFED	$658,000	
Merced River Ranch Restoration		
CALFED	$2,100,000	Not fully Expended
Braden Farms and Hatchery Gravel Addition		
Delta Fish Protection Agreement - DWR	$517,935	Not fully Expended
TOTAL PROJECT	**$20,930,617**	

Table 1. Listing of known restoration actions, partners, and expenditures towards habitat improvements on the Merced River.

1.2. *Goals and Objectives of Action*

Goals have been provided for each of the projects individually, but they all share similarities. The stated goal of the MRSHEP was to "have a continuous and functional river over the entire project reach" (DWR, 2001). This goal is shared by the purchase of the Merced River Ranch and the current restoration planning effort at that site. The primary goal of these projects is, in general, to "benefit the salmon and other native species of the Merced River by creating a more natural and functional river corridor with well defined channels and floodplains." The specific objectives include:

A. eliminate or isolate juvenile salmon predator habitat;
B. increase the quantity and quality of spawning habitat for Chinook salmon;
C. increase the quantity and quality of rearing habitat for Chinook salmon;
D. improve river and floodplain dynamics;
E. create and enhance the riparian corridor;
F. improve sustainability of the river;
G. improve the adult and juvenile migratory path.

Project designers hoped to achieve these objectives through several features of the design of these projects. Predator habitat was eliminated by filling ponds, and the channel reconfigured to improve spawning and rearing habitat for salmon. River and floodplain dynamics were improved by reconfiguring and scaling the channel to fit the post-dam flow regime. The design channel included riffles, pools, and a meander that fits the approximate slope and design bankfull flow. Constructed floodplains were replanted with native riparian vegetation and contain simulated abandoned channels and backwater channels for diversity. These features will hopefully lead to an enhanced riparian corridor, improved sustainability of the channel, and an improved migratory path for salmon through the reach (DWR, 2001).

This proposal would continue and expand the monitoring of the existing projects (listed in Table 1) to effectively evaluate whether or not they are achieving the goals described above and provide pre-project information for planned future projects. The monitoring proposed here is focused largely on the MRSHEP projects, but includes the river from CHD (RM 52) to the Gallo Ranch area (RM 37) for the salmonid evaluations (redd counts, snorkeling and survival evaluations). Specific objectives of the monitoring in this proposal are:

A. continue the geomorphologic and hydrologic monitoring at the MRSHEP;
B. continue spawning and redds monitoring throughout the upper river;
C. modify survival evaluations by transitioning from dye marking to PIT tags to improve the reach-specific accuracy of the evaluations;
D. restart juvenile production evaluations for the entire river at RM 13;
E. add snorkeling to the biological monitoring to assess the project impacts on juvenile rearing.

2. *Justification*

Conceptual Models: The Merced River has undergone extensive modification over the years to provide agricultural and municipal water supply, flood control, and power generation, as well as raw materials such as gravel products and gold. As early as the 1870's, large canal systems were built to divert Merced River water for agricultural uses. Several dams were built to regulate flows, the largest being New Exchequer Dam (completed in 1967) which can store up to 1,032,000 acre-feet of water in its reservoir. Mining for gold and aggregate downstream of the dams has been extensive, leaving tailings and numerous pits within the river corridor.

The manipulation of the river has led to loss and degradation of native habitat. With the building of dams, access to spawning grounds upstream has been lost, and gravel recruitment is greatly reduced in reaches below the dams. The large in-stream ponds left by mining create habitat for introduced predator fish species which prey upon juvenile salmon. In an effort to better understand those problems influencing salmon production in the Merced River, CDFG biologists have identified several factors which, in concert, seem to have contributed to the decline of San Joaquin fall-run Chinook salmon. Among those identified factors are degraded channel, poor gravel composition, low flows, high water temperatures, low intragravel oxygen content, predation on outmigrating juvenile salmon by warmwater fish such as large and smallmouth bass, and insufficient spawning habitat (CDFG, November 1993; CDFG Memo September 6, 1991, CDFG Memo November 23, 1987). Specific to the proposed project site, CDFG biologists estimate that 75 percent of the annual Merced River natural salmon spawning and production occurs upstream from the “Robinson” site (B. Loudermilk, personal communication). This logically implies that a significant portion of the Merced River annual production of natural outmigrating salmon juveniles must successfully negotiate this man-made hazard.

Flow regulation leads to reduced peak flows and an overall reduction in the average flow in the river. These result in a general narrowing of the channel (J. Vick, 1995). The two-year flow event before dam construction (pre-Exchequer) was approximately 16,000 cfs (Exchequer gage). Flow records show that since New Exchequer Dam began operation, the two year event is approximately 2,300 cfs (Snelling gage). This means that the high flows which traditionally scoured and flushed vegetation from active gravel bars and banks and delivered coarse sediment are all but absent. As a result, there is encroachment of vegetation which leads to narrowing and armoring of the channel.

A loss of gravel recruitment to the lower reaches of the river can also be attributed to dams. The river is “sediment starved” during higher flows, and tends to recruit sediment from channel banks and beds. Over time this results in channel degradation, which when combined with reduced flow can further narrow the channel and lead to abandoned floodplains. Prior to the January, 1997 flood event, the reach of Merced River between the Highway 59 bridge and Snelling (within which this project falls) had shown little evidence of degradation, although reaches both upstream and downstream of it appeared to be degrading (J. Vick, 1995). During the 1997 event, the berms which had confined the river to the historic channel in the Robinson project reach (RM 42 to 43.5) were breached, and as a result the river abandoned its channel in favor of a gravel pit with an invert approximately six feet lower. This abandonment of the channel resulted in the loss of several salmon spawning riffles and much of the existing nursery habitat.

The original problem in the Robinson project reach consisted of a narrow channel confined by levees with in-stream ponds and no floodplain. With the 1997 flood event came several major changes to the reach when the river breached the levees which had confined it. As a result, the problem changed to one of a somewhat different nature. For much of the length, the river traveled through a wide, flat area which lacked a defined channel or adequate gravel, and then into a series of ponds. Not only is this situation geomorphically unlikely and unnatural, it provides many barriers to both juvenile and adult salmon survival. The wide, flat, shallow area presented stranding issues during flow fluctuation, as well as avian predation of smolts. During low summer/fall flows, the wide, flat, shallow area also provided a passage problem for spawning adults returning to upstream spawning areas (during the September of 1997, CDFG was for forced to dig a temporary channel through part of the proposed project site to facilitate a safer fish passage past the site). The in-stream ponds provide habitat for predatory fish. The ponds to some extent also served to increase water temperatures, particularly under low flow conditions.

Prior to rebuilding the river channel and floodplain in the Robinson Reach in 2002, the river flowed through these warm ponds of slow-moving water which are ideal habitat for large and smallmouth bass and other predators of juvenile salmon. A pilot study which investigated predation of juvenile salmon in ponded portions of the Tuolumne River indicated that small and largemouth bass were a legitimate predator of juvenile Chinook salmon (EA, September 1990). Anecdotal information also indicates the well accepted knowledge that most instream ponded areas within the Stanislaus, Tuolumne, and Merced Rivers provide excellent bass fishing. From this information, it has been assumed that this same salmon predator relationship exits in all captured mining pits throughout the east-side San Joaquin basin tributaries. The juvenile salmon migrating downstream become disoriented in the slow moving waters of the pond and become extremely vulnerable to predation by bass and other potential predators. Juvenile salmon transiting through these warm water ponds are less likely to survive than those salmon smolts outmigrating in faster moving cool river water. It is also logical to assume that the ponds also serve as a reproduction site, rearing area, and distribution point from which these salmon predators migrate and recharge the river system.

An Adaptive Management Forum was convened on November 2001 (AMF, 2002). They evaluated the scientific information that was available (such as is described above) and identified a number of areas where monitoring of the restoration activities in the Merced River might be improved. These include developing clear conceptual models and including specific hypotheses to be evaluated with monitoring. They recommended a more solid commitment to funding of monitoring and treating the restoration projects as experiments (adaptive management). More evaluation of was suggested to improve our understanding of juvenile life history of Chinook and steelhead as well as other native aquatic species.

Conceptual models have been produced for reach specific processes in the Merced River Corridor Plan that apply to this monitoring and project specific models have been produced for restoration projects funded by CalFed (Figure 2) and MRSHEP (Figure 3). The hypotheses in Tables 3 to 9 were generated from these conceptual models. These conceptual models identify reduced turbidity and increased size and temperature in river pools as the cause of reduced survival of outmigrants, and an immobile streambed increasingly saturated with sand as the cause of reduced spawning habitat availability. The models do not state specifically that increasing the volume and quality of spawning gravels will increase the amount of spawning, but it is implied by the increase in carcasses

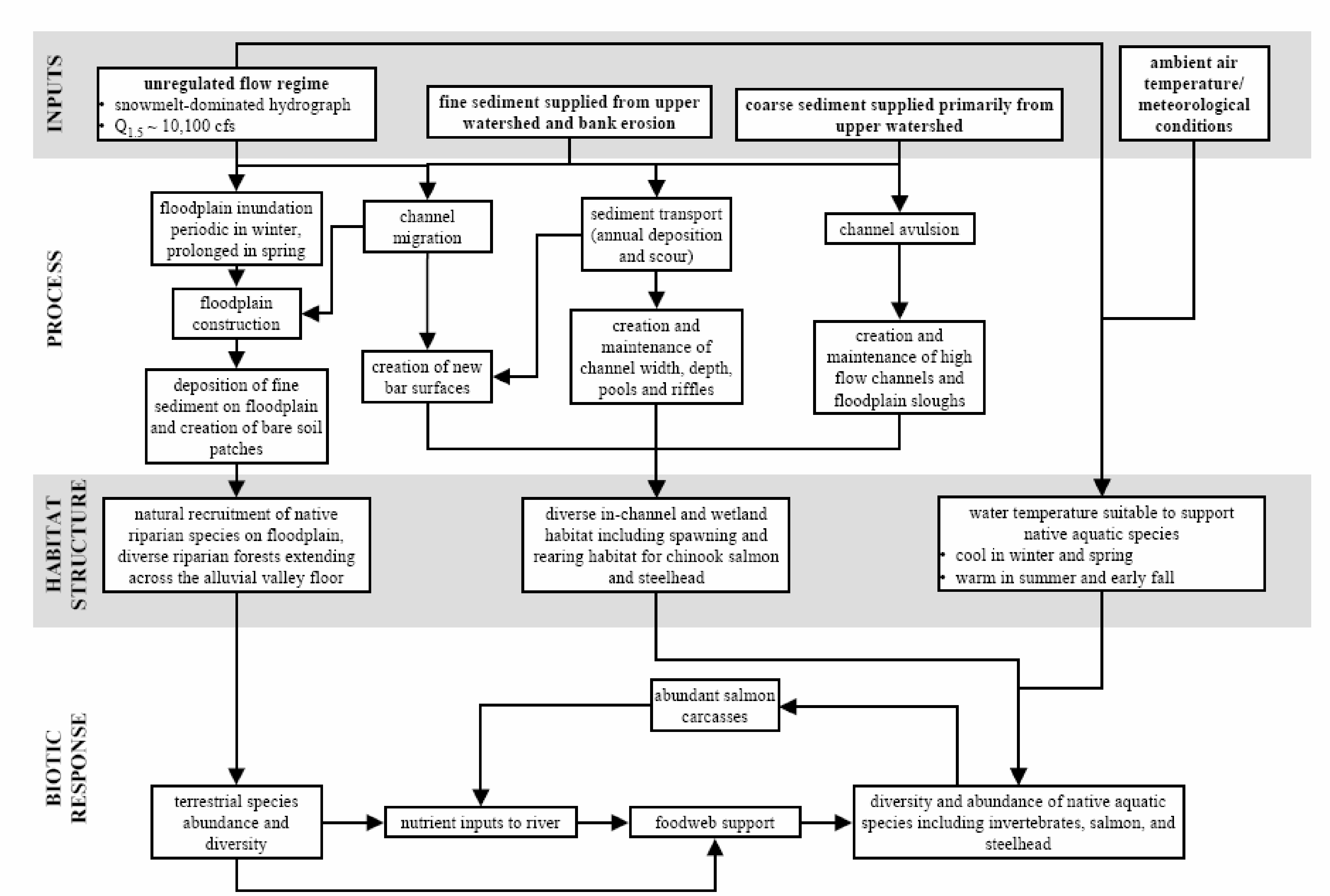
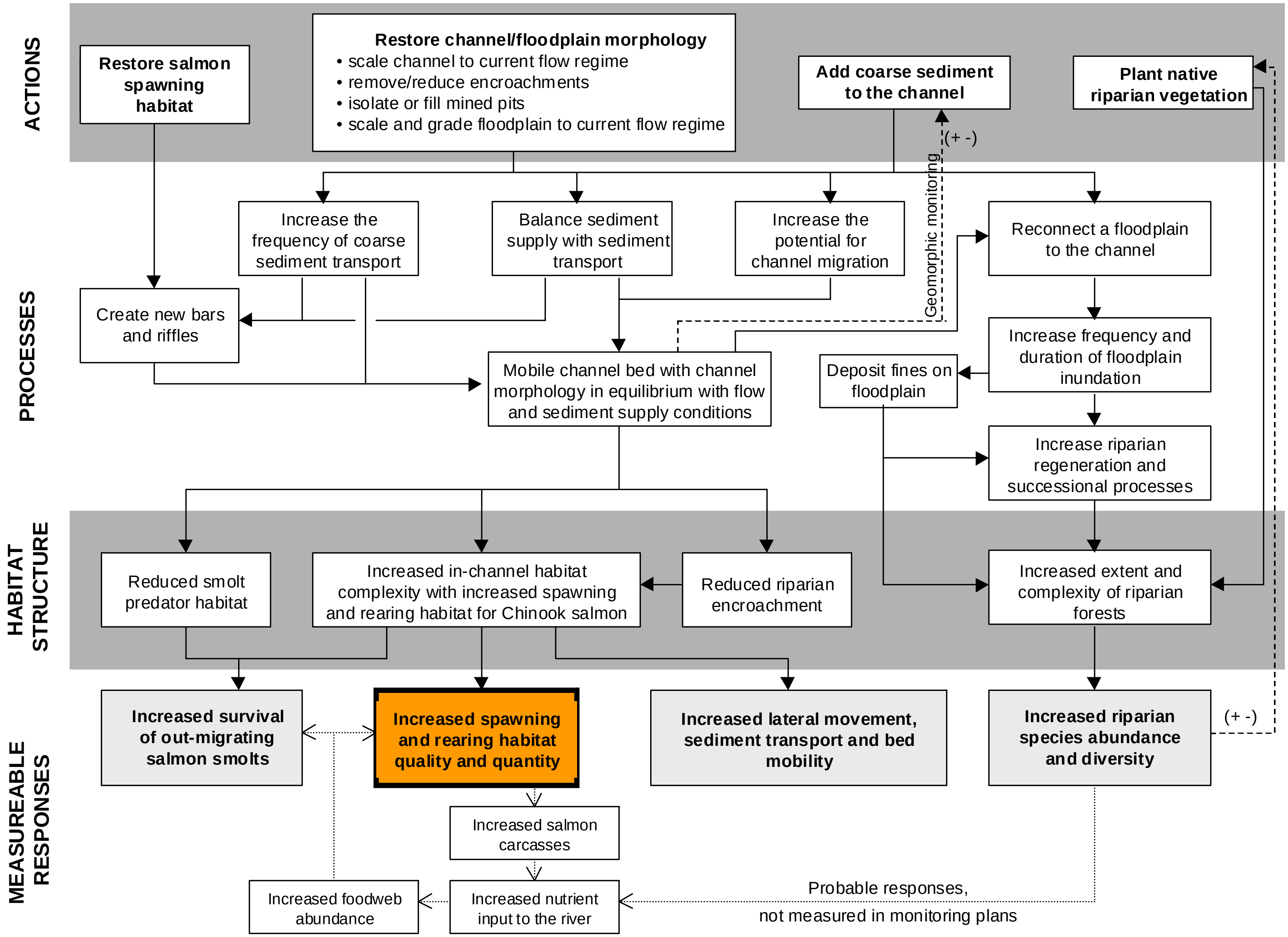


