

October 31, 2005
Workplan for Fiscal Year 2006

I. Anadromous Fish Restoration Program (AFRP) – Section 3406(b)(1)

II. Responsible Entities

	Agency	Staff Name	Role
Lead	FWS	Russ Bellmer	Program Manager
Co-Lead	BOR	Ken Lentz	Program Manager

III. Program Objectives

The objectives for the Anadromous Fish Restoration Program (AFRP) can be found in the Final Restoration Plan. These objectives are listed below:

1. Improve habitat for all life stages of anadromous fish through provision of flows of suitable quality, quantity, and timing, and improved physical habitat;
2. Improve survival rates by reducing or eliminating entrainment of juveniles at diversions;
3. Improve the opportunity for adult fish to reach their spawning habitats in a timely manner;
4. Collect fish population, health, and habitat data to facilitate evaluation of restoration actions;
5. Integrate habitat restoration efforts with harvest and hatchery management; and
6. Involve partners in the implementation and evaluation of restoration actions.

The AFRP is one of Central Valley Project Improvement Act (CVPIA) programs being integrated with the CalFed Ecosystem Restoration Program (ERP). To facilitate this integration, the above objectives are included in the ERP Draft Stage 1 Implementation Plan. These objectives are also complementary to other goals and objectives listed in the Draft Stage 1 Implementation Plan and would help address the objectives of the CBDA's Multi-Species Conservation Strategy and the Biological Opinion for the CVPIA.

The AFRP shares ERP's Single Blueprint concept which provides a unified and cooperative approach to restoration. The AFRP is committed to integrating its activities with the ERP's actions and using a scientifically-based adaptive management approach to achieve AFRP objectives.

IV. Status and Background of the Program

The Final Restoration Plan for the AFRP (Restoration Plan) was completed in 2001 to

help guide the long-term implementation of the program. The Restoration Plan provides a programmatic guide for the implementation of the CVPIA programs that contribute to the goal of making all reasonable efforts to at least double natural production, on a sustainable base, of anadromous fish. The Restoration Plan presents the goal, objectives, and strategies of the AFRP, as well as a list of reasonable actions. The Restoration Plan identifies the need for partners, local involvement, public support, adaptive management, and flexibility as key attributes of the AFRP.

To implement this plan, the FWS established five Federal Habitat Restoration Coordinator (HRC) positions; each assigned a specific geographic area within California's Central Valley. In their assigned areas, HRCs represent the AFRP, develop and nurture partnerships, develop projects with partners that improve the natural production of anadromous fish, and oversee all aspects of implementation of projects in which the AFRP invests funds. In 1998, the AFRP added three more HRC's from the California Department of Fish and Game (DFG) to this effort; one from three of the DFG regions within the Central Valley provide assistance to the USFWS and ensure close coordination with the DFG, the State agency with primary responsibility for restoration of anadromous fish habitat. Together, the USFWS and DFG HRCs form an interagency team to coordinate, develop and implement restoration projects consistent with the goal, objectives, strategies, processes and priorities described in the Restoration Plan.

AFRP derives managerial, administrative and technical support from the California/Nevada Operations Office, Red Bluff Fish and Wildlife Office, and Sacramento Fish and Wildlife Office, including assistance with environmental compliance processes (NEPA, ESA, and FWCA) and completion of science-based studies essential to AFRP habitat restoration efforts (Instream Flow Incremental Methodology studies, salmonid passage studies, habitat mapping, spawning surveys, etc.).

The AFRP and several other CVPIA programs functionally integrated with the CALFED and CALFED ERP Proposal Solicitation Process (PSP), resulting in peer reviewed projects potentially available for AFRP funding. As part of this functional integration, when AFRP fiscal year funding coincides with the CALFED PSP, potential AFRP proposed projects after request for proposal on GRANTS.GOV (web site for Federal grants and contracts).undergo CALFED scientific and technical review to help ensure the best and highest priority projects are implemented and to ensure the most efficient use of funds. During years when the AFRP fiscal year funding does not fall within a scheduled CALFED PSP, AFRP project proposals are peer reviewed with the CALFED experts.

Environmental Limiting Factors

AFRP projects implemented from actions and evaluations in the AFRP Restoration Plan^a since 1995 have addressed the limiting factor identified in the AFRP Working Paper^b.

a USFWS. 2001. Final restoration plan for the Anadromous Fish Restoration Program, A plan to increase natural production of anadromous fish in the Central Valley of California.

b USFWS, 1995. Working paper on restoration needs, habitat restoration actions to double natural

All AFRP activities provided biological benefits to the targeted species.

Table 1 shows the numbers and percentages of Central Valley watersheds and the limiting factors that were addressed and their relationship to AFRP objectives. Insufficient flow is a limiting factor associated with all watersheds (27 CVPIA identified watersheds)^b; and has been partially addressed in about 40% of the watersheds. Adult and juvenile salmon and steelhead entrainment and passage, and stream habitat restoration are also limiting factors and were partially addressed in about 20% of the watersheds. When flows, spawning habitat, and sediment control were improved, they addressed AFRP Objective 1. Projects that improved juvenile entrainment addressed Objective 2. Projects that improved fish passage addressed Objective 3. Projects that evaluate, improve survival, assess effects of hatchery fish on natural production, and involve partners in watershed planning addressed Objectives 4 - 6.

Table 1. Percentages and numbers of watersheds where actions were taken to address limiting factors and the AFRP Objectives (all actions are implemented with partners and meet objective 6).

AFRP limiting factors	Percent (and number) of watersheds where actions were taken	AFRP objective addressed, (1-6)
Insufficient flow	41 (11)	1
Adult and juvenile entrainment	26 (7)	2
Stream habitat loss	22 (6)	1
Fish passage obstacles	22 (6)	3
Predation	15 (4)	1,4
Spawning habitat	15 (4)	1,4
Effects of hatchery fish on natural stocks	11 (3)	5
Erosion and sediment control	7 (2)	1

Project Categories

The AFRP has implemented over 150 restoration projects in nine categories in 27 watersheds, including the mainstem of the Sacramento and the San Joaquin rivers. The general AFRP restoration project categories are presented in Table 2 along with the percentage of watersheds where projects were implemented, percentage of project types, and objective addressed. For example, 50% of the 27 watersheds have restoration planning activities, 17% of the total projects implemented to date are planning projects, and these projects address objective 6. AFRP supported seven projects where fish production of anadromous fish in the Central Valley of California, Volume 3, AFRP

screens were integrated in the fish ladder structures (mostly on the Lower Butte Creek Project).

