

# Draft CVPIA Fiscal Year 2014 Annual Work Plan

June 10, 2013

## ***Program Title: Anadromous Fish Restoration Program 3406(b)(1)***

### ***Responsible Entities:***

<b>Staff Name</b>	<b>Agency</b>	<b>Role</b>
<i>Kim Webb</i>	<i>Service</i>	<i>Lead</i>
<i>Tom Kisanuki</i>	<i>Reclamation</i>	<i>Co-Lead</i>

### ***Program Goals and Objectives for FY 2014***

The goal of the Anadromous Fish Restoration Program (AFRP), as stated in Section 3406(b)(1) of the Central Valley Project Improvement Act (CVPIA), is to "develop within three years of enactment and implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991". Section 3406(b)(1) also states that "this goal shall not apply to the San Joaquin River between Friant Dam and the Mendota Pool".

The objectives for the AFRP can be found in the Final Restoration Plan for the Anadromous Fish Restoration Program (Restoration Plan)<sup>1</sup>:

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.
6. Involve partners in the implementation and evaluation of restoration actions.

The Restoration Plan was completed in 2001 to guide the long-term development of the AFRP. The Restoration Plan provides a programmatic-level description of the AFRP and, is used to guide the implementation of all of the provisions of the CVPIA that contribute to the goal of making all reasonable efforts to at least double natural production of anadromous fish (AFRP doubling-goal). The following provisions contribute to accomplishing the goal of the AFRP (b)(1) program: (b)(1)(B), (b)(2), (b)(3), (b)(5), (b)(9), (b)(10), (b)(12), (b)(13), (b)(15), (b)(16), (b)(19), (b)(21), and 3406 (g).

The AFRP is one of five CVPIA programs that was integrated with the CALFED Ecosystem Restoration Program (ERP) (Record of Decision, 2000)<sup>2</sup>. To facilitate this integration, the Restoration Plan objectives

---

<sup>1</sup> Final Restoration Plan for the Anadromous Fish Restoration Program, A Plan to Increase Natural Production of Anadromous Fish in the Central Valley of California. Released as a Revised Draft on May 30, 1997 and adopted as final on January 9, 2001. CVPIA, AFRP, Stockton, CA. [[http://www.fws.gov/stockton/afrp/restplan\\_final.cfm](http://www.fws.gov/stockton/afrp/restplan_final.cfm)].

were included in the CALFED ERP Draft Stage 1 Implementation Plan<sup>3</sup>. 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 CALFED Multi-Species Conservation Strategy<sup>4</sup> and the Biological Opinion on the Long Term Operations of the Central Valley Project and State Water Project<sup>5</sup>. The AFRP shares ERP's vision of the Single Blueprint concept which provides a unified and cooperative approach to restoration. AFRP has continued to coordinate with ERP and remains committed to the complementary goals and objectives that were recently updated in the Conservation Strategy for Restoration<sup>6</sup>. In addition, AFRP strives to integrate with and contribute to the adaptive management approach and continue consistency and collaboration with a wide variety of programs and efforts that are consistent with AFRP goals and objectives. AFRP frequently partners with and contributes to planning and implementation projects with entities such as the Delta Stewardship Council (<http://deltacouncil.ca.gov>), Delta Science Program (<http://deltacouncil.ca.gov/science-program>), the Bay Delta Conservation Plan (<http://baydeltaconservationplan.com>), the Fish Passage Improvement Program (<http://www.water.ca.gov/fishpassage/>), the San Joaquin River Restoration Program ([www.restoresjr.net](http://www.restoresjr.net)), the Interagency Ecological Program (<http://www.water.ca.gov/iep/>), and others.

In 2008 an Independent Review<sup>7</sup> of CVPIA was conducted to assess the fisheries programs activities and progress toward achieving the anadromous fish doubling goals. The Independent Review identified four major recommendations which include 1) Improve the Program's Science Based Framework; 2) Reorganize Program Structure and Management; 3) Improve Implementation by Making Full Use of CVPIA Authorities; and 4) Improve Collaboration with All Related Programs in the Central Valley. The resulting report recommendations have led us to improve our approaches to adaptive management and implement an improved science-based strategy to achieve our goals and objectives through the use of physical and biological metrics to capture ecosystem function, standardizing methods and data management, developing hypotheses specific to the implementation of restoration actions, characterizing pre-project existing conditions, and implementation of pre- and post-project monitoring to evaluate and document project success. AFRP also supports recommendations to improve collaboration and coordination both within the CVPIA Programs, as well as with other programs focused on similar goals. AFRP will be working diligently to increase our efforts to integrate the CVPIA Fisheries Resource Area programs and implement actions comprehensively in a holistic ecosystem approach.

## ***Status of the Program***

The Restoration Plan presents the goal, objectives, and strategies of the AFRP, as well as a list of reasonable actions and evaluations for each Central Valley watershed. AFRP actions and evaluations implemented since 1995 have addressed environmental limiting factors listed in the AFRP Working Paper (Working Paper)<sup>8</sup>. These factors were identified by the AFRP technical team as limiting natural production of anadromous fish in Central Valley streams (i.e. instream flows, water temperature, loss of natural stream habitat, obstacles to fish passage, entrainment of juveniles at diversions, Central Valley Project and State Water Project Delta pumping operations, contaminants, and harvest). Prior to the

---

<sup>2</sup> Programmatic Record of Decision, CALFED Bay-Delta Program, August 28, 2000. Sacramento, CA.

<sup>3</sup> Draft Stage 1 Implementation Plan, August 2001. Ecosystem Restoration Program, CALFED Bay- Delta Program. Sacramento, CA.

<sup>4</sup> CALFED Bay-Delta Program Multi-Species Conservation Strategy. August 28, 2000. California Bay-Delta Program. Sacramento, CA.

<sup>5</sup> Biological Opinion on the Long Term Operations of the Central Valley Project and State Water Project. June 4, 2009. USBR, Sacramento, CA.

<sup>6</sup> Draft Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions, July 2011. Ecosystem Restoration Program, Delta Science Program, Sacramento, CA.

<sup>7</sup> USBR and USFWS. 2008. Listen to the River: An Independent Review of the CVPIA Fisheries Program. Prepared under contract with Circlepoint for the U.S. Bureau of Reclamation and the U.S. Fish and Wildlife Service. Sacramento, CA. [[http://www.usbr.gov/mp/cvpia/docs\\_reports/indep\\_review/FisheriesReport12\\_12\\_08.pdf](http://www.usbr.gov/mp/cvpia/docs_reports/indep_review/FisheriesReport12_12_08.pdf)].

<sup>8</sup> 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. [<http://www.fws.gov/stockton/afrp/workingpaper.cfm>].

completion of the Restoration Plan, the AFRP emphasized planning and environmental inventories. These were followed by implementation of habitat restoration projects and actions. Restoration Plan actions are implemented throughout the Central Valley watersheds in accordance with AFRP restoration priority criteria.

Progress made towards addressing the restoration actions and evaluations in the Restoration Plan is available on the CVPIA website ([http://www.usbr.gov/mp/cvpia/docs\\_reports/](http://www.usbr.gov/mp/cvpia/docs_reports/)). About 23% of all Restoration Plan actions and evaluations (289) have been completed in the 1995 to 2013 time period (Table A). Of the 105 projects identified by the Program Assessment Rating Tool (PART) as high and medium priority structural actions and evaluations in the Restoration Plan, 69 (66%) have been completed. The CVPIA Program Activity Review (CPAR)<sup>9</sup> identified 128 Restoration Plan high and medium priority actions that are “time certain” performance goals. Of the 128 actions in CPAR, forty-six (36%) have been completed (Table B). There are also annual or in perpetuity projects such as gravel augmentation (replacing gravel lost behind dams) and flow augmentation in the Restoration Plan that are reported under other provisions of the CVPIA such as the (b)(2), (b)(3), and (b)(13) programs.

The AFRP also documents its progress toward achieving its doubling goal targets by calculating anadromous fish natural production estimates that incorporate in-river and hatchery escapement, ocean and in-stream harvest, and the proportion of hatchery returns that spawn in-river<sup>8</sup>. The Central Valley Chinook salmon (all races) natural production average from 1992-2012 was 398,585 fish which dropped below the 1967-1991 baseline average Chinook salmon production of 497,054 as a result of the low returns of fall run fish in 2012 that totaled 293,985 fish (Table C). Average Chinook salmon natural production for the period 1992-2012 has exceeded the watershed doubling goal target on Clear Creek, Butte Creek, and Battle Creek and in 2012 the Mokelumne River observed high returns (12,484 naturally produced fish)(Table D). Substantial gains in fish populations have been observed where investment in flow and passage has occurred (Butte, Battle, and Clear Creeks). Clear Creek and the Mokelumne River have also had a substantial investment in habitat restoration. Winter-run natural production numbers had continued to trend upward since 1994 until the poor returns in the last six years (2007-2012). Spring-run numbers have trended upwards since 1991, and production increased in 2012 to 30,522 naturally produced fish. Fall-run natural production has decreased to the baseline levels due to the recent stock collapse observed in 2007-2010 though numbers have increased in some watersheds in 2012. Late fall-run production had increased greatly since the low period (1993-1997) but continued to decline in 2012. Data on Chinook salmon doubling can be found in the Chinookprod file on the AFRP website (<http://www.fws.gov/stockton/afrp>) and is summarized in Tables C and D. Progress for the AFRP production targets for white and green sturgeon, American shad, and striped bass are reported under the (b)(16) provision in the CAMP annual report ([http://www.fws.gov/sacramento/fisheries/CAMP-Program/Documents-Reports/Documents/2011\\_CAMP\\_annual\\_report.pdf](http://www.fws.gov/sacramento/fisheries/CAMP-Program/Documents-Reports/Documents/2011_CAMP_annual_report.pdf)). 2013 production numbers are not yet reported but will be updated when the data becomes available in April 2014.

## ***Adaptive Management***

The AFRP continues to implement a science-based management framework that uses an adaptive management process. Adaptive management is a structured, iterative process of optimal decision making that emphasizes designing experiments to test hypothesis, address key uncertainties, monitoring outcomes, analyzing and learning, improving management actions, and continually evaluating and refining program actions and hypothesis. The AFRP will build on the existing framework put forth in the CVPIA Record of Decision; the Final Restoration Plan; the recommendations from the CVPIA Fisheries Independent Review Panel; and lessons learned to-date in implementing CVPIA. In addition, the AFRP will use information obtained from the adaptive management process and the program will be managed so that incremental benefits are gained, new knowledge is obtained, and progress is made towards program goals and establishing natural ecosystem functions.

---

<sup>9</sup>USBR. 2009. Central Valley Project Improvement Act Program Activity Review Report. Sacramento, CA [[http://www.usbr.gov/mp/cvpia/docs\\_reports/docs/2009\\_Final%20CPAR%20Report%208-25-09.pdf](http://www.usbr.gov/mp/cvpia/docs_reports/docs/2009_Final%20CPAR%20Report%208-25-09.pdf)].

Specifically for FY14, AFRP is proposing to fund projects that were planned and prioritized from information obtained in FY12-FY13 from monitoring, evaluations, studies, and research. Some specific FY13 examples follow:

Sturgeon studies continued to experiment with egg mats and underwater video survey techniques to identify and map sturgeon habitat. Consequently, sixty-five white sturgeon eggs were collected in 2012 at four sampling locations in the San Joaquin River, representing at least six spawning events and three new spawning locations. Additionally, 10 and 19 white sturgeon were captured and implanted with acoustic transmitters in 2012 and 2013, respectively. Movements of these fish will be tracked to learn more about the spatial and temporal distribution of white sturgeon in the San Joaquin River (SJR). Additionally, a multibeam sonar and RTK-GPS was used to map detailed bathymetry of the river bed and potentially identify substrate type and assess the habitat quality for sturgeon. This information will be used to test hypothesis regarding the effects of flow and temperature on fish movement and spawning in the San Joaquin River and expand the existing knowledge for future evaluation of habitat restoration activities.

AFRP continued to implement floodplain and spawning habitat restoration projects in the American, Stanislaus, and Merced rivers where project monitoring and evaluations provided additional insight for planning future phases of these projects and testing hypothesis regarding fish habitat needs. In the American River, pre- and post-project monitoring at both treatment and control sites suggest that habitat restoration efforts have been effective. Monitoring at the Upper Sunrise Project continued to reveal immediate response from Chinook salmon and steelhead moving up into the side channel to spawn after completion of the project though the spawning gravel placed in the main river channel received little use. Consequently, additional spawning gravel was added to the site, and instream woody material was anchored near the north bank to provide increased habitat complexity for juveniles. The additional work appears to have further improved the habitat quality at the Upper Sunrise site. Chinook salmon spawning increased and Chinook salmon fry were seen using woody debris at the site in late winter. AFRP also completed a side-channel and floodplain restoration project in collaboration with the US Army Corps of Engineers, Oakdale Irrigation District, River Partners, and FishBio, LLC at the Honolulu Bar Recreation Area on the Stanislaus River. Similarly, restoration projects on the Merced River have been built to maximize the fisheries benefits through improved spawning and rearing habitat creation that will function under the existing regulated flow regime. Floodplain benches were created to inundate at the 1-3 year, 3-5 year, and 10 year flow recurrence. Subsequent evaluations were conducted in each of these projects during spring flows and documented site use by juvenile salmon and steelhead, as well as evaluating sediment movement and invertebrate populations. The data from these intensive studies are confirming hypotheses regarding floodplain benefits to fish production and will influence designs for future floodplain and side-channel restoration within these and other Central Valley streams.