Figure 2. This conceptual model was developed by Stillwater Sciences (draft, 2002)



Conceptual model of habitat restoration actions on the Merced River Salmon Habitat Enhancement Project.

Figure 3. This model was developed during the Robinson Reach phase of MRSHEP.

3. Previously Funded Monitoring

Previous monitoring was funded by the 4-Pumps Program and focused on hypotheses 1-6 and 13-16. The 4-Pumps program also funded the smolt survival evaluations and temperature monitoring throughout the MRSHEP restoration project (Hypotheses 17-22). Reporting on this monitoring is planned spring 2005. A spawning study that is funded by AFRP is also being conducted through FY 2006. Sportfish Restoration Act funding has been utilized for spawning survey and redd counts with an annual report produced every year since 1987 (CDFG, 2003). Funding to continue these studies is not currently available from any current sources and hence this request for funding. Limited juvenile salmonid monitoring using snorkeling is being conducted in the dredger tailings reach as a portion of the Merced River Ranch Baseline Monitoring Study (Stillwater Sciences), which is a component of the Merced River Corridor Restoration Plan - Phase IV Project (CALFED ERP-02-P12-D).

4. Approach and Scope of Work

Monitoring of this project will be for both morphological and biological processes. The morphological and vegetative components of the Robinson project will be monitored by CDWR, and the tasks are outlined below. That will be followed by biological monitoring tasks that will be primarily performed by the CDFG. This monitoring is chiefly designed to tell us whether our overarching project goal, to benefit salmon by creating a more natural and functional reach with well defined channels and floodplain, has been achieved. The original draft geomorphic monitoring plan and biological monitoring plans can be found in the MRSHEP Phase III-Robinson Reach Engineering Report (June, 2001). The Revegetation and Fish Monitoring plans can also be found in Appendices D and F of the Initial Study/Environmental Assessment document (March, 2001).

Our morphological monitoring program focuses on looking both at the project as a whole and at specific areas of concern while evaluating results as they apply to project goals and objectives. While the monitoring activities will produce a picture of the performance of the project design overall, several areas will be watched for changes that were predicted by our models. One area that will be monitored closely is the upstream reach floodplains. Movement of particles in the floodplain between stations 4+00 and 35+00 is predicted by the HEC-RAS model at high flows, which could result in braided or split channel development. This type of change could be a concern for fish passage and would affect river and floodplain dynamics. Another concern is channel and floodplain degradation between stations 4+00 and 35+00 and resultant aggradation below stations 35+00 and 54+00. HEC-RAS and Stillwater Sciences models both show high gravel transport rates in that upstream reach, and if it occurs, negative spawning habitat effects could result without proper maintenance. Another area of high transport during flooding is located near station 92+00, which is the narrowest part of the floodplain in the reach. The channel will be monitored there to track any degradation. One more area of concern is around the Highway 59 Bridge. Backwater effects at high flows may decrease sediment transportability of the channel and aggradation may occur; however, the scheduled widening of the bridge opening should help alleviate this.

The biological monitoring follows two principle pathways. The first is to evaluate the effects of restoration projects on the spawning distribution and amount of spawning in each area. Spawning is currently thought to be too concentrated in relative limited areas and the expectation is that these projects would disperse the spawning and therefore reduce superimposition of redds, thereby increasing the effectiveness of the spawn. Secondly, the monitoring will evaluate the survival and production of juveniles in the system. This monitoring depends on the use of hatchery smolts, and while that is an effective method in some respects, there are concerns about using hatchery fish in monitoring that is intended to evaluate project effects on wild fish. This has resulted in the recommendation by these authors to test the use of PIT tag technology to potentially allow the use of both hatchery and wild fish in these evaluations.

4.1. Approach and Scope of Work

Thirty-two cross-sections will be routinely surveyed and are also designated for pebble counts. In addition, the monitoring plan identifies several cross-sections at which tracer gravel experiments, velocity studies, and sediment samples will be performed (Table 1, Figures 1 and 2). These activities will help us determine whether design parameters were correct, and ultimately whether the goal of creating a functional reach was achieved.

In addition to assessing the degree to which restoration efforts have produced "a more natural and functional reach," some activities described here will also quantify fundamental linkages among channel morphology, sediment transport, and in-stream habitat. The proposed data collection and analysis is designed to evaluate a unifying conceptual model: over time, fluvial processes will modify the simple restoration design to create a more topographically complex channel, which will provide more heterogeneous habitat and, presumably, increase the diversity and productivity of the aquatic ecosystem. This model will be tested by developing innovative monitoring techniques and modeling approaches and by performing spatially explicit statistical analyses of biologically relevant geomorphic variables. More specifically, the primary objectives of the proposed work are to document morphologic changes with high-resolution topographic surveys, estimate sediment transport rates from these morphologic data, and develop a probabilistic model of flow and sediment transport that can be used to evaluate gravel augmentation strategies and simulate channel dynamics.

4.1.1. <u>Task 1.0: Project Management</u>

This is intended to provide support and project management for CALFED activities. These activities include but are not limited to contract administration, meetings, tours and presentations as identified.

4.1.2. <u>Task 2.0: Public Participation</u>

Information and data summaries from the monitoring projects will be presented to the Merced River Stakeholder group twice per year. This group consists of local individual who are interested in the activities on the Merced River. The technical advisory group that is being formed for work that is specified in a memorandum of understanding (MOU) between CDFG and Merced Irrigation District will be asked to assist in planning the field activities in this project. Many of the tasks specified are also work that is desired within the MOU. An annual flier will be produced that describes the task completed that year and what information is being developed from the work. These will be handed out at meetings (stakeholders, TAC, etc.) and posted on the AFRP website hopefully.

Geomorphic and Riparian Vegetation Monitoring

4.1.3. Task 3.1: Ground Surveys

A baseline survey was performed after construction was complete in 2002. Section surveys and a channel thalweg profile are scheduled to take place annually if a flow of greater than 1,700 cfs has occurred or if movement of tracer gravel has been observed; however, if three consecutive years have not yielded these conditions, the surveys will take place anyway. We chose 1,700 cfs because it is the design bankfull flow, and bed movement is expected based on the models. Cross-sections and profiles will be used to document any changes in the storage of alluvium and to show trends in changing channel features. Four of the monitoring cross-sections will be surveyed across the floodplain on one side (see Figures 1 and 2) if flows have exceeded 3,000 cfs to monitor the Simulated Abandoned Channels, and one more will be surveyed across the floodplain at the upstream end when flows exceed 5,000 cfs.

The upstream monitoring sections will be used to watch for movement on the floodplain since higher flows were shown in the HEC-RAS model to have high shear in that reach. The model also showed a drop in shear at the transition around station 54+00, so we will use several cross-sections to monitor for aggradation at high flows in that area. We will also use water surface surveys at various flows to check the HEC-RAS model results.

High-resolution topographic surveys bracketing significant flows would allow us to produce maps of morphologic change and measure erosion/deposition volumes from elevation differences. In an article appearing in the current issue of *Remote Sensing of Environment* (Legleiter et al., 2004), it is demonstrated that retrieval of water depth from multispectral digital imagery is theoretically sound and potentially highly accurate. The results suggest that airborne image data could be used to produce continuous, high resolution maps of channel morphology and in-stream habitat with improved efficiency and coverage relative to ground-based surveys. We are actively pursuing external funding to obtain remotely sensed data for the Merced River study area. We hypothesize that, in the context of river restoration, high-resolution topographic data collected during monitoring programs can be used to estimate reach-scale sediment transport rates, which can then be incorporated into a sediment budget and used to plan gravel augmentation efforts.

4.1.4. Task 3.2: Pebble Counts

In addition to the section surveys, a coincident pebble count will help document any changes in gravel quality. Along with the other monitoring activities, this will help us understand the sediment transport conditions in the reach and whether design assumptions were correct, as well as help calibrate the reach-scale sediment transport rate model.

4.1.5. Task 3.3: Tracer Gravel

Tracer data will provide particle path length distributions for calibrating travel distance-based transport rate estimates.

4.1.6. Task 3.4-3.7: Sediment Transport Models

A sediment model is also being developed to help define and predict transport problems. A modified version of the HEC-6 transport modeling software will be used, as well as modified 2-D models. Sediment samples (Helley-Smith and Macneil) and detailed flow and velocity measurements on five cross-sections will aid in the development of a sediment transport module that will function in the modified HEC-6 software and 2-D models.

In addition, the reach-scale sediment transport rate model mentioned in section 4.1.1 would require Bedload traps or Helley-Smith samples and scour chains at upstream and downstream limits of the study-reach. Those actions would lead to boundary conditions for the budget cell method of estimating transport rates from morphologic change. Direct samples also would be used to validate morphologic estimates.

4.1.7. Task 3.7: Flow Gage

To assist in the development of the hydraulic and sediment models and hydraulic analysis, a gage was installed and calibrated on the upstream end of the project. River stage will be recorded at 15 minute intervals on a continuing basis and downloaded and processed so that a local record of flow will be available.