Table 2. Restoration projects implemented as they relate to AFRP restoration project categories and AFRP objectives.

AFRP Restoration Project categories	Percent of watersheds where projects occurred	Percent of all projects	AFRP objectives (1-6)
Watershed planning	50	17	1-6 (all)
Fish passage	35	14	3
Education	25	4	6
Riparian easement acquisition and restoration	55	19	1, 5
Life-history evaluations	35	14	4
Gravel restoration	25	7	1
Predator mine-pit isolation	10	4	1
Hydrological modeling, fluvial geomorphology	60	13	1
Anadromous fish monitoring	35	8	4, 5

AFRP general progress toward Salmon Production Goals

The progress made toward addressing environmental limiting factors identified in the Working Paper and implementing the restoration actions in the Restoration Plan summarized in Table 3. About 26% of all the listed limiting factors in the Working Paper have been addressed and about 26% Restoration Plan actions and evaluations were implemented in the 1995 to 2005 time period. Several restoration actions continue in perpetuity, because they are seasonally removed (e.g., water and gravel) or geomorphologically impeded (e.g., high dams that intercept natural gravel recruitment).

Estimated total Central Valley-wide Chinook salmon natural production increased about 5% (Table 3) from baseline, well below the AFRP Doubling Goal. Those streams which have had most of their environmental limiting factors improved and restoration actions implemented have resulted in about two times or more salmon production beyond their doubling goals (e.g., Butte and Clear Creeks). It is questionable if this short-term increase can be sustained in either creek.

With the exception of streams with hatcheries (Table 3), other streams having equal to or less than 70% of their limiting factors addressed and 60% of their restoration actions implemented, show negative production increases, averaging 28% in the 1992-2004 period.

Table 3. Estimated percent of AFRP limiting factors addressed and percent change from baseline for Chinook Salmon

AFRP Central Valley watersheds	Percent of limiting factors addressed¹	Percent of AFRP projects implemented²	Doubling goals^b	Baseline 67-91³	Estimated natural production 92-04^c	Estimated % difference from baseline⁴
All AFRP Central Valley watersheds^g	26	27	990,000	496,393	521,110	5
Upper mainstem Sacramento River	67	59	477,022 ⁵	235,000	105,273	-55
Upper mainstem Sacramento River Tributaries						
Clear Creek	95	95	7,100 ⁶	3,600	12,000	233
Butte Creek	85	80	3,500 ^{f,7}	1,800	14,000	678
Big Chico Creek	40	40	800 ^{f,g}	650	130	-80
Mill Creek	60	40	8,600 ^{f,g}	4,300	3,900	-9
Deer Creek	20	60	8,000 ^{f,g}	4,100	3,300	-24
Cow Creek	0	0	4,600 ^f	2,400	Data n.a.	
Battle Creek	20	25	10,550 ^e	5,300	23,200	338
Antelope Creek	50	0	720 ^f	400	Data n.a.	
Bear Creek	0	0	Data n.a.	Data n.a.	Data n.a.	
Paynes	0	0	330 ^f	170	Data n.a.	
Stoney Creek	0	0	Not set	Data n.a.	Data n.a.	
Cottonwood Creek	0	0	5,900 ^f	3,000	4,000	33
Thomes Creek	0	0	Not set	Data n.a.	Data n.a.	
Elder Creek	0	0	Not set	Data n.a.	Data n.a.	
Miscellaneous tributaries ⁸	0	0	1,100 ^f	552	Data n.a.	
Lower Sacramento River and Delta Tributaries						
Feather River ^h	0	8	170,000 ^f	87,000	133,000	53
Yuba River	43	36	66,000 ^f	34,000	43,000	27

Bear River	0	0	450 ^f	636	Data n.a.	
American River ^h	29	15	160,000 ^f	81,200	153,000	88
Cosumnes River	50	33	3,300 ^f	1,700	650	-62
Mokelumne River	25	31	9,300 ^f	4,700	9,200	96
Calaveras River	40	33	2,200 ^f	800	Data n.a.	
San Joaquin River Basin						
San Joaquin River	10	15	Not set	38,500	27,600	-28
Stanislaus River	40	33	22,000 ^f	11,000	7,200	-35
Tuolumne River	55	40	38,000 ^f	19,000	10,300	-46
Merced River ^h	42	50	18,000 ^f	9,000	9,800	9

¹ These are Limiting Factors identified in the “USFWS. 1995. Working paper on restoration needs, habitat restoration actions to double natural production of anadromous fish in the Central Valley of California, Volume 3, AFRP”. **This category includes limiting factors partially addressed.**

² USFWS. 2001. Final restoration plan for the Anadromous Fish Restoration Program, A plan to increase natural production of anadromous fish in the Central Valley of California. The percentage of restoration projects implemented does not imply that those percentages reflect all of the actions necessary to address a limiting factor are completed, e.g., actions such as “replenishing gravel or riparian habitat” are general in nature as stated in the AFRP Restoration Plan, and the plan implies that those types of actions must be repeated in perpetuity (gravel replenishment) for that watershed or repeated for different sections of the watershed (riparian restoration).

³ CHINOOKPROD - KINGPROD.123. 1995. Working Paper on Restoration Needs; Habitat restoration actions to double natural production of anadromous fish in the Central Valley of California. Volume 2, page 2-IX-5-18. U.S. Fish and Wildlife Service; and California Department of Fish and Game. 2005. Grand Tab. Native Anadromous Fish and Watershed Branch. California Department of Fish and Game. February 3, 2005.

⁴ The percent of increased natural production over baseline for each watershed was calculated by subtracting baseline natural production (1967-1991) from natural production (1992-2004) and dividing the result by baseline natural production (1967-1991).

⁵ All Chinook salmon races

⁶ Fall-run Chinook salmon

⁷ Spring-run Chinook salmon

⁸ Miscellaneous streams include production estimates of fall-run Chinook salmon in streams above RBDD and between Princeton and RBDD.

V. FY 2005 Accomplishments by Watershed

During FY05, the AFRP staff focused mostly ongoing projects. Below is a list of projects active in FY05.