Preliminary reports, fish monitoring, and assessments regarding fish passage barriers, relative temporal and spatial flows, as well as potential restoration opportunities have been completed by the California Department of Fish and Wildlife and the Service for Antelope, Mill, Deer, Cow, and Cottonwood creeks. Additionally, the Lower Antelope Creek Geomorphology Study preliminary report determined that there was an additional need to collect stream gage data and hydraulic modeling in order to develop fish passage restoration actions. This information was used to prioritize and plan FY13 and FY14 fish passage projects and studies in Deer Creek, Cow Creek, and Antelope Creek.

AFRP staff also worked with multiple water agencies to coordinate fall and spring pulse flows in the San Joaquin River Basin tributaries, Mokelumne River, American River, Yuba River, and Sacramento River. The AFRP continued to monitor and evaluate the effectiveness of these measures by implementing redd dewatering studies and collecting real-time monitoring data through fish counting weirs and other activities. For example, AFRP worked with the East Bay Municipal Utility District (EBMUD) and other signatories of the Lower Mokelumne Joint Settlement Agreement to adaptively manage the watershed and coordinate fall pulse flows in an effort to improve adult Chinook salmon returns. These efforts led to the development of a pilot project that incorporated the management of the fall pulse flows in October and the closing of the Delta Cross Channel (DCC) gates to minimize adult straying of Mokelumne origin Chinook salmon. The DCC gates were not closed in October of 2012 due to low flow conditions and

water quality concerns in the South Delta. Preliminary CWT returns are showing an estimated 15-20%

This information

will help test the hypothesis that Chinook salmon straying can be reduced with fall pulse flows and having the DCC closed during a portion of October. Modifications to DCC operations can be used to help AFRP achieve its doubling goal in the Mokelumne River.

On the Yuba River, an interagency team optimized efforts to benefit juvenile salmon through development of a beneficial flow schedule consistent with the Yuba River Accord flow allocations. The Yuba Accord was developed with the aim to implement a new flow regime that would improve conditions for Chinook salmon and steelhead in the 24-mile reach of the lower Yuba River, but also allow for a reliable water supply for consumptive users. Yuba Accord flows are released according to six “schedules” based on water year type. In all years, Yuba Accord flows are intended to the extent possible to provide sufficient habitat, including suitable water temperatures, for spawning and egg incubation from October through March; provide adequate conditions for rearing and cues for emigration of juveniles from April through June; and provide suitable water temperatures for rearing and holding of juveniles and adults from July through September. These efforts have been largely successful in improving conditions for salmonids in the lower Yuba River and are intensively monitored to test various hypotheses. Seasonal high flows in February 2012 were optimized by the Yuba River Management Team in a manner that accommodated hydrologic conditions while benefiting juvenile salmonid survival and growth.

The AFRP also coordinated fall and spring pulse flows with multiple water and fishery agencies in the San Joaquin Basin to improve Chinook salmon survival and habitat conditions. The total volume of “fish flows” that were scheduled in the Merced, Tuolumne, and Stanislaus Rivers in 2013 were 16,800, 105,494, and 147,564 acre feet, respectively. The CVPIA Dedicated Project Yield (b)(2) program annually manages 800,000 acre feet of Central Valley Project (CVP) water. In dry years such as 2013, the amount of Central Valley Project (CVP) water for fish, wildlife, and habitat restoration purposes may be reduced by up to 100,000 acre feet. The AFRP was able to coordinate additional “fish flows” that supplemented the (b)(2) water to help improve habitat conditions to help meet the AFRP doubling goals. Fall pulse flows in the San Joaquin Basin help to improve water quality in the mainstem San Joaquin River, guide fish into their natal streams, and improve water temperatures for spawning and egg incubation. Spring pulse flows improve water temperature and juvenile outmigrant survival as described by the Vernalis Adaptive Management Program<sup>10</sup> and other ongoing studies. Annual collaborations on the use of fisheries flows will continue as the AFRP works to maximize the beneficial uses of available resources on these streams through the various ongoing regulatory processes.

The first year data collection of a multi-year survival study using radio tags to assess geographic sources of juvenile salmon (~60mm) mortality within the Stanislaus River migratory corridor was completed. The study aims to pinpoint geographic areas of high juvenile salmon mortality to guide future restoration efforts. Data from the previous (and other) studies is shared by AFRP with the Stanislaus Operations Group (SOG) which is comprised of representatives from state and federal agencies representing water and fish interests. The information provided feeds adaptively into decisions about water management and also influences decisions by the National Marine Fisheries Service regarding Reasonable and Prudent Alternatives under the Biological Opinion on the Long Term Operations of the Central Valley Project and State Water Project (OCAP) which is currently under remand, and being revised. Additionally, as part of the SOG, AFRP provided expertise regarding flow and habitat requirements to minimize salmon redd stranding and scour. The program will continue to use the adaptive management process to improve habitat conditions and design experiments that will improve management actions and inform the development of future projects and/or recommendations.

---

<sup>10</sup>San Joaquin River Group Authority. 2010. Annual Technical Report. Sacramento, CA.

**Table A. Summary of Progress Towards Completing 289 Final Restoration Plan Actions and Evaluations by Watershed, FY 1992-2012**

Watershed	Total actions and evaluations in Final Restoration Plan	Actions and evaluations completed to date	Actions and evaluations addressed in 2012	% of actions and evaluations completed to date
American River	13	2	1	15
Antelope Creek	2	0	1	0
Battle Creek	12	8	3	67
Bear Creek	2	0		0
Bear River	8	0	1	0
Big Chico Creek	10	3		30
Butte Creek	39	32		82
Calaveras River	6	0	1	0
Central Valley-Wide	15	1	4	7
Clear Creek	7	5		71
Colusa Basin Drain	2	0		0
Cosumnes River	9	2	2	18
Cottonwood Creek	5	1	2	20
Cow Creek	4	0	2	0
Deer Creek	5	0	1	0
Elder Creek	2	0		0
Feather River	12	0	1	0
Merced River	8	0	4	0
Mill Creek	5	1	1	20
Miscellaneous Small Tributaries	1	0		0
Mokelumne River	13	1	1	8
Ocean	3	0		0
Paynes Creek	2	0		0
Upper Mainstem Sacramento River	22	8	2	36
Sacramento-San Joaquin Delta	29	0	4	0
Mainstem San Joaquin River	13	0	1	0
Stanislaus River	9	1	4	11
Stoney Creek	1	0		0
Thomes Creek	6	2		33
Tuolumne River	10	0	1	0
Yuba River	14	0	3	0
<b>All Watersheds<sup>1</sup></b>	<b>289</b>	<b>67</b>	<b>40</b>	<b>23</b>

<sup>1</sup> Actions to be implemented CVP-wide via tools identified in AFRP Final Restoration Plan.

**Table B. Summary of Progress Towards 128 High and Medium Priority Time Certain Actions (53 Structural, 75 Non-Structural)**

Watershed	53 Structural Actions		75 Non-structural Actions	
	Number of structural actions completed in FY 2013*	Number of structural actions completed since 1992	Number of non-structural actions completed in FY 2013*	Number of non-structural actions completed since 1992
American River		1		1
Battle Creek		3		2
Big Chico Creek		1		1
Butte Creek		13		17
Clear Creek		1		
Cosumnes River				1
Cottonwood Creek		1		
Mill Creek		1		
Stanislaus River				1
Thomes Creek				2
<b>All Watersheds</b>		<b>21</b>		<b>25</b>
* NOTE: Although structural or non-structural actions were not completed in FY 2013, work continued on 20 watersheds throughout the Central Valley.				

**Table C. Yearly Estimates of Natural Production of Anadromous Fish and the Average Natural Production by Species within Central Valley River and Streams, 1992-2012**

						Chinook Salmon Run			
Year	Steelhead <sup>a</sup>	American Shad <sup>b</sup>	Striped Bass <sup>c</sup>	Green Sturgeon <sup>d</sup>	White Sturgeon <sup>e</sup>	Fall	Late Fall	Winter	Spring
Baseline	6,546	2,129	1,252,259	983	5,571	374,049	34,192	54,439	34,374
Target	13,000	4,300	2,500,000	2,000	11,000	750,000	<b>68,000</b>	<b>110,000</b>	<b>68,000</b>
1992	4,086	2,010	777,293			192,117	<b>27,778</b>	<b>3,167</b>	<b>4,463</b>
1993		5,153	656,505	68	692	316,846	<b>2,411</b>	<b>1,060</b>	<b>4,229</b>
1994		1,318	599,770		6,392	382,650	<b>1,063</b>	<b>505</b>	<b>7,811</b>
1995		6,803				709,299	<b>764</b>	<b>4,284</b>	<b>36,884</b>
1996		4,260	1,043,239			485,160	<b>453</b>	<b>2,160</b>	<b>6,309</b>
1997		2,591		1,306	11,689	601,000	<b>1,350</b>	<b>2,079</b>	<b>3,866</b>
1998		4,134	1,356,412	470	8,971	272,337	<b>83,027</b>	<b>5,680</b>	<b>49,676</b>
1999		715				399,951	<b>17,299</b>	<b>5,472</b>	<b>11,163</b>
2000		764	1,591,419			658,688	<b>19,933</b>	<b>2,657</b>	<b>11,643</b>
2001		761		7,117	5,129	525,947	<b>27,679</b>	<b>9,916</b>	<b>31,185</b>
2002		1,914	945,878	1,690	2,775	537,843	<b>56,588</b>	<b>9,195</b>	<b>31,626</b>
2003		9,342	829,111			518,803	<b>9,106</b>	<b>10,853</b>	<b>33,319</b>
2004		947	1,312,452			507,252	<b>21,277</b>	<b>14,812</b>	<b>28,674</b>
2005		1,741	1,058,679	2,555	2,898	395,601	<b>20,738</b>	<b>21,417</b>	<b>38,813</b>
2006		2,303		3,144	6,991	227,677	<b>15,575</b>	<b>19,680</b>	<b>14,487</b>
2007		551	752,275	1,530	10,559	106,592	<b>30,326</b>	<b>4,121</b>	<b>16,777</b>
2008		271	1,116,062	1,330	6,257	39,236	<b>4,806</b>	<b>2,555</b>	<b>11,619</b>
2009		624	830,641	10,272	6,258	30,604	<b>4,350</b>	<b>4,070</b>	<b>3,196</b>
2010		683	696,159			120,464	<b>5,860</b>	<b>1,534</b>	<b>3,222</b>
2011		892	894,606			170,321	<b>5,645</b>	<b>899</b>	<b>6,847</b>
2012						293,985	<b>5,539</b>	<b>3,900</b>	<b>30,522</b>
Average	NA	2389	964,033	2,948	6,237	356,780	<b>17,218</b>	<b>6,191</b>	<b>18,397</b>
% of Goal	NA	56%	39%	147%	57%	48%	<b>25%</b>	<b>5.6%</b>	<b>27%</b>

a Insufficient data are available to estimate natural production of steelhead in the Central Valley other than upstream of Red Bluff Diversion Dam. Operational changes at Red Bluff Diversion Dam after 1994 preclude the ability to collect comparable post-baseline data for this taxon.

b Mid-water trawl index for young-of-the-year American shad in the Sacramento-San Joaquin River Delta and San Pablo and Suisun bays, 1992-2010.

c Estimated abundance of adult striped bass in the Central Valley's anadromous waters, 1992-2011. Estimates for 2007, 2008, 2009, 2010, and 2011 are preliminary and subject to change.

d Estimated abundance of green sturgeon >40 inches in total length, 1992-2009. Estimates for 2006, 2007, 2008, and 2009 are preliminary and subject to change.

e Estimated abundance of 15-year-old white sturgeon, 1992-2009. Estimates for 2006, 2007, 2008, and 2009 are preliminary and subject to change.

