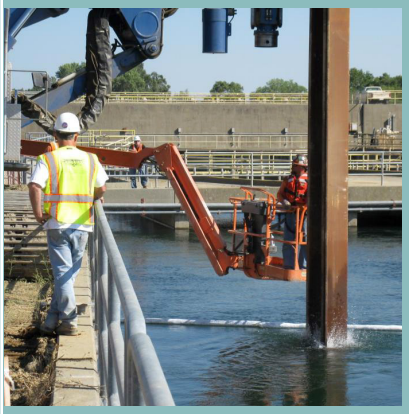

Central Valley Project Improvement Act

Public Law 102-575

Annual Report

Fiscal Year 2010

Department of the Interior

U.S. Bureau of Reclamation
U.S. Fish and Wildlife Service

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PURPOSE

This Fiscal Year (FY) 2010 CVPIA Annual Accomplishments Report summarizes the actions authorized under the Central Valley Project Improvement Act (CVPIA or Act) of 1992 and highlights FY 2010 accomplishments (October 1, 2010 - September 30, 2011). Section 3408 (f) of the Act directs the Secretary of Interior to submit an annual report describing all significant actions taken toward achievement of the intent and purposes of Title 34. The agencies primarily responsible for implementing the CVPIA are the U.S. Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (Service).

INTRODUCTION AND BACKGROUND

CENTRAL VALLEY PROJECT IMPROVEMENT ACT OF 1992

In 1992, the 102nd Congress passed, and the President signed, the multi-purpose water legislation known as the CVPIA. Officially designated Title 34 of Public Law 102-575, this landmark piece of legislation amends previous authorizations of the California Central Valley Project (CVP) to include fish and wildlife protection, restoration, enhancement, and mitigation as project purposes having equal priority with irrigation and domestic water supply uses, and power generation. The CVPIA also contributes to the State's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin River Delta Estuary.

The purpose of the CVPIA is expressed in six broad statements found in Section 3402 of the Act:

- To protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California;
- To address impacts of the CVP on fish, wildlife, and associated habitats;
- To improve the CVP's operational flexibility;
- To increase water-related benefits provided by the CVP to the state through expanded use of voluntary water transfers and improved water conservation;
- To contribute to the State's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin Delta Estuary;
- To achieve a reasonable balance among competing demands for use of CVP water, including the requirements of fish and wildlife, agricultural, municipal and industrial, and power contractors.

CVPIA GOALS

The current focus of the CVPIA Program is on fish and wildlife restoration, water management, and conservation activities, authorized in Sections 3406 and 3408 of the Act. These goals fit within three broad resource areas: fisheries, refuges and other. Figure ES-1 shows the active CVPIA provisions that contribute to each resource area as well as those provisions that are completed or inactive.

FUNDING OBLIGATIONS AND ACCOMPLISHMENTS

Since FY 1993 Congress appropriated Restoration Fund and Water & Related Resources funds to the CVPIA Program. In addition, funds have been obligated from State cost-share funds, Bay-Delta funds and the American Recovery and Reinvestment Act (ARRA) funding. From these combined sources, a total of $1.3 billion has been obligated by CVPIA over the past 18 years, as shown in Figure ES-2.

FY 2010

A total of $200 million was obligated in FY 2010, a substantial increase from the $96.7 million obligated in FY 2009, and substantially more than the $69 million average since 1992. As shown in Figure ES-3, the increase in funding is largely due to the introduction of ARRA funds. These funds were made available for designed and permitted "shovel-ready" projects. For FY 2010, ARRA funding totaled $120 million, while RF included $35.4 million and $6.8 million came from prior year funds. Of the $200 million balance, approximately $24 million was obligated from the W&RR account; $2.2 million was obligated from the State cost-share funds; and $11.7 million was obligated from Bay-Delta funds.

STATE OF CALIFORNIA COST-SHARE

Section 3406 of the CVPIA requires that the U.S. enter into a cost-sharing agreement with the State for CVPIA implementation. On June 27, 1994, the State and the U.S. entered into the Sharing of Costs Agreement for Mitigation Projects and Improvements (SCAMPI). In FY 2010, two amendments to SCAMPI were processed: Amendment No. 4 to SCAMPI, executed in February, 2010, increased the maximum amount payable by the State pursuant to the cost-share provisions of CVPIA by $5.5 million to $167.6 million for the Red Bluff Diversion Dam Task Order Agreement. Amendment No. 5 to SCAMPI was also executed which increased the maximum amount payable to the U.S. by the State by $1.4 million to $169 million to contribute towards the cost of the Vernalis Adaptive Management Plan (VAMP) Task Order Agreement. Under Amendment No. 6, which is in progress in FY 2011, the State will make a second payment to the U.S. towards the cost of the Fish Passage Improvement Project at the Red Bluff Diversion Dam in the amount of $6.5 million increasing the maximum amount payable to the U.S. by the State to $175.5 million.

FY 2010 ACCOMPLISHMENTS

The following sections provide an overview of the FY 2010 accomplishments in each of the three resources areas: Fisheries, Refuges and Other Resources. These summaries offer a snapshot of the work accomplished in FY 2010. Chapter 2 of this report provides more information on the accomplishments of each program activity.

FISHERIES RESOURCES

Central Valley

The **(b)(1) Anadromous Fish Restoration Program (AFRP)** activities included removal of Wildcat Dam on Battle Creek to restore fish passage and construction of a boulder weir fishway at Rooney Dam to improve fish passage on the Consumes River. Other accomplishments included placement of over 22,000 tons of gravel for habitat improvements on the Merced River and Mokelumne River, and completion of environmental documents for two floodplain and side-channel enhancement projects on the Stanislaus River. In addition, numerous monitoring activities and surveys were conducted on the American River, Bear River, Cottonwood and Cow Creeks to better understand habitat conditions and adaptively manage to meet fish needs.

The **(b)(1)(B) Modified CVP Operations Program** modified operations on the system multiple times to provide benefits to anadromous fish on Clear Creek without impacting other CVP obligations or authorized



purposes. The program also completed monitoring for juvenile spring-run and fall-run Chinook salmon and steelhead rearing for the lower reach of Clear Creek, and completed a draft report for fall-run Chinook salmon and steelhead spawning on Clear Creek.

The **(b)(2) Dedicated Project Yield Program**, successfully allocated the full 800,000 AF of (b)(2) water, in water year 2010 (October 1, 2009–September 30, 2010), which was considered to be "a below normal" water year type. The 800,000 AF was managed for fish, wildlife and habitat restoration purposes.

The **(b)(3) Water Acquisition Program** acquired 60,340 AF of water (30% of the 200,000 AF target) to improve instream flows and habitat restoration for anadromous fish under the San Joaquin River Agreement.

The **(b)(4) Tracy (Jones) Pumping Plant Program** completed a new on-site biological resources building; installed a new trash rack cleaner; and continued study of the Two Gates Fish Protection Demonstration Project. These activities are aimed at improving fish collections and reducing the number of fish entrained at the Jones Pumping Plant.

The **(b)(5) Contra Costa Canal Pumping Plant Program** continued construction of the new Rock Slough Fish Screen, including completion of the coffer dams, footing and foundation for the facility. When complete, this fish screen will prevent fish mortality due to operation of the pumping plant.

The **(b)(9) (b)(19) Flow Fluctuation Program** used (b)(2) and (b)(3) water and re-operations pursuant to (b)(1)(B) to augment and maintain flows on CVP streams to minimize losses of anadromous fish due to flow fluctuations.

The **(b)(10) Red Bluff Diversion Dam Program** completed the interim pumping plant, and began construction of the permanent pumping plant, including excavation of the forebay, pumping station, switch yard, and installation of sheet piles. When complete, the new pumping plant will allow for 100% fish passage above Red Bluff Diversion Dam without affecting deliveries to Glenn-Colusa Irrigation District (GCID) and Sacramento National Wildlife Refuge.

The **(b)(12) Clear Creek Restoration Program** met water temperature targets 26% of the time during spring Chinook salmon spawning, arguably the most temperature-sensitive time of the year. The temperature target was exceeded most of the time from September 15 to October 31 when flows were interrupted to allow for the removal of toxic mine waste. To increase spawning habitat, 3,000 tons of gravel were added by the program and an additional 5,500 tons were placed by the Western Shasta Resources Conservation District.