Vendor Name	Award Amount	Watershed & Name of Project
KDH Consultants	\$182,280.00	Stanislaus River. Continual monitoring for the Knight's Ferry gravel replenishment, Phase 2.
Big Eagle and Associates	\$16,450.00	Merced River. Tag & clip 125k smolts with full tags at CDFG Merced River Hatchery.
S P Cramer & Associates Inc.	\$100,000.00	Lower Stanislaus River. Develop a plan to restore anadromous fish habitat.
HDR Engineering, Inc.	\$200,000.00	Big Chico Creek. Evaluation of Iron Canyon fish ladder repair & construction.
South Yuba River Citizens	\$65,560.00	Yuba River. Chinook salmon & steelhead life history evaluation.
Ducks Unlimited Inc.	\$125,000.00	Lower Butte Creek. East side Sutter Bypass small pumping plant screens.
Ducks Unlimited Inc.	\$30,000.00	Lower Butte Creek. East side Sutter Bypass small pumping plant screens.
Fishery Foundation of California	\$124,980.00	Cosumnes River. Salmonid barrier program.
Fishery Foundation of California	\$155,120.00	Lower Calaveras. Chinook salmon & steelhead life history limiting factors analysis.
Yuba County Water Agency	\$30,000.00	Yuba River. Goldfields fish barrier replacement project.
Tri Dam Project	\$190,000.00	Stanislaus River. Test/demonstrate portable Alaskan weir to count & characterize runs of anadromous salmonids.
South Yuba River Citizens	\$45,560.00	Lower Yuba River. Juvenile Chinook salmon life history & thermal bioenergetics evaluation.
California Fish & Game	\$239,250.00	CDFG Regions 1, 2 & 4. Acquire the services of 3 Environmental Specialists IV Biologists.
Ducks Unlimited Inc.	\$208,000.00	Butte Creek. White Mallard Dam & associated diversions, Phase III.
Ducks Unlimited Inc.	\$50,000.00	Butte Creek. White Mallard Dam & associated diversions, Phase III.
East Bay Municipal Utility District	\$79,850.00	Mokelumne River. Spawning habitat improvement project.
University of California. Davis	\$161,810.00	Yuba River. SHIRA based river analysis & filed based manipulative sediment transport experiments to balance habitat & geomorphic goals.
The CSU, Chico Research	\$144,140.00	Butte Creek & Big Chico Creek. Salmon & steelhead life history investigation.

Bureau of Land Management	\$3,600.00	Tuolumne River. Review of the mineral portion of the MJ Ruddy/Warner Deardorff appraisal.
California State University,	\$3,000.00	Lower American River. Science Conference April 21 - 23, 2005.
American Fisheries Society	\$2,000.00	Symposium & 39th annual meeting conserving CA-NV fisheries.
Regents of University of California	\$10,000.00	California Cooperative Ecosystems Studies Unit (CESU) initial FWS participation.
RBFWO	\$355,000.00	Projects on upper Sac. Rv. & Trib.
Total	\$2,521,600.00	

Central Valley-Wide

As part of the ongoing Central Valley-wide effort to understand the decline in anadromous salmon populations, in addition to habitat degradation, another aspect being researched is successful reproduction and survival, through a "Research of Sex Reversal in Central Valley Chinook Salmon Occurrences and Population Genetic Consequences Study". Over the past few years, research has been done in Idaho, Washington and California to determine the incidence of phenotypic sex reversal (i.e. the fish looks female, but genetically its male). This research was amended in FY05 to expand the investigation to include naturally spawning samples of spring-run Chinook salmon collected from 1999 to 2002 from Butte, Deer, and Mill creeks.

Battle Creek

In FY05 one of Battle Creek's limiting factors, effectively screen tailrace at Coleman Powerhouse, was resolved when a tailrace barrier was constructed by PG&E on their Coleman Powerhouse tailrace. AFRP staff served as the federal lead for environmental documentation to facilitate the tailrace barrier project.

Butte Creek

The work continues on the three Lower Butte Creek Project phases: Phase I (Existing Conditions) is 100% complete; Phase II (Engineering Design/Environmental Docs/Permits) is 80% complete; and, Phase III (Construction) is 60% complete. Additional Phase II non-structural projects are under way in the Sutter Bypass with the completion of a memorandum of understanding for the east side of the Sutter Bypass that will result in the development of a fish passage restoration plan that will review the small pumping plants and establish minimum flows for fish passage for both borrow channels of the Sutter Bypass. Projects recently completed in Phase III Construction are: "Sutter Bypass E-W Diversion Dam", "Weir 5", "Weir 3"; "Butte Sink Weir", "North Weir", "End Weir", "Morton Weir", "Field and Tule Turnout", "Mile Canal Turnout", "Drivers Cut Adult Fish Barrier" and "Reclamation District 833 Adult Fish Barrier"; "West of Butte Creek Bifurcation Dam", "Drumheller Slough Adult Fish Barrier", and the "White Mallard Duck Club Adult Fish Barrier". An additional Phase III construction project,

“White Mallard Dam and Fish Ladder”, is underway.

Yuba River

The “Spawning Habitat Integrated Rehabilitation Approach Based River Analysis and Sediment Transport Study” is improving our understanding of how gravel resources (i.e. spawning habitat) respond to changes in flow. Preliminary results of this study reveal a very high correlation between those areas the model predicted would be good spawning habitat, and actual redd locations. Data collected to date includes sampling tracer gravel cores, locating Chinook salmon redds, and conducting a bathymetric survey of a spawning reach at the University of California property at flows of 600 cfs, 12,000 cfs, and 45,000 cfs.

Three separate studies on the Yuba River address the AFRP Program goal of collecting fish population, health, and habitat data to facilitate evaluation of restoration actions. The Chinook salmon and steelhead life history evaluation is was completed. The purpose of this study is to determine the timing, abundance, and distribution of adult Chinook salmon in the lower river using VAKI Riverwatchers, infrared detection devices, installed in both fish ladders at Daguerre Point Dam. The “Juvenile Life History Evaluation on the Yuba River” is trapping, tagging, and releasing wild juvenile Chinook salmon, and recapturing them as adults, 3-5 years later in carcass surveys. The steelhead scale and otolith analyses project is entering its second year of sampling. This project investigates the suite of life history strategies expressed by Central Valley steelhead scale and otolith annuli.

The Yuba Goldfields Barrier in the outfall of waterway 13 was constructed in August 2003 to eliminate entrainment of adults into the Goldfields; however, the high flows in May 2004, which exceeded 45,000 cfs, breached this structure. As a result AFRP provided funds in FY05 to repair this damage.