4.1.8. Task 4.0: Riparian Revegetation Monitoring

A total of 44 transects will be monitored to assess survival, efficacy of mycorrhizal usage and watering schemes. Pole cuttings and container stock will also be monitored for survival. The project is broken into 6 management areas and will offer a variety of conditions and control for the experiments. Monitoring is also expected to yield results on the efficacy of various weed control methods, including planting cover crops and native herbaceous species and use of herbicides, and mechanical and hand weeding. Ground water levels will also be monitored and analyzed for any correlation to plant success, health, or survival. Thirty-five observation wells were installed in April, 2002 to monitor ground water and its interaction with the river channel itself. We hope to use the wells to monitor water levels during selected flow releases. Knowledge of groundwater trends is important because it is likely to affect the success of revegetation efforts and the enhancement of the riparian corridor as a whole. A comparison will be made of the relative efficacy and cost-effectiveness of restoration planting, enhanced recruitment by different artificial irrigation techniques, and natural recruitment in the absence of manipulation.

Biological Monitoring

The river from Crocker-Huffman Dam (RM 52) to an area called the Gallo Apple Ranch (RM 35) is included in the CDFG biological evaluations. The area upstream of the MRSHEP was originally included in the survival evaluations to provide reference reaches to compare to the restored area. However as other projects are implemented in these upstream areas, this data becomes preproject data for the new restoration areas such as the Merced River Ranch (currently being planned) and the screening program for the open ditch diversions, which are mostly between the Merced River Ranch and the Robinson Reach. The spawning escapement surveys cover the entire spawning area of the river which is from CHD to Santa Fe Blvd (RM 22). The data are recorded in association with each riffle (total #~120) in the river. The survival evaluations involve release groups at five locations and one recovery site at Gallo Ranch. The data therefore allow analysis of four reaches between CHD and Gallo Ranch. The site for rotary screwtraps (RSTs) were chosen in the mid 1990's. The best trapping site found near the bottom of the river was upstream of Hageman Park at RM 13.

4.1.9. Task 5.0: Salmon Spawning Habitat Improvement

CDFG performs weekly spawning escapement surveys for adult Chinook salmon spawning from early October to late December. Carcasses are tagged for mark-recapture estimation of abundance. Numbers of live fish and redds are recorded at each riffle area. These surveys have been performed since the 1950's. Annual reports are produced describing the results of these surveys (see; CDFG,2003).

4.1.10. Task 6.0: Juvenile Salmon Survival Monitoring
Dye-marked and coded wire tagged salmon smolts will be released in the Merced River above the project site and recovered (trapped) in rotary screw traps below the project site; survival rates and migration rates (distance/time) will be estimated. This assessment is from CHD downstream to an area below the last restoration project (Gallo Ranch). This section of river is broken into four reaches, each of which is independently evaluated. PIT tag release will be implemented concurrently with the dye release. It will give a better assessment of reach-by-reach survival and migration rates because data on the fish well be gathered at five "recovery" sites while the dye marks are all recovered at one site (Gallo). This change follows up on a discussion at the AMF where it was suggested to increase the number of recovery sites to allow reach specific evaluation. Increasing the recovery with dye marked fish would have been cost prohibitive as we would have had to add three more rotary screwtrap sites at $120K per site.

Survival estimates are made currently by expanding the dye marks captured by the vulnerability of the fish to the screwtrap divided by the number released in that group. PIT tag estimates would be a direct survival value of number of fish seen at a detection station divided by the number released in that group. The PIT tag study will would also give us detailed travel time and growth rates if the fish are recaptured at downstream sampling sites. This sort of recovery would be coordinated with two screwtrap sites and a trawl site further downstream. It is currently expected that Program Mark would be used to evaluate the data since the survival models available in that software extensive and best model assessments could be performed. The resulting survival values are compared to associate environmental conditions such as flow and temperature to identify possible causation.

4.1.11. Task 7.0: Juvenile Production Monitoring
Juvenile Chinook salmon production will be estimated for the entire river by capturing juveniles at RM 13 with a rotary screwtrap. Vulnerability of juveniles will be tested each week by expanding actual catch to numbers passing the trap site. The rotary screwtraps also give additional information on the occurrence of other species of fish. A representative group of all fish species are measured and several environmental variables are recorded. These data have been collected since 1998 with the exception of 2004. Data were electronically transmitted to IEP rather than a report being required.

4.1.12. Task 8.0: Juvenile Salmonid Rearing Habitat Assessment
Study will perform one year of intensive snorkel surveys to help determine the factors determining salmonid habitat use in restored and un-restored sites in the dredger tailings reach below Crocker Huffman Dam (RM 52–40) and the upper portion of the gravel mining reach (RM 40–37). Ten sampling locations will be selected based upon accessibility, location with respect to previously implemented (Ratzlaff, Robinson) and planned pilot restoration experiments (MRR), and the potential to make use of previously collected geomorphic-survey data that also provides physical information for characterizing juvenile FCS rearing habitat (e.g. substrate type, water depth, velocity) (Stillwater Sciences 2004).

At each site, fish mesohabitat units will be delineated using visual observations of water depth and flow, and available geomorphic data (i.e. pebble counts and facies maps). The sampling units will be laid out as two-dimensional features of varying shapes, or polygons, where each unit is a discrete functional habitat having a representative range of physical variables (depth, velocity, substrate, and cover). This meso-habitat scale approach is consistent with the general techniques of Kocik and Ferreri (1988), McCain (1992), Thomas and Bovee (1993), and Cannon and Kennedy (2003) and allows a flexible approach to evaluating habitat use patterns at a scale that can be readily visualized and understandable. The number and size of sampling units within a site are expected to vary due to channel characteristics and site-specific habitat heterogeneity, but in general they will range from a low of 5–10 meters (~15–30 ft) to a maximum of 100 meters (~300 feet) in length.

All observed fish will be identified, counted, and sized as the diver proceeds up or down the sampling unit, depending upon flow conditions. Near-bank sampling units will be sampled sequentially from downstream to upstream in a zig-zag pattern to reduce 1) the potential for sediment disturbance, 2) the approach speed of the diver, and 3) startle-bias due to the upstream-orientation of fish in the current. In addition to the size of the sampling unit (length, width), other physical characteristics (e.g., depth, % Overhead Cover, % Submerged Cover, Substrate size, velocity, Temp, DO, turbidity) will be sampled using a point transect method and recorded for each survey. Data analysis will center on differences in relative abundance by meso-habitat and individual variables using ANOVA or an appropriate non-parametric technique should the data require it.

4.2. Performance Measures

The monitoring activities outlined above are needed to evaluate the hypotheses formulated for this project, and those hypotheses and how the monitoring activities relate to them are shown in Tables 2 through 5. The table also shows how they will help us evaluate the stated goals and objectives of the project. These monitoring actions will allow engineers and scientists to assess the effectiveness of the design with respect to the project goals and objectives. They will also provide information that will assist in adaptive management decisions, and in determining volume and location of gravel replenishment projects for the reach in the future. We expect to have the replenishment sites at the upstream end where gravel transport rates should be highest, but we will use our monitoring data to confirm the specific sites and amounts.

Monitoring Section	Project Station	Channel Survey	Floodplain /SAC Survey	Water Surface Survey	Pebble Count	Velocity Profiles	Tracer Gravel Study	Sediment Samples (Helly-Smith)
1	17+75							
2	26+10							
2b	28+00							
3	31+10							
4	32+65							
4b	34+00							
4c	36+80							
5	38+00							
6	41+90							
6b	44+80							
7	46+20							
8	48+90							
9	51+90							
9b	55+00							
10	55+70							
11	58+20							
12	60+70							
12b	63+70							
13	64+65							
14	66+80							
15	70+20							
16	72+80							
17	77+25							
18	80+70							
19	85+35							
20	88+70							
21	93+15							
22	96+65							
22b	101+00							
23	101+75							
24	104+20							
25	107+55							

Table 2. Geomorphic Monitoring Cross-Sections and Activities

Figure 4. Geomorphic Monitoring Section Locations, Upstream Half (Robinson Reach)

Figure 5. Geomorphic Monitoring Section Locations, Downstream Half (Robinson Reach)

Hypothesis	Monitoring Parameter	Data Evaluation	Goals and Objectives Addressed
1. Project will change from baseline physical conditions.	a. As-built cross-sections and profile. b. Pebble counts. (riffles and point bar apexes)	Use baseline conditions to evaluate project performance according to stated goals and objectives.	Results used to evaluate project performance according to MRSHEP Goal, Phase III Goal, and Objectives D, F and G.
2. Hydraulic models and assumptions used in the design are adequate.	a. Water surface elevation and slope will be measured at the following flows: > 200cfs > 1,700cfs > 5,000cfs	Use data to evaluate the accuracy of the models and assumptions used in the design of the riffles, channel and floodplain.	Results used to evaluate project performance according to MRSHEP Goal, Phase III Goal, and Objectives D, F and G.
a. n values are correct. (0.035-0.04)	> 7,500cfs		
b. flood-plain begins inundation as flow reaches design bankfull.	b. Install and calibrate a flow gage at the upstream end of the project.		
c. riffle depths and velocities are as designed.	c. Pebble counts taken on riffles.		
	d. Velocity profiles.		
3. Bed will be mobilized annually with unknown frequency and gradation with significant movement occurring at flows above 1,700cfs.	a. Evaluate and reset tracer gravel at sections: 4, 6, 9, and 19. b. Transport samples taken with a Helly Smith sampler.	Utilize tracer gravel and sediment samples to indicate bed movement and initiate data collection. Compare data with baseline conditions.	Results used to evaluate project performance according to MRSHEP Goal, Phase III Goal, and Objectives B, D and F.
	c. Cross-sections and profile to be evaluated in the spring after flows greater than 1,700cfs have occurred and tracer rock has moved or significant movement has occurred.	Data will be evaluated to determine the quantity and quality of gravel transported. This will be used to determine the timing, quantity, and gradation of replenishment gravel.	
	d. Install and calibrate a flow gage at the upstream end of the project. e. Velocity profiles. f. Pebble Counts	Hydraulic and sediment data will be used to develop a sediment transport model to predict transport rates and movement of the channel.	

Table 3. Hypothesis, Monitoring Parameter and Evaluation 1-3

Hypothesis	Monitoring Parameter	Data Evaluation	Goals and Objectives Addressed
4. Planform changes are expected during flows of 5,000cfs or every five years. This is of special interest at the slope transitions, upper southern floodplain and other floodplain features.	a. Cross-sections and profile b. Pebble counts. c. Reset tracer gravel. d. Take flow and velocity profiles on the monitoring sections. e. Aerial photos roughly every 5 years. These flows are expected to occur only three times during 15 years.	Use surveys to indicate plan form changes from the original design parameters. Compare all data with baseline data and analyze for plan form changes. Use sediment transport model and transport measurements to predict channel movement and identify potential problems.	Results used to evaluate project performance according to MRSHEP Goal, Phase III Goal, and Objectives B, D, E, and F.
5. Surface water on the project site influences ground water elevations. The ground water elevations in turn affect the viability of riparian growth.	a. Measurement of ground water levels. b. Concurrent measurement of surface water elevations.	Evaluate river and well elevations to model the ground and surface water interface, and compare the elevations to mapped vegetation. This relationship is key to the establishment and succession of riparian habitat in the project.	Results used to evaluate project performance according to MRSHEP Goal, Phase III Goal, and Objectives E and F.
6. Reach-scale bedload transport rates can be inferred from measurements of morphologic change.	a. High-resolution topographic surveys bracketing significant flows. b. Pebble counts and tracer gravel. c. Bedload traps or Helley-Smith samples and scour chains.	Use topographic data to measure morphologic change. Establish particle size and path length distributions. Establish upstream boundary cell for budget cell method. Derive morphology-based transport rate estimates. Validate morphologic estimates with direct field sampling.	Results used to evaluate project performance according to MRSHEP Goal, Phase III Goal, and Objectives B, D, and F.
7. Spatial patterns and probability distributions of flow depth and velocity vary with discharge and can be used to characterize in-stream habitat.	a. Obtain coordinates of channel centerline from topographic survey or rectified aerial photography. b. Spatially distributed measurements of flow depth and velocity at a range of discharges.	Transform data to stream-centered coordinate system. Develop geostatistical models of spatial structure for each discharge. Quantify channel complexity and habitat heterogeneity. Incorporate spatial structure into stochastic hydraulic habitat models. Interpret evolution of model parameters with flow stage.	Results used to evaluate project performance according to MRSHEP Goal, Phase III Goal, and Objectives B, C, D, F, and G.