**Table D. Average Natural Production Numbers in Each Watershed Compared to the AFRP Doubling Goal Targets, 1992-2012**

Watershed	Species	Doubling Goal Target	1992-2012 Average Natural Production Numbers	Percent of Target
American River*	Fall-Run	160,000	104,751	65.5
Antelope Creek	Fall-Run	720	0	0
Battle Creek*	Fall-Run	10,000	17,610	176
Bear River	Fall-Run	450	N/A	N/A
Big Chico Creek	Fall-Run	800	N/A	N/A
Butte Creek	Fall-Run	1,500	2,251	150
Clear Creek	Fall-Run	7,100	10,663	150
Cosumnes River	Fall-Run	3,300	814	24.7
Cottonwood Creek	Fall-Run	5,900	1,950	33.0
Cow Creek	Fall-Run	4,600	1,876	40.8
Deer Creek	Fall-Run	1,500	865	57.7
Feather River*	Fall-Run	170,000	89,922	52.9
Merced River*	Fall-Run	18,000	6,517	36.2
Mill Creek	Fall-Run	4,200	1,838	43.8
Miscellaneous Creeks	Fall-Run	1,100	78	7.1
Mokelumne River*	Fall-Run	9,300	8,556	92.0
Paynes Creek	Fall-Run	330	N/A	N/A
Sacramento River	Fall-Run	230,000	70,485	30.6
Stanislaus River	Fall-Run	22,000	5,180	23.5
Tuolumne River	Fall-Run	38,000	6,634	17.5
Yuba River	Fall-Run	66,000	30,983	46.9
Central Valley Wide	Fall-Run	750,000	356,780	47.6
Battle Creek*	Late-fall-Run	550	677	123.1
Sacramento River	Late-fall-Run	68,000	17,367	25.5
Central Valley Wide	Late-fall-Run	68,000	17,218	25.3
Butte Creek	Spring-Run	2,000	14,525	726.2
Deer Creek	Spring-Run	6,500	1,984	30.5
Mill Creek	Spring-Run	4,400	1,204	27.4
Sacramento River	Spring-Run	59,000	684	1.2
Central Valley Wide	Spring-Run	68,000	18,397	27.0
Calaveras River	Winter-Run	2,200	0	0
Sacramento River*	Winter-Run	110,000	6,191	5.6
Central Valley Wide	Winter-Run	110,000	6,191	5.6
<b>TOTAL</b>	<b>All races</b>	<b>990,000</b>	<b>398,585</b>	<b>40.3</b>

Table 1. FY2014 Proposed Activities and Costs

CVPIA Section 3406 (b)(1), Anadromous Fish Restoration Program

	3406 (b)(1) Requested Funding for Fiscal Year 2014				
	Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
<b>Total Funding</b>	\$7,008,000	\$0	\$0	\$0	\$7,008,000
Reclamation	\$77,467	\$0			\$77,467
Service	\$6,930,533	\$0			\$6,930,533
CA DFG			\$0	\$0	\$0
CA DWR			\$0	\$0	\$0

1.1 Program Management			3406 (b)(1) Requested Funding for Fiscal Year 2014								
AWP Activity Number	Activity Name	Activity Description	Agency		Program Performance Goal	FY2014 Projected Performance	Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
			Name	Fractional FTE							
1.1.1	USFWS lead	Program Manager. Provide program management budgeting, program reviews, and program coordination. Represent the FWS on interagency teams. (FRFR48330834FR0)	FWS	0.80			\$193,340				\$193,340
1.1.2	USBR co-lead	Participate in interagency development, BOR representative to the AFRP work teams, and assist with program management, budgeting, program reviews, and program coordination (H37-02142025-0000000 Work Order: 199189)	BOR	0.11			\$21,244				\$21,244
1.1.3	USFWS Assistant Program Manager	Directs the program activities, develops annual work plan, and manages program budget. (FRFR48330834FR0)	FWS	1.00			\$241,675				\$241,675
							<b>Sub-Total for Program Management, FY2014</b>				
							<b>Restoration Fund</b>	<b>Water and Related Resources</b>	<b>State Cash</b>	<b>State In-Kind</b>	<b>Total All Sources</b>
<b>Subtotal Funding</b>							\$456,259	\$0	\$0	\$0	\$456,259
							Reclamation	\$21,244	\$0		\$21,244
							Service	\$435,015	\$0		\$435,015
							CA DFG		\$0	\$0	\$0
							CA DWR		\$0	\$0	\$0

1.2 Program Support											
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	3406 (b)(1) Requested Funding for Fiscal Year 2014				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
1.2.1	Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data for the Mokelumne, Cosumnes, and Lower Sacramento River. (FRFR48330834FR0)	FWS	0.75			\$181,256				\$181,256
1.2.2	Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data for the Merced River. (FRFR48330834FR0)	FWS	0.50			\$120,838				\$120,838
1.2.3	Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data for the Tuolumne and San Joaquin Rivers. (FRFR48330834FR0)	FWS	0.50			\$120,838				\$120,838
1.2.4	Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data for the Stanislaus River. (FRFR48330834FR0)	FWS	1.00			\$241,675				\$241,675
1.2.5	Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data for the Feather, Yuba, and American Rivers. (FRFR48330834FR0)	FWS	1.00			\$241,675				\$241,675
1.2.6	Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data for Battle, Big Chico, and Butte Creeks. (FRFR48330834FR0)	FWS	1.00			\$244,400				\$244,400
1.2.7	Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data for Antelope, Cottonwood, Cow, Deer, and Mill Creeks. (FRFR48330834FR0)	FWS	1.00			\$244,400				\$244,400
1.2.8	Assistant Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data. (FRFR48330834FR0)	FWS	1.00			\$241,675				\$241,675
1.2.9	Assistant Habitat Restoration Coordinator	Manage contracts and grants, develop projects, facilitate communication and environmental permitting, provide outreach, and analyze and report data. (FRFR48330834FR0)	FWS	1.00			\$241,675				\$241,675

1.2.10	State Coordination	CDFW Habitat Restoration Coordinators: Funding is for the continued support of three full time CDFW senior or equivalent biologists, one each from CDFW's Region 1 (Upper mainstem Sacramento River and tributaries from Keswick Dam south to, and including, Butte Creek on the east side and to Colusa Basin Drain on the west side of the upper mainstem of the Sacramento River) , Region 2 (Lower Sacramento River and Delta tributaries from the Feather River south to the Calaveras River (including the Feather, Yuba, American, Cosumnes, and Mokelumne rivers), and Region 4 (Sacramento-San Joaquin Delta and mainstem San Joaquin River including the Merced, Tuolumne, and the Stanislaus rivers), to act as Habitat Restoration Coordinators (HRCs). The State HRCs will continue to play a role in the interagency team with the AFRP to coordinate, develop, and implement restoration actions consistent with the Final Restoration Plan. Costs include 6% FWS contract administration (FRFR4833-08C4FR0).	FWS	0.00			\$415,325			\$415,325		
1.2.11	CVPIA Coordination	CVPIA Program Management and Supervision (FRFR48330834FR0)	FWS	0.20			\$44,608			\$44,608		
							<b>Sub-Total for Program Support, FY2014</b>					
							<b>Restoration Fund</b>	<b>Water and Related Resources</b>	<b>State Cash</b>	<b>State In-Kind</b>	<b>Total All Sources</b>	
							<i>Subtotal Funding</i>	\$2,338,365	\$0	\$0	\$0	\$2,338,365
							<i>Reclamation</i>	\$0	\$0		\$0	
							<i>Service</i>	\$2,338,365	\$0		\$2,338,365	
							<i>CA DFG</i>			\$0	\$0	\$0
							<i>CA DWR</i>			\$0	\$0	\$0

1.3		Technical Support									
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	3406 (b)(1) Requested Funding for Fiscal Year 2014				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
1.3.1	Engineering Support	Provide funding to NMFS for engineering support in FY15 for AFRP fish passage and screening projects in the Merced River, Calaveras River, Deer Creek, Cow Creek (Millville Diversion Dam), Cottonwood Creek, Antelope Creek, Mill Creek, and the Yuba River. Activities could include performing necessary office and field work involving pre-construction site evaluation, and review of project alternatives, selected construction activities, performance tests, operations and maintenance plans, and post-construction evaluations of facilities, and set up short-term monitoring for facility approval and the long-term inspection methodology.	BOR	0.25			\$56,223				\$56,223
							<b>Sub-Total for Technical Support, FY2014</b>				
							Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
							\$56,223	\$0	\$0	\$0	\$56,223
							<b>Subtotal Funding</b>				
							\$56,223	\$0			\$56,223
							Reclamation Service	\$0	\$0		\$0
							CA DFG		\$0	\$0	\$0
							CA DWR		\$0	\$0	\$0

2.1		Pre-Project Study, Research, Reconnaissance									
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	3406 (b)(1) Requested Funding for Fiscal Year 2014				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
2.1.1	Dry Creek/ Spenceville Wildlife Area assessment	Habitat assessment of Dry Creek in the vicinity of the Spenceville Wildlife Area and Beale Air Force Base. This activity will determine the quality of anadromous salmonid habitat and evaluate passage barriers in Dry Creek and develop a GIS shapefile (FRFR48330834FR0)(See Table 3).	FWS	0.04	750,000 Fall-run Chinook	Habitat Assessment	\$10,000				\$10,000
							<b>Sub-Total for Pre-Project Study</b>				
							Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
							\$10,000	\$0	\$0	\$0	\$10,000
							<b>Subtotal Funding</b>				
							\$10,000	\$0			\$10,000
							Reclamation Service	\$0	\$0		\$0
							CA DFG	\$10,000	\$0		\$10,000
							CA DWR		\$0	\$0	\$0

2.4		Environmental Compliance										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	3406 (b)(1) Requested Funding for Fiscal Year 2014					
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources	
2.4.1	Deer Creek DCID Dam	Replace and/or repair the DCID diversion dam to provide adequate passage for fall-run, late fall-run, spring-run Chinook, and steelhead. This project will benefit Chinook salmon and steelhead and provide access to 32 miles of habitat. This project is a cooperative effort between the USFWS, CDFW, NMFS, and Deer Creek Irrigation District. This project cost shared \$160,000 with the CDFW ERP. Costs include 6% FWS contract admin. (FRFR4833-08C4FR0) <u>PROJECT TIMELINE ACCELERATED AND FUNDED WITH \$79,500 OF FY2013 FUNDS</u>	FWS	0.00	miles of river opened to fish passage	In Progress.	79500 \$0					79500 \$0
2.4.2	Yuba River Daguerre Alley Floodplain Restoration Project	Restore up to 180 acres of floodplain habitat and approximately 2.5 miles of side channel habitat. This project will benefit steelhead and Chinook salmon. Funding for planning, conceptual designs, and NEPA, NHPA Section 106, ESA, CWA Section 404 and 401, and State or local permits. This project is a cooperative effort between the USFWS, CDFW, NMFS, USCOE, Yuba River Management Team, and Yuba County Water Agency. This project will address Final Restoration Plan Action 6 and Evaluation 4. Costs include 6% FWS contract admin. (FRFR4833-08C4FR0)	FWS	0.00	ac of Restored Floodplain Habitat	In Progress.	\$159,000					\$159,000
2.4.3	Yuba River Narrows Restoration Project	Restore up to 0.5 miles of in-channel habitat by restoring and replenishing gravel and removing shot rock debris from the the Narrows Reach. Funding for NEPA, National Historic Preservation Act Section 106, ESA, CWA Section 404 and 401, and any State or local permits. This project will benefit Fall- and Spring-run Chinook salmon and Steelhead. This project is a cooperative effort between the USFWS, CDFW, NMFS, USCOE, Yuba River Management Team, and Yuba County Water Agency. Addresses Final Restoration Plan Action 8 and Evaluation 4. Costs include 6% FWS contract admin. (FRFR4833-08C4FR0)	FWS	0.00	cubic yards of Spawning gravel placed	In Progress.	\$159,000					\$159,000
2.4.4	Mill Creek Fish Passage, Phase 2	Address fish passage at the Upper Dam and Ward Dam diversion structures to benefit Chinook salmon and steelhead and provide access to 44 miles of spawning habitat. This project is a cooperative effort between USFWS, CDFW, and Los Molinos Mutual Water Company. Costs include 6% FWS contract admin (FRFR4833-08C4FR0).	FWS	0.00	miles of river opened to fish passage	In Progress.	\$47,700					\$47,700
							<b>Sub-Total for Environmental Compliance, FY2014</b>					
							<b>Restoration Fund</b>	<b>Water and Related Resources</b>	<b>State Cash</b>	<b>State In-Kind</b>	<b>Total All Sources</b>	
							\$365,700	\$0	\$0	\$0	\$365,700	
							<i>Reclamation</i>	\$0	\$0		\$0	\$0
							<i>Service</i>	\$365,700	\$0		\$365,700	
							<i>CA DFG</i>			\$0	\$0	\$0
							<i>CA DWR</i>			\$0	\$0	\$0