Cosumnes River

AFRP provided funding to complete construction on fish passage barriers. To date, the AFRP has fixed all but one of the major barriers on the Cosumnes River, Rooney Brothers Dam at River Mile 25. Construction on this barrier will occur in fall 2005 or fall 2006.

The AFRP has funded an effort to identify water supply resources so that the lower river does not go dry in the early fall when adults are returning to the river to spawn; however progress on this project is slow because it involves negotiations to obtain water resources from outside the Cosumnes River basin. The AFRP funded two separate studies, to steelhead distribution, habitat utilization and food habits. Both studies were completed and final reports submitted. The biological benefits were information on floodplain usage, stranding, interspecific competition, and distribution of non-native exotic species, such as red-eye bass (*Micropterus coosae*).

Mokelumne River

Riparian restoration on Murphy Creek (a Mokelumne River tributary) was completed (cattle exclusion fences await lower water levels and should be completed this fiscal year). Additionally, in FY05, approximately 2,300 additional tons of spawning gravel were added to the river channel, increasing spawning, incubation and rearing habitat for salmonids. Two side-channel restoration projects were also completed this year as part of the Mokelumne River Partnership. Biological benefits of the above projects include: reduced fine sediments and cattle waste; reduced water temperatures; additional rearing habitat; increased habitat complexity and additional food resources. Monitoring of gravel augmentation has occurred and will continue in order to document the utilization of added gravel and the habitat variables associated with preferred spawning sites. Added gravel has been heavily utilized according to recent redd surveys.

The “Mokelumne River Spawning Improvement Project” has improved spawning habitat through gravel augmentation and is an ongoing cost-share effort with East Bay Municipal Utilities District. In association with this project, the Demonstration Project to Test a New Interdisciplinary Approach to Rehabilitating Salmon Spawning in the Central Valley has focused on small-scale monitoring to identify preferred spawning habitat to aid design of gravel augmentation projects within and beyond the Central Valley. The nearly completed “Mokelumne River Streambank Improvement Project” provides fencing and off-channel watering for livestock in conjunction with a co-funded revegetation project designed to improve riparian conditions and reduce livestock waste.

Calaveras River

Biological benefits from AFRP funded projects included improvements to the operation and efficiency of the Bellota Weir fish ladder (allowing more steelhead and salmon to reach spawning grounds). As addressed in the status section of the Habitat Conservation Plan (Cramer Associates, in preparation), the major limiting factor on the Calaveras River is passage of both adults and juveniles. Entrainment into water diversions is the next most limiting factor. Entrainment of juvenile salmonids will continue to occur until diversions are screened, most notably the Stockton East Water District diversion at Bellota. Monitoring continues to document stranding and should continue to provide baseline information until improvements are made and monitoring can verify the reduction in stranding and entrainment.

A fish ladder has been retrofitted at Bellota Weir (Summer 2005) and is currently undergoing evaluation. Stranding and carcass surveys are being conducted along with an analysis of factors limiting salmonid populations. A flow modeling study conducted by the California Department of Water Resources to prioritize passage improvements is nearly complete. AFRP is participating in the Habitat Conservation Plan workgroup for steelhead along with other state and federal agencies. CALFED has funded a preliminary engineering study to replace the Bellota Weir, the diversion screen and fish ladders.

Stanislaus River

Operation and testing of a fish counting weir with an infrared fish counter and digital camera were conducted. The first year of egg survival studies to evaluate gravel augmentation projects was completed. Preliminary findings are showing up to 80% survival. A fisheries summary has been completed and conceptual models are in preparation as part of the Stanislaus River Restoration Plan. The “Gravel Augmentation and Side-channel/floodplain Restoration” project continued. Results of the above projects include: accurate enumeration of Chinook salmon escapement for doubling goal evaluation; documentation of steelhead passage; and analysis of the size composition of added gravel for optimum spawning success. The above projects addressed the limiting factors of stream habitat restoration, spawning habitat and watershed planning. Results from the gravel study, “Continuing Monitoring for the Knight’s Ferry Gravel Replenishment Project, Phase II” has shown significant use of spawning gravels by adult salmonids and poor survival of eggs within gravel lacking smaller size fractions (missing gravel < ½ inch in diameter). Optimal size composition of gravels will be better understood in future planned studies by both AFRP and BOR and has implications on gravel augmentation projects.

Accurate and standardized escapement data are necessary to evaluate program progress toward doubling. The AFRP is currently funding the “Test and Demonstrate a Portable Alaskan Weir to Count and Characterize Runs of Anadromous Salmonids in the Stanislaus River Project” to demonstrate new technology (VAKI Riverwatchers-infrared detection devices- and digital photography). This project provides an accurate and standardized assessment of escapement. Potentially, this methodology can be used on other streams. The AFRP manages a juvenile Chinook salmon monitoring project and a rotary screw trapping contract funded mostly through the BOR and the b(2) programs. This project assists in correlating flow with juvenile mortality.

A restoration plan is in development which has completed a summary of existing fisheries information and is currently working on a set of conceptual models addressing limiting factors.

Tuolumne River

Ongoing projects to restore spawning, rearing, and floodplain habitats in the Tuolumne River include: a) monitoring at the “Restore the 7/11 Segment of the Mining Reach Project #1” materials restoration site (CALFED funded); b) revising appraisals for the “MJ Ruddy Restoration Project by the Department of Interior; c) continuation of the environmental permitting, design engineering, and pre-project monitoring (Phase I) at the Tuolumne Special Run Pool 10 site (AFRP); e) continuation of post-project monitoring of the “Grayson River Ranch Floodplain Restoration Project” (CALFED); f) continuation of the “Fall Attraction Flow Study” (AFRP); and, h) initiation of the planning for the “Fine Sediment Management Project” (CALFED).

Many of these projects, such as Gravel Augmentation at La Grange Bridge, Bobcat Flat RM 43, and the 7/11, MJ Ruddy, and Warner Deardorff segments of the mining reach

restoration project, are reconstructing riffle-pool sequences and floodplain habitats in areas degraded by past aggregate mining operations to simultaneously enhance spawning and juvenile habitats and reduce predator populations. Other projects, such as the Special Run Pool 9 and 10 projects have focused on restoring or isolating captured mine pits to reduce the impacts of predation. To date, five restoration projects have been constructed, whereas the other six funded projects are in various stages of design, permitting, and acquisition of protective easements. The MJ Ruddy Segment of the Mining Reach Restoration Project has encountered difficulties with easement acquisition.