Table 4. Hypothesis, Monitoring Parameter and Evaluation 4-7

Hypothesis	Monitoring Parameter	Data Evaluation	Goals and Objectives Addressed
8. Partial transport of mixed grain size sediment can be modeled using spatially varying probability distributions of critical and applied shear stress. This stochastic modeling framework can then be used to design and evaluate various gravel augmentation strategies.	a. Spatially distributed grain size measurements from pebble counts and substrate photos. b. Microtopographic profiles obtained with a surface roughness template. c. Spatially distributed velocity profile measurements. d. High-resolution topographic survey.	Parameterize location-specific probability distributions of critical shear stress from bed texture data. Use velocity measurements to develop a geostatistical model of the location-specific probability of exceeding the critical shear stress. Incorporate results into cellular, stochastic model of flow and sediment transport. Compare results to the output from a finite element deterministic model. Analyze the role of spatial variability of shear stress in partial transport and substrate patchiness. Use the model to design and evaluate various gravel augmentation strategies.	Results used to evaluate project performance according to MRSHEP Goal, Phase III Goal, and Objectives B, C, D, F, and G.
9. Under immobile riverbed conditions the ecologically relevant riverbed characteristics will degrade over time.	a. Measure and map surface grain size distribution. b. Measure and map patches of surface fine bed material and surface microtopography. c. Measure subsurface grain size distribution, hydraulic conductivity, and dissolved oxygen.	Use this data to evaluate whether the conditions within the Robinson Reach are likely to provide sufficient quality rearing and spawning habitat for Chinook salmon. This data will also provide baseline data for future gravel augmentation, if any.	Results used to evaluate project performance according to the overarching goal of MRSHEP and Objectives B, C, D, and F.
10. Bankfull flows will flush fine bed material from the subsurface.	a. Same as hypothesis #9 plus the following: b. Depth of scour and deposition	Use this data to evaluate whether the conditions within the Robinson Reach are likely to provide sufficient quality rearing and spawning habitat for Chinook salmon.	Results used to evaluate project performance according to the overarching goal of MRSHEP and Objectives B, C, D, and F.

Table 5. Hypothesis, Monitoring Parameter and Evaluation 8-10

Hypothesis	Monitoring Parameter	Data Evaluation	Goals and Objectives Addressed
11. The distribution of fines on the surface and in the subsurface can be predicted.	a. Same as hypothesis #9 & #10 plus the following: b. Install infiltration cans and measure infiltration rates. c. Fine fraction of bedload. d. Suspended load. e. Velocity profiles. f. Discharge. g. Survey enough of the channel to model 2-D fluid dynamics.	Use this data to evaluate whether the conditions within the Robinson Reach are likely to provide sufficient quality rearing and spawning habitat for Chinook salmon.	Results used to evaluate project performance according to the overarching goal of MRSHEP and Objectives B, C, D, and F.
12. The quantity and distribution of fine bed material affects the mobility of the coarse gravel framework.	a. Same data as needed for hypotheses #9 and #11, specifically the amount of fines on the surface/in the subsurface and the depth of scour/deposition.	Use this data to evaluate whether the conditions within the Robinson Reach are likely to provide sufficient quality rearing and spawning habitat for Chinook salmon.	Results used to evaluate project performance according to the overarching goal of MRSHEP and Objectives B, C, D, and F.
13. Controlling exotic plant species will reduce competition to native plant species, increasing native plant survival and growth.	a. Measure percent survival of seed and container and pole cuttings. b. Measure percent cover of seed. c. Species composition (richness).	Use baseline conditions to evaluate weed infestation and then monitor plant populations after weed control methods have been applied. Results used to evaluate the efficacy of the various weed control methods.	Results used to evaluate project performance according to the overarching goal of MRSHEP and Objective E.
14. Recruitment and establishment of native woody riparian species will increase with irrigation and timing of irrigation will differentially favor recruitment and survival of native woody riparian species.	a. Measure percent survival of container, pole cuttings and any recruitment of native woody species within a transect. b. Measure growth rates of naturally recruited native woody species. c. Measure presence/absence of all species.	Data will be evaluated to determine the quantity and quality of recruitment of woody plant species. This will be used to determine the timing and quantity of irrigation. Results used to evaluate the benefits of irrigation, timing and amount needed to re-establish native riparian species	Results used to evaluate project performance according to the overarching goal of MRSHEP and Objective E.

Table 6. Hypothesis, Monitoring Parameter and Evaluation 11-14

Hypothesis	Monitoring Parameter	Data Evaluation	Goals and Objectives Addressed
15. Adding mycorrhizal inoculants during seeding increases plant survival and growth.	a. Measure percent cover. b. Measure species composition (richness).	Use transect data to measure percent cover of all species within the native seeded areas that had mycorrhizal inoculant added and compare to those seeded areas where no inoculant was added. Results used to evaluate whether adding mycorrhizal inoculant increases native plant growth and if it is necessary in the restoration process.	Results used to evaluate project performance according to the overarching goal of MRSHEP and Objective E.
16. Direct seeding of native herbaceous species increases diversity and cover of native riparian species over areas that were not seeded.	a. Measure percent cover. b. Measure species composition (richness).	Use transect data to measure percent cover of all species within the native seeded areas and compare to those areas that were not seeded. Results used to evaluate whether seeding increases plant diversity on the project site.	Results used to evaluate project performance according to the overarching goal of MRSHEP and Objective E.

Table 7. Hypothesis, Monitoring Parameter and Evaluation 15-16

Hypothesis	Monitoring Parameter	Data Evaluation	Goals and Objectives Addressed
17. Water velocity, depths and temperature conditions will become more favorable for anadromous and resident salmonids.	a. Document distribution of redds within the river. b. Measure depth and velocity at redds. c. Measure depth and velocity (and mesohabitat type) at locations used by rearing juveniles.	Calculate percent of spawning at each riffle within the river. Develop habitat suitability curves for both adults and juveniles. Temperature has been found to vary little from top to bottom of a project.	Results used to evaluate the whether restoration projects are meeting the goal of the projects and objectives A, B, C and G. Temperature not still used
18. Following restoration of physical habitat conditions at the project site (temperature, flows, etc.), more salmon smolts will survive through the project site.	a. Measure percent survival of smolts moving over the project reachs. b. Measure travel time through the reaches.	Survival and travel rates will be compared pre and post- restoration. This will be done in a stratified manner considering temperature and flow.	Results used to evaluate the whether restoration projects are meeting the goal of the projects and objectives A and G.
19. Adding clean gravel and appropriate spawning depths to the streambed will increase the amount of spawning habitat for chinook salmon.	a. Document distribution of redds within the river. b. Measure depth and velocity at redds.	If new spawning areas are used then the amount of spawning habitat was increased. It will be essential to look for reductions in habitat use close to the new riffles to see if the fish are simply being relocated.	This is in general the principle goal of the projects.
20. Increase spawning success through increased spawning habitat can be associated with habitat restoration.	a. Number of redds per riffle b. Percent of total redds in the river within any one riffle.	Data will be compared from restored and unrestored area to see if the restored areas contribute an increasing amount of the spawning.	This is in general the principle goal of the projects.

Table 8. Hypothesis, Monitoring Parameter and Evaluation 17-20

Hypothesis	Monitoring Parameter	Data Evaluation	Goals and Objectives Addressed
21. Restored channel structure and increased amounts of spawning gravel will increase the production of juvenile Chinook salmon.	a. Document distribution of redds within the river. b.Measure production below spawning area c. Measure depth and velocity (and mesohabitat type) at locations used by rearing juveniles.	Calculate percent of spawning at each riffle within the river. Develop habitat suitability curves for both adults and juveniles.	Results used to evaluate the whether or not the restoration projects are meeting the goal of the MRSHEP and objectives A, B, C and G.
22. Increasing the extent of channel margins and pools during restoration will increase the quantity and quality of suitable rearing habitats and the abundance of juvenile salmon in restored reaches.	a. Measure depth and velocity (and mesohabitat type) at locations used by rearing juveniles. b.Estimate density of rearing juveniles in each mesohabitat c. Estimate densities of steelhead	Densities of juveniles and rainbow trout will be compared among all mesohabitats and between restored and unrestored reaches of the river.	Results will determine whether or not objective C is being attained.

Table 9. Hypothesis, Monitoring Parameter and Evaluation 21-22

5. Feasibility

Extensive monitoring, since 2002, has already been completed on the project with an organization and structure already functioning and in place. The 4-Pumps (DWR and CDFG) program is already finding much of this work and has funded a plan to continue monitoring on the project 2017 for $893,000. Additionally the USFWS is funding a spawning study on the site. This request is for only a portion of the costs for the next three years.

Access to the project 300+ site is also secured by a conservation easement with the Wildlife Conservation Board.

6. Expected Outcomes and Products

Quarterly, semi-annual and annual reports are the primary expected products. Several peer-reviewed papers should be produced from this work as well as presentations at a CDBA science conference and Cal-Neva AFS.

7. Data Handling, Storage, and Dissemination

All data will be stored by DWR and CDFG. Most of CDFG's data will be stored in Access databases that already exist and are currently in use. Data will be made available upon request and CDFG is working to make the basic data available on their website so that individuals can access that data at will.

8. Public Involvement and Outreach

This process was described in Task 2. Basically we will involve the local TAC and stakeholder groups. This work team would organize a workshop with the parties involved on the Tuolumne River restoration activities in the second year to review differences between the two rivers in conceptual models and results to look for efficiencies and improvements not obvious in looking at the results from only one rivers data.

9. *Work Schedule*

Proposed Timeline

task	Description	FY 2007 Jul - Sep	FY 2007 Oct - Dec	FY 2007 Jan - Mar	FY 2007 Apr - Jun	FY 2008 Jul - Sep	FY 2008 Oct - Dec	FY 2008 Jan - Mar	FY 2008 Apr - Jun	FY 2009 Jul - Sep	FY 2009 Oct - Dec	FY 2009 Jan - Mar	FY 2009 Apr - Jun
1	Project Management												
2	Public Participation												
3.1	Surveys												
3.2	Pebble Counts												
3.3	Tracer Gravel Studies												
3.4	Sediment Samples												
3.5	Velocity Profiles												
3.6	Infiltration cans												
3.7	Data analysis and modeling												
3.8	Semi-annual Reporting												
3.9	Annual Reporting												
4.1	Transect monitoring												
4.2	Photo monitoring												
4.3	Oak (969) monitoring												
4.4	Sample containers and pole cuttings												
4.5	Data reduction and entry												
4.6	Well Monitoring												
4.7	Data analysis												
4.8	Semi-annual Reporting												
4.9	Annual Reporting												
5.1	Redd Counts/Escapement Surveys												
5.2	Data Entry/Storage												
5.3	Data Analysis												
5.4	Semi-annual Reporting												
5.5	Annual Reporting												
6.1	Dye Marking Salmon Smolts												
6.2	PIT Tagging Salmon Smolts												
6.3	Smolt Release/Hatchery Assistance												
6.4	PIT Tag Station Monitoring												
6.5	Data Entry/Storage												
6.6	Data Analysis												
6.7	Semi-annual Reporting												
6.8	Annual Reporting												
7.1	Rotary Screw Trap Operation												
7.2	Data Entry/Storage												
7.3	Data Analysis												
7.4	Semi-annual Reporting												
7.5	Annual Reporting												
8.1	Snorkel Surveys												
8.2	Data Entry/Storage												
8.3	Data Analysis												
8.4	Semi-annual Reporting												
8.5	Annual Reporting												

B. Applicability to CALFED Bay-Delta Program ERP Goals, the ERP Draft Stage 1 Implementation Plan, and CVPIA Priorities

1. ERP GOALS AND CVPIA PRIORITIES

The proposed project's relationship to CALFED ecosystem stressors, the USFWS "Anadromous Fisheries Restoration Plan", and the CDFG "Restoring Central Valley Streams: A Plan for Action" is presented in the original project proposal (Attachment 1, Section 4d). Following is the proposed project relationship to current CALFED and AFRP goals and objectives:

Expected Benefits:

Specific project biological/ecological objectives are:

- Improve juvenile and adult salmon fish passage by reconfiguring stream channel conditions;
- Eliminate juvenile salmon predator habitat by filling the unnatural instream pond area;
- Increase the quantity and quality of spawning habitat for chinook salmon by adding spawning gravel, reconfiguring spawning beds and the river course through the filled pond;
- Increase the quantity and quality of rearing habitat for chinook salmon by increasing available inchannel diversity;
- Improve river and floodplain dynamics by reconfiguring the channel to better conform with the present flow regime;
- Enhance riparian and seasonally inundated vegetation by increasing and revegetating floodplain at the project site which will be captured by the river during high flows.