2.6		Pre-Project Monitoring			3406 (b)(1) Requested Funding for Fiscal Year 2014						
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	3406 (b)(1) Requested Funding for Fiscal Year 2014				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
2.6.1	Stanislaus River Floodplain Restoration Project at Buttonbush	Restore up to 18 acres of floodplain habitat and approximately 2,800 feet of side channel habitat to benefit Chinook salmon and steelhead. This activity funds topographic surveys and flow inundation analysis. Pre-project monitoring data that will be collected to characterize the pre-project habitat conditions including water depth and velocities, substrate size distribution, and biological data (i.e. macroinvertebrates, vegetation surveys, etc.) to be used for project permitting, design, and evaluation of project benefits. This project is a cooperative effort between the USFWS and the USCOE. Costs include 6% FWS contract admin. (FRFR4833-08C4FR0)(See Table 3).	FWS	0.00	ac of Restored Floodplain Habitat	In Progress	\$124,888				\$124,888
2.6.2	South Fork Cottonwood Fish Passage Improvement Project	Repair fish passage barriers and allow fish to access suitable habitat. Species to benefit include CV steelhead, Late-Fall run Chinook salmon, and Spring-run Chinook salmon. This activity will conduct habitat assessment and cross-sectional profiles of SF Cottonwood upstream and downstream of the Hammer Diversion hydropower dam (FRFR48330834FR0)(See Table 3).	FWS	0.11	miles of river opened to fish passage	In Progress	\$25,000				\$25,000
2.6.3	Lower Sacramento River Bullock Bend Floodplain Restoration Project	Restore 117 acres of floodplain and riparian habitat in a leveed section of the lower Sacramento River. Includes topographic surveys and flow inundation analysis. Data that will be collected to characterize the pre-project habitat conditions including water depth and velocities, substrate size distribution, and biological data (i.e. macroinvertebrates, vegetation surveys, etc.) to be used for project permitting, design, and evaluation of project benefits. This project will benefit Central Valley steelhead, late-fall run, spring run, and winter run Chinook salmon. This project is a cooperative effort between the USFWS, NMFS, USCOE, CDWR FloodSAFE Environmental Stewardship Program, and Westervelt Ecological Services. Total project cost is estimated at \$6,598,869 of which CDWR and Westervelt Ecological Services are cost sharing. Costs include 6% FWS contract admin (FRFR4833-08C4FR0).	FWS	0.00	ac of Restored Floodplain Habitat	In Progress	\$53,000				\$53,000
							<b>Sub-Total for Pre-Project Monitoring, FY2014</b>				
							<b>Restoration Fund</b>	<b>Water and Related Resources</b>	<b>State Cash</b>	<b>State In-Kind</b>	<b>Total All Sources</b>
<b>Subtotal Funding</b>							\$202,888	\$0	\$0	\$0	\$202,888
<b>Reclamation Service</b>							\$0	\$0			\$0
<b>CA DFG</b>							\$202,888	\$0			\$202,888
<b>CA DWR</b>									\$0	\$0	\$0

2.7 Construction/Implementation			3406 (b)(1) Requested Funding for Fiscal Year 2014								
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	3406 (b)(1) Requested Funding for Fiscal Year 2014				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
2.7.1	Knights Ferry Floodplain Restoration	Phase 2 - Restore up to 1 acre of side-channel and floodplain habitat to benefit Chinook salmon and steelhead. Cooperative effort between the USFWS and the USCOE. Costs include 6% FWS contract admin (FRFR4833-08C4FR0).	FWS	0.00	ac of Restored Floodplain	In Progress	\$530,000				\$530,000
2.7.2	Floodplain Restoration Project at Buttonbush	Restore up to 18 acres of floodplain habitat and approximately 2,800 feet of side channel habitat to benefit Chinook salmon and steelhead. Partners with USFWS and the USCOE. Costs include 6% FWS contract admin (FRFR4833-08C4FR0). <u>PROJECT TIMELINE ACCELERATED AND FUNDED WITH \$330,271 OF FY2013 FUNDS</u>	FWS	0.00	ac of Restored Floodplain Habitat	In Progress	<del>530,000</del> \$199,729				<del>530,000</del> \$199,729
2.7.3	Lower American River Floodplain Restoration	Sacramento Area Water Forum to conduct spawning and rearing habitat restoration in the lower American River at six potential gravel augmentation sites and three side channels. Co-implemented with the 3406 (b)(13) program and CDFW. Costs include 6% FWS contract admin (FRFR4833-08C4FR0).	FWS	0.00	ac of Restored Floodplain Habitat	In Progress	\$159,000				\$159,000
2.7.4	Mokelumne R. Spawning Habitat Imp.	Purchase and place 6,557 tons of spawning gravel in the Mokelumne River. This project is being co-implemented with the East Bay Municipal Utility District. Costs include 6% FWS contract admin (FRFR4833-08C4FR0).	FWS	0.00	cubic yards of Spawning gravel	In Progress	\$106,000				\$106,000
2.7.5	South Fork Cottonwood Fish Passage Improvement Project, Phase 3	Repair fish passage barriers and allow fish to access suitable habitat to benefit CV steelhead, late-fall run and spring run Chinook salmon. Will provide fish passage at the Hammer Diversion hydropower dam blocking five miles of high quality spawning and rearing habitat. Costs include 6% FWS contract administration. <u>PROJECT TIMELINE ACCELERATED AND FUNDED WITH \$318,000 OF FY2013 FUNDS</u>	FWS	0.00	miles of river opened to fish passage	In Progress	<del>318,000</del> \$0				<del>318,000</del> \$0
2.7.6	Snelling Restoration Project at Henderson Park (Phase 2)	Restore up to 1 mile of in-channel habitat and 15 acres of riparian floodplain habitat by restoring and replenishing gravel and reconfiguring "ponded" sections of the river to benefit fall run Chinook salmon and steelhead. This project addresses Final Restoration Plan Action 3 and Evaluation 2 in the Merced River. Costs include 6% FWS contract admin (FRFR4833-08C4FR0).	FWS	0.00	ac of Restored Floodplain Habitat	In Progress	\$789,525				\$789,525
2.7.7	Deer Creek Dam Fish Passage	Replace and/or repair the DCID diversion dam to provide adequate passage for fall-run, late fall-run, spring-run Chinook, and steelhead and provide access to 32 miles of habitat. Partners: USFWS, CDFW, NMFS, and Deer Creek Irrigation District. Costs shared \$160,000 with the CDFW ERP. Costs include 6% FWS contract admin. <u>PROJECT TIMELINE ACCELERATED AND FUNDED WITH \$272,229 OF FY2013 FUNDS</u>	FWS	0.00	miles of river opened to fish passage	In Progress	<del>272,229</del> \$0				<del>272,229</del> \$0
							<b>Sub-Total for Construction/Implementation, FY2014</b>				
							<b>Restoration Fund</b>	<b>Water and Related Resources</b>	<b>State Cash</b>	<b>State In-Kind</b>	<b>Total All Sources</b>
<b>Subtotal Funding</b>							\$1,784,308	\$0	\$0	\$0	\$1,784,308
<b>Reclamation Service</b>							\$0	\$0			\$0
<b>CA DFG</b>							\$1,784,308	\$0			\$1,784,308
<b>CA DWR</b>									\$0	\$0	\$0

2.8		Post-Project Monitoring			3406 (b)(1) Requested Funding for Fiscal Year 2014						
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
			Name	Fractional FTE							
2.8.1	Merced River Ranch Floodplain and Side-channel Restoration Project	Restored 6 acres of riparian floodplain and 1.23 miles of spawning habitat to benefit fall Chinook salmon and steelhead. Implementation monitoring will determine if the project was installed to the design standards. Effectiveness monitoring will determine if the project was effective in recovering habitat conditions suitable to target species. Validation monitoring will determine if floodplain restoration projects, like the one at MRR, recover productive habitat for salmonids and riparian vegetation. Cooperative effort between the USFWS and the CDFW. Costs include 6% FWS contract admin (FRFR4833-08C4FR0)(See Table 3).	FWS	0.00	ac of Restored Floodplain Habitat	Completed in FY13	\$223,769				\$223,769
2.8.2	Cosumnes River Juvenile Outmigration Monitoring	Evaluate projects and operate a Rotary Screw Trap at Hwy 99. This project is in partnership with Fish Foundation of California and CDFW. This project addresses Final Restoration Plan Evaluations 1, 2, and 3 in the Cosumnes River. Costs include 6% FWS contract admin (FRFR4833-08C4FR0)(See Table 3).	FWS	0.00	750,000 Fall-run Chinook	Population Assessment	\$63,600				\$63,600
2.8.3	Tehama Wildlife Area Fish Passage Project	Topographic surveys for the Tehama Wildlife Area Fish Passage Project in Antelope Creek (FRFR48330834FR0)(See Table 3).	FWS	0.04	miles of river opened to fish passage	Reported in 2012	\$10,000				\$10,000
2.8.4	Yuba River Hammon Bar Riparian Habitat Restoration Post-project Monitoring	Evaluate site inundation frequency and the survival and growth of the pole cuttings as affected by elevation/distance to groundwater, and by location in either erosional or depositional areas. Results will be used to inform the installation of future riparian restoration projects so as to provide the greatest value to juvenile salmonid rearing habitat. This activity will fund topographic surveys, substrate and cover data to be used in developing a 2-dimensional hydraulic and habitat model of the Hammon Bar restoration site. Project partners include South Yuba River Citizens League, Americorps, Yuba County Water Agency, Pacific Gas & Electric, Bureau of Land Management, and Western Agregates. PG&E is cost sharing \$30,000 of the total cost of the project of \$522,000 (FRFR48330834FR0)(See Table 3).	FWS	0.09	ac of Restored Floodplain Habitat	5 acres (Reported in 2012)	\$20,000				\$20,000
							<b>Sub-Total for Post-Project Monitoring, FY2014</b>				
							<b>Restoration Fund</b>	<b>Water and Related Resources</b>	<b>State Cash</b>	<b>State In-Kind</b>	<b>Total All Sources</b>
							\$317,369	\$0	\$0	\$0	\$317,369
							<i>Subtotal Funding</i>				
							<i>Reclamation</i>	\$0	\$0		\$0
							<i>Service</i>	\$317,369	\$0		\$317,369
							<i>CA DFG</i>		\$0	\$0	\$0
							<i>CA DWR</i>		\$0	\$0	\$0

4.2		Research (Evaluations, Studies, Investigations)					3406 (b)(1) Requested Funding for Fiscal Year 2014				
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	3406 (b)(1) Requested Funding for Fiscal Year 2014				
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources
4.2.1	Stanislaus River Juvenile Chinook and O. mykiss Mortality Study	Identify specific areas and sources of mortality for juvenile Chinook salmon and steelhead in the lower Stanislaus River using radio and hydro acoustic telemetry. Costs include 6% FWS contract administration (FRFR4833-08C4FR0)(See Table 3).	FWS	0.00	750,000 Fall-run Chinook	Fish Distribution and Population Information	\$313,882				\$313,882
4.2.2	Mill and Deer Wild Juvenile Chinook Acoustic Tagging Investigations	(Year 3 of 3): Juvenile spring and fall-run Chinook salmon will be implanted with acoustic transmitters to evaluate the effects of natural and anthropogenic changes in flow and related water project operations on their survival and movement patterns within the Sacramento River and Delta. Cost share \$1.7 million from ERP, NMFS, UC Davis, and UC Santa Cruz. Costs include 6% FWS contract admin (FRFR4833-08C4FR0)(See Table 3).	FWS	0.00	68,000 Spring-run Chinook	Fish Distribution and Population Information	\$125,080				\$125,080
4.2.3	Green Sturgeon Juvenile Overwintering Migration Investigation	Collect spatial and temporal habitat use and migration timing and related physical variables (temperature, flow, turbidity, photoperiod) of juvenile green sturgeon. This activity will determine if, when, and where age-0 juveniles migrate out of the upper Sacramento River and at what size (FRFR48330834FR0)(See Table 3).	FWS	0.42	2,000 Green Sturgeon	Fish Distribution and Population Information	\$103,700				\$103,700
4.2.4	American River Structured Decision Making (SDM) Monitoring Studies	Data collection and monitoring to support the SDM model and refine habitat restoration needs in the American River. This activity is being co-implemented by the b(13) and b(16) programs in partnership with the Sacramento Area Water Forum, CDFW, and USGS. Costs include 6% FWS contract admin (FRFR4833-08C4FR0)(See Table 3).	FWS	0.00	750,000 Fall-run Chinook	Fish Distribution and Population Information	\$349,440				\$349,440
4.2.5	Sacramento River Redd Dewatering Study	Determine location, timing, and the percentage of fall run Chinook salmon redds that are dewatered. Locations will be mapped and correlated to river flows and dam releases. Info will be used to make recommendations on future flow management and will assess the degree to which this may be affecting achievement of the AFRP doubling goal. This project is being co-implemented with the b(2) program and cost sharing \$10,000 from CDFW. Costs include 6% FWS contract admin (FRFR4833-08C4FR0)(See Table 3).	FWS	0.00	750,000 Fall-run Chinook	Fish Distribution and Population Information	\$53,000				\$53,000
4.2.6	San Joaquin River Sturgeon Acoustic Study	Implant acoustic transmitters in Acipenser spp. in the San Joaquin River basin to evaluate distribution and habitat use (FRFR48330834FR0)(See Table 3).	FWS	0.40	11,000 White Sturgeon	Fish Distribution and Population Information	\$96,670				\$96,670