Studies described in the Tuolumne River Habitat Restoration Plan indicate that excessive amounts of fine sediment have degraded spawning and rearing habitats throughout most of the river. A “Fine Sediment Management Project” was recently funded by the CALFED and is still in the planning phase. When implemented, it will reduce fine sediments in spawning and rearing habitats by constructing sediment collection basins near La Grange, manually clean riffles, add clean gravel to the spawning reach. This study will also conduct experiments to determine the relationship between bed permeability and egg survival to emergence.

Monitoring has indicated that: a) the number of Chinook salmon redds nearly doubled at the 7/11 mining reach project sites compared to nearby control sites immediately following construction in fall 2003; b) isolating the gravel pit at SRP 9 did not affect the density of largemouth bass in the river and may have increased the density of smallmouth bass; and c) the wet conditions in 2005 have sustained high survival rates for planted vegetation at Grayson River Ranch. In 2005, CALFED selected the “Tuolumne River Restoration Monitoring Project” for funding. This project will monitor channel morphology, sediment transport, riparian vegetation, salmonid distribution and abundance, and salmonid habitat at the 7/11, MJ Ruddy, SRP 9, Bobcat Flat, fine sediment management, and spawning gravel transfusion project sites.

Merced River

Ongoing projects to restore spawning, rearing, and floodplain habitats in the Merced River are all in initial conceptual stages and include the “Upper Western Stones Project” (4-Pumps funded) and the “Merced River Dredger Tailings Reach Phase I” project (CALFED funded). Several of the funded projects, such as the “Merced Dredger Tailing Reach Phase I” and the “Upper Western Stones Phases of the Merced River Salmon Habitat Enhancement Project”, are reconstructing riffle-pool sequences and floodplain habitats to provide spawning and rearing habitats in areas degraded by past aggregate mining operations. The Wing Dam Gravel Projects and 4-Pumps Gravel Maintenance Projects are helping supply spawning-sized gravels to the river near Crocker-Huffman Dam. The AFRP funded study “A Feasibility Investigation of Reintroduction of Anadromous Salmonids Above Crocker-Huffman Dam on the Merced River” is still ongoing. CALFED has funded development of restoration plans for the Merced River that the AFRP uses to estimate the funding needed to implement the remaining high priority projects.

The ongoing studies indicate that in response to the gravel restoration at the “Assess the Spawning Habitat on the Robinson Reach on the Merced River”, Chinook salmon spawner use was restored to pre-1997 flood damage levels immediately following construction. It is anticipated that biological benefits at Robinson Ranch site will gradually increase as pool depth and riparian vegetation increase. The physical habitat simulation studies at the Robinson Ranch site were useful for comparing the amount of spawning and rearing habitat between pre- and post-project conditions, but not for predicting actual use by salmonids.

The effectiveness of the past Magnuson and Ratzlaff projects to reduce predation on juvenile salmonids has not been studied. Studies are also needed to assess the impacts of creating spawning beds with the abnormally porous dredger tailings at the “Merced River Dredger Tailing Reach Phase I and II” sites on incubating salmonid eggs. Sediment transport studies by Stillwater Sciences indicated that 2,600 cubic yards of gravel should be added each year to maintain habitat quality.

San Joaquin Basin

The CDFG riffle atlas is approximately 75% complete. The CDFG study to read archived Chinook salmon scale samples from the San Joaquin Basin is approximately 85% complete. Biological benefits of these projects should include better understanding of salmon spawning habitat distribution and the ability to accurately allocate brood years into returning year classes (vital to assessment of the fishery and evaluation of restoration projects).

Mill Creek

Mill Creek hydroacoustic study has been competitively bid and a Cooperative Agreement to carry out the work in FY05-06 is underway. Beginning fall 2005, a consulting firm will conduct a pilot study to examine the effectiveness of using hydroacoustics to count adult salmonid escapement in Mill Creek, California. Three potential sites will be evaluated and two methods of counting will be compared. Data to be collected include: run timing and diel distribution of spring Chinook salmon and steelhead passage, target strength data, and fish lengths. The final document will outline one-time and annual costs for operating a hydroacoustic counting program at Mill Creek. Once all results are available, recommendations will be made as to the feasibility of using hydroacoustics for monitoring escapement in Mill Creek.

Antelope and Deer Creeks

Antelope and Deer creeks fish passage projects have been competitively bid and a Cooperative Agreement to carry out the work in FY06 is underway. The CDFG was awarded the contract and will begin construction in 2006. A new fish ladder will be constructed on Antelope Creek. On Deer Creek a structure will be built below Stanford Vina Dam to raise the pool water elevation to enhance fish ladder access for salmon and steelhead. For both projects, monitoring will be in the form of photo points, stream flow

measurements pre- and post- project, and post-project visits to evaluate adequacy of the structures and observe fish use. Post-project monitoring will also determine changes in ladder accessibility due to the pool elevation change and changes in pool depth; optimal ladder design information will be used and can be found in the literature and in natural resource agency guidelines. Monitoring will be provided by DFG staff.

Big Chico Creek

Iron Canyon is a major passage challenge to spring-run Chinook salmon and steelhead. The AFRP is developing an initial engineering design for this complex fish passage facility. A request for proposals was issued in June 2005 and a contract was let to conduct an engineering evaluation of Iron Canyon. The AFRP and agency partners felt it prudent to conduct this initial evaluation before committing funds to the larger cost associated with final designs and construction.

VI. Tasks, Costs, Schedules and Deliverables

A. Narrative Explanation of Tasks.

- 1.0 Program management
- 1.1 Program management - The FWS is responsible for managing the AFRP. The program develops all grants and cooperative agreements and implements the overall program including outreach, coordinating with stakeholders, identifying funding partners and funding peer-reviewed restoration projects.
- 1.2. Program management - The BOR coordinates AFRP activities between the AFRP and BOR, coordinates within BOR, and assists in developing and implementing the overall program including outreach, coordinating with stakeholders, and identifying partnering funds.
- 1.3 Program implementation- The Habitat Restoration Coordinators (HRC) identify restoration priorities, develop and nurture restoration partnerships, review proposals within the CALFED ERP Proposal Solicitation Process framework, recommend projects for AFRP funding, manage project deadlines and deliverables and implement the AFRP at the watershed level. The Assistant HRC's assist the AFRP HRCs and program management.
- 1.4 Program implementation (Red Bluff Fish and Wildlife Office (RBFWO)) - Same as 1.3 above.
- 1.5 Management/Administrative support (SFWO) - The SFWO provides support to the AFRP in management, interagency program coordination, external affairs and administration.
- 2.0 Technical Support
- 2.1 Sacramento Fish and Wildlife Office:

- 2.1.1 Incremental Flow Instream Methodology (IFIM)- The IFIM biologists carry out AFRP directed IFIM studies in the Sacramento and San Joaquin basin rivers and tributaries. These activities, instream flow requirements for CVPIA, are covered under a separate program, 3406 (b)(1)(B).
- 2.1.2 Environmental compliance (HCD)- completes AFRP requested documents under the National Environmental Policy Act, Endangered Species Act, and cultural resource environmental documentation for AFRP projects.
- 2.1.3 Endangered Species Act compliance (ESP)- AFRP Program Manager coordinates for any proposed restoration activities that the AFRP is lead on.
- 2.2 California-Nevada Office (CNO): Realty program provides realty support services to the AFRP.
- 3.0 Project funding and implementation: (See Budget Table 4)

B. Schedules and Deliverables

#	Task	Dates		Deliverable
		Start	Complete	
1	Program management	10/01/05	09/30/06	Provides a draft FY05 Annual Work Plan (AWP), final grants, cooperative agreements, and contracts for projects supported by the AFRP, identifying partners and co-funding, selecting and funding peer-reviewed restoration projects.
1.1	Program management (AFRP/STFWO)	10/01/05	09/30/06	Program manager is responsible for AFRP performance and CALFED integration. Assistant Program Manager reports to Program Manager and implements the AFRP (see 1 above).
1.2	Program management (BOR/AFRP)	10/01/05	09/30/06	Provides management support and coordination between BOR and AFRP
1.3	Program implementation (AFRP/STFWO)	10/01/05	09/30/06	Habitat Restoration Coordinators (HRC) prioritize projects, develop partnerships, develop proposals, and manage project deadlines and deliverables. Assistant HRC's support all HRC work.
1.4	Program implementation (AFRP/RBFWO)	10/01/05	09/30/06	Habitat Restoration Coordinators (HRC) prioritize projects, develop partnerships, develop proposals, and manage project deadlines and deliverables.
1.5	Management/Administrative support (CNO/SFWO)	10/01/05	09/30/06	Provides support in external affairs, administration and interagency program coordination to AFRP.
2.0	Technical support	10/01/05	09/30/06	Provides IFIM evaluations, NEPA and ESA compliance and real estate appraisal reviews for AFRP-led projects
2.1	Sacramento FWO	10/01/05	09/30/06	Provides NEPA and ESA documents required for obligation of program funds as required for each of the projects supported by the program.

#	Task	Dates		Deliverable
		Start	Complete	
2.1.1	Instream flow evaluations (AFRP/SFWO)	10/01/05	09/30/06	Conducts instream flow, spawning habitat studies, prepares annual reports.
2.1.2	Environmental compliance (FWS/SFWO/HCD)	10/01/05	09/30/06	Provides NEPA and ESA documents required for obligation of program funds as required for each of the projects supported by the program.
2.1.3	Endangered Species Act compliance (FWS/SFWO/ESP)	10/01/05	09/30/06	Provides Biological Opinions, EA's and NEPA documents on AFRP-led projects.
2.2	California Nevada Office – Realty (FWS/CNO-Realty)	10/01/05	09/30/06	Provides realty support services, appraisals, escrow and contract review management to the AFRP.
3.0	Project funding and implementation	10/01/05	09/30/06	Project funding and implementation. As part of efforts to better integrate implementation of CVPIA and CALFED programs consistent with the CALFED Implementation Memorandum of Understanding, the AFRP expects to prioritize future projects fully considering the CALFED ERP Proposal Solicitation Process (PSP). Projects will be identified for funding based on their contribution to the AFRP and CALFED program objectives, and their consistency with the priorities listed in Section III, Program Objectives.—Some of the specific projects may be a continuation of previously funded projects, others will be new to the program. Project prioritization will also be closely coordinated with other CVPIA related program activities and with the USBR's Central Valley Project Conservation Program.

C. Summary of Projected FY06 Program Cost Estimates*

	Task	Total Costs
1.0	Program Management	
1.1	Program Management- (USFWS/STFWO)	88,239*
1.2	Program Management- (USBR/AFRP)	21,001
1.3	Program implementation-(AFRP/STFWO)	1,138,663
1.4	Program implementation-AFRP-RBFWO)	382,760
1.5	Management/Administrative support (CNO/SFWO)	379,347
	Subtotal	2,010,009
2.0	Environmental Documentation and appraisal review and technical support	
2.1	Sacramento FWO	
2.1.1	Instream flow evaluations (AFRP/SFWO)	255,786
2.1.2	Environmental compliance (USFWS/SFWO/HCD)	189,673
2.1.3	Endangered Species Act compliance (USFWS/SFWO/ESP)	94,837
2.2	California Nevada Office – Realty (USFWS/CNO-Realty)	47,418
	Subtotal	587,715
	Total Support & Operations	2,597,724
3.0	Project Funding and Implementation	1,994,143
	Total Program	4,591,867

* Numbers have not been finalized; for example Bioday rates for FY06 have not been calculated

D. AFRP Estimated Proposed Program Budget

	Task	FTEs	Operations	Overhead costs	Total costs
1.0	Program Management				
1.1	Program Management- (USFWS/STFWO)	0.32	72,327	15,912	88,239
1.2	Program Management- (USBR/AFRP)	0.10	17,214	3,787	21,001
1.3	Program implementation-(AFRP/STFWO)	6.00	933,330	205,333	1,138,663
1.4	Program implementation-AFRP-RBFWO)	2.30	313,718	69,022	382,760
1.5	Management/Administrative support (CNO/SFWO)	2.00	310,940	68,407	379,347
	Subtotal	10.72	1,647,529	362,460	2,010,009
2.0	Environmental Documentation and appraisal review and technical support				
2.1	Sacramento FWO				
2.1.1	Instream flow evaluations (AFRP/SFWO)	1.31	203,651	52,135	255,786
2.1.2	Environmental compliance (USFWS/SFWO/HCD)	1.00	155,470	34,203	189,673
2.1.3	Endangered Species Act compliance (USFWS/SFWO/ESP)	0.50	77,735	17,102	94,837
2.2	California Nevada Office – Realty (USFWS/CNO-Realty)	0.25	38,868	8,551	47,418
	Subtotal	3.06	475,724	111,991	587,715
	Total Support & Operations	13.78	2,123,253	474,451	2,597,724
3.0	Project Funding and Implementation (see Table 4)		1,881,267	112,876	1,994,143
	Total Program	13.78	4,004,520	587,327	4,591,867