Ecosystem Restoration Importance:

The proposed project revision is critical because it addresses several of the Central Valley anadromous fish and habitat restoration goals identified in the DFG Central Valley Action Plan, USFWS Anadromous Fish Restoration Plan, and the CALFED Ecosystem Restoration Plan. Specifically, the proposed project addresses the Central Valley restoration goals:

Ecosystem Restoration Strategic Goals

- Goal 1 : At Risk Species - San Joaquin fall-run Chinook salmon; several State and Federal threatened and endangered species and habitat types;
- Goal 2: Ecosystem Processes and Biotic Communities - Riverwide wetland, floodplain, and native riparian restoration activities;
- Goal 4: Habitats - Riverwide floodplain, seasonal wetland, and native riparian;
- Goal 5: Non-native Invasive Species - Reduce the negative predation impact of introduced recreational warmwater fish species on outmigrating juvenile Chinook salmon fish passage.

MSCS/ERP Actions

- Improved Salmonid Spawning and Rearing Habitats - Reconfigured salmon spawning area and long-term spawning gravel replenishment;
- Fishery Monitoring, Assessment, and Research - Conduct monitoring and assessment activities which are intended to measure the success of the project as it relates to the intended objectives and whether these objective yield the intended restoration benefits.

Address Scientific Uncertainties

- Decline in Productivity - Project objectives include increased spawning success by providing better quality spawning area; increased juvenile salmon survival by reducing predation by nonnative warmwater fish species during smolt outmigration.
- Channel Dynamics, Sediment Transport, Riparian Vegetation - Project technology utilizes reconfigured channel dynamics and augmented sediment transport manipulation to achieve intended habitat benefits. Native riparian and wetland vegetation is a part of the required stream corridor reconstruction effort.
- Beyond the Riparian Corridor - Habitat easements which will address future land use, such as purchasing mining rights and cattle grazing, will be obtained.

C. Qualifications

The CDFG is the legislative mandated "trustee of the State's fish and wildlife resources" and has for several decades been involved with salmon restoration actions within California. Since 1986, the Delta Fish Protection Agreement (Four Pumps) between CDFG and CDWR has been instrumental in facilitating numerous salmon restoration actions within the San Joaquin and Sacramento River tributaries. The Four Pumps Program is unique in that it allows the two agreement parties, CDFG and CDWR, to draw upon the specialized talents and expertise available within the two departments. During the 18-year existence of the program, project quality and staff capabilities have increased significantly with program experience and stakeholder involvement. Four Pumps restoration actions within the Central Valley continue to remain in the forefront of Central Valley salmon restoration planning efforts.

Following are qualifications of the identified project contacts:

<u>Project Manager</u> – Dean Marston, Senior Biologist (B.A. Wildlife Zoology) in CDFG's San Joaquin Valley Southern Sierra Region. Mr. Marston currently provides the supervision for four biologists working on the San Joaquin River Salmon Program. The program implements monitoring of adult and juvenile Chinook salmon, genetic evaluations, age determination studies and assisting with environmental review and habitat restoration. Mr Marston has more than fifteen years of experience in fisheries biology that includes work as a watershed coordinator, FERC project review, temperature modeling in reservoirs and streams, as well as coho and steelhead management in coastal streams.

<u>Biological Coordination</u> – Tim Heyne, Associate Biologist (M.A. Biology; B.A. Environmental Sciences) in CDFG's San Joaquin Valley Southern Sierra Region. Mr. Heyne currently provides the field supervision for several biologists working on the San Joaquin River Salmon Program. The program implements monitoring of adult and juvenile Chinook salmon, genetic evaluations, age determination studies and assisting with environmental review and habitat restoration. Mr Heyne has more than twenty years of experience in fisheries biology that includes work with aquatic toxicology, reservoir fish biology, crayfish behavior, larval striped

bass growth rates and stream fish biology. He has wide experience with data management of large data sets and the analysis and correction of that data.

Engineering/Geomorphic Coordination - Kevin Faulkenberry, Associate Engineer (Registered) in CDWR San Joaquin District. Currently Mr. Faulkenberry manages the San Joaquin District's salmon habitat restoration program. While working to manage this program, Mr. Faulkenberry has developed many cooperative relations with local, State and federal agencies that have proven to be instrumental in all phases of project development and implementation. Mr. Faulkenberry has over ten years of experience in planning, permitting, surveying, design, and construction management of river restoration projects on the San Joaquin River system while working for CDWR. Familiar with gravel replacement, predator habitat isolation, floodplain restoration and backwater stabilization, Mr. Faulkenberry has completed numerous successful projects on the Stanislaus, Tuolumne, Merced and San Joaquin rivers, and has training in developing hydraulic models for HEC-2, flow-frequency and sediment-transport analysis.

Project Development/Financial Coordination - Fred Jurick, Staff Environmental Scientist (M.S. Natural Resource Management; B.A. Marine Biology) in CDFG Inland Fisheries Division. Mr. Jurick has served as the CDFG Four Pumps Salmon Coordinator since 1993 and the Federal Tracy Fish Mitigation Agreement Coordinator since 1996 with responsiblity for coordinating with the CDFG and CDWR field staff to develop and facilitate salmon restoration projects. These activities include, among others, coordination of project planning efforts, preparing project proposals, securing funding approval, preparing environmental documentation, acquiring project permits, and coordinating environmental compliance activities.

Four Pumps/Financial Coordination - Stephani Spaar, Staff Environmental Scientist (M.S. Fisheries; B.A. Biology) in CDWR's Division of Environmental Services, has been with DWR since 1987 working on various Bay-Delta and Central Valley fisheries studies and habitat projects with the Interagency Ecological Program and Four Pumps Agreement, and has managed the Four Pumps program since 1999. Ms. Spaar is responsible for implementing and coordinating the program and its numerous fish mitigation projects, including preparation and management of large contracts and budgets, coordination of cost-share funding, project tracking and scheduling, and close coordination with CDFG and other CDWR divisions on permitting, engineering, and other aspects of project implementation.

Revegetation Coordination - Karen Dulik, Environmental Scientist (M.S. Soil Science; B.S. Marine Science) in CDWR San Joaquin District. Ms. Dulik is currently coordinating the ongoing revegetation design work, monitoring, data analysis, and reporting for the program. Ms. Dulik has over 5 years experience working on riverine habitat restoration projects on the San Joaquin River System.

D. Cost

Table 10. Merced River Salmon Habitat Enhancement Project Budget Tabulation
Year One (2007)

task	description	labor	benefits	travel	supplies and expendables	services and consultants	equipment	lands and rights of way	other direct costs	direct total	indirect costs	total
1.0	**Project Management**								$60,308.43	$60,308.43		$60,308.43
2.0	**Public Participation**	$4,080.00	$1,020.00	$2,250.00						$7,350.00	$1,020.00	$8,370.00
3.0	**Geomorphic Monitoring**											
3.1	Surveys	$7,365.42	$2,668.49	$2,250.00						$12,283.92	$3,502.26	$15,786.17
3.2	Pebble Counts	$1,767.70	$640.44							$2,408.14	$840.54	$3,248.68
3.3	Tracer Gravel Studies	$589.23	$213.48							$802.71	$280.18	$1,082.89
3.4	Sediment Samples	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.5	Velocity Profiles	$1,767.70	$640.44							$2,408.14	$840.54	$3,248.68
3.6	Infiltration cans	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.7	Data analysis and modeling	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.8	Semi-annual Reporting	$1,473.08	$533.70							$2,006.78	$700.45	$2,707.23
3.9	Annual Reporting	$5,892.34	$2,134.79							$8,027.13	$2,801.81	$10,828.94
4.0	**Riparian Revegetation Monitoring**											
4.1	Transect monitoring	$3,130.22	$1,134.08							$4,264.29	$1,488.42	$5,752.71
4.2	Photo monitoring	$521.70	$189.01							$710.72	$248.07	$958.79
4.3	Oak (969) monitoring	$1,043.41	$378.03							$1,421.43	$496.14	$1,917.57
4.4	Sample containers and pole cuttings	$1,565.11	$567.04							$2,132.15	$744.21	$2,876.36
4.5	Data reduction and entry	$1,304.26	$472.53							$1,776.79	$620.17	$2,396.96
4.6	Well Monitoring	$1,043.41	$378.03							$1,421.43	$496.14	$1,917.57
4.7	Data analysis	$782.55	$283.52							$1,066.07	$372.10	$1,438.18
4.8	Semi-annual Reporting	$782.55	$283.52							$1,066.07	$372.10	$1,438.18
4.9	Annual Reporting	$2,608.51	$945.06							$3,553.58	$1,240.35	$4,793.93
5.0	**Salmon Spawning Habitat Improvement**											
5.1	Redd Counts/Escapement Surveys	$20,528.64	$5,132.16		$1,000.00		$2,000.00			$28,660.80	$5,132.16	$33,792.96
5.2	Data Entry/Storage	$2,400.00	$600.00							$3,000.00	$600.00	$3,600.00
5.3	Data Analysis	$11,840.00	$2,960.00							$14,800.00	$2,960.00	$17,760.00
5.4	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
5.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
6.0	**Juvenile Salmon Survival Monitoring**											
6.1	Dye Marking Salmon Smolts	$1,800.00	$450.00		$1,000.00					$3,250.00	$450.00	$3,700.00
6.2	PIT Tagging Salmon Smolts	$5,760.00	$1,440.00				$26,000.00			$33,200.00	$1,440.00	$34,640.00
6.3	Smolt Release/Hatchery Assistance	$4,800.00	$1,200.00							$6,000.00	$1,200.00	$7,200.00
6.4	PIT Tag Station Monitoring	$28,800.00	$7,200.00				$58,000.00			$94,000.00	$7,200.00	$101,200.00
6.5	Data Entry/Storage	$4,800.00	$1,200.00							$6,000.00	$1,200.00	$7,200.00
6.6	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
6.7	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
6.8	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
7.0	**Juvenile Production Monitoring**											
7.1	Rotary Screw Trap Operation	$76,982.40	$19,245.60		$1,000.00					$97,228.00	$19,245.60	$116,473.60
7.2	Data Entry/Storage	$7,200.00	$1,800.00							$9,000.00	$1,800.00	$10,800.00
7.3	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
7.4	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
7.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
8.0	**Juvenile Salmonid Rearing Habitat Assessment**											
8.1	Snorkle Surveys	$33,359.04	$8,339.76		$1,000.00					$42,698.80	$8,339.76	$51,038.56
8.2	Data Entry/Storage	$7,200.00	$1,800.00							$9,000.00	$1,800.00	$10,800.00
8.3	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
8.4	Semi-annual Reporting	$3,780.80	$945.20							$4,726.00	$945.20	$5,671.20
8.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
9.0	**Contingency**								$60,308.43	$60,308.43		$60,308.43
totals		**$328,945.84**	**$87,278.16**	**$4,500.00**	**$4,000.00**	**$0.00**	**$86,000.00**	**$0.00**	**$120,616.85**	**$631,340.86**	**$92,360.27**	**$723,701.13**

project totals

labor	benefits	travel	supplies and expendables	services and consultants	equipment	lands and rights of way	other direct costs	direct total	indirect costs	total
$328,946	**$87,278**	**$4,500**	**$4,000**	**$0**	**$86,000**	**$0**	**$120,617**	**$631,341**	**$92,360**	**$723,701**