The **(b)(13) Spawning and Rearing Habitat Restoration Program** purchased and placed approximately 5,500 tons of gravel in the Sacramento River and 16,000 tons of gravel on the American River to provide spawning and rearing habitat.

The **(b)(15) Head of Old River Barrier Program** installed a seasonal, non-physical bubble curtain at the head of Old River to help keep fish in the mainstem of the San Joaquin River and out of Old River where they are at risk for entrainment. Preliminary monitoring suggested that the curtain is effective at limiting the number of fish that enter Old River.

The **(b)(16) Comprehensive Assessment and Monitoring Program (CAMP)** completed an annual report that synthesizes and analyzes anadromous fish monitoring data collected between 1992 and 2010 on 22 watersheds. The CAMP also performed an assessment of data currently being collected by all CVPIA programs, began developing a data management plan, and developed and conducted six Data Stewardship classes to improve the way data is collected, entered and accessed by the CVPIA programs.

The **(b)(21) Anadromous Fish Screen Program (AFSP)** completed construction of four projects, screening a total 262 cfs to reduce entrainment of juvenile Chinook salmon, steelhead, green sturgeon and white sturgeon. Projects included cylindrical screens at Sutter Mutual State Ranch, Sycamore Mutual (Davis Ranches #2), and River Garden Farms #2, and a cone screen at the Lake California diversion on the Sacramento River.

The **(g) Ecosystem and Water Systems Operations Models Program** applied the CalSim II and CalLite

Tracy fish collection facility

models to evaluate provisions in the National Marine Fisheries Service (NMFS) and the Service Operations Criteria Plan (OCAP) biological opinions. The program also assisted the NMFS in utilizing the CalSim II, ECOSIM-W, and CalLite models to develop feasible Reasonable and Prudent Alternatives (RPAs) for the NMFS and the Service OCAP biological opinions; and applied the Upper Sacramento River Water Quality Model to support the Sacramento River Temperature Task Group in making and updating plans for summer season reservoir operations.

Natural Production of Anadromous Fish

Natural production of anadromous fish is an outcome based goal of the CVPIA Program. The Act specifically requires that actions (output based goals) must be taken to increase the natural production to twice the average of the baseline period (1967-1991), also referred to as the "doubling goal."

Chinook Salmon

The Chinook salmon fall-run is by far the largest run and is frequently used as an indication of the overall health of the system. However, each run is important and discussed in this report.

The data for estimated natural production of Chinook salmon shows that in only a single instance has any run exceeded the Central Valley wide doubling goal; this occurred for the late-fall run in 1998. However, this run was below the baseline mean for all but 1998 and 2002 and (for the baseline period) has decreased to less than 15% of the baseline (<7.5% of the doubling goal) in 2008 and 2009.

The fall-run exceeds the baseline mean for 11 out of the 18 years since the passage of the CVPIA, but only approached the Central Valley wide doubling goal once (1995) during the same period. The natural production of this run has seen a continuous decline since 2002 with a precipitous drop since 2005. The 2008 and 2009 values have been only 11% and 8% of the baseline mean (~5.5% and 4% of doubling target), respectively.

The winter run has never exceeded the baseline mean since 1992. The natural production was 5% and 8% of the baseline mean (2.5% and 4% of the doubling goal) in 2008 and 2009, respectively.

The spring run exceeded the baseline mean numbers only in 1995 and 1998. It appeared to show steady improvement from 1999 to 2005 but has declined

since that time. The 2008 and 2009 production is 13% and 7% of the baseline mean (6.5% and 3.5% of the doubling goal), respectively.

Other Anadromous Fish

The other anadromous fish with CVPIA targets are more fully discussed in (b)(16). No surveys of striped bass, green or white sturgeon were performed in 2009. Steelhead production targets cannot be addressed because operational changes at the Red Bluff Diversion Dam after 1994 preclude the ability to collect comparable post-baseline data for this taxon. The American Shad is the only taxon with data available from 1992 through 2009. The baseline mean mid-water trawl index for the shad is 2,129. This fish actually matched or exceeded the doubling goal in four out of the 18 years since 1992; there were an additional three years in which it exceeded the baseline values (1997, 1998, and 2006). The last three years have seen the numbers at 25.9%, 12.7%, and 29.3% of the baseline mean (12.8%, 6.3%, and 14.5% of the doubling goal), respectively.

In general, the last few years have not been good for the anadromous fish of the Central Valley. There has been a consistent drop in Chinook salmon production in spite of the CVPIA Program accomplishing significant restoration projects. The causes of these decreases are generally accepted to be due to poor ocean conditions and a number of other factors as described in Lindley, et al (2009) and Vogel (2011).

Trinity River Basin

The (b)(1) & (b)(23) Trinity River Restoration Program released 656,700 AF from the Lewiston Reservoir to provide adequate temperature and habitat conditions for fish and wildlife at different life stages. The program also made progress on five additional channel rehabilitation sites (with completion expected by December 2010); and placed 13,500 cubic yards (CY) of coarse sediment, the highest amount placed to date. This includes large, immobile gravel for construction.

San Joaquin River Basin

The (c)(1) San Joaquin River Restoration Program (SJRRP) completed the Fisheries Management Plan and Implementation Plan. The program also implemented experimental flow releases from Friant Dam, and recirculated 42,000 AF of water that was used for the experimental flow releases back to the Friant Division long-term contractors to reduce water supply impacts to Friant Division contractors.

REFUGES RESOURCES

The Refuges Water Supply Program (RWSP) delivered 390,546 AF of Level 2 and 58,021 AF of Incremental Level 4 water during FY 2010. A total of 54,335 AF was delivered from non-CVP diverse sources, including riparian water rights water, pre-1914 water rights water, groundwater, accretion water, and water provided under Merced Irrigation District's existing mitigation agreement with the Federal Energy Regulatory Commission. The refuges facilities construction program constructed an automated trash rack on the Newman Canal to improve removal of debris at the gate. The program also completed testing of the East Bear Creek Phase I Pumping Plant and Pipeline for the San Luis NWR, and revised operating procedures were implemented and tested to optimize deliveries.

OTHER RESOURCES

The Habitat Restoration Program contributed towards protection of 2,049 acres of new habitat and restoration of 38 acres in Fresno, Merced, Stanislaus and El Dorado counties to benefit endangered or threatened species, including Hartweg's golden sunburst, vernal pool fairy shrimp, succulent owl's clover, burrowing owl, San Joaquin kit fox, giant kangaroo rat, riparian brush rabbit, Gabbro soils plants and San Joaquin woolly threads. The Land Retirement Program retired 30 acres of land and restored 400 acres to upland habitat by planting native seed mixes that are adapted to local conditions. The program also eliminated the production of over 3,700 AF of poor quality agricultural drainage water by taking irrigated agricultural land out of production.

RECENT DEVELOPMENTS

Since 1993, the CVPIA Program has steadily progressed in completing specific actions called for by Congress to meet the goals of CVPIA. Several

developments in FY 2010 affected the Program's planning and implementation, including ARRA funding, State cost-share funding, the State Water Package, OCAP, the Bay Delta Conservation Plan, and changing environmental factors.

American Recovery and Reinvestment Act (ARRA) Funding

ARRA's funding in FY 2010 enhanced the CVPIA Program's capabilities to restore fisheries and wildlife refuges. To date, approximately $120 million has been awarded to Reclamation for CVPIA activities. In FY 2010, ARRA funds were obligated for the following: Contra Costa Canal Pumping Plant Program, 3406 (b)(5), obligated $16.1 million to begin construction on the Contra Costa Canal fish screen, which is scheduled to be completed by November; Red Bluff Diversion Dam Program, 3406 (b)(10), obligated $98.7 million to begin construction on the permanent pumping plant for the fish passage project, which is scheduled to be complete in FY 2012; Trinity River Restoration Program, 3406 (b)(1) and (b)(23), obligated $5.05 million to restore the Lowden, Trinity House Gulch, and Reading Creek channels; these sites were about 60% complete in FY 2010 and restoration efforts will continue in FY 2011; the RWSP obligated $5 million for the construction of groundwater wells in FY 2011 at the Pixley National Wildlife Refuge and Gray Lodge State Wildlife Area; and obligated $2 million to begin construction of the groundwater wells at the Volta State Wildlife Area with completion scheduled for FY 2011. The RWSP obligated funds totaling $7 million was part of Reclamation's Drought Program and therefore, are excluded from the CVPIA ARRA obligation of $120 million.

State Water Package

In FY 2010, the State legislature developed a measure known as the Safe, Clean, and Reliable Drinking Water Supply Act. The purpose of the law is to protect water quality and ensure safe, clean drinking water; meet the water supply needs of California residents, farms, businesses; expand water conservation and recycling; restore fish and wildlife habitat; reduce polluted runoff that contaminates rivers, streams, beaches, and bays; and protect the safety of water supplies threatened by earthquakes and other natural disasters. It includes State issuance of bonds totaling $11,140,000,000 paid from existing State funds. The measure contains funding for CVPIA Program activities such as Central Valley wildlife refuge water and construction of fish passage improvements at Red Bluff Diversion Dam. The bond was originally slated to appear on the November 2, 2010, ballot as Proposition 18. However, on August 9, 2010, the California State Legislature decided to postpone the vote on the measure until the November 6, 2012, ballot.

As a result of the State Water Package, the State appropriated $28 million in funding from Proposition 50, to fund the Two-Gates Fish Protection Demonstration Program. However, the independent review of the Two Gates Demonstration Project found additional data is needed to assess its effectiveness in achieving its objectives. Once the data are obtained and assessed, a determination on whether the project should move forward will be made. Reclamation is working with DWR and the State Water Project contractors to develop additional actions that could be implemented in addition to and/or as alternatives to the Two-Gates Project.

Operations Criteria and Plan (OCAP)

On December 15, 2008, the Service issued its Biological Opinion (BO) analyzing the effects of the CVP and SWP operations on the threatened delta smelt. On June 4, 2009, NMFS issued its BO analyzing the effects of the CVP and SWP operations on threatened and endangered (T&E) salmonids and other listed species. The conclusions resulted in a determination of "likely to jeopardize" and "would jeopardize", respectively. The CVP and SWP are currently operating under the two BO's which set forth Reasonable and Prudent Action (RPA) alternatives that are required to be implemented by Reclamation to optimize protection for anadromous species during operation of the CVP. The BOs have both been challenged in Federal District Court. In December 2010, U.S. District Court Judge Oliver Wanger issued a ruling on the Service OCAP BO. The judgment requires the Service to revise the BO to more rigorously research the delta smelt flow requirements



for the CVP system. In FY 2010, several CVPIA activities contributed to meeting the RPA requirements such as:

- Implementation of the new pumping plant and fish screen at the Red Bluff Diversion Dam for increased passage of spring-run Chinook and green sturgeon;
- Construction of the Contra Costa Pumping Plant No. 1 fish screen to mitigate fishery impacts; and
- Surveys conducted by the Flow Fluctuations and Reservoir Storage program for steelhead juveniles and redds on the American River to inform operational changes to reduce stranding and isolation of listed anadromous salmonid species.

Independent Reviews for Fisheries and Refuges

In 2007, as part of the Office of Management and Budget (OMB) Program Assessment and Rating Tool (PART) process, the CVPIA Program went through an independent review to evaluate how efficiently and effectively the CVPIA was meeting its goals. A Fisheries Independent Review panel assessed the implementation of the Central Valley fisheries program activities under CVPIA (i.e. fish doubling). The panel's recommendations can be found in, "Listen to the River – An Independent Report on the CVPIA Fisheries Program" dated December, 2008. Since the panel's recommendations were released, the fifteen separate authorities that make up the fisheries program have been working together to implement improvements to the program and to develop a fisheries resource area plan. This plan will articulate a reorganization strategy that places an emphasis on managing the fisheries related provisions as one program, rather than as individual programs. This new structure will enable the program to: articulate an overarching vision; utilize a science-based management framework to address problems at a system level; report accomplishments by watershed; and improve transparency by communicating the coordination and decision-making that occurs within the program.

In 2008 and 2009, the RWSP was reviewed and the panel's recommendations are presented in a report entitled, "Undelivered Water: Fulfilling the CVPIA Promise to Central Valley Refuges", dated November 3, 2009. In response to the panel's recommendations, the RWSP has taken several steps: entered into an agreement with the Service and the National Fish and Wildlife Foundation to explore avenues to improve the effectiveness of the water acquisitions, including those for Incremental Level 4; assessed ways to increase the priority for pumping, conveyance and storage of Incremental Level 4 water supplies in CVP facilities; continued planning for external conveyance construction; and investigated storage options in existing or new groundwater banks.

Drought and Climate Change

The water year type is a designation that is based on hydrologic indices for the Sacramento and San Joaquin Valleys. Water Year Type is either wet, above normal, below normal, dry or critical and is determined by factors of precipitation and runoff and is therefore indicative of local regional conditions that influence climate, snowpack and runoff. In drier years, the CVPIA program activities responsible for acquiring and delivering water for instream purposes or for refuges, may be limited in their ability to purchase or deliver water. Some of these reductions are a result of the market bearing higher prices with lower supplies, and some of these reductions such as for (b)(2) water are consistent with Interior policies. In California, drought has occurred over three consecutive years from 2007 through 2009 (annual statewide precipitation (ppt) totaled 63%, 72% and 76% of average, respectively). Although more recent postings on the California Department of Water Resources website denote "normal" ppt for California currently, it typically takes more than one season, or one year to recover from a drought that's taken place over multiple years. For the longer term, drought and climate change will increasingly challenge our ability to meet water demands, because as the climate warms, projections are that ppt will fall mostly as rain, rather than snow. This projected decrease in snowpack and potential increase in rain precipitation may affect our ability to maintain sufficient storage through the summer to achieve the instream flow and temperature objectives for anadromous fish.

Factors affecting fish production

An anadromous fisheries stock collapse began in 2006, reached a low in 2009 and persisted in 2010. Figure ES-1 shows the estimated natural production of all Central Valley Chinook Salmon runs from 1952-2010. The numbers are separated into Pre-Baseline (1952-1966), Baseline (1967-1991); containing the baseline mean that the Act requires to double fish production), and Post-Baseline (1992-2010). The doubling-goal and the averages for each period are also shown. The post-Baseline period has two averages shown: the higher average is for the period 1992-2005 prior to the stock collapse and the lower average is for 1992-2010 which includes the stock collapse.

We know that the decline was not restricted to the Central Valley anadromous fish but was seen in streams throughout the Pacific Northwest. There have been a number of opinions on why the populations have declined and have remained low but the prevailing theory is a combination of stressors including freshwater and estuarine habitat degradation, poor ocean conditions in 2005 and 2006, high harvest rates in 2007 and drought conditions from 2000-2003. These and other causes are more thoroughly discussed by others including Lindley, et al (2009) and Vogel (2011).

Suspension of commercial fishing in 2008-2009 may help the populations to recover, but the drought of 2007-2009 may confound the recovery. While phenomena such as droughts can cause local and regional population declines, the state and federal governments have the ability to limit some of these impacts downstream of reservoirs by adjusting water releases and deliveries. However, changes in ocean conditions, as discussed by Lindley, et al (2009), can cause significant variations in the escapement. In addition, the lack of understanding of these conditions, and their cumulative effects, can make managing the fisheries very challenging.

One of the most obvious consequences of the population decline is that meeting the fish doubling goal will require more time than estimated. A secondary consequence is that the collapse of naturally produced Chinook salmon has resulted in a gene pool that could easily be overwhelmed by hatchery-produced fish.

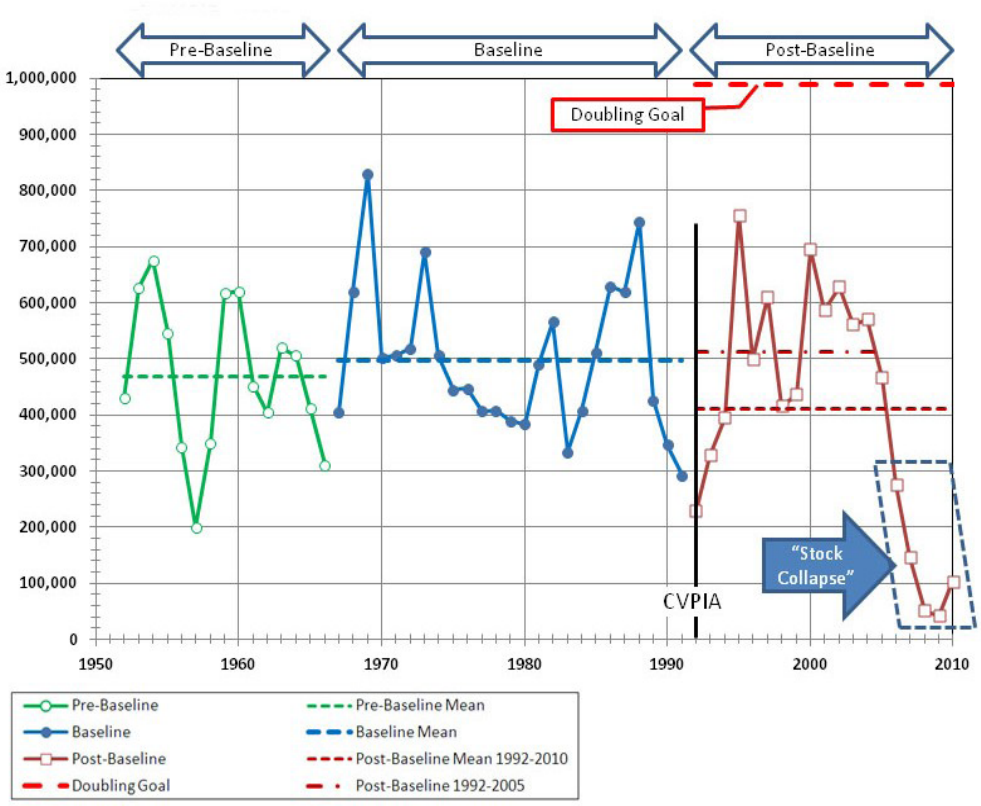
The CVPIA Program works to improve the success of the salmon at the beginning and the end of the lifecycle: birth/rearing and returning and spawning. Conditions seaward of the Delta are generally beyond this program's control. Actions taken by the CVPIA Program are recognized to be positive actions to improve habitat for the spawning and rearing of anadromous fish. It could even be said that without the actions taken by the CVPIA Program some races of salmonids might have fared even worse over the past few years. Chapter 2 summarizes measures of progress toward the broad goals of the CVPIA Program for the past 18 years along with other actions that improve the ecosystem.

Science Based Management Framework

Since 1992, the CVPIA Program has implemented many projects to improve a variety of ecosystem functions (spawning, rearing, migration, etc.) that are known to be beneficial to anadromous fish species. In spite of these actions, conditions that are beyond the authority of the CVPIA Program can overwhelm the system functions that are within the CVPIA authority. In most cases, the CVPIA Program does not have the ability to determine the exact influence of individual phenomena on program goals. The CVPIA Program requires a system that can separate and quantify the impacts within our control and those outside of our control.

To increase our understanding these phenomena and other cause and effect relationships, the CVPIA Program will develop and implement a science-based management framework (SBMF). The creation of this framework was recommended by the Fisheries Independent Review Panel and is seen by the agencies as a valuable tool. The SBMF will be a process for future decision-making about priorities and actions based on species' needs, monitoring and adaptive management, directed toward specific goals and outcomes. Such a process will improve the CVPIA Program's understanding of the

sociological, hydrological, oceanic, meteorological, and biological systems that are the essence of the ecosystems associated with the Central Valley project and its native species. Improved knowledge and understanding of all the ecosystem functions, and the interplay of these functions, will allow the program activity managers to take advantage of the principles of adaptive management. Utilizing the tools of adaptive management will reduce the uncertainty with which we make resource management decisions. This will allow managers to adaptively set priorities on which actions will be most efficient and effective in obtaining the overall goals of the Act.



[1] Anadromous Fish Restoration Program. 2010. Chinookprod. Last updated: April 22, 2010. Available: <http://www.fws.gov/stockton/afrp/Documents/Chinookprod_042210.xls>.

Figure ES-1: Estimated Natural Production of All Central Valley Chinook Salmon Runs, 1952-2009

Chapter 1

INTRODUCTION

Chapter 1- Introduction

PURPOSE

This fiscal year (FY) 2010 CVPIA Annual Accomplishments Report summarizes the actions authorized under the Central Valley Project Improvement Act (CVPIA or Act) of 1992 and highlights FY 2010 accomplishments (October 1, 2009 - September 30, 2010). Section 3408 (f) of the Act directs the Secretary of Interior to submit an annual report describing all significant actions taken toward achievement of the intent and purposes of Title 34. Accomplishments, funding obligations and recent developments for Section 3406 and 3408 CVPIA Program activities are presented in Chapter 2 by resource area (Fisheries, Refuges, and Other Resources). The relevant Sections of the Act are provided for reference in Appendix C.

INTRODUCTION AND BACKGROUND

CENTRAL VALLEY PROJECT IMPROVEMENT ACT OF 1992

In 1992, the 102nd Congress passed, and the President signed, the multi-purpose water legislation known as the CVPIA. Officially designated as Title 34 of Public Law 102-575, this landmark piece of legislation amends previous authorizations of the California Central Valley Project (CVP) to include fish and wildlife protection, restoration, enhancement, and mitigation as project purposes having equal priority with irrigations and domestic water supply uses, and power generation.

The purpose of the CVPIA is expressed in six broad statements found in Section 3402 of the Act:

- To protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California;
- To address impacts of the CVP on fish, wildlife, and associated habitats;
- To improve the CVP's operational flexibility;
- To increase water-related benefits provided by the CVP to the state through expanded use of voluntary water transfers and improved water conservation;
- To contribute to the state's interim and long-term efforts to protect the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary;
- To achieve a reasonable balance among competing demands for use of CVP water, including the requirements of fish and wildlife, agricultural, municipal and industrial, and power contractors.

The Secretary of the Department of Interior (Interior) assigned primary responsibility for implementing CVPIA's many provisions to Reclamation and the Service, both agencies of Interior. Reclamation and the Service coordinate with other federal agencies, tribes, the State of California (State), and numerous partners and stakeholders during each fiscal year to plan and implement activities.

CVPIA BACKGROUND

For 74 years, California has depended on the CVP for a large part of its water needs, particularly for agriculture. With a climate typified by extremely variable precipitation, both temporally and regionally, the State relies heavily on dams and reservoirs to balance and manage its water resources, and on an extensive distribution system to convey water supplies for regional needs. Much of the State's water originates in the north and is conveyed southward, primarily through the Sacramento River system. Some water is diverted along the way, with the remainder fl owing into the Sacramento-San Joaquin River Delta, where CVP water co-mingles with other supplies such as those of the State Water Project (SWP). A portion

Figure 1: Central Valley Project (CVP) System

of the water entering the delta is pumped south; the majority discharges to the San Francisco Bay and the Pacific Ocean. The CVP today comprises 18 dams and reservoirs (able to store 9 million acre-feet of water), 11 power plants, 500 miles of canals and aqueducts, three fish hatcheries, and associated facilities including pumping plants and power lines. The ecosystems of the Central Valley, Delta Estuary, San Francisco Bay, and Trinity River are affected by water diversions–particularly in drought years–so much so that the courts have intervened to ensure that adequate fresh water enters these ecosystems. Compliance with the Endangered Species Act (ESA) and water quality mandates requires water releases from CVP dams to regulate water temperatures, salinity and instream flows, and limits water diversions to protect ESA-listed fi sh from the effects of pumping water at the Tracy (Jones) Pumping Plant in the Delta. These factors have greatly increased the competition for existing water supplies and have focused scrutiny on the ways that water resources are being used. Environmental conditions have changed greatly since

the CVP was authorized in 1935. Population growth and development have increased farm, urban, and industrial water demands. Concurrently, populations of fish and wildlife have declined, resulting in some species being listed as endangered or threatened due to severe habitat loss. In response, a new imperative for resource management and ecological stewardship has evolved.

CVPIA GOALS

The current focus of the CVPIA Program is on fish and wildlife restoration, water management, and conservation activities, authorized in Sections 3406 and 3408 of the Act. These goals fit within three broad resource areas: Fisheries, Refuges and Other Resources. Figure 2 shows the active CVPIA provisions that contribute to each resource area as well as those provisions that are completed or inactive. Additional information on the completed projects and how they have contributed to the CVPIA restoration efforts may be found online at http://www.usbr.gov/mp/cvpia/index.html. Contract renewals (Section 3404) and water transfers (Section 3405) goals are also important CVPIA goals and are mentioned here, but are not the focus of this report since they are not funded with the CVPIA Restoration Fund; their goals and accomplishments are briefly discussed following the Fisheries, Refuges and Other Resources area discussion.

Fisheries	Refuges	Other
Central Valley 3406 (b)(1) Anadromous Fish Restoration Program 3406 (b)(1)(B) Modified CVP Operations 3406(b)(2) Dedicated Project Yield 3406(b)(3) Water Acquisition Program 3406 (b)(4) Tracy Pumping Plant Program 3406 (b)(5) Contra Costa Canal Pumping Plant 3406 (b)(7) Meet Flow Standards and Objectives 3406 (b)(8) Short Pulse Flows 3406 (b)(9) Flow Fluctuations 3406 (b)(10) Red Bluff Diversion Dam 3406 (b)(12) Clear Creek Restoration Program 3406 (b)(13) Spawning and Rearing Habitat Restoration Program 3406 (b)(15) Head of Old River Barrier 3406 (b)(16) Comprehensive Assessment and Monitoring Program 3406 (b)(19) Reservoir Storage 3406 (b)(21) Anadromous Fish Screen Program 3406 (g) Ecosystem and Water System Operations Models **Trinity River Basin** 3406 (b)(23) Trinity River Restoration Program **San Joaquin River Basin** 3406 (c)(1) San Joaquin River Restoration Program	**Refuge Water Supply** 3406 (b)(3) and 3406 (d)(2) Water Acquisition Program 3406 (d)(1), (d)(2), and (d)(5) Wheeling and Conveyance 3406 (d)(5) Facilities Construction and San Joaquin Basin Action Plan Lands	**Terrestrial Habitat and Species & Water Quality and Conservation** 3406 (b)(1) "other" Habitat Restoration Program 3408 (h) Land Retirement Program **Completed Programs** 3406 (b)(6) Shasta Temperature Control Device 3406 (b)(17) ACID Diversion Dam 3406 (b)(20) Glenn-Colusa Irrigation District Program 3406 (b)(22) Waterfowl Incentive Program 3406 (c)(2) Stanislaus River Basin Water Needs Program 3406 (d)(6) Central Valley Wetlands Supply 3406 (e) Supporting Investigations 3406 (f) Project Fisheries Impact Report 3408 (i) Water Conservation Program 3408 (j) Water Augmentation (Yield Study) **Inactive Programs** 3406 (b)(11) Coleman National Fish Hatchery 3406 (b)(14) Delta Cross Channel and Georgiana Slough 3406 (b)(18) Restore Striped Bass Fishery

Figure 2: Provisions by Resource Area

FISH, WILDLIFE, IMPROVED WATER MANAGEMENT & CONSERVATION (CVPIA SECTIONS 3406 AND 3408)

FISHERIES RESOURCE AREA

Central Valley

The Act directs Interior to, "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...." The target established by this portion of the Act is known as the "fish-doubling goal", which pertains to Chinook salmon, Rainbow trout (steelhead), striped bass, American shad, white sturgeon and green sturgeon; species believed to have been impacted by CVP construction and operation. Section 3406 (b)(1), which authorizes the Anadromous Fish Restoration Program (AFRP), is wholly devoted to the purpose of fish doubling. The AFRP's 2001 Final Restoration Plan (Plan) identified 289 actions and evaluations that were determined to be reasonable given numerous technical, legal and implementation considerations. The Plan's actions and evaluations are covered in the October 1999 Central Valley Project Improvement Act Final Programmatic Environmental Impact Statement. When the Plan's actions are implemented in concert, they provide for comprehensive restoration that improves freshwater habitat for Chinook salmon and other anadromous fish species.

In addition to the anadromous fish "doubling goal", the CVPIA Program uses the suite of structural and non-structural restoration actions from the Plan to measure progress. Progress toward "fish doubling" goal and the restoration actions, as well as other CVPIA provisions that support the Central Valley fisheries goals, and take part in implementing the Plan's actions and evaluations are discussed in Chapter 2.

Trinity River Basin

The CVPIA includes provisions to authorize activities for the Trinity River Restoration Program (TRRP); Section 3406 (b)(23) for delivering flows and 3406 (b)(1) for river restoration. The Trinity River is the Klamath River's largest tributary and is geographically separate from the Central Valley and the Sacramento River. However, substantial water from the Trinity River has historically been exported through a trans-basin diversion to support water needs in the Central Valley. The goal of the TRRP is to restore and sustain natural production of anadromous fish populations downstream of Lewiston Dam to pre-dam levels, to facilitate dependent tribal, commercial, and sport fisheries' full participation in the benefits of restoration via enhanced harvest opportunities. This will be accomplished through restoring habitats for the anadromous fishery resources by implementing variable annual instream flows, rehabilitating the channel, and managing sediment. The TRRP carries out actions that are stipulated in the Record of Decision (ROD), signed on December 19, 2000, the Trinity River Mainstem Fishery Restoration Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR), completed in October 2000.

San Joaquin River Basin

The San Joaquin River Restoration Program (SJRRP) carries out activities to restore and maintain fish populations in "good condition" on the mainstem of the San Joaquin River while reducing or avoiding adverse water supply impacts to Friant Division long-term contractors. Specific actions to achieve these goals include reintroduction of spring-run Chinook salmon, restoration flow releases and recirculation of restoration flows back to Friant Division contractors. The SJRRP is being planned and implemented because of the Natural Resources Defense Council, et al., v. Kirk Rodgers, et al. Stipulation of SJRRP Settlement (Settlement). Implementation of the Settlement, including planning, environmental studies and other activities necessary to achieve the Settlement's Restoration and Water Management goals are authorized in the San Joaquin River Restoration Settlement (SJRRP) Act, included in the Omnibus Public Land Management Act of 2009. The Act, which authorizes and directs the Secretary to fully implement the Settlement, was signed by the President on March 30, 2009, and became Public Law 111-11. The Act established the San Joaquin River Restoration Fund (SJRR Fund) and authorizes the use of up to $2 million a year from the Central Valley Project Restoration Fund under the Section 3406 (c)(1).

REFUGES RESOURCES AREA

The CVPIA includes several provisions in Section 3406 (d) that are designed to contribute to the maintenance, restoration and enhancements of wetlands and waterfowl habitat. The Act directs Interior to: provide, either directly or through contractual agreements with other appropriate parties, firm water supplies of suitable quality to maintain and improve wetland habitat areas on 19 federal, state and private lands, collectively referred to as "refuges." The Refuge Water Supply Program (RWSP).goal is to provide 555,515 AF of water annually, including 422,251 AF of Level 2 water; 26,007 AF of replacement water; and 133,264 AF of Incremental Level 4 water to the refuges, as required by the Act.

Independent Reviews for Fisheries and Refuges

In 2007, as part of the Office of Management and Budget (OMB) Program Assessment and Rating Tool (PART) process, the CVPIA Program conducted two independent reviews to evaluate efficiency and effectiveness toward meeting the Act's goals. A Fisheries Independent Review panel assessed the implementation of the Central Valley fisheries activities (i.e. fish doubling). The panel's recommendations can be found in, "Listen to the River – An Independent Report on the CVPIA Fisheries Program" dated December 2008, which calls for a science-based adaptive management approach, increased focus on the Bay-Delta and increased flows for fish. Since the panel's recommendations were released, the fifteen separate authorities that contribute to the "fish doubling" goal have been working together to implement improvements and to develop a fisheries resource area plan. This plan will articulate a reorganization strategy that places an emphasis on managing the fisheries related provisions as one program, rather than as individual program activities. This new structure will enable the program to articulate an overarching vision; utilize a science-based management framework to address problems at a system level; report accomplishments by watershed; and improve transparency by communicating the coordination and decision-making that occurs within the program.

In 2008 and 2009, the RWSP was reviewed and the panel's recommendations are presented in a report entitled, "Undelivered Water: Fulfilling the CVPIA Promise to Central Valley Refuges", dated November 3, 2009. In response to the panel's recommendations, the RWSP has taken several steps: entered into an agreement with the Service and the National Fish and Wildlife Foundation to explore avenues to improve the effectiveness of the water acquisitions, including those for Incremental Level 4; assessed ways to increase the priority for pumping, conveyance and storage of Incremental Level 4 water supplies in CVP facilities; continued planning for external conveyance construction; and investigated storage options in existing or new groundwater banks.

OTHER RESOURCE AREA

The third focus of the CVPIA restoration initiatives is directed at terrestrial habitat and species; and water quality and conservation. Provisions supporting this initiative include the Section 3406 (b)(1)"other" Habitat Restoration Program (HRP), which focuses on protecting native habitats that have been directly and indirectly affected by the CVP's construction and operation. This is accomplished through the purchase of fee title or conservation easements on lands where threats are significant and restoring lands to native habitat. The HRP contributes to the protection and/or restoration of the 2.7 million acres of habitat affected by the construction and operation of the CVP.

The Land Retirement Program (LRP), Section 3408 (h), goals include the purchase and retirement of land from agricultural production to improve water quality and provide for terrestrial habitat restoration. By ceasing irrigation of agricultural lands, the LRP reduces the volume of agricultural drainage produced, improving water quality and providing the opportunity to restore wildlife habitat. Specifically, the goal of the LRP is to retire 15,000 acres of agricultural lands by 2014 for the Land Retirement Demonstration Project and to restore up to 400 acres of that land annually.

CONTRACT RENEWALS (CVPIA SECTION 3404)

The Act directs Interior to "... upon request, renew any existing long-term repayment or water service contract for the delivery of water from the Central Valley Project ..."

Since the passage of CVPIA, Reclamation has completed interim and long-term contract renewals for the various CVP divisions and units. To date, Reclamation has executed 132 forty-year renewal contracts with Sacramento River Water Right Settlement contractors and 87 long-term renewal contracts with contractors from the Sacramento River Division, including the Trinity River, Shasta, Black Butte and Tehama-Colusa and Corning Canals units, Delta-Mendota Canal Division, and Friant divisions. Twenty-six long-term renewal contracts have either been negotiated or are in the process of being negotiated and are awaiting execution. Thirteen Sacramento River Water Right Settlement contractors elected not to renew and two contracts are pending renewal.

Long-term renewal contracts for the seven Cross Valley contractors are currently being negotiated, as are contracts for the Sacramento Municipal Utility District (SMUD) and the City of Tracy. Reclamation and the nine San Luis Unit contractors have completed negotiations for long-term renewal contracts, and are awaiting execution pending completion of final environmental documentation, including consultations with the Service and the National Marine Fisheries Service (NMFS).

WATER TRANSFERS (CVPIA SECTION 3405)

Water transfers are a means by which existing water supplies can be reallocated from one user to another to assist in meeting existing and future water needs within California. Water transfers represent an important management option because they create opportunities to meet municipal, industrial demands, as well as benefit environmental and recreational values. CVPIA authorizes individuals and districts who received CVP water to transfer all or a portion of that water to other users within the state for any purpose

San Joaquin River

recognized as beneficial under state law, subject to certain terms and conditions.

Reclamation has approved the transfer of CVP water in the following categories for FY 2010:

- 482,075 acre-feet of CVP agricultural water was approved for agricultural purposes;
- 2,152 acre-feet of CVP agricultural water was approved for municipal and industrial purposes;
- 13,650 acre-feet of CVP municipal and industrial water was approved for agricultural purposes;
- 4,606 acre-feet of CVP municipal and industrial water was approved for municipal and industrial purposes;
- 40,714 acre-feet of CVP agricultural water was approved to Reclamation's Refuge Water Acquisition Program.

These records are normally maintained on a contract year basis, March 1 to the last day of the following February (the contract year is designated by the year in which it begins). Therefore, the stated amounts will differ from other numbers reported for the contract year.

PROGRESS AND FUNDING

CVPIA fish, wildlife, and improved water management and conservation actions are implemented through a variety of agreements that are held with partners including other federal and State agencies, tribes and local organizations. Reclamation and the Service use interagency agreements, memoranda of understanding, grants and cooperative agreements to partner with entities that have the authority, interest, ability, expertise and/or resources to implement CVPIA restoration actions.

The CVPIA Program utilizes multiple funding sources: Restoration Fund (RF), Water and Related Resources (W&RR), and the State of California (State). The Act specifies funding for each provision should either be reimbursable, non-reimbursable, from the State; or a combination of these sources. The RF, established by Section 3407(d) of the CVPIA, is an account in the Treasury of the United States (U.S.) and consists largely of revenue generated by fees levied on CVP water and power users. The total maximum annual RF appropriation authorized by CVPIA is $50 million (1992 price levels). Of this, $30 million (1992 price level) is the maximum amount (payment ceiling) that is authorized to be assessed and collected from the water and power users. The $30 million payment ceiling is calculated on a 3-year rolling average, which results in a cyclical funding pattern when collections are limited by the water deliveries and appropriations are limited by Congress. The annual appropriation bill from Congress provides budget authority based on estimated collections, and the obligation of these funds can only occur after the collections are made.

FUNDING OBLIGATIONS TO DATE

Since FY 1993, Congress appropriated RF and W&RR funds to the CVPIA Program. In addition, funds have been obligated from State cost-share funds, Bay-Delta funds and the American Recovery and Reinvestment Act (ARRA) funding. From these combined sources, a total of $1.3 billion has been obligated by the CVPIA Program over the past 18 years, as shown in Figure 3.

FY 2010

A total of $200 million was obligated in FY 2010, a substantial increase from the $96.7 million obligated

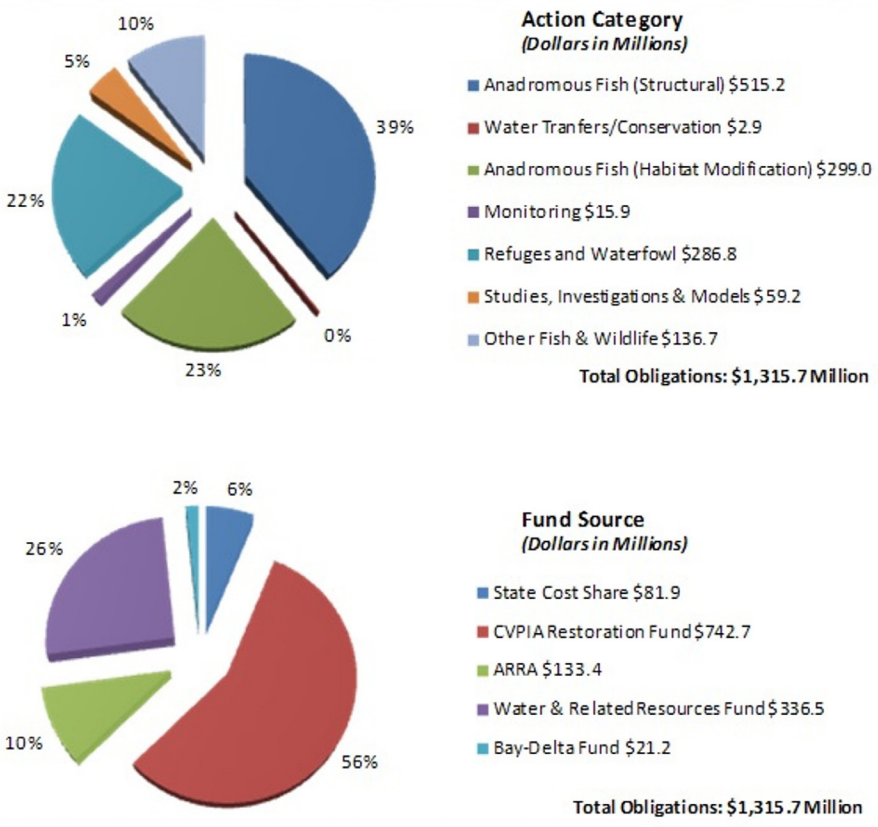


Figure 3: Total CVPIA Program Obligations by Action Category and Fund Source, 1993–2010

in FY 2009, and substantially more than the $69 million average since 1992. As shown in Figure 4, the increase in funding is largely due to the introduction of ARRA funds. These funds were made available for designed and permitted "shovel-ready" projects. For FY 2010, ARRA funding totaled $120 million, while RF included $35.4 million and $6.8 million came from prior year funds. The balance of the $200 million, approximately $24 million was obligated from the W&RR account; $2.2 million was obligated from the State cost-share funds; and $11.7 million was obligated from Bay-Delta funds. See Table 1 for a description of funding for each CVPIA Program activity in FY 2010.

STATE OF CALIFORNIA COST-SHARE

Section 3406 of the CVPIA requires that the U.S. enter into a cost-sharing agreement with the State for CVPIA implementation. On June 27, 1994, the State and the U.S. entered into the Sharing of Costs Agreement for Mitigation Projects and Improvements (SCAMPI). Initially under SCAMPI the State's maximum amount payable was $50 million through the agreements expiration in December 31, 2008.

Amendment No. 1 to SCAMPI, executed in June 1998, specified that the maximum amount payable to the U.S. by the State under the CVPIA cost-share was $93 million, the amount of funding provided by Proposition 204. Amendment No. 2 to SCAMPI, executed in August 2001, increased the maximum amount payable by the State pursuant to the cost-share provisions of CVPIA to $162,110,000. Amendment No. 3 to SCAMPI, executed in December 2008, resulted in an extension of SCAMPI for an additional three years to December 31, 2011.

In FY 2010, two amendments to SCAMPI were processed: Amendment No. 4 to SCAMPI, executed in February 2010, increased the maximum amount payable by the State pursuant to the cost-share provisions of CVPIA by $5,500,000 to $167,610,000 for the Red Bluff Diversion Dam Task Order Agreement. Amendment No. 5 to SCAMPI was also executed which increased the maximum amount payable to the U.S. by the State by $1,404,887 to $169,014,887 to contribute towards the cost of the

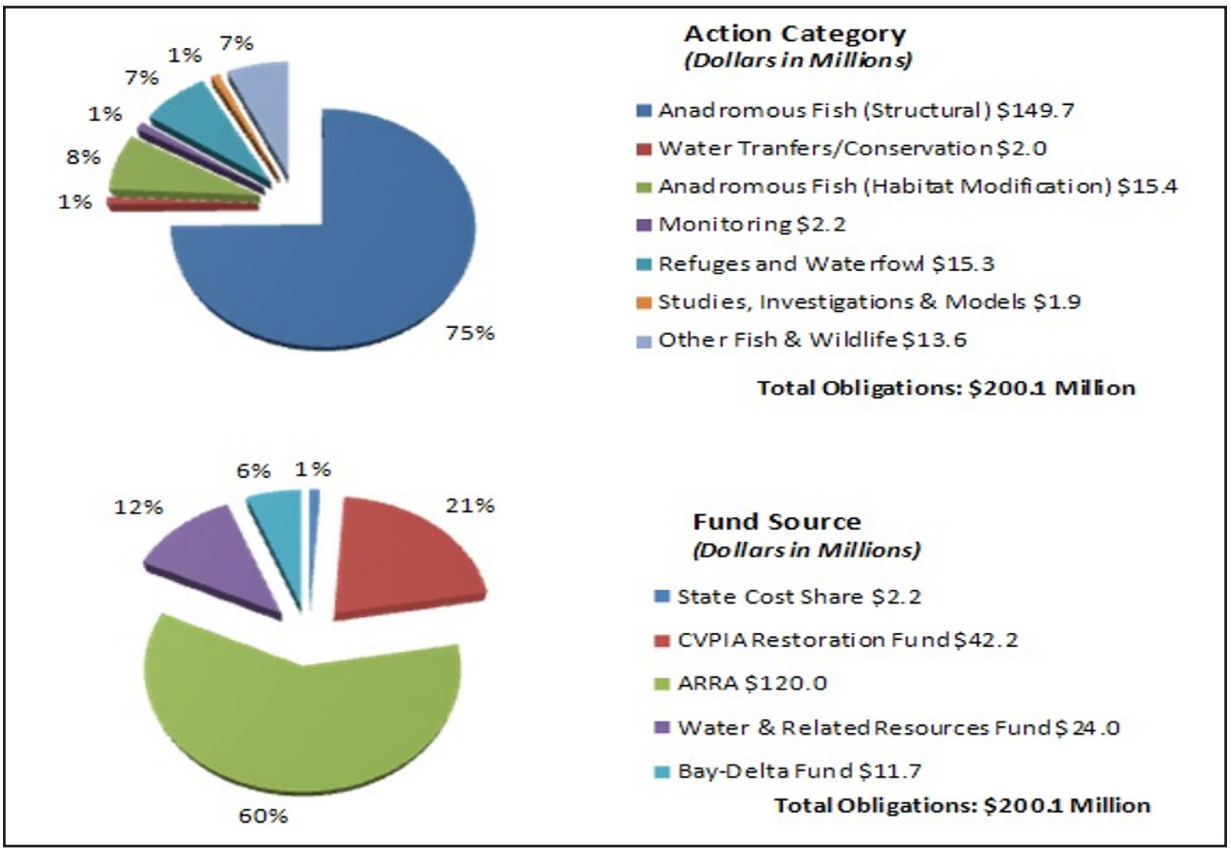


Figure 4: FY 2010 CVPIA Program Obligations by Action Category and Fund Source

Table 1: FY 2010 Funding Obligations by Provision (rounded)

Provision			Water & Related Funds	Restoration Funds	State Funds	Bay Delta Funds	ARRA Funds
3405(a)	Water Transfer Program		0	0	0	$2,039,000	0
3406(b)(1)	Anadromous Fish Restoration Program		0	$4,129,564	0	0	0
3406(b)(1)	"other" – Habitat Restoration Program		0	$1,268,000	0	0	0
3406(b)(1)	"other" – San Joaquin River Riparian Restoration		0	($33,000)	0	0	0
3406(b)(1)	"other" – Trinity River Restoration Program		$5,014,000	$1,787,000	0	$206,000	$5,038,000
3406(b)(1)(B)	Modify CVP Operations		0	$253,000	0	0	0
3406(b)(2)	Dedicated Project Yield		0	$906,000	0	0	0
3406(b)(3)	Water Acquisition Program -Instream Water (includes 3408(g) [VAMP])		0	$7,511,000		($17,000)	0
		VAMP	0	($1,128,000)	0	0	0
		Level 4	$489,000	$5,825,000	0	0	0
3406(b)(4)	Tracy (Jones) Pumping Plant Program		$2,683,000	$229,000	0	0	0
		Two Gates	0	0	0	$331,000	0
3406(b)(5)	Contra Costa Canal Pumping Plant No. 1		$20,000	0	0	$3,000	$16,135,000
3406(b)(9)	Flow Fluctuations		0	$6,100	0	0	0
3406(b)(10)	Red Bluff Diversion Dam		$12,170,000	0	$2,230,000	0	$98,775,000
3406(b)(12)	Clear Creek Restoration Program		0	$605,000	0	0	0
3406(b)(13)	Spawning Gravel		0	$693,000	($2,000)	0	0
3406(b)(15)	Head of Old River Barrier		0	0	0	$179,000	0
3406(b)(16)	Comprehensive Assessment and Monitoring Program		0	$2,181,000	0	0	0
3406(b)(19)	Minimum Carryover Storage		0	0	0	0	0
3406(b)(20)	Glenn Colusa Irrigation District		$50,000	0	0	0	0
3406(b)(21)	Anadromous Fish Screen Program		$500,000	$7,680,000	0	$8,779,000	0
3406(b)(23)	Trinity River Restoration		$2,699,000	0	0	0	0
3406(c)(1)	San Joaquin River Comprehensive Plan		0	$1,272,000	0	0	0
3406(d)(1)	Refuge Water Supply	Level 2 conveyance included in (d)(5)					
3406(d)(2)	Refuge Water Supply	Level 4 acquisition included in (b)(3)					
3406(d)(5)	Refuge Facilities Construction Program	Construction	$2,000	$245,000	0	0	0
		Wheeling	$105,000	$7,975,000	0	$206,000	0
3406(d)(5)	San Joaquin Basin Action Plan		$273,000	$167,000	0	0	0
3406(g))	Models		0	$602,000	0	0	0
3406(h)	Land Retirement Program		$2,000	$377,000	0	0	0
TOTAL FUNDING OBLIGATED			$24,007,000	$42,207,000	$2,228,000	$11,725,000	$119,948,000

Note: Funding obligations in ( ) are credit amounts

Vernalis Adaptive Management Plan (VAMP) Task Order Agreement. Under Amendment No. 6, which is in progress in FY 2011, the State will make a second payment to the U.S. towards the cost of the Fish Passage Improvement Project at the Red Bluff Diversion Dam in the amount of $6,500,000 increasing the maximum amount payable to the U.S. by the State to $175,514,887.

Currently the State, Reclamation and the Service are reconciling the federal and State cost-share under the SCAMPI. The agencies are analyzing cost-share credits and debits with the goal of reconciling the expenditures to-date in an effort to move the CVPIA Program forward with adequate cost-share funding. Reclamation and the Service are also working with the State on annual work planning and in future years State managed CVPIA-related activities and funding will be documented in CVPIA Program activity Annual Work Plans.

RECENT DEVELOPMENTS

Since 1993, the CVPIA Program has steadily progressed in completing specific actions called for by Congress to meet the goals of CVPIA. Several developments in FY 2010 affected the planning and implementation, including ARRA funding, State cost-share funding, the State Water Package, OCAP, the Bay Delta Conservation Plan, and changing environmental factors.

AMERICAN RECOVERY AND REINVESTMENT ACT (ARRA) FUNDING

ARRA's funding in FY 2010 enhanced the CVPIA Program's capabilities to restore fisheries and wildlife refuges. To date, approximately $120 million has been awarded to Reclamation for CVPIA Program activities. In FY 2010, ARRA funds were obligated for the following: Contra Costa Canal Pumping Plant Program, 3406 (b)(5), obligated $16.1 million to begin construction on the Contra Costa Canal fish screen, which is scheduled to be completed by November; Red Bluff Diversion Dam Program, 3406 (b)(10), obligated $98.7 million to begin construction on the permanent pumping plant for the fish passage project, which is scheduled to be complete in FY 2012; TRRP, 3406 (b)(1) and (b)(23), obligated $5.05 million to restore the Lowden, Trinity House Gulch, and Reading Creek channels; these sites were about 60% complete in FY 2010 and restoration efforts will continue in FY 2011; and the RWSP obligated $5 million for the construction of groundwater wells in FY 2011 at the Pixley National Wildlife Refuge and Gray Lodge State Wildlife Area; and obligated $2 million to begin construction of the groundwater wells at the Volta State Wildlife Area with completion scheduled for FY 2011. The RWSP obligated funds, totaling $7 million, as part of Reclamation's Drought Program and therefore, are excluded from the CVPIA ARRA obligation of $120 million.

STATE WATER PACKAGE

In FY 2010, the State legislature developed a measure known as the Safe, Clean, and Reliable Drinking Water Supply Act. The purpose of the law is to protect water quality and ensure safe, clean drinking water; meet the water supply needs of California residents, farms, businesses; expand water conservation and recycling; restore fish and wildlife habitat; reduce polluted runoff that contaminates rivers, streams, beaches, and bays; and protect the safety of water supplies threatened by earthquakes and other natural disasters. It includes State issuance of bonds totaling $11,140,000,000 paid from existing State funds. The measure contains funding for CVPIA Program activities such as Central Valley wildlife refuge water and construction of fish passage improvements at Red Bluff Diversion Dam. The bond was originally slated to appear on the November 2, 2010, ballot as Proposition 18. However, on August 9, 2010, the California State Legislature decided to postpone the vote on the measure until the November 6, 2012, ballot.

As a result of the State Water Package, the State appropriated $28 million in funding from Proposition 50, to fund the Two-Gates Fish Protection Demonstration Program. However, the independent review of the Two Gates Demonstration Project found additional data is needed to assess its effectiveness in achieving its objectives. Once the data are obtained and assessed, a determination on whether the project should move forward will be made. Reclamation is working with DWR and the State Water Project

contractors to develop additional actions that could be implemented in addition to and/or as alternatives to the Two-Gates Project.

OPERATIONS CRITERIA AND PLAN (OCAP)

On December 15, 2008, the Service issued its Biological Opinion (BO) analyzing the effects of the CVP and SWP operations on the threatened delta smelt (2008 FWS OCAP BO). On June 4, 2009, NMFS issued its BO analyzing the effects of the CVP and SWP operations on threatened and endangered (T&E) salmonids and other listed species (2009 NMFS OCAP BO). The conclusions resulted in a determination of "likely to jeopardize" and "would jeopardize", respectively. The CVP and SWP are currently operating under the two BO's which set forth Reasonable and Prudent Action (RPA) alternatives that are required to be implemented by Reclamation to optimize protection for species during operation of the CVP. The BOs were both challenged in Federal District Court. In December 2010, U.S. District Court Judge Oliver Wanger issued a ruling on the Service OCAP BO. The judgment requires the Service to revise the BO to research more rigorously the delta smelt flow requirements for the CVP system. In FY 2010, several activities contributed to meeting the RPA requirements including:

- implementation of the new pumping plant and fish screen at the Red Bluff Diversion Dam for increased passage of spring-run Chinook and green sturgeon (Section 3406 (b) (1));
- construction of the Contra Costa Pumping Plant No. 1 fish screen to mitigate fishery impacts (Section 3406 (b) (5));
- surveys conducted by the Flow Fluctuations and Reservoir Storage program for steelhead juveniles and redds on the American River to inform operational changes to reduce stranding and isolation of listed anadromous salmonid species (Sections 3406 (b) (9) & (19)).

DROUGHT AND CLIMATE CHANGE

The water year type is a designation that is based on hydrologic indices for the Sacramento and San Joaquin Valleys. Water year type is either wet, above normal, below normal, dry or critical, and

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is determined by factors of precipitation and runoff and is therefore indicative of local and regional conditions that influence climate, snowpack and runoff. In drier years, the CVPIA Program activities responsible for acquiring and delivering water for instream purposes and for refuges may be limited in their ability to purchase or deliver water. Some of these limitations are a result of the market bearing higher prices for more limited supplies, while flow reductions such as for (b)(2) water are consistent with Interior policies. In California, drought has occurred over three consecutive years from 2007 through 2009 (annual statewide precipitation (ppt) totaled 63%, 72% and 76% of average, respectively). Although more recent postings on the California Department of Water Resources website denote "normal" precipitation for California currently, it typically takes more than one season, or one year, to recover from a drought that has taken place over multiple years. For the longer term, drought and climate change will increasingly challenge our ability to meet water demands. Unknown variations in snowpack and rain precipitation will continue to affect our ability to manage water storage and to achieve the instream flow and temperature objectives for anadromous fish.

FACTORS AFFECTING FISH PRODUCTION

An anadromous fisheries stock collapse began in 2006, reached a low in 2009 and persisted in 2010. Figure 5 shows the estimated natural production of all Central Valley Chinook Salmon runs from 1952-2010. The numbers are separated into Pre-Baseline (1952-1966), Baseline (1967-1991); containing the baseline mean that the Act requires to double fish production),

and Post-Baseline (1992-2010). The doubling-goal and the averages for each period are also shown. The post-Baseline period has two averages shown: the higher average is for the period 1992-2005 prior to the stock collapse and the lower average is for 1992-2010 which includes the stock collapse.

We know that the decline was not restricted to the Central Valley anadromous fish but was seen in streams throughout the Pacific Northwest. There have been a number of opinions on why the populations have declined and have remained low but the prevailing theory is a combination of stressors including freshwater and estuarine habitat degradation, poor ocean conditions in 2005 and 2006, high harvest rates in 2007 and drought conditions from 2000-2003. These and other causes are more thoroughly discussed by others including Lindley, et al (2009) and Vogel (2011).

Suspension of commercial fishing in 2008-2009 may help the populations to recover, but the drought of 2007-2009 may confound the recovery. While phenomena such as droughts can cause local and regional population declines, the state and federal governments have the ability to limit some of these impacts downstream of reservoirs by adjusting water releases and deliveries. However, changes in ocean conditions, as discussed by Lindley, et al (2009), can cause significant variations in the escapement. In addition, the lack of understanding of these conditions, and their cumulative effects, can make managing the fisheries very challenging.