Table 4. Draft FY06 AFRP proposed program budget

Watershed	Project Title	Estimated Budget
Yuba River	Chinook salmon and steelhead life history evaluation- VAKI Monitoring and Analysis (3-year study FY05-07)	\$190,000
Yuba River	Spawning Habitat Integrated Rehab. Approach-based analysis on the Yuba River- SHIRA-based analysis, Phase II	\$300,000
Yuba River	Lower Yuba River salmon life history	\$50,000
Mokelumne River	Mokelumne River spawning habitat improvement project	\$100,000
Calaveras River	Continuation Lower Calaveras salmonid life history limiting factor analysis	\$35,000
Stanislaus River	Test a Portable Alaskan Weir to Count and Characterize Runs of Anadromous Salmonids in the Stanislaus River	\$265,000
Stanislaus River	Stanislaus River Restoration plan development and outreach	\$100,000
Cosumnes River	Continue improving passage of salmonids at diversion dams and barriers	\$200,000
Butte Creek	Butte and Big Chico creeks salmon life history	\$256,000
Butte Creek	Sutter bypass eastside, Mod. 3 (MOU/Restoration Plan- Butte Creek)	\$150,000
Merced River	Wing dam gravel purchase and screening, lower Merced River	\$100,000
¹ Battle Creek	Orwick Diversion Headgate and Bypass Project	\$150,000
¹ Stanislaus River	Otolith Microchemistry/Microstructure Life History Analysis	\$98,143
Total Ongoing Projects (FRO2)		\$1,994,143

¹ New projects that could be funded in FY 2006.

E. DRAFT AFRP Five-Year Capability Budget Plan for FY07 - 11

In the draft five-year capability Budget Plan (FY07-11), the AFRP has the potential to spend over \$100 million, approximately \$20 million per year. New projects will be prioritized and implemented as funding allows. If current AFRP funding levels continue at approximately \$5 million per year, the projects listed in the Five-Year Budget Plan could take over 20 years to implement. Priority will be given to those projects that promote natural channel and riparian habitat values and natural processes, such as those affecting stream flow, water temperature, water quality and riparian areas, and to activities that affect emigration or access to streams, such as sites of entrainment into diversions and migration barriers.

The following table is a result of HRCs efforts working with partners, interested individuals, and experts to develop watershed plans that address priorities to increase natural production of salmonids. The potential projects listed are continually updated as new information and needs are incorporated into the planning process.

Table E. DRAFT AFRP Five-Year Capability Budget Plan FY07 – 11*

Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Ongoing Projects						
Butte and Big Chico creeks salmon life history	\$200,000					\$200,000
Chinook salmon and steelhead life history evaluation- VAKI Monitoring and Analysis (3-year study FY05-07)	\$100,000	\$50,000	\$50,000	\$50,000	\$50,000	\$300,000
Spawning Habitat Integrated Rehab. Approach-based analysis on the Yuba River-SHIRA-based analysis, Phase II	\$250,000	\$200,000				\$450,000
Lower Yuba River salmon life history	\$50,000	\$55,000	\$55,000	\$55,000		\$215,000
Mokelumne River spawning habitat improvement project	\$200,000	\$200,000				\$400,000
Continue Lower Calaveras	\$212,000	\$100,000	\$100,000	\$100,000	\$100,000	\$612,000

salmonid life history limiting factor analysis						
Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Continue improving passage of salmonids at diversion dams and barriers	\$100,000	\$100,000				\$200,000
Test and Demonstrate a Portable Alaskan Weir to Count and Characterize Runs of Anadromous Salmonids in the Stanislaus River	\$300,000	\$300,000				\$600,000
Orwick Diversion Headgate and Bypass Project	\$165,000					\$165,000
Stanislaus River Restoration plan development and outreach	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$750,000
Chinook salmon and steelhead life history evaluation- VAKI Monitoring and Analysis (3-year study FY05-07)	\$100,000	\$100,000				\$200,000
Spawning Habitat Integrated Rehab. Approach-based analysis on the Yuba River-SHIRA-based analysis, Phase II	\$1,827,000	\$1,255,000	\$355,000	\$355,000	\$300,000	\$3,692,000
New Projects						
Mill Creek fish passage study	\$150,000					\$150,000
Stream habitat restoration on the Sierra College campus (Gregg Bates) (Dry Creek)	\$130,000	\$160,000				\$290,000
Secret Ravine Channel Habitat Restoration (Dry Creek)	\$150,000	\$150,000				\$300,000
Radio-telemetry tracking of adult spring-run salmon on the Yuba	\$60,000	\$60,000				\$120,000

River as they hold, then spawn.						
Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Feather River steelhead spawning side-channel improvements	\$100,000	\$500,000	\$500,000			\$1,100,000
Otolith Microchemistry/Microstructure Life History Analysis (Stanislaus River)	\$200,000					\$200,000
American River steelhead life history	\$100,000	\$100,000	\$100,000			\$300,000
Mokelumne River side-channel restoration	\$50,000	\$50,000				\$100,000
Cottonwood Creek geomorphological analysis, Phase 1 (Ph 2 outlying years)	\$200,000					\$200,000
American River Riparian assessment and enhancement project	\$100,000	\$300,000	\$300,000	\$300,000		\$1,000,000
One-mile Dam modification and gravel supplementation project-City of Chico (Big Chico Creek)	\$175,000					\$175,000
Lower Bear River existing conditions study	\$100,000	\$100,000	\$100,000			\$300,000
Feather River gravel introductions	\$300,000	\$300,000	\$300,000	\$300,000		\$1,200,000
West Tehama (Thomes and Elder Creeks) riparian and flood plain conditions inventory, Phase 1 (Ph 2 in outlying years)		\$100,000				\$100,000
South Yuba-Brophy Fish screen engineering	\$500,000					\$500,000