Table 10 cont. Merced River Salmon Habitat Enhancement Project Budget Tabulation
Year Two (2008)

task		labor	benefits	travel	supplies and expendables	services and consultants	equipment	lands and rights of way	other direct costs	direct total	indirect costs	total
1.0	**Project Management**								$55,308.43	$55,308.43		$55,308.43
2.0	**Public Participation**	$4,080.00	$1,020.00	$2,250.00						$7,350.00	$1,020.00	$8,370.00
3.0	**Geomorphic Monitoring**											
3.1	Surveys	$7,365.42	$2,668.49	$2,250.00						$12,283.92	$3,502.26	$15,786.17
3.2	Pebble Counts	$1,767.70	$640.44							$2,408.14	$840.54	$3,248.68
3.3	Tracer Gravel Studies	$589.23	$213.48							$802.71	$280.18	$1,082.89
3.4	Sediment Samples	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.5	Velocity Profiles	$1,767.70	$640.44							$2,408.14	$840.54	$3,248.68
3.6	Infiltration cans	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.7	Data analysis and modeling	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.8	Semi-annual Reporting	$1,473.08	$533.70							$2,006.78	$700.45	$2,707.23
3.9	Annual Reporting	$5,892.34	$2,134.79							$8,027.13	$2,801.81	$10,828.94
4.0	**Riparian Revegetation Monitoring**											
4.1	Transect monitoring	$3,130.22	$1,134.08							$4,264.29	$1,488.42	$5,752.71
4.2	Photo monitoring	$521.70	$189.01							$710.72	$248.07	$958.79
4.3	Oak (969) monitoring	$1,043.41	$378.03							$1,421.43	$496.14	$1,917.57
4.4	Sample containers and pole cuttings	$1,565.11	$567.04							$2,132.15	$744.21	$2,876.36
4.5	Data reduction and entry	$1,304.26	$472.53							$1,776.79	$620.17	$2,396.96
4.6	Well Monitoring	$1,043.41	$378.03							$1,421.43	$496.14	$1,917.57
4.7	Data analysis	$782.55	$283.52							$1,066.07	$372.10	$1,438.18
4.8	Semi-annual Reporting	$782.55	$283.52							$1,066.07	$372.10	$1,438.18
4.9	Annual Reporting	$2,608.51	$945.06							$3,553.58	$1,240.35	$4,793.93
5.0	**Salmon Spawning Habitat Improvement**											
5.1	Redd Counts/Escapement Surveys	$20,528.64	$5,132.16		$1,000.00		$2,000.00			$28,660.80	$5,132.16	$33,792.96
5.2	Data Entry/Storage	$2,400.00	$600.00							$3,000.00	$600.00	$3,600.00
5.3	Data Analysis	$11,840.00	$2,960.00							$14,800.00	$2,960.00	$17,760.00
5.4	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
5.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
6.0	**Juvenile Salmon Survival Monitoring**											
6.1	Dye Marking Salmon Smolts	$1,800.00	$450.00		$1,000.00					$3,250.00	$450.00	$3,700.00
6.2	PIT Tagging Salmon Smolts	$5,760.00	$1,440.00				$26,000.00			$33,200.00	$1,440.00	$34,640.00
6.3	Smolt Release/Hatchery Assistance	$4,800.00	$1,200.00							$6,000.00	$1,200.00	$7,200.00
6.4	PIT Tag Station Monitoring	$28,800.00	$7,200.00				$8,000.00			$44,000.00	$7,200.00	$51,200.00
6.5	Data Entry/Storage	$4,800.00	$1,200.00							$6,000.00	$1,200.00	$7,200.00
6.6	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
6.7	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
6.8	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
7.0	**Juvenile Production Monitoring**											
7.1	Rotary Screw Trap Operation	$76,982.40	$19,245.60		$1,000.00					$97,228.00	$19,245.60	$116,473.60
7.2	Data Entry/Storage	$7,200.00	$1,800.00							$9,000.00	$1,800.00	$10,800.00
7.3	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
7.4	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
7.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
8.0	**Juvenile Salmonid Rearing Habitat Assessment**											
8.1	Snorkle Surveys	$33,359.04	$8,339.76		$1,000.00					$42,698.80	$8,339.76	$51,038.56
8.2	Data Entry/Storage	$7,200.00	$1,800.00							$9,000.00	$1,800.00	$10,800.00
8.3	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
8.4	Semi-annual Reporting	$3,780.80	$945.20							$4,726.00	$945.20	$5,671.20
8.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
9.0	**Contingency**								$55,308.43	$55,308.43		$55,308.43
totals		**$328,945.84**	**$87,278.16**	**$4,500.00**	**$4,000.00**	**$0.00**	**$36,000.00**	**$0.00**	**$110,616.85**	**$571,340.86**	**$92,360.27**	**$663,701.13**

project totals

labor	benefits	travel	supplies and expendables	services and consultants	equipment	lands and rights of way	other direct costs	direct total	indirect costs	total
$328,946	**$87,278**	**$4,500**	**$4,000**	**$0**	**$36,000**	**$0**	**$110,617**	**$571,341**	**$92,360**	**$663,701**

Table 10 cont. Merced River Salmon Habitat Enhancement Project Budget Tabulation
Year Three (2009)

task		labor	benefits	travel	supplies and expendables	services and consultants	equipment	lands and rights of way	other direct costs	direct total	indirect costs	total
1.0	**Project Management**								$55,308.43	$55,308.43		$55,308.43
2.0	**Public Participation**	$4,080.00	$1,020.00	$2,250.00						$7,350.00	$1,020.00	$8,370.00
3.0	**Geomorphic Monitoring**											
3.1	Surveys	$7,365.42	$2,668.49	$2,250.00						$12,283.92	$3,502.26	$15,786.17
3.2	Pebble Counts	$1,767.70	$640.44							$2,408.14	$840.54	$3,248.68
3.3	Tracer Gravel Studies	$589.23	$213.48							$802.71	$280.18	$1,082.89
3.4	Sediment Samples	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.5	Velocity Profiles	$1,767.70	$640.44							$2,408.14	$840.54	$3,248.68
3.6	Infiltration cans	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.7	Data analysis and modeling	$4,419.25	$1,601.10							$6,020.35	$2,101.36	$8,121.70
3.8	Semi-annual Reporting	$1,473.08	$533.70							$2,006.78	$700.45	$2,707.23
3.9	Annual Reporting	$5,892.34	$2,134.79							$8,027.13	$2,801.81	$10,828.94
4.0	**Riparian Revegetation Monitoring**											
4.1	Transect monitoring	$3,130.22	$1,134.08							$4,264.29	$1,488.42	$5,752.71
4.2	Photo monitoring	$521.70	$189.01							$710.72	$248.07	$958.79
4.3	Oak (969) monitoring	$1,043.41	$378.03							$1,421.43	$496.14	$1,917.57
4.4	Sample containers and pole cuttings	$1,565.11	$567.04							$2,132.15	$744.21	$2,876.36
4.5	Data reduction and entry	$1,304.26	$472.53							$1,776.79	$620.17	$2,396.96
4.6	Well Monitoring	$1,043.41	$378.03							$1,421.43	$496.14	$1,917.57
4.7	Data analysis	$782.55	$283.52							$1,066.07	$372.10	$1,438.18
4.8	Semi-annual Reporting	$782.55	$283.52							$1,066.07	$372.10	$1,438.18
4.9	Annual Reporting	$2,608.51	$945.06							$3,553.58	$1,240.35	$4,793.93
5.0	**Salmon Spawning Habitat Improvement**											
5.1	Redd Counts/Escapement Surveys	$20,528.64	$5,132.16		$1,000.00		$2,000.00			$28,660.80	$5,132.16	$33,792.96
5.2	Data Entry/Storage	$2,400.00	$600.00							$3,000.00	$600.00	$3,600.00
5.3	Data Analysis	$11,840.00	$2,960.00							$14,800.00	$2,960.00	$17,760.00
5.4	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
5.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
6.0	**Juvenile Salmon Survival Monitoring**											
6.1	Dye Marking Salmon Smolts	$1,800.00	$450.00		$1,000.00					$3,250.00	$450.00	$3,700.00
6.2	PIT Tagging Salmon Smolts	$5,760.00	$1,440.00				$26,000.00			$33,200.00	$1,440.00	$34,640.00
6.3	Smolt Release/Hatchery Assistance	$4,800.00	$1,200.00							$6,000.00	$1,200.00	$7,200.00
6.4	PIT Tag Station Monitoring	$28,800.00	$7,200.00				$8,000.00			$44,000.00	$7,200.00	$51,200.00
6.5	Data Entry/Storage	$4,800.00	$1,200.00							$6,000.00	$1,200.00	$7,200.00
6.6	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
6.7	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
6.8	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
7.0	**Juvenile Production Monitoring**											
7.1	Rotary Screw Trap Operation	$76,982.40	$19,245.60		$1,000.00					$97,228.00	$19,245.60	$116,473.60
7.2	Data Entry/Storage	$7,200.00	$1,800.00							$9,000.00	$1,800.00	$10,800.00
7.3	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
7.4	Semi-annual Reporting	$960.00	$240.00							$1,200.00	$240.00	$1,440.00
7.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
8.0	**Juvenile Salmonid Rearing Habitat Assessment**											
8.1	Snorkle Surveys	$33,359.04	$8,339.76		$1,000.00					$42,698.80	$8,339.76	$51,038.56
8.2	Data Entry/Storage	$7,200.00	$1,800.00							$9,000.00	$1,800.00	$10,800.00
8.3	Data Analysis	$10,880.00	$2,720.00							$13,600.00	$2,720.00	$16,320.00
8.4	Semi-annual Reporting	$3,780.80	$945.20							$4,726.00	$945.20	$5,671.20
8.5	Annual Reporting	$8,800.00	$2,200.00							$11,000.00	$2,200.00	$13,200.00
9.0	**Contingency**								$55,308.43	$55,308.43		$55,308.43
totals		**$328,945.84**	**$87,278.16**	**$4,500.00**	**$4,000.00**	**$0.00**	**$36,000.00**	**$0.00**	**$110,616.85**	**$571,340.86**	**$92,360.27**	**$663,701.13**

project totals

labor	benefits	travel	supplies and expendables	services and consultants	equipment	lands and rights of way	other direct costs	direct total	indirect costs	total
$328,946	**$87,278**	**$4,500**	**$4,000**	**$0**	**$36,000**	**$0**	**$110,617**	**$571,341**	**$92,360**	**$663,701**

TOTAL COSTS for the Project										
labor	benefits	travel	supplies and expendables	services and consultants	equipment	lands and rights of way	other direct costs	direct total	indirect costs	total
$986,838	**$261,834**	**$13,500**	**$12,000**	**$0**	**$158,000**	**$0**	**$341,851**	**$1,774,023**	**$277,081**	**$2,051,103**

Table 11. Labor Distribution

Classification	Hourly Rate
Associate Engineer	$36.83
Environmental Scientist	$32.61
Senior Biologist	$37.00
Associate Biologist	$31.00
Biologist	$24.00
Scientific Aide	$15.00

Table 11 cont. Labor Distribution

Task	Description	Year #1 (2007)					
		# of People	Days	Hours/Day	Total Hours	Hourly Rate	Notes
2.0	**Public Participation**	2	5	8	80	$34.00	Prorated 1:1 Senior & Assoc Rates
3.0	**Geomorphic Monitoring**						
3.1	Surveys	5	5	8	200	$36.83	Associate Engineer
3.2	Pebble Counts	3	2	8	48	$36.83	Associate Engineer
3.3	Tracer Gravel Studies	2	1	8	16	$36.83	Associate Engineer
3.4	Sediment Samples	3	5	8	120	$36.83	Associate Engineer
3.5	Velocity Profiles	3	2	8	48	$36.83	Associate Engineer
3.6	Infiltration cans	3	5	8	120	$36.83	Associate Engineer
3.7	Data analysis and modeling	1	15	8	120	$36.83	Associate Engineer
3.8	Semi-annual Reporting	1	5	8	40	$36.83	Associate Engineer
3.9	Annual Reporting	1	20	8	160	$36.83	Associate Engineer
4.0	**Riparian Revegetation Monitoring**						
4.1	Transect monitoring	3	4	8	96	$32.61	Environmental Scientist
4.2	Photo monitoring	1	2	8	16	$32.61	Environmental Scientist
4.3	Oak (969) monitoring	2	2	8	32	$32.61	Environmental Scientist
4.4	Sample containers and pole cuttings	2	3	8	48	$32.61	Environmental Scientist
4.5	Data reduction and entry	1	5	8	40	$32.61	Environmental Scientist
4.6	Well Monitoring	1	4	8	32	$32.61	Environmental Scientist
4.7	Data analysis	1	3	8	24	$32.61	Environmental Scientist
4.8	Semi-annual Reporting	1	3	8	24	$32.61	Environmental Scientist
4.9	Annual Reporting	1	10	8	80	$32.61	Environmental Scientist
5.0	**Salmon Spawning Habitat Improvement Monitoring**						
5.1	Redd Counts/Escapement Surveys	3	48	8	1152	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
5.2	Data Entry/Storage	1	20	8	160	$15.00	Sci Aide Rate
5.3	Data Analysis	2	20	8	320	$37.00	Senior Biologist
5.4	Semi-annual Reporting	1	5	8	40	$24.00	Biologist
5.5	Annual Reporting	2	20	8	320	$27.50	Prorated 1:1 Assoc & Biologist Rates
6.0	**Juvenile Salmon Survival Monitoring**						
6.1	Dye Marking Salmon Smolts	3	5	8	120	$15.00	Sci Aide Rate
6.2	PIT Tagging Salmon Smolts	5	10	8	400	$14.40	Prorated 4:1 ratio Sci Aide to Biologist
6.3	Smolt Release/Hatchery Assistance	2	20	8	320	$15.00	Sci Aide Rate
6.4	PIT Tag Station Monitoring	2	100	8	1600	$18.00	Prorated 1:1 ratio Sci Aide to Biologist
6.5	Data Entry/Storage	1	40	8	320	$15.00	Sci Aide Rate
6.6	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
6.7	Semi-annual Reporting	1	5	8	40	$24.00	Biologist Rate
6.8	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates
7.0	**Juvenile Production Monitoring**						
7.1	Rotary Screw Trap Operation	3	180	8	4320	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
7.2	Data Entry/Storage	1	60	8	480	$15.00	Sci Aide Rate
7.3	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
7.4	Semi-annual Reporting	1	5	8	40	$24.00	Biologist Rate
7.5	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates
8.0	**Juvenile Salmonid Rearing Habitat Assessment**						
8.1	Snorkle Surveys	3	78	8	1872	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
8.2	Data Entry/Storage	1	60	8	480	$15.00	Sci Aide Rate
8.3	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
8.4	Semi-annual Reporting	1	5	8	40	$94.52	Biologist Rate
8.5	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates

Table 11 cont. Labor Distribution

Task	Description	Year #2 (2008)					
2.0	**Public Participation**	2	5	8	80	$34.00	Prorated 1:1 Senior & Assoc Rates
3.0	**Geomorphic Monitoring**						
3.1	Surveys	5	5	8	200	$36.83	Associate Engineer
3.2	Pebble Counts	3	2	8	48	$36.83	Associate Engineer
3.3	Tracer Gravel Studies	2	3	8	48	$36.83	Associate Engineer
3.4	Sediment Samples	3	5	8	120	$36.83	Associate Engineer
3.5	Velocity Profiles	0	0	0	0	$36.83	Associate Engineer
3.6	Infiltration cans	0	0	0	0	$36.83	Associate Engineer
3.7	Data analysis and modeling	1	5	8	40	$36.83	Associate Engineer
3.8	Semi-annual Reporting	1	3	8	24	$36.83	Associate Engineer
3.9	Annual Reporting	1	13	8	104	$36.83	Associate Engineer
4.0	**Riparian Revegetation Monitoring**						
4.1	Transect monitoring	3	4	8	96	$32.61	Environmental Scientist
4.2	Photo monitoring	1	2	8	16	$32.61	Environmental Scientist
4.3	Oak (969) monitoring	2	2	8	32	$32.61	Environmental Scientist
4.4	Sample containers and pole cuttings	2	3	8	48	$32.61	Environmental Scientist
4.5	Data reduction and entry	1	5	8	40	$32.61	Environmental Scientist
4.6	Well Monitoring	1	4	8	32	$32.61	Environmental Scientist
4.7	Data analysis	1	3	8	24	$32.61	Environmental Scientist
4.8	Semi-annual Reporting	1	3	8	24	$32.61	Environmental Scientist
4.9	Annual Reporting	1	10	8	80	$32.61	Environmental Scientist
5.0	**Salmon Spawning Habitat Improvement Monitoring**						
5.1	Redd Counts/Escapement Surveys	3	48	8	1152	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
5.2	Data Entry/Storage	1	20	8	160	$15.00	Sci Aide Rate
5.3	Data Analysis	2	20	8	320	$37.00	Senior Rate
5.4	Semi-annual Reporting	1	5	8	40	$24.00	Biologist Rate
5.5	Annual Reporting	2	20	8	320	$27.50	Prorated 1:1 Assoc & Biologist Rates
6.0	**Juvenile Salmon Survival Monitoring**						
6.1	Dye Marking Salmon Smolts	3	5	8	120	$15.00	Sci Aide Rate
6.2	PIT Tagging Salmon Smolts	5	10	8	400	$14.40	Prorated 4:1 ratio Sci Aide to Biologist
6.3	Smolt Release/Hatchery Assistance	2	20	8	320	$15.00	Sci Aide Rate
6.4	PIT Tag Station Monitoring	2	100	8	1600	$18.00	Prorated 1:1 ratio Sci Aide to Biologist
6.5	Data Entry/Storage	1	40	8	320	$15.00	Sci Aide Rate
6.6	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
6.7	Semi-annual Reporting	1	5	8	40	$24.00	Biologist Rate
6.8	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates
7.0	**Juvenile Production Monitoring**						
7.1	Rotary Screw Trap Operation	3	180	8	4320	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
7.2	Data Entry/Storage	1	60	8	480	$15.00	Sci Aide Rate
7.3	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
7.4	Semi-annual Reporting	1	5	8	40	$24.00	Biologist Rate
7.5	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates
8.0	**Juvenile Salmonid Rearing Habitat Assessment**						
8.1	Snorkle Surveys	3	78	8	1872	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
8.2	Data Entry/Storage	1	60	8	480	$15.00	Sci Aide Rate
8.3	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
8.4	Semi-annual Reporting	1	5	8	40	$94.52	Biologist Rate
8.5	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates

Table 11 cont. Labor Distribution

Task	Description	Year #3 (2009)					
2.0	**Public Participation**	2	5	8	80	$34.00	Prorated 1:1 Senior & Assoc Rates
3.0	**Geomorphic Monitoring**						
3.1	Surveys	5	5	8	200	$36.83	Associate Engineer
3.2	Pebble Counts	3	2	8	48	$36.83	Associate Engineer
3.3	Tracer Gravel Studies	2	3	8	48	$36.83	Associate Engineer
3.4	Sediment Samples	3	5	8	120	$36.83	Associate Engineer
3.5	Velocity Profiles	0	0	0	0	$36.83	Associate Engineer
3.6	Infiltration cans	0	0	0	0	$36.83	Associate Engineer
3.7	Data analysis and modeling	1	5	8	40	$36.83	Associate Engineer
3.8	Semi-annual Reporting	1	3	8	24	$36.83	Associate Engineer
3.9	Annual Reporting	1	13	8	104	$36.83	Associate Engineer
4.0	**Riparian Revegetation Monitoring**						
4.1	Transect monitoring	3	4	8	96	$32.61	Environmental Scientist
4.2	Photo monitoring	1	2	8	16	$32.61	Environmental Scientist
4.3	Oak (969) monitoring	2	2	8	32	$32.61	Environmental Scientist
4.4	Sample containers and pole cuttings	2	3	8	48	$32.61	Environmental Scientist
4.5	Data reduction and entry	1	5	8	40	$32.61	Environmental Scientist
4.6	Well Monitoring	1	4	8	32	$32.61	Environmental Scientist
4.7	Data analysis	1	3	8	24	$32.61	Environmental Scientist
4.8	Semi-annual Reporting	1	3	8	24	$32.61	Environmental Scientist
4.9	Annual Reporting	1	10	8	80	$32.61	Environmental Scientist
5.0	**Salmon Spawning Habitat Improvement Monitoring**						
5.1	Redd Counts/Escapement Surveys	3	48	8	1152	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
5.2	Data Entry/Storage	1	20	8	160	$15.00	Sci Aide Rate
5.3	Data Analysis	2	20	8	320	$37.00	Senior Rate
5.4	Semi-annual Reporting	1	5	8	40	$24.00	Biologist Rate
5.5	Annual Reporting	2	20	8	320	$27.50	Prorated 1:1 Assoc & Biologist Rates
6.0	**Juvenile Salmon Survival Monitoring**						
6.1	Dye Marking Salmon Smolts	3	5	8	120	$15.00	Sci Aide Rate
6.2	PIT Tagging Salmon Smolts	5	10	8	400	$14.40	Prorated 4:1 ratio Sci Aide to Biologist
6.3	Smolt Release/Hatchery Assistance	2	20	8	320	$15.00	Sci Aide Rate
6.4	PIT Tag Station Monitoring	2	100	8	1600	$18.00	Prorated 1:1 ratio Sci Aide to Biologist
6.5	Data Entry/Storage	1	40	8	320	$15.00	Sci Aide Rate
6.6	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
6.7	Semi-annual Reporting	1	5	8	40	$24.00	Biologist Rate
6.8	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates
7.0	**Juvenile Production Monitoring**						
7.1	Rotary Screw Trap Operation	3	180	8	4320	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
7.2	Data Entry/Storage	1	60	8	480	$15.00	Sci Aide Rate
7.3	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
7.4	Semi-annual Reporting	1	5	8	40	$24.00	Biologist Rate
7.5	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates
8.0	**Juvenile Salmonid Rearing Habitat Assessment**						
8.1	Snorkle Surveys	3	78	8	1872	$17.82	Prorated 2:1 ratio Sci Aide to Biologist
8.2	Data Entry/Storage	1	60	8	480	$15.00	Sci Aide Rate
8.3	Data Analysis	2	20	8	320	$34.00	Prorated 1:1 Senior & Assoc Rates
8.4	Semi-annual Reporting	1	5	8	40	$94.52	Biologist Rate
8.5	Annual Reporting	2	40	8	640	$27.50	Prorated 1:1 Assoc & Biologist Rates

E. Compliance with Standard Terms and Conditions – N/A

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Tasks And Deliverables

Merced River Restoration Project Monitoring, Crocker−Huffman Dam to Gallo Ranch

Task ID	Task Name	Start Month	End Month	Deliverables
1.0	Project Management	1	36	Semiannual and final reports, Presentations, &Data Management
2.0	Public Participation	1	36	Presentations, Meeting Attendance, Data Dissemination
3.0	Geomorphic Monitoring	1	36	Semiannual and final reports
4.0	Riparian Revegetation Monitoring	1	36	Semiannual and final reports
5.0	Salmon Spawning Habitat Improvement Monitoring	3	36	Semiannual and final reports
6.0	Juvenile Salmon Survival Monitoring	6	36	Semiannual and final reports
7.0	Juvenile Production Monitoring	6	36	Semiannual and final reports
8.0	Juvenile Salmonid Rearing Habitat Assessment	6	36	Semiannual and final reports
9.0	Contingency	1	36	Semiannual and final reports

Comments

If you have comments about budget justification that do not fit elsewhere, enter them here.

Budget Summary

Project Totals

Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
$986,838	**$261,836**	**$13,500**	**$12,000**	**$0**	**$158,000**	**$0**	**$341,848**	**$1,774,022**	**$277,084**	**$2,051,106**

Do you have cost share partners already identified?
Yes.

If yes, list partners and amount contributed by each:

1)Delta Fish Protection Agreement−DWR (for monitoring through 2017)−−$896,404; 2)USFWS−CVPIA (spawning survey through 2006)−−$132,268

Do you have potential cost share partners?
No.

If yes, list partners and amount contributed by each:

Are you specifically seeking non−federal cost share funds through this solicitation?

Merced River Restoration Project Monitoring, Crocker−Huffman Dam to Gallo Ranch

Merced River Restoration Project Monitoring, Crocker−Huffman Dam to Gallo Ranch

Year 1 (Months 1 To 12)

Task	Labor	Benefits	Travel	Supplies And	Services And	Equipment	Lands	Other	Direct	Indirect	Total

				Expendables	Consultants		And Rights Of Way	Direct Costs	Total	Costs	
1.0: project management (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**60308**	$60,308	**0**	$60,308
2.0: Public Participation (12 months)	**4080**	**1020**	**2250**	**0**	**0**	**0**	**0**	**0**	$7,350	**1020**	$8,370
3.0: Geomorphic Monitoring (12 months)	**32113**	**11635**	**2250**	**0**	**0**	**0**	**0**	**0**	$45,998	**15270**	$61,268
4.0: Riparian Revegetation Monitoring (12 months)	**12782**	**4631**	**0**	**0**	**0**	**0**	**0**	**0**	$17,413	**6078**	$23,491
5.0: Salmon Spawning Habitat Improvement Monitoring (10 months)	**44529**	**11132**	**0**	**1000**	**0**	**2000**	**0**	**0**	$58,661	**11132**	$69,793
6.0: Juvenile Salmon Survival Monitoring (7 months)	**66600**	**16650**	**0**	**1000**	**0**	**84000**	**0**	**0**	$168,250	**16650**	$184,900
7.0: Juvenile Production Monitoring (7 months)	**104822**	**26206**	**0**	**1000**	**0**	**0**	**0**	**0**	$132,028	**26206**	$158,234
	64020	**16005**	**0**	**1000**	**0**	**0**	**0**	**0**	$81,025	**16005**	$97,030

8.0: Juvenile Salmonid Rearing Habitat Assessment (7 months)											
9.0: Contingency (12 months)	0	0	0	0	0	0	0	60308	$60,308	0	$60,308
Totals	**$328,946**	**$87,279**	**$4,500**	**$4,000**	**$0**	**$86,000**	**$0**	**$120,616**	**$631,341**	**$92,361**	**$723,702**

Year 2 (Months 13 To 24)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
1.0: project management (12 months)	0	0	0	0	0	0	0	55308	$55,308	0	$55,308
2.0: Public Participation (12 months)	4080	1020	2250	0	0	0	0	0	$7,350	1020	$8,370
3.0: Geomorphic Monitoring (12 months)	32113	11635	2250	0	0	0	0	0	$45,998	15270	$61,268
4.0: Riparian Revegetation Monitoring (12 months)	12782	4630	0	0	0	0	0	0	$17,412	6078	$23,490
5.0: Salmon Spawning Habitat Improvement	44529	11132	0	1000	0	2000	0	0	$58,661	11132	$69,793