4.2.7	San Joaquin River Sturgeon Habitat Assessment	This assessment will continue to sample for sturgeon eggs and larvae and collect physical habitat measurements of the San Joaquin River including multibeam bathymetry surveys, hydraulic mapping, and bed sediment characterization (FRFR48330834FR0)(See Table 3).	FWS	0.40	11,000 White Sturgeon	Fish Distribution and Population Information	\$96,670				\$96,670	
4.2.8	San Joaquin River System and Delta Contaminants, Age and Growth, and Microchemistry Project	Identify the effects of contaminants on sturgeon populations, assess effects of fin ray removal on growth and survival, assess current age-and-growth characteristics, and identify spawning and rearing locations, the frequency and spatial and temporal aspects of marine migrations, and spawning periodicity of white sturgeon (FRFR4833-08C4FR0)(See Table 3).	FWS	0.00	11,000 White Sturgeon	Fish Distribution and Population Information	\$132,500				\$132,500	
4.2.9	Impacts of Illegal Marijuana Activity on Fish	Identify the effects of illegal marijuana cultivation and contaminants on water quality and fish production in Deer Creek and Mill Creek. Cost-share of \$39,750 is being provided by CDFW for this activity (FRFR4833-08C4FR0).	FWS	0.00	68,000 Spring-run Chinook	Habitat/Water Quality Assessment	\$76,000				\$76,000	
							<b>Sub-Total for Research</b>					
							<b>Restoration Fund</b>	<b>Water and Related Resources</b>	<b>State Cash</b>	<b>State In-Kind</b>	<b>Total All Sources</b>	
							<b>Subtotal Funding</b>	\$1,346,942	\$0	\$0	\$0	\$1,346,942
							<b>Reclamation Service</b>	\$0	\$0		\$0	
							<b>CA DFG</b>	\$1,346,942	\$0		\$1,346,942	
							<b>CA DWR</b>		\$0	\$0	\$0	

4.3		Modeling										
AWP Activity Number	Activity	Activity Name & Description	Agency		Program Performance Goal	FY2014 Projected Performance	3406 (b)(1) Requested Funding for Fiscal Year 2014					
			Name	Fractional FTE			Restoration Fund	Water and Related Resources	State Cash	State In-Kind	Total All Sources	
4.3.1	Stanislaus River Floodplain Model	Support work on the Stanislaus River floodplain restoration projects. This activity will fund the identification of likely restoration projects using results of floodplain modeling and the development of a floodplain juvenile production model (FRFR48330834FR0).	FWS	0.09	ac of Restored Floodplain Habitat	In Progress	\$20,000					\$20,000
4.3.2	Yuba River Daguerre Alley Floodplain Restoration Project	Support work on the Yuba River restoration projects . This activity funds the development of a River2D model for the Daguerre Alley Floodplain Restoration Project (FRFR48330834FR0).	FWS	0.18	ac of Restored Floodplain Habitat	In Progress	\$40,000					\$40,000
4.3.3	Antelope Creek Lower Slab Passage Assessment	Develop a hydraulic model for a fish passage assessment of the Antelope Creek Lower Slab Fish Barrier. This activity will determine if the depth and velocities encountered by migrating adult salmonids at this site are adequate for passage during low flows (FRFR48330834FR0).	FWS	0.09	mi of river opened to fish passage	In Progress	\$20,000					\$20,000
4.3.4	American River Floodplain Model	Support work on the American River floodplain restoration projects and the CVPIA SDM data needs. This activity will identify restoration projects using results of floodplain modeling and the development of a floodplain juvenile production model (FRFR48330834FR0).	FWS	0.09	ac of Restored Floodplain Habitat	In Progress	\$20,000					\$20,000
4.3.5	Yuba River Floodplain Model	Support work on the Yuba River floodplain restoration projects and the CVPIA SDM data needs. This activity will identify restoration projects using results of floodplain modeling and the development of a floodplain juvenile production model (FRFR48330834FR0).	FWS	0.04	ac of Restored Floodplain Habitat	In Progress	\$10,000					\$10,000
4.3.6	Tuolumne River Floodplain Model	Support work on the Tuolumne River floodplain restoration projects and the CVPIA SDM data needs. This activity will identify restoration projects using results of floodplain modeling and the development of a floodplain juvenile production model (FRFR48330834FR0).	FWS	0.09	ac of Restored Floodplain Habitat	In Progress	\$20,000					\$20,000
							<b>Sub-Total for Modeling, FY2014</b>					
							<b>Restoration Fund</b>	<b>Water and Related Resources</b>	<b>State Cash</b>	<b>State In-Kind</b>	<b>Total All Sources</b>	
							<i>Subtotal Funding</i>	\$130,000	\$0	\$0	\$0	\$130,000
							<i>Reclamation Service</i>	\$0	\$0			\$0
							<i>CA DFG</i>	\$130,000	\$0			\$130,000
							<i>CA DWR</i>			\$0	\$0	\$0

Table 2. FY2015 Proposed Activities and Costs  
 CVPIA Section 3406 (b)(1), Anadromous Fish Restoration Program

			3406 (b)(1) Requested Funding For Fiscal Year 2015						
			Restoration Fund	Water and Related Resources	State Cash	Total All Sources			
<b>Total</b>			\$13,200,000	\$0	\$0	\$13,200,000			
US Bureau of Reclamation			\$0	\$0		\$0			
US Fish and Wildlife Service			\$13,200,000	\$0		\$13,200,000			
California Dept of Fish and Wildlife					\$0	\$0			
California Dept of Water Resources					\$0	\$0			
			Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
Task	Project Name	Project Description	BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
<b>Program Mgmt &amp; Support</b>					\$2,849,571				\$2,849,571
<b>Project 1</b>	Mill Creek Fish Passage Project	Implementation and construction to address fish passage at the Upper Dam and Ward Dam diversion structures in Mill Ck to benefit Chinook and steelhead by providing access to 44 miles of spawning habitat. Partners: USFWS, CDFW, and Los Molinos Mutual Water Co. Includes 6% FWS contract admin. <u>PROJECT TIMELINE ACCELERATED AND FUNDED WITH \$530,000 OF FY2013 FUNDS</u>			530000 \$0				530000 \$0

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
<b>Project 2</b>	Deer Creek Dam Fish Passage Project	Replace and/or repair the DCID diversion dam to provide passage for fall run, late fall-run, spring-run Chinook, and steelhead. Partners: USFWS, CDFW, NMFS, and DCID. Costs shared \$160,000 with CDFW ERP. Includes 6% FWS contract admin. <u>PROJECT TIMELINE ACCELERATED AND FUNDED WITH \$530,000 OF FY2013 FUNDS</u>			530000 \$0			530000 \$0	
<b>Project 3</b>	Age, Growth, and Fin Ray Microchemistry of Sturgeon in the Sacramento and San Joaquin River Delta	Assess current age-and-growth characteristics, and identify spawning and rearing locations, the frequency and spatial and temporal aspects of marine migrations, and spawning periodicity of white sturgeon. Costs include 6% FWS contract admin.			\$318,000			\$318,000	
<b>Project 4</b>	Cow Creek Riparian Restoration	Rrestore 20 acres of riparian habitat (FRP Action 4). Costs include 6% FWS contract admin.			\$106,000			\$106,000	
<b>Project 5</b>	Mill Creek: Riparian Habitat Maintenance & Restoration	Restore 20 acres of riparian habitat to benefit Chinook and steelhead (FRP Action 4). Costs include 6% FWS contract admin.			\$106,000			\$106,000	

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
Project 6	Stanislaus River Knights Ferry Floodplain Restoration Project	Restore up to 1 acre of side-channel and floodplain habitat to benefit Chinook and steelhead through post-project monitoring. Partners: USFWS and USCOE. Includes 6% FWS contract admin. <u>PROJECT TIMELINE ACCELERATED AND FUNDED WITH \$210,000 OF FY2013 FUNDS</u>			265000 \$55,000				265000 \$55,000
Project 7	Stanislaus River Floodplain Restoration Project at Buttonbush	Restore up to 18 acres of floodplain habitat and approximately 2,800 feet of side channel habitat to benefit Chinook salmon and steelhead through constuction and implementation. Partners: USFWS and USCOE. Includes 6% FWS contract admin. <u>PROJECT TIMELINE ACCELERATED AND FUNDED WITH \$530,000 OF FY2013 FUNDS</u>			530000 \$0				530000 \$0
Project 8	Lower American River Floodplain Restoration	Sacramento Area Water Forum to conduct spawning and rearing habitat restoration in the lower American River at six potential gravel augmentation sites and three side channels. Co-implemented with the 3406 (b)(13) program and CDFW. Includes 6% FWS contract admin.			\$159,000				\$159,000

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
Project 9	Merced River Snelling Channel and Floodplain Restoration Project at Henderson Park	Implementation, effectiveness and validation monitoring of restoration of up to 1 mile of in-channel habitat and 15 acres of riparian floodplain habitat by restoring and replenishing gravel and reconfiguring "ponded" sections of the river to benefit fall Chinook and steelhead. Cooperative effort between the USFWS and the CDFW. (FRP Action 3 and Eval 2 in the Merced R.) Includes 6% FWS contract admin. <b>This project can be undertaken in 2014 with increased funding of \$212,000.</b>			\$212,000				\$212,000
Project 10	Yuba River Daguerre Alley Floodplain Restoration Project	Restore up to 180 acres of floodplain habitat and approximately 2.5 miles of side channel habitat to benefit steelhead and Chinook salmon through environmental compliance. Cooperative effort between the USFWS, CDFW, NMFS, USCOE, Yuba R. Management Team, and Yuba Co WA. (FRP Action 6 and Eval 4) Includes 6% FWS contract admin.			\$318,000				\$318,000

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
Project 11	Yuba River Narrows Restoration Project	Restore up to 0.5 miles of in-channel habitat by restoring and replenishing gravel and removing shot rock debris from the the Narrows Reach to benefit Chinook and steelhead. Includes 6% FWS contract admin. <b>This project can be undertaken in 2015 with increased funding of \$2,547,420.</b>			\$5,402,580				\$5,402,580
Project 12	Mokelumne R. Spawning Habitat Improvement	Purchase and place 6,557 tons of spawning gravel in the Mokelumne R. (FRP Actions 2 and 7). Includes 6% FWS contract admin.			\$106,000				\$106,000
Project 13	Cosumnes River Juvenile Outmigration Monitoring	Evaluate post-project restoration projects and operate a Rotary Screw Trap at Hwy 99. In partnership with Fish Foundation of California and CDFW. (FRP Eval 1, 2, and 3 in the Cosumnes R.) Includes 6% FWS contract admin.			\$63,600				\$63,600

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
Project 14	American River Structured Decision Making (SDM) Monitoring Studies	Data collection and monitoring to support the SDM model and refine habitat restoration needs in the American River. Co-implemented by the b(13) and b(16) programs in partnership with the Sacramento Area Water Forum, CDFW, and USGS. Includes 6% FWS contract admin. <b>This project could be undertaken in 2014 with increased funding of \$349,440.</b>			\$349,440			\$349,440	
Project 15	Fish Screen Optimization Model	Prioritize fish screens in the Mokelumne R. (FRP Action 5), Stanislaus R. (FRP Action 3), San Joaquin R. (FRP Action 4), and Tuolumne R. (FRP Action 3). Co-implemented with b(21) in partnership with CDFW. Includes 6% FWS contract admin.			\$63,000			\$63,000	
Project 16	Deer Creek Impacts of Illegal Marijuana Activity on Fish	Identify the effects of illegal marijuana cultivation and contaminants on water quality and fish production in Deer Ck and Mill Ck. Cost-share of \$39,750 with CDFW for this activity. Includes 6% FWS contract admin.			\$115,000			\$115,000	

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
<b>Project 17</b>	South Fork Cottonwood Fish Passage Improvement Project	Repair fish passage barriers and allow fish to access five miles of high quality spawning and rearing habitat to benefit include Central Valley steelhead, late-fall, and spring-run Chinook salmon. Includes post-project monitoring at the Hammer Diversion hydropower dam. Includes 6% FWS contract admin.			\$106,000				\$106,000
<b>Project 18</b>	Lower Deer Creek Falls Fish Passage Improvement Project, Phase 2	Enviromental compliance for the repair or replacement of the Lower Deer Ck Falls fish ladder (CV Eval 11) and improve passage to 5.75 mi. of spawning and rearing habitat for steelhead and spring run Chinook. Cooperative effort between the USFWS and CDFW. Includes 6% FWS contract admin.			\$106,000				\$106,000

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
Project 19	Lower Sacramento River Bullock Bend Floodplain Restoration Project	Restore 117 ac of floodplain and riparian habitat in the lower Sacramento R. to benefit steelhead and Chinook. Cooperative effort between the USFWS, NMFS, USCOE, FloodSAFE, and Westervelt. Total project cost is estimated at \$6,598,869 of which CDWR and Westervelt Ecological Services are cost sharing. Includes 6% FWS contract admin.			\$261,629			\$261,629	
Project 20	AFRP New Projects	20) Stanislaus Rehab; 21) Yuba Restoration; Delta/CV Wide Model; Sacramento R Assessment; 22) Delta: Westervelt Restoration; 23) Stanislaus and Tuolumne: Salmon lifehistory; 24) San Joaquin - Delta: Lifehistory ; 25) Merced: fish screens; 26) Yuba R Daguerre Point Dam Outmigration Study; 27) Merced R Restoration at Santa Fe; 28) Cottonwood Ck Plant Control; 29) NF Cottonwood Fish and Flow Needs; 30) Heritage Oaks Restoration; 31) Payne's Ck Project; 32) Battle Ck inventory; 33) Bear Ck Flow Study; 34) Sulphur Ck Watershed Assessment. Include 6% FWS contract admin.			\$2,503,180			\$2,503,180	

Table 2. FY2016 Proposed Activities and Costs  
 CVPIA Section 3406 (b)(1), Anadromous Fish Restoration Program

			3406 (b)(1) Requested Funding For Fiscal Year 2016						
			Restoration Fund	Water and Related Resources	State Cash	Total All Sources			
<b>Total</b>			\$10,000,000	\$0	\$0	\$10,000,000			
US Bureau of Reclamation			\$0	\$0		\$0			
US Fish and Wildlife Service			\$10,000,000	\$0		\$10,000,000			
California Dept of Fish and Wildlife					\$0	\$0			
California Dept of Water Resources					\$0	\$0			
			Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
Task	Project Name	Project Description	BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
<b>Program Mgmt &amp; Support</b>					\$2,849,571				\$2,849,571
<b>Project 1</b>	Stanislaus River Floodplain Restoration Project at Buttonbush	Restore up to 18 acres of floodplain habitat and approximately 2,800 feet of side channel habitat to benefit Chinook and steelhead through project construction and implementation. Cooperative effort between the USFWS and the USCOE. Includes 6% FWS contract admin.			\$265,000				\$265,000
<b>Project 2</b>	Lower American River Floodplain Restoration	Sacramento Area Water Forum to conduct spawning and rearing habitat restoration in the lower American R. at six gravel augmentation sites and three side channel sites. Co-implemented with the 3406 (b)(13) program and CDFW. Includes 6% FWS contract admin.			\$159,000				\$159,000

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
<b>Project 3</b>	Yuba River Narrows Restoration Project	Restore up to 0.5 miles of in-channel habitat by restoring and replenishing gravel and removing shot rock debris from the the Narrows Reach to benefit Chinook and steelhead. Includes 6% FWS contract admin.			\$2,547,420				\$2,547,420
<b>Project 4</b>	Yuba River Daguerre Alley Floodplain Restoration Project	Restore up to 180 acres of floodplain habitat and approximately 2.5 miles of side channel habitat to benefit steelhead and Chinook through pre-project planning, scoping, and conceptual designs. Cooperative effort between the USFWS, CDFW, NMFS, USCOE, Yuba R Mgmt Team, and Yuba Co WA. (FRP Action 6 and Eval 4) Includes 6% FWS contract admin.			\$1,635,009				\$1,635,009
<b>Project 5</b>	Antelope Creek Juvenile Fish Passage Project	Prevent out-migrating salmonids from becoming entrained in two diversion canals thorough providing a bypass system. Cooperative effort between the USFWS, CDFW, NMFS, Tehama Co RCD, Los Molinos Mutual Water Company, and the landowner. Includes 6% FWS contract admin.			\$1,484,000				\$1,484,000

Task	Project Name	Project Description	Federal Costs(\$)				State Cost Share (\$)		Total Costs (\$)
			BOR Restoration Fund	BOR W&RR Fund	FWS Restoration Fund	FWS W&RR Fund	CA DFW	CA DWR	
<b>Project 6</b>	Lower Deer Creek Falls Fish Passage Improvement Project	Repair or replace the Lower Deer Ck Falls fish ladder (CV Eval 11) and improve passage to 5.75 miles of spawning and rearing habitat for steelhead and Chinook. Cooperative effort between the USFWS and CDFW. Includes 6% FWS contract admin.			\$530,000				\$530,000
<b>Project 7</b>	Stanislaus River Migratory Corridor Rehabilitation	Restore shallow water migratory habitat downstream of Riverbank through project planning, design, and environmental compliance. Includes 6% FWS contract admin.			\$530,000				\$530,000

**Table 3. Monitoring**

Table 3 – Proposed Monitoring Activity	
<b>Project Description:</b>	Dry Creek/Spenceville Wildlife Area habitat assessment
<b>FY 2014 Project Complete?</b>	No
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP Subtask 2.1.1
<b>Scope of the monitoring effort:</b>	Conduct habitat assessment of Dry Creek in the vicinity of the Spenceville Wildlife Area and Beale Air Force Base
<b>Product/deliverable:</b>	Annual report
<b>Cost:</b>	\$10,000
<b>Questions posed:</b>	What is the quality of anadromous salmonid habitat in Dry Creek in the vicinity of the Spenceville Wildlife Area?
<b>Objectives:</b>	Determine the quality of anadromous salmonid habitat in Dry Creek in the vicinity of the Spenceville Wildlife Area
<b>Results – expected or actual:</b>	Quantified quality of anadromous salmonid habitat in Dry Creek in the vicinity of the Spenceville Wildlife Area
<b>Data collection methods:</b>	Visual observation
<b>Data management:</b>	Spreadsheet and shapefile, Mark Gard, USFWS.
<b>Assessment:</b>	Evaluate habitat quality and identify potential fish passage barriers.
<b>Use of information in future decision making:</b>	Habitat assessment will be used to determine the need for restoration actions.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	Stanislaus River Knights Ferry Pre-project Monitoring. This project will restore up to 1 acre of side-channel and floodplain habitat to benefit Chinook salmon and steelhead. This project is a cooperative effort between the USFWS and the USCOE. This activity funds topographic surveys and flow inundation analysis. Costs include 6% FWS contract administration.
<b>FY 2014 Project Complete?</b>	Pre-project monitoring will be completed prior to project construction.
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP 2.6.1
<b>Scope of the monitoring effort:</b>	Between the covered bridge and Sonora Road bridge upstream of the town of Knights Ferry.
<b>Product/deliverable:</b>	Electronic data files and reports.
<b>Cost:</b>	\$124,888
<b>Questions posed:</b>	What are the topography and flow characteristics of the pre-project site? What is the composition of the substrate? What species are present pre-project?
<b>Objectives:</b>	Refine topographic and flow data, collect substrate data, and collect biological data to be used for project permitting, design, and evaluation of project benefits.
<b>Results – expected or actual:</b>	Topographic data, substrate data, biological data.
<b>Data collection methods:</b>	Total station, pits with pebble counts, visual inventory, snorkel survey, standard macroinvertebrate sampling, and flow transects.
<b>Data management:</b>	Data will be stored as GIS, database, and/or excel files.
<b>Assessment:</b>	We are assessing the physical and biological characteristics of the site prior to project implementation.
<b>Use of information in future decision making:</b>	Necessary for permitting (biological inventory, topography, flow), design (topography, substrate composition, flow), and evaluation (topography, flow, biological data) of the project. Additionally, this information will help prioritize habitat needs and guide future floodplain restoration efforts for the Stanislaus River.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	SF Cottonwood Habitat Assessment (waterfall to downstream of Hammer Diversion Dam)
<b>FY 2014 Project Complete?</b>	No
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP 2.6.2
<b>Scope of the monitoring effort:</b>	Conduct habitat assessment of SF Cottonwood from waterfall to downstream of Hammer Diversion
<b>Product/deliverable:</b>	Annual report
<b>Cost:</b>	\$25,000
<b>Questions posed:</b>	What is the quality of anadromous salmonid habitat in SF Cottonwood, what are representative cross-sectional profiles downstream of Hammer Diversion prior to dam removal?
<b>Objectives:</b>	Determine the quality of anadromous salmonid habitat in SF Cottonwood, measure representative cross-sectional profiles downstream of Hammer Diversion prior to dam removal.
<b>Results – expected or actual:</b>	Quantified quality of anadromous salmonid habitat in SF Cottonwood, representative cross-sectional profiles downstream of Hammer Diversion prior to dam removal.
<b>Data collection methods:</b>	Visual observation for anadromous salmonid habitat assessment; autolevel, stadia rod and tape for cross-sectional profiles.
<b>Data management:</b>	Spreadsheet and GIS shapefile, Mark Gard, USFWS.
<b>Assessment:</b>	Habitat assessments and fish passage project assessment.
<b>Use of information in future decision making:</b>	Habitat assessment will be used to determine the need for restoration actions. Cross-sectional profiles will be used to determine downstream effects of dam removal.

**Table 3 – Proposed Monitoring Activity**

<b>Table 3 – Proposed Monitoring Activity</b>	
<b>Project Description:</b>	Lower Sacramento Bullock Bend Floodplain Restoration Project
<b>FY 2014 Project Complete?</b>	Yes (pre-project monitoring will be completed, implementation will likely occur in FY 2015)
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP 2.6.3
<b>Scope of the monitoring effort:</b>	Pre-project monitoring data that will be collected to characterize the pre-project habitat conditions including existing and anticipated future water depths and velocities, substrate size distribution, and various biological data (i.e. riparian vegetation surveys, terrestrial species surveys, etc.) to be used for project permitting, design, and evaluation of project benefits. Additionally, the pre-project data will be used to finalize designs for the reconnection of approximately 117 acres of floodplain and riparian habitat.
<b>Product/deliverable:</b>	Pre-project assessment of existing habitat, habitat and species data required to complete design and permitting processes.
<b>Cost:</b>	\$53,000
<b>Questions posed:</b>	What is the condition of the existing habitat and species assemblage at the site and how various restoration alternatives can benefit multiple species? What restoration alternatives will optimize the reconnection of the floodplain and riparian habitat to the Sacramento River?
<b>Objectives:</b>	Complete surveys of the existing habitat and species required for optimal design and permitting processes.
<b>Results – expected or actual:</b>	Expected – existing habitat and species use will be characterized under current conditions and a final design that optimizes floodplain habitat reconnection, retention and enhancement of existing riparian vegetation and benefit to aquatic (CV steelhead, multiple runs of Chinook salmon, etc.) and terrestrial organisms. Additionally, this monitoring will provide a baseline to compare changes in productivity and utility of the site once implementation is completed and will provide data for all required permits.
<b>Data collection methods:</b>	Topographic surveys, flow modeling, and standard survey methods for riparian vegetation, terrestrial and aquatic organisms
<b>Data management:</b>	Westervelt Ecological Services will manage all data from all monitoring aspects of this project and provide digital copies of the data to AFRP.
<b>Assessment:</b>	Current condition of the site (including habitat and species use) will be assessed.
<b>Use of information in future decision making:</b>	This portion of the project will guide final design of the implemented project to maximize benefit to target habitat and species. Pre-project monitoring will also provide a baseline to compare changes in productivity and utility of the site once implementation is completed and will provide data for all required permits. Additionally, this information will help prioritize habitat needs and guide future floodplain restoration efforts for the Lower Sacramento River.

**Table 3 – Proposed Monitoring Activity**

<b>Table 3 – Proposed Monitoring Activity</b>	
<b>Project Description:</b>	Merced River Ranch Floodplain and Side-channel Restoration (Post Project Monitoring and Evaluation)
<b>FY 2014 Project Complete?</b>	Yes
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP subtask 2.8.1
<b>Scope of the monitoring effort:</b>	Implementation, Effectiveness, Validation.
<b>Product/deliverable:</b>	Monitoring Report
<b>Cost:</b>	\$223,769 ( 2 <sup>nd</sup> year of monitoring)
<b>Questions posed:</b>	<p>The primary question to be answered by the implementation monitoring is: was the project installed as designed?</p> <p>The primary question to be answered by the effectiveness monitoring is: was the project effective at meeting restoration objectives?</p> <p>The primary question to be answered by the validation monitoring is: are the basic assumptions behind the project’s conceptual model valid (i.e., does the project contribute to increased productivity for juvenile salmonid populations in the Merced River)?</p>
<b>Objectives:</b>	Assess the project using the three tiered approach described above.
<b>Results – expected or actual:</b>	Data and analysis
<b>Data collection methods:</b>	The implementation monitoring will determine if the project was installed according to the design standards. Hydrology, topography/bathymetry, sediment budget and vegetation will be assessed. The effectiveness monitoring will determine if the project was effective in recovering habitat conditions suitable to target species. A range of physical and biological traits will be tracked before and after restoration to assess ecosystem function. The final part of the monitoring program will determine if floodplain restoration projects, like the one at MRR, recover productive habitat for salmonids and riparian vegetation. This validation monitoring includes experiments to assess ecosystem function for salmonids and test hypotheses regarding floodplain benefits.
<b>Data management:</b>	Data recorded electronically in a database or spreadsheet.
<b>Assessment:</b>	The monitoring will assess implementation, effectiveness and validation of the project.
<b>Use of information in future decision making:</b>	This information will help prioritize habitat needs and guide future floodplain restoration efforts.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	Cosumnes River juvenile outmigration and adult escapement monitoring
<b>FY 2014 Project Complete?</b>	Yes
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP Subtask 2.8.2
<b>Scope of the monitoring effort:</b>	A rotary screw trap (RST) and VAKI Riverwatcher will be deployed in the Cosumnes River to develop juvenile outmigration and adult escapement estimates
<b>Product/deliverable:</b>	<ol style="list-style-type: none"> <li>1. Juvenile Outmigration estimate based on expansion of RST results</li> <li>2. Adult Escapement estimate based on VAKI Riverwatcher results</li> </ol>
<b>Cost:</b>	\$63,600
<b>Questions posed:</b>	What is the impact of recent fish passage and habitat restoration projects on the Cosumnes River Chinook salmon population?
<b>Objectives:</b>	Develop better annual juvenile outmigration and adult escapement estimates for the Cosumnes River and begin to compare those estimates in light of recent restoration and passage projects in the system.
<b>Results – expected or actual:</b>	This project was funded with EOY funds in 2013 and has yielded a robust adult escapement for the system. Juvenile outmigration monitoring is ongoing and a juvenile outmigration estimate will be developed for FY13 and FY14. We expect multiple years of estimates in both of these categories to allow us to being to assess the impact of recently completed restoration and passage projects in the system.
<b>Data collection methods:</b>	RST and VAKI Riverwatcher
<b>Data management:</b>	Fishery Foundation of California is managing the data and developing estimates, all raw data and estimates developed from it are routinely provided to AFRP
<b>Assessment:</b>	This project provides us valuable information by which we can assess the effectiveness and impact of fish passage and gravel augmentation projects that we have funded in this system over the last several years.
<b>Use of information in future decision making:</b>	Results of this project will provide us a better estimate of the relative impact that our projects have on the Cosumnes River Chinook salmon population annually. Additionally, estimates from the Cosumnes River (no major dam = basically unregulated) will be compared to estimates from other systems in different water year types to evaluate the potential impact of regulation of flows across multiple CV watersheds.

**Table 3 – Proposed Monitoring Activity**

<b>Table 3 – Proposed Monitoring Activity</b>	
<b>Project Description:</b>	Tehama Wildlife Area Fish Passage Project Antelope Creek Bridge resurvey
<b>FY 2014 Project Complete?</b>	No
<b>CVPIA annual work plan subtask number:</b>	FY14 AFRP AWP Subtask 2.8.3
<b>Scope of the monitoring effort:</b>	Conduct a topography survey of the Antelope Bridge crossing with RTK GPS and total station.
<b>Product/deliverable:</b>	Annual report
<b>Cost:</b>	\$10,000
<b>Questions posed:</b>	How has the topography at the Antelope Bridge crossing site changed as a result of high flows?
<b>Objectives:</b>	Determine how much the topography at the Antelope Bridge crossing site changed as a result of high flows.
<b>Results – expected or actual:</b>	2-dimensional plot showing amount of aggradation or erosion at Antelope Bridge crossing site
<b>Data collection methods:</b>	Topography survey using RTK GPS and total station.
<b>Data management:</b>	Spreadsheet and GIS shapefile, Mark Gard, USFWS.
<b>Assessment:</b>	The monitoring will assess implementation, effectiveness and validation of the project.
<b>Use of information in future decision making:</b>	Determine if any additional construction is needed to allow fish passage.

**Table 3 – Proposed Monitoring Activity**

<b>Table 3 – Proposed Monitoring Activity</b>	
<b>Project Description:</b>	Hammon Bar Floodplain Restoration Monitoring
<b>FY 2014 Project Complete?</b>	No
<b>CVPIA annual work plan subtask number:</b>	FY14 AFRP AWP Subtask 2.8.4
<b>Scope of the monitoring effort:</b>	Collect topography, substrate and cover data to be used in developing a 2-dimensional hydraulic and habitat model of the Hammon Bar restoration site
<b>Product/deliverable:</b>	Annual report
<b>Cost:</b>	\$20,000
<b>Questions posed:</b>	How much juvenile Chinook salmon rearing habitat was created by the Hammon Bar restoration project?
<b>Objectives:</b>	Quantify the amount of juvenile Chinook salmon rearing habitat that was created by the Hammon Bar restoration project.
<b>Results – expected or actual:</b>	Number of square feet of juvenile Chinook salmon rearing habitat that was created by the Hammon Bar restoration project.
<b>Data collection methods:</b>	Topography data to be collected with RTK GPS and ADCP. Substrate and cover data to be collected by visual observation.
<b>Data management:</b>	Spreadsheet and GIS shapefile, Mark Gard, USFWS.
<b>Assessment:</b>	The monitoring will assess implementation, effectiveness and validation of the project.
<b>Use of information in future decision making:</b>	Data will be useful to design future riparian restoration projects to increase their success in creating juvenile Chinook salmon rearing habitat.

**Table 3 – Proposed Monitoring Activity**

<b>Table 3 – Proposed Monitoring Activity</b>	
<b>Project Description:</b>	Identify specific areas and sources of mortality for juvenile Chinook salmon in the lower Stanislaus River using radio telemetry.
<b>FY 2014 Project Complete?</b>	Year three of multi-year effort. Additional years will allow comparison of survival differences among different water year types.
<b>CVPIA annual work plan subtask number:</b>	AFRP FY 14 AWP Subtask 4.2.1
<b>Scope of the monitoring effort:</b>	Lower Stanislaus River from Oakdale down to Durham Ferry on the San Joaquin River.
<b>Product/deliverable:</b>	Final Report documenting geographic scope of mortality.
<b>Cost:</b>	\$313,882
<b>Questions posed:</b>	<p>1. Ho: The survival probability of salmonid smolts is the same in all river segments, and sub-reaches of the Stanislaus and is constant throughout the migration period.</p> <p>2. Ho: The location of salmonid mortalities is randomly distributed within the 30 mi study reach, 10 mi segments, and 3.3 mi sub-reaches.</p> <p>3. Ho: Areas of low salmonid survival are not associated with the biotic and abiotic characteristics of those areas relative to areas of high survival.</p> <p>4. Ho: The location of salmonid mortalities is unrelated to the habitat type in which the mortality is detected.</p>
<b>Objectives:</b>	<p><b>Objective 1:</b> Use radio telemetry technology to estimate reach-specific survival of juvenile salmonids in the lower Stanislaus in 3.3- 10- and 30-mile increments and determine whether there is spatial variation in survival along the 30 mile study reach.</p> <p><b>Objective 2:</b> Use mobile telemetry surveys to identify the location of salmonid mortality during outmigration at the finest resolution possible (sub-meter scale) to identify problem areas that could be targeted for future actions.</p> <p><b>Objective 3:</b> Associate biotic and abiotic characteristics with areas of greater salmonid mortality to explore whether reach specific differences in these characteristics contribute to differences in survival along the Stanislaus River.</p> <p><b>Objective 4:</b> Track experimental fish using mobile radio telemetry surveys and monitor their movement and behavior during their outmigration in relation to potential sources of mortality (e.g., predator pools, agricultural return drain, etc.).</p>
<b>Results – expected or actual:</b>	Identification of habitat segments with elevated mortality rates (or lack thereof).
<b>Data collection methods:</b>	Radio-telemetry (fixed and mobile)
<b>Data management:</b>	MS-Access database with GPS data included
<b>Assessment:</b>	Monitoring will assess geographic scope of mortality to juvenile Chinook salmon through a portion of the rearing and migratory corridor.
<b>Use of information in future decision making:</b>	The results of this study will assist with the identification of future restoration actions (i.e. mine pit isolation projects) or other solutions that are necessary for the recovery of the Stanislaus salmonid populations.

**Table 3 – Proposed Monitoring Activity**

<b>Table 3 – Proposed Monitoring Activity</b>	
<b>Project Description:</b>	Mill and Deer Creeks: Wild Juvenile Chinook Acoustic Tagging Investigations
<b>FY 2014 Project Complete?</b>	No; three year study (this will fund Year 3).
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP Subtask 4.2.2
<b>Scope of the monitoring effort:</b>	Spring-run Chinook watersheds, with a focus on Mill, Deer, and possible Antelope Creek
<b>Product/deliverable:</b>	Annual report.
<b>Cost:</b>	\$125,080
<b>Questions posed:</b>	How do native migratory fishes navigate through the San Francisco estuary? What factors affect their migratory behavior? What are the management implications? How do habitat attributes such as geometry, water flow, temperature, turbidity, contaminants, presence of predators, and food quantity and quality affect abundance and distribution of native fishes in the estuary? How do connectivity between different habitat types and geographical extent and arrangement of habitats affect abundance and distribution of native fishes in the San Francisco Estuary?
<b>Objectives:</b>	Goal: Address juvenile migratory salmon needs in order to improve the fishery. Objective: Collecting fish movement and behavior data via acoustic tagging.
<b>Results – expected or actual:</b>	Expected; more accurate and specific information to make effective management decisions.
<b>Data collection methods:</b>	Acoustic tagging and tracking; mapping, habitat data collection.
<b>Data management:</b>	Digital files with raw data will be archived by the AFRP in an Excel and relational databases. All drawings, maps, etc. will be delivered and maintained by AFRP. A final report will be available on the AFRP website.
<b>Assessment:</b>	Monitoring will assess geographic scope of mortality to juvenile Chinook salmon through a portion of the rearing and migratory corridor.
<b>Use of information in future decision making:</b>	The data will enable researchers to evaluate effects of natural and anthropogenic changes in flow and related water project operations on their survival and movement patterns within the Sacramento River and Delta, and then ultimately allow managers to more effectively manage flows for the benefit of juvenile salmonids.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	Sacramento River Green Sturgeon Juvenile Overwintering Migration Investigation.
<b>FY 2014 Project Complete?</b>	N/A: New Investigation.
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP Subtask 4.2.3
<b>Scope of the monitoring effort:</b>	Sacramento River: Keswick Dam to Highway 32 Bridge. Multiple sampling locations within this 100 river mile reach.
<b>Product/deliverable:</b>	Narrative based final report that provides data results and analysis with discussion of the information derived from sampling efforts. Life-history based data on fish size (length and weight), habitat utilization and spatial distribution patterns of age-0+ green sturgeon juveniles migrating in the Sacramento River.
<b>Cost:</b>	FY2014: \$103,700.
<b>Questions posed:</b>	Do Sacramento River green sturgeon juveniles exhibit a migration pattern to overwintering habitat in the river or in the delta? What habitat(s) are utilized by juvenile sturgeon in the fall and winter in the Sacramento River? What environmental conditions exist in the area(s) where juveniles are sampled or utilizing?
<b>Objectives:</b>	Determine if, when and where age-0 juveniles migrate out of the upper Sacramento River and at what size.
<b>Results – expected or actual:</b>	The proposed activity is expected to produce digital files and maps and a final report documenting the results of the investigation.
<b>Data collection methods:</b>	Multiple methods will be employed and, as permits allow, sampling by benthic trawl, passive benthic traps, baited ‘minnow’ traps, gill or trammel nets and possibly, hook and line will be explored to determine effective methods of capture.
<b>Data management:</b>	Digital files with raw data will be archived by the USFWS in an Access and or GIS database, as appropriate. A final agency report (.pdf) will be made available on the USFWS and AFRP websites.
<b>Assessment:</b>	Spatial and temporal habitat use and migration timing and related physical variables (temperature, flow, turbidity, photoperiod) of juvenile green sturgeon.
<b>Use of information in future decision making:</b>	Green sturgeon juvenile habitat use attributes and migration timing to the legal Delta is currently a very large data gap in life history models for green sturgeon. Sampling is anticipated to result in the acquisition of critical life history information for population recovery planning, and provide data to make better informed decisions on the effects of flow management operations on a threatened species. Data will also be used to determine feasibility of more extensive habitat use research (i.e., micro-acoustic tagging) to better determine movement patterns and habitat use of this listed species.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	Lower American River Structured Decision Making Model for Salmonid Habitat Restoration—Monitoring Data Collection for Model Input Parameters
<b>FY 2014 Project Complete?</b>	No—monitoring is expected to continue at least through FY 2019
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP subtask 4.2.4
<b>Scope of the monitoring effort:</b>	A prototype SDM model was developed for the LAR in 2011, with refinements developed in 2012 using available data and best professional judgment. Sensitivity analyses indicate that estimates of (1) the current availability of habitat (juvenile and spawning), (2) egg to larval survival, and (3) juvenile outmigrant survival (and outmigrant to adult return ratios) heavily influence model results. Proposed monitoring activities are intended to improve the estimates of these key parameters.
<b>Product/deliverable:</b>	Data collected in the LAR to refine the estimates of the above parameters; monitoring reports; an improved SDM model incorporating new data on specific life stages and habitat to assist in the selection of future habitat restoration projects; assessment of the need for the collection of additional data concerning e.g. habitat-specific growth and survival.
<b>Cost:</b>	\$349,440 with additional funds needed for out years
<b>Questions posed:</b>	How much salmonid spawning and rearing habitat currently is available in the LAR? What is the expected life-stage specific survival of eggs and juvenile outmigrants in the LAR? Should restoration efforts focus on increasing/improving spawning habitat or rearing habitat, and where would restoration efforts be the most effective?
<b>Objectives:</b>	In a focused manner, collect additional monitoring data to improve estimates of (1) the current availability of habitat (juvenile and spawning), (2) egg to larval survival, and (3) juvenile outmigrant survival in the LAR. Improve the function and utility of the existing SDM model for the LAR.
<b>Results – expected or actual:</b>	Expected results include collection of data sufficient to refine estimates of (1) the current availability of habitat (juvenile and spawning), (2) egg to larval survival, and (3) juvenile outmigrant survival in the LAR; these estimates are expected to be incorporated into the existing SDM model for the LAR.
<b>Data collection methods:</b>	<ol style="list-style-type: none"> <li>1. From existing maps, modeling, and monitoring information, identify habitat areas of uncertain quality in the LAR; collect additional field data (e.g., depth, velocity, and substrate) in these areas to refine habitat abundance and quality estimates.</li> <li>2. Construct artificial redds in locations varying in gravel size/previous gravel augmentation efforts and bury known quantities of green Chinook salmon eggs and steelhead eggs in incubation tubes; retrieve tubes to evaluate egg to larval survival under the different conditions.</li> <li>3. Install and operate rotary screw traps (RSTs) at a</li> </ol>

	<p>downstream location such as adjacent to CalExpo. These RSTs will be motorized to ensure rotation occurs even under backwatering conditions. Compare numbers of juvenile salmonids collected to those collected from RSTs installed upstream near Watt Avenue to estimate juvenile salmonid outmigrant survival.</p> <p>4. Plan for subsequent work as necessary to support the SDM model (e.g., PIT or acoustic tagging of juveniles to relate habitat use to growth and survival, etc.)</p>
<b>Data management:</b>	Data will be collected on data sheets or entered directly into laptop computers or other portable devices. Data will be backed up and stored on the server of the grantee, contractor, or USFWS.
<b>Assessment:</b>	Results are expected to be partly dependent on intra- and inter-annual variability in environmental conditions, particularly flow and water temperature, so rigorous statistical analysis would require data be collected over several years. However, even one year of data collection should allow refined estimates of key parameters for the SDM model. Habitat measurements will be compared to existing standards for salmonid spawning and rearing habitat. The egg to larval survival study will have several replicates of egg tubes so that the effects of covariates (e.g., gravel size, hyporheic flow, location in the river, etc.) on survival can be investigated. RST work will occur over a period of months and thus allow weekly estimates of growth and survival and provide insight on outmigration timing.
<b>Use of information in future decision making:</b>	This work is intended specifically to support and improve the usability of the existing SDM model for the LAR. The purpose of the SDM model is to inform management decisions concerning the restoration of spawning and rearing habitat in the LAR.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	The Sacramento River Redd Dewatering Study is a comprehensive study to determine location, timing and percentage of naturally produced fall-run Chinook redds that are dewatered or in danger of being dewatered. Locations will be mapped and correlated to river flows and dam releases. Info will be used to make recommendations on future flow management and will assess the degree to which this may be affecting achievement of the AFRP doubling goal for natural production.
<b>FY 2014 Project Complete?</b>	Yes.
<b>CVPIA annual work plan subtask number:</b>	AFRP FY14 AWP subtask 4.2.5
<b>Scope of the monitoring effort:</b>	Keswick Dam to Red Bluff on the mainstem Sacramento River.
<b>Product/deliverable:</b>	Annual report.
<b>Cost:</b>	FY14 Cost \$129,000. (This project is cost sharing \$10,000 from CDFW and \$76,000 from b(2)). Costs include 6% FWS contract administration.
<b>Questions posed:</b>	<b>What percentage of redds become dewatered as flow reductions occur?</b> How is the doubling goal impacted by decreases in flow that result in dewatered redds? How could flow management be refined to best protect the fall Chinook salmon population from decreased flows? At what flows and dam release do Fall Chinook salmon redds become dewatered? In which locations are dewatered redds most prevalent?
<b>Objectives:</b>	Determine when/where and the percentage of Fall Chinook redds that are dewatered and map the locations correlated to river flows and dam releases. Full time dedicated staff will survey and gather data in the 70 mile stretch of river between Red Bluff and Redding. This data may be shared with the CVPIA flow management group (b(2) group) as needed.
<b>Results – expected or actual:</b>	Mapping of redd locations, depths and river reaches with corresponding delineation of redds in danger of dewatering at different flow levels. This study will produce digital files and maps and a final report documenting the results.
<b>Data collection methods:</b>	Two full time dedicated staff will use a boat on the mainstem river to survey for areas of potential redd dewatering. After disembarking from the boat, they will collect data on-foot. The data gathered will be compared to the aerial surveys to get a relationship between the two counting methodologies.
<b>Data management:</b>	A final report will be available on the AFRP website.
<b>Assessment:</b>	Information gained on redd location and depth will be conveyed to the flow management group for their consideration. This information will be balanced with the need to provide enough water storage for temperature control needs for winter Chinook.
<b>Use of information in future decision making:</b>	<b>Determining the percentage of redds that are being protected, or the percentage of redds that are in danger of dewatering will help to make decisions regarding flow management.</b> Protection of fall Chinook eggs and incubation is a valuable step to protect the population. This project will protect naturally spawning fall Chinook in their primary spawning area -- the goals of both AFRP and b(2) flow management teams.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	San Joaquin River Sturgeon Acoustic Study – implant acoustic transmitters in <i>Acipenser</i> spp. in the San Joaquin River basin to evaluate distribution and habitat use.
<b>FY 2014 Project Complete?</b>	No
<b>CVPIA annual work plan subtask number:</b>	AFRP FY 14 AWP 4.2.6
<b>Scope of the monitoring effort:</b>	Monitor <i>Acipenser</i> spp. distribution and habitat use of the San Joaquin River system.
<b>Product/deliverable:</b>	Report detailing study findings regarding spatial and temporal distribution and habitat use of <i>Acipenser</i> spp. throughout the San Joaquin River system.
<b>Cost:</b>	\$96,670
<b>Questions posed:</b>	<ol style="list-style-type: none"> <li>1) Are white sturgeon or green sturgeon present in the San Joaquin River or its tributaries during their life cycle?</li> <li>2) What areas and habitat types do white sturgeon or green sturgeon use and how do they use them (e.g., spawning, holding, rearing)?</li> <li>3) What is the timing and duration of movements of white sturgeon and green sturgeon?</li> <li>4) How do movements relate to flows, temperature, and other parameters?</li> <li>5) What factors inhibit accessibility of white sturgeon and green sturgeon to suitable habitat (e.g., flow regime, thermal or physical barriers)?</li> </ol>
<b>Objectives:</b>	<ol style="list-style-type: none"> <li>1) Identify sturgeon holding and spawning habitat</li> <li>2) Tag and track white sturgeon and green sturgeon</li> </ol>
<b>Results – expected or actual:</b>	Plan to tag up to 20 white sturgeon and green sturgeon and characterize distribution, movements, and habitat use.
<b>Data collection methods:</b>	Side scan sonar and DIDSON equipment will be used to identify sampling locations, along with local knowledge and expertise. Trammel, gill, and hoop nets will be used, along with angling and trot lines, to capture sturgeon. VEMCO acoustic transmitters will be implanted and sturgeon will be tracked using VEMCO stationary and mobile tracking receivers and hydrophones.
<b>Data management:</b>	Electronic database operated by HYDRA.
<b>Assessment:</b>	Will follow methods described in McKenzie, J. R., B. Parsons, A. C. Seitz, R. K. Kopf, M. Mesa, and Q. Phelps, editors. 2012. Advances in fish tagging and marking technology. American Fisheries Society, Symposium 76, Bethesda, Maryland.
<b>Use of information in future decision making:</b>	To identify habitat restoration actions that would benefit white sturgeon and green sturgeon and inform discussion regarding the timing and duration of flows.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	San Joaquin River Sturgeon Habitat Assessment – combine collection of sturgeon eggs with physical measurements of the San Joaquin River including multibeam bathymetry surveys, hydraulic mapping, and bed sediment characterization.
<b>FY 2014 Project Complete?</b>	No
<b>CVPIA annual work plan subtask number:</b>	AFRP FY 14 AWP 4.2.7
<b>Scope of the monitoring effort:</b>	San Joaquin River system and Delta
<b>Product/deliverable:</b>	Digital database with raw data files and final reports that provide analysis of the data.
<b>Cost:</b>	\$96,670
<b>Questions posed:</b>	<ol style="list-style-type: none"> <li>1) Are green sturgeon spawning in the San Joaquin River system?</li> <li>2) Do white sturgeon spawn in the San Joaquin River every year, regardless of water year type?</li> <li>3) Do spawning locations vary depending upon river stage?</li> <li>4) Do spawning locations share similar habitat characteristics (e.g., depth, velocity, substrate type)?</li> <li>5) What is the spatial and temporal distribution of sturgeon in the San Joaquin River basin?</li> <li>6) Are there specific habitat characteristics (e.g., depth, velocity, substrate type) that would help identify additional spawning locations?</li> </ol>
<b>Objectives:</b>	To document sturgeon spawning activity in the San Joaquin River basin and identify and evaluate similar habitat throughout the system for spawning activity. Integration of the bathymetric, velocity, and substrate data will allow for qualitative and quantitative estimates of various habitat types within the study reaches.
<b>Results – expected or actual:</b>	There are final annual reports for 2011 activities for both main components of this monitoring effort (egg sampling and physical habitat measurements); 2012 reports will be available in December 2012. Digital files of raw data and final reports documenting and interpreting the results of the monitoring activities will be available at the conclusion of the work.
<b>Data collection methods:</b>	Egg collection mats will be used to assess spawning activity. Collected eggs will be identified to species and be subject to genetic testing. Multibeam sonar will be used, along with RTK-GPS for positioning, to map the detailed bathymetry of the river bed and substrate type. Measurements of water flow characteristics (e.g., flow, velocity) will be collected using an Acoustic Doppler Current Profiler. Further, underwater video and photography will be used, along with physical grab samples, to characterize the substrate types of the river.
<b>Data management:</b>	Digital files with raw data will be archived by the AFRP in a database. A final report documenting the results of the project will be available on the AFRP website.
<b>Assessment:</b>	Sturgeon spawning habitat in the San Joaquin River will be evaluated. Environmental characteristics of sturgeon spawning habitat will be described.
<b>Use of information in future decision making:</b>	Identifying sturgeon spawning habitat will help AFRP focus future restoration actions for these species in the San Joaquin River. Green sturgeon is listed as threatened under the ESA and identifying spawning locations will assist AFRP and other agencies with recovery and doubling efforts.

**Table 3 – Proposed Monitoring Activity**

<b>Project Description:</b>	San Joaquin River System and Delta Contaminants, Age and Growth, and Microchemistry Project
<b>FY 2014 Project Complete?</b>	No
<b>CVPIA annual work plan subtask number:</b>	AFRP FY 14 AWP 4.2.8
<b>Scope of the monitoring effort:</b>	Suisun and San Pablo bays, Sacramento-San Joaquin Delta, lower Sacramento and San Joaquin rivers.
<b>Product/deliverable:</b>	Digital database with raw data files and four final reports that describe methods, results, discussion, and management implications.
<b>Cost:</b>	\$132,500
<b>Questions posed:</b>	<ol style="list-style-type: none"> <li>1) How are ambient levels of trace elements and organic and inorganic contaminants affecting the health of adult white sturgeon and green sturgeon, the viability of their gametes, and development of their offspring?</li> <li>2) Are contaminant issues prevalent throughout the system, or localized?</li> <li>3) Does removing the anterior pectoral fin ray affect growth and survival of adult white sturgeon?</li> <li>4) What are current characteristics of age and growth of adult white sturgeon?</li> <li>5) Have age and growth characteristics of white sturgeon changed since the mid-1970s?</li> <li>6) Can microchemistry technology be used to identify basin of origin, rearing areas, marine migrations, and spawning periodicity of white sturgeon?</li> </ol>
<b>Objectives:</b>	Identify the effects of contaminants on sturgeon populations, assess effects of fin ray removal on growth and survival, assess current age-and-growth characteristics, and identify spawning and rearing locations, the frequency and spatial and temporal aspects of marine migrations, and spawning periodicity of white sturgeon.
<b>Results – expected or actual:</b>	The proposed activities will produce digital files of raw data and final reports documenting the results of the monitoring activities.
<b>Data collection methods:</b>	Tissue samples will be collected from angler-harvested adult white sturgeon for the contaminants, microchemistry, and age-and-growth components. Farmed white sturgeon will be used to assess effects of fin ray removal and to validate microchemistry results. Depending upon the results of the fin-ray-removal-effects project, fin ray samples may be obtained from CDFW from sturgeon captured during their fall trammel netting efforts.
<b>Data management:</b>	Digital files with raw data will be archived by the AFRP in a database. Final reports documenting the results of the project will be available on the AFRP website.
<b>Assessment:</b>	Effects of contaminants on all life stages of white sturgeon and green sturgeon, effects of fin ray removal on growth and survival of adult white sturgeon, and population dynamics characteristics of white sturgeon will be evaluated. Environmental characteristics of sturgeon spawning habitat and juvenile rearing habitat will be described.
<b>Use of information in future decision making:</b>	Effects of contaminants on sturgeon and habitat use information will assist AFRP with focusing future restoration actions for these species in the San Joaquin River and the Sacramento-San Joaquin Delta. Green sturgeon are listed as threatened under the ESA and distribution data will assist AFRP with recovery efforts.