and design						
Paynes Cr. watershed assessment						\$0
Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Antelope Creeks watershed assessment						\$0
Cottonwood Creek Riparian Habitat Inventory, ph1 (Phase 2 in outlying years)		\$100,000				\$100,000
Mill Creek riparian habitat identification and mapping, ph 1 (Ph 2 outlying year)		\$80,000				\$80,000
Central Valley Wide: Working at a Watershed Level		\$70,000		\$70,000		\$140,000
Fish ladder improvements and habitat assessment, Beale Air Force Base (Dry Creek)	\$100,000	\$100,000	\$100,000			\$300,000
Steelhead spawning side-channel improvements (American River)	\$500,000	\$500,000				\$1,000,000
Calaveras River fish passage improvement project	\$250,000	\$150,000	\$250,000	\$150,000	\$150,000	\$950,000
Pilot studies of Alaska Weirs/Vaki River Watchers for Merced River to survey Chinook salmon and steelhead escapement. Calibrate with mark-recapture surveys.	\$200,000	\$200,000	\$200,000	\$150,000		\$750,000
Development of a strategic plan and implementation of	\$1,000,000	\$1,000,000	\$1,000,000			\$3,000,000

actions to restore fish habitat/passage in the northern Yolo Bypass						
Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Riparian and floodplain habitat modeling and restoration (Feather River)	\$150,000	\$300,000	\$250,000			\$700,000
Bobcat Flat RM 43 Phase II, Tuolumne River	\$100,000	\$900,000				\$1,000,000
Bobcat Flat SRP3, Tuolumne River		\$200,000	\$2,300,000			\$2,500,000
Bobcat Flat RM 44, Tuolumne River			\$150,000	\$1,500,000		\$1,650,000
Expand screw trap monitoring and calibration at San Joaquin confluence and lower boundary of spawning reach in the Tuolumne River.	\$350,000	\$350,000	\$350,000	\$350,000		\$1,400,000
Smolt health monitoring in the Stanislaus, Tuolumne, and Merced Rivers	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$375,000
Investigate effects of high turbidity and elevated water temperature on Chinook salmon egg survival in the Merced River below Crocker-Huffman Dam.			\$175,000	\$175,000		\$350,000
Estimate impacts of predation on juvenile Chinook salmon survival at captured		\$250,000	\$250,000	\$250,000		\$750,000

mine pits (SRPs) and dredged ditch habitats in the lower Tuolumne River.						
Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Complete construction of the Infiltration Gallery at SRP 9 on the Tuolumne River. Negotiate with TID and MID for \$800,000 annual O&M costs				\$10,000,000		\$10,000,000
Weir and fish counter to restore spring run to the Stanislaus River.	\$250,000	\$150,000	\$150,000	\$150,000	\$150,000	\$850,000
Implement the Spawning Gravel Transfusion Project (Phase II) on the lower Tuolumne River.					\$17,500,000	\$17,500,000
Restore SRP 5, 6 and 7 on the lower Tuolumne River					\$7,000,000	\$7,000,000
Implement the Fine Sediment Management Control Project Phase II on the lower Tuolumne River					\$2,000,000	\$2,000,000
Acquire and restore the upper Robinson Ranch Project. Possible 4-Pumps contribution.				\$2,500,000		\$2,500,000
Restore the remaining segments of the Gravel Mining Reach of the Merced River, Phase 1 of five phases.					\$10,000,000	\$10,000,000
Implement non-native weed control in the Merced River Gravel		\$500,000	\$500,000	\$500,000		\$1,500,000

Mining Reach						
Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Annual wing dam spawning gravel augmentation on the Merced River	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000
Knight's Ferry Floodplain/Side-Channel restoration	\$250,000	\$100,000	\$50,000	\$50,000	\$50,000	\$500,000
Calaveras River spawning gravel augmentation			\$100,000	\$250,000	\$250,000	\$600,000
The Lower Butte Creek Project- The Weir 2 Fish Passage improvement, East Side Sutter Bypass	\$3,728,000					\$3,728,000
Merced River Dredger Tailings Reach Phase II Project. Partnership with Santa Fe Aggregates	\$1,000,000	\$2,650,000	\$150,000	\$150,000		\$3,950,000
Lower Butte Creek-Sutter Bypass Willow Slough fish passage project	\$2,177,000					\$2,177,000
Sutter Bypass eastside, Mod 3 (MOU/Restoration Plan – Butte Creek	\$50,000	\$50,000				\$100,000
Lower Butte Creek – Facilitation/Coordination	\$100,000	\$100,000				\$200,000

White Mallard Dam Construction	\$130,000	\$25,000				\$155,000
Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Five Points Construction	\$4,257,000	\$1,690,000				\$5,947,000
Sutter Bypass Weir #2	\$3,000,000	\$50,000				\$3,050,000
Sutter Bypass Willow Slough Fish Ladder	\$1,750,000	\$50,000				\$1,800,000
Mill Creek Fish Passage Improvement Project		\$100,000				\$100,000
Bear Creek Watershed Management Strategy/Plan						\$0
Cottonwood and Cow Creeks Fish Distribution Study and Barrier Assessment	\$100,000	\$110,000				\$210,000
Cottonwood Creek floodplain feasibility design and construction		\$5,000,000				\$5,000,000
Orwick Diversion Analysis and Improvement Project (e.g., headgate with water meter)	\$10,000					\$10,000
Cow Creek Passage Improvement Demo Project	\$80,000					\$80,000
Cow Creek Riparian Habitat Mapping Project, Phase 1 (Phase II to be implemented in outlying years)			\$125,000		\$100,000	\$225,000
Bear, Antelope and Paynes Creeks Riparian Habitat Mapping Project		\$125,000				\$125,000
Bear, Antelope and Paynes Creeks Fish		\$100,000	\$90,000	\$100,000		\$290,000

Distribution Study and Barrier Assessment						
Project	FY07	FY08	FY09	FY10	FY11	Total 5-year cost, (FY07-FY11)
Bear Creek Diversion Mapping			\$90,000			\$90,000
Cottonwood Creek Riparian Restoration Project			\$100,000			\$100,000
Small Tributary Habitat Restoration Project, Upper Sac River		\$100,000				\$100,000
Subtotals	\$23,022,000	\$17,745,000	\$8,205,000	\$17,470,000	\$37,725,000	\$104,167,000
Total Project Costs	\$24,849,000	\$19,000,000	\$8,560,000	\$17,825,000	\$38,025,000	\$107,859,000

*** For planning purposes, the following non-prioritized list identifies both ongoing and new AFRP watershed restoration projects. The new projects could be developed, implemented and funded with available funding from FY07 through FY11.**

VII. Appendix B- AFRP Restoration and Research Gap Analysis (Refer to Appendix B at <http://www.delta.dfg.ca.gov/afrp/documents.asp>).