Monitoring (12 months)											
6.0: Juvenile Salmon Survival Monitoring (12 months)	66600	16650	0	1000	0	34000	0	0	$118,250	16650	$134,900
7.0: Juvenile Production Monitoring (12 months)	104822	26206	0	1000	0	0	0	0	$132,028	26207	$158,235
8.0: Juvenile Salmonid Rearing Habitat Assessment (12 months)	64020	16005	0	1000	0	0	0	0	$81,025	16005	$97,030
9.0: Contingency (12 months)	0	0	0	0	0	0	0	55308	$55,308	0	$55,308
Totals	**$328,946**	**$87,278**	**$4,500**	**$4,000**	**$0**	**$36,000**	**$0**	**$110,616**	**$571,340**	**$92,362**	**$663,702**

Year 3 (Months 25 To 36)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
1.0: project management (12 months)	0	0	0	0	0	0	0	55308	$55,308	0	$55,308
2.0: Public Participation (12 months)	4080	1020	2250	0	0	0	0	0	$7,350	1020	$8,370

3.0: Geomorphic Monitoring (12 months)	32113	11635	2250	0	0	0	0	0	$45,998	15270	$61,268
4.0: Riparian Revegetation Monitoring (12 months)	12782	4631	0	0	0	0	0	0	$17,413	6078	$23,491
5.0: Salmon Spawning Habitat Improvement Monitoring (12 months)	44529	11132	0	1000	0	2000	0	0	$58,661	11132	$69,793
6.0: Juvenile Salmon Survival Monitoring (12 months)	66600	16650	0	1000	0	34000	0	0	$118,250	16650	$134,900
7.0: Juvenile Production Monitoring (12 months)	104822	26206	0	1000	0	0	0	0	$132,028	26206	$158,234
8.0: Juvenile Salmonid Rearing Habitat Assessment (12 months)	64020	16005	0	1000	0	0	0	0	$81,025	16005	$97,030
9.0: Contingency (12 months)	0	0	0	0	0	0	0	55308	$55,308	0	$55,308
Totals	**$328,946**	**$87,279**	**$4,500**	**$4,000**	**$0**	**$36,000**	**$0**	**$110,616**	**$571,341**	**$92,361**	**$663,702**

Budget Justification

Merced River Restoration Project Monitoring, Crocker−Huffman Dam to Gallo Ranch

Labor

Classification &Hourly Rate: Assoc. Engineer ($36.83); Environmental Scientist ($32.61); Senior Biologist ($37.00); Assoc. Biologist ($31.00; Biologist ($24.00); Scientific Aide ($15.00). Year One (2007)Classificaton &Hours: Task #2−Senior Biologist(60)/Assoc. Biologist(60); Task #3−Assoc. Engineer(872); Task #4−Environmental Scientist(392); Task #5−Senior Biologist(320), Assoc. Biolgist(160), Biologist(582), Scientific Aide(930); Task #6−Senior Biologist(160), Assoc. Biolgist(480), Biologist(1240), Scientific Aide(1880); Task #7−Senior Biologist(160), Assoc. Biolgist(480), Biologist(1800), Scientific Aide (3360); Task #8−Senior Biologist(160), Assoc. Biolgist(480), Biologist(984), Scientific Aide(1728). Year Two (2008)Classificaton &Hours: Task #2−Senior Biologist(60)/Assoc. Biologist(60); Task #3−Assoc. Engineer(584); Task #4−Environmental Scientist(392); Task #5−Senior Biologist(320), Assoc. Biolgist(160), Biologist(582), Scientific Aide(930); Task #6−Senior Biologist(160), Assoc. Biolgist(480), Biologist(1240), Scientific Aide(1880); Task #7−Senior Biologist(160), Assoc. Biolgist(480), Biologist(1800), Scientific Aide (3360); Task #8−Senior Biologist(160), Assoc. Biolgist(480), Biologist(984), Scientific Aide(1728). Year Three (2009)Classificaton &Hours: Task #2−Senior Biologist(60)/Assoc. Biologist(60); Task #3−Assoc. Engineer(584); Task #4−Environmental Scientist(392); Task #5−Senior Biologist(320), Assoc. Biolgist(160), Biologist(582), Scientific Aide(930); Task #6−Senior Biologist(160), Assoc. Biolgist(480), Biologist(1240), Scientific Aide(1880); Task #7−Senior Biologist(160), Assoc. Biolgist(480), Biologist(1800), Scientific Aide (3360); Task #8−Senior Biologist(160), Assoc. Biolgist(480), Biologist(984), Scientific Aide(1728).

Benefits

Classification &Benefit Rate (given in percent of hourly compensation rate): Assoc. Engineer (13.94%); Environmental Scientist (13.94%); Senior Biologist (25%); Assoc. Biologist (25%); Biologist (25%); Scientific Aide (25%).

Travel

Travel Costs: Year One (2007) $4,500 ($2,500−−Task #2 Perdiem at $125/day to Attend meetings and give presentations; $2,500−−Task #3 Perdiem at $125/day for UC Santa Barbara Graduate Students to conduct travel to Merced River for purposes of assisting with geomorphic surveys). Same for years Two (2008) and Three (2009)

Supplies And Expendables

Year One (2007:Task #5−Salmon Spawning Habitat Improvement Monitoring ($1,000 for Office costs: pens, paper, phone, photocopier, printer etc.); Task #6−Juvenile Salmon Survival Monitoring ($1,000 for Office costs: pens, paper, phone, photocopier, printer etc.); Task #7−Juvenile Production Monitoring ($1,000 for Office costs: pens, paper, phone, photocopier, printer etc.); Task #8−Juvenile Salmonid Rearing Habitat Assessment ($1,000 for Office costs: pens, paper, phone, photocopier, printer etc.). Same for years Two (2008) and Three (2009).

Services And Consultants

The Department of Fish and Game (applicant) will contract with the Department of Water Resources (sub−contractor) to conduct Tasks #3 &#4.

Equipment

Year One (2007):Task #5−Salmon Spawning Habitat Improvement Monitoring ($2,000 for escapement survey costs: waders, oars,

hog rings/tags, boat motor repair parts); Task #6−Juvenile Salmon Survival Monitoring ($26,000 PIT Tags−−4,000 @ $6.50/tag; $50,000 PIT Tag Monitoring Stations−−5 @ $10,000/station; $7,000 Vehicle Maintenance/Repair; $1,000 PIT Tag Monitoring Station Cable/Housing−−10 @ 100 each). Year Two (2008):Task #5−Salmon Spawning Habitat Improvement Monitoring ($2,000 for escapement survey costs: waders, oars, hog rings/tags, boat motor repair parts); Task #6−Juvenile Salmon Survival Monitoring ($26,000 PIT Tags−−4,000 @ $6.50/tag; $7,000 Vehicle Maintenance/Repair; $1,000 PIT Tag Monitoring Station Cable/Housing−−10 @ 100 each). Year Three (2009):Task #5−Salmon Spawning Habitat Improvement Monitoring ($2,000 for escapement survey costs: waders, oars, hog rings/tags, boat motor repair parts); Task #6−Juvenile Salmon Survival Monitoring ($26,000 PIT Tags−−4,000 @ $6.50/tag; $7,000 Vehicle Maintenance/Repair; $1,000 PIT Tag Monitoring Station Cable/Housing−−10 @ 100 each).

Lands And Rights Of Way

None

Other Direct Costs

Year 1 (2007): Task #1 Program Management calculated at %10 of Direct Total Costs for Tasks #2 through #8; Task #9 Contingency calculated at %10 of Direct Total Costs for Tasks #2 through #8. Same for Years Two (2008)and Three (2009).

Indirect Costs/Overhead

There are two Indirect Cost/Overhead rates: Tasks #4 &#5 @ 47.55% (DWR rate); Tasks #6 through #8 @ 25% (DFG rate).

Comments

A complete Budget Tabulation and Labor Distribution is included in the Proposal Document

Environmental Compliance

Merced River Restoration Project Monitoring, Crocker−Huffman Dam to Gallo Ranch

CEQA Compliance

Which type of CEQA documentation do you anticipate?
− none
X negative declaration or mitigated negative declaration
− EIR
− categorical exemption

If you are using a categorical exemption, choose all of the applicable classes below.
− Class 1. Operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" itemized above are not intended to be all−inclusive of the types of projects which might fall within Class 1. The key consideration is whether the project involves negligible or no expansion of an existing use.
− Class 2. Replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced.
− Class 3. Construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure. The numbers of structures described in this section are the maximum allowable on any legal parcel, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 4. Minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 6. Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies. These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not

yet approved, adopted, or funded.
– Class 11. Construction, or placement of minor structures accessory to (appurtenant to) existing commercial, industrial, or institutional facilities, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

Identify the lead agency.
Department of Water Resources

Is the CEQA environmental impact assessment complete?
Yes.

If the CEQA environmental impact assessment process is complete, provide the following information about the resulting document.

Document Name	**Merced River Salmon Habitat Enhancement Project Robinson–River Mile 42.1 to 44.4**
State Clearinghouse Number	**SCH#2001011128**

If the CEQA environmental impact assessment process is not complete, describe the plan for completing draft and/or final CEQA documents.

NEPA Compliance

Which type of NEPA documentation do you anticipate?
– none
X environmental assessment/FONSI
– EIS
– categorical exclusion

Identify the lead agency or agencies.

U.S. Fish and Wildlife Service

If the NEPA environmental impact assessment process is complete, provide the name of the resulting document.
Merced River Salmon Habitat Enhancement Project––Robinson Phase

If the NEPA environmental impact assessment process is not complete, describe the plan for completing draft and/or final NEPA documents.

Successful applicants must tier their project's permitting from the CALFED Record of Decision and attachments providing programmatic guidance on complying with the state and federal endangered species acts, the Coastal Zone Management Act, and sections 404 and 401 of the Clean Water Act.

Please indicate what permits or other approvals may be required for the activities contained in your proposal and also which have already been obtained. Please check all that apply. If a permit is *not* required, leave both Required? and Obtained? check boxes blank.

Local Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
conditional Use Permit	–	–	
variance	–	–	
Subdivision Map Act	–	–	
grading Permit	–	–	
general Plan Amendment	–	–	
specific Plan Approval	–	–	
rezone	–	–	
Williamson Act Contract Cancellation	–	–	
other	–	–	

State Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
scientific Collecting Permit	–	–	
CESA Compliance: 2081	–	–	
CESA Complance: NCCP	–	–	
1602	–	–	
CWA 401 Certification	–	–	
Bay Conservation And Development Commission Permit	–	–	

reclamation Board Approval	–	–	
Delta Protection Commission Notification	–	–	
state Lands Commission Lease Or Permit	–	–	
action Specific Implementation Plan	–	–	
other	–	–	

Federal Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
ESA Compliance Section 7 Consultation	–	–	
ESA Compliance Section 10 Permit	–	–	
Rivers And Harbors Act	–	–	
CWA 404	–	–	
other NOAA Fisheries 4(D) Rule Take Authorization	X	X	

Permission To Access Property	Required?	Obtained?	Permit Number (If Applicable)
permission To Access City, County Or Other Local Agency Land Agency Name	–	–	
permission To Access State Land Agency Name	–	–	
permission To Access Federal Land Agency Name	–	–	
permission To Access Private Land Landowner Name Mr. Chris Robinson	X	X	

If you have comments about any of these questions, enter them here.

Land Use

Merced River Restoration Project Monitoring, Crocker−Huffman Dam to Gallo Ranch

Does the project involve land acquisition, either in fee or through easements, to secure sites for monitoring?
X No.
− Yes.

How many acres will be acquired by fee?

How many acres will be acquired by easement?

Describe the entity or organization that will manage the property and provide operations and maintenance services.

Is there an existing plan describing how the land and water will be managed?
− No.
− Yes.

Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?
− No.
X Yes.

Describe briefly the provisions made to secure this access.

Applicant has legal authorization to access project sites

Do the actions in the proposal involve physical changes in the current land use?
X No.
− Yes.

Describe the current zoning, including the zoning designation and the principal permitted uses permitted in the zone.

Describe the general plan land use element designation, including the purpose and uses allowed in the designation.

Describe relevant provisions in other general plan elements affecting the site, if any.

Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?
X No.
– Yes.

Land Designation	Acres	Currently In Production?
Prime Farmland		–
Farmland Of Statewide Importance		–
Unique Farmland		–
Farmland Of Local Importance		–

Is the land affected by the project currently in an agricultural preserve established under the Williamson Act?
X No.
– Yes.

Is the land affected by the project currently under a Williamson Act contract?
– No.
– Yes.

Why is the land use proposed consistent with the contract's terms?

Describe any additional comments you have about the projects land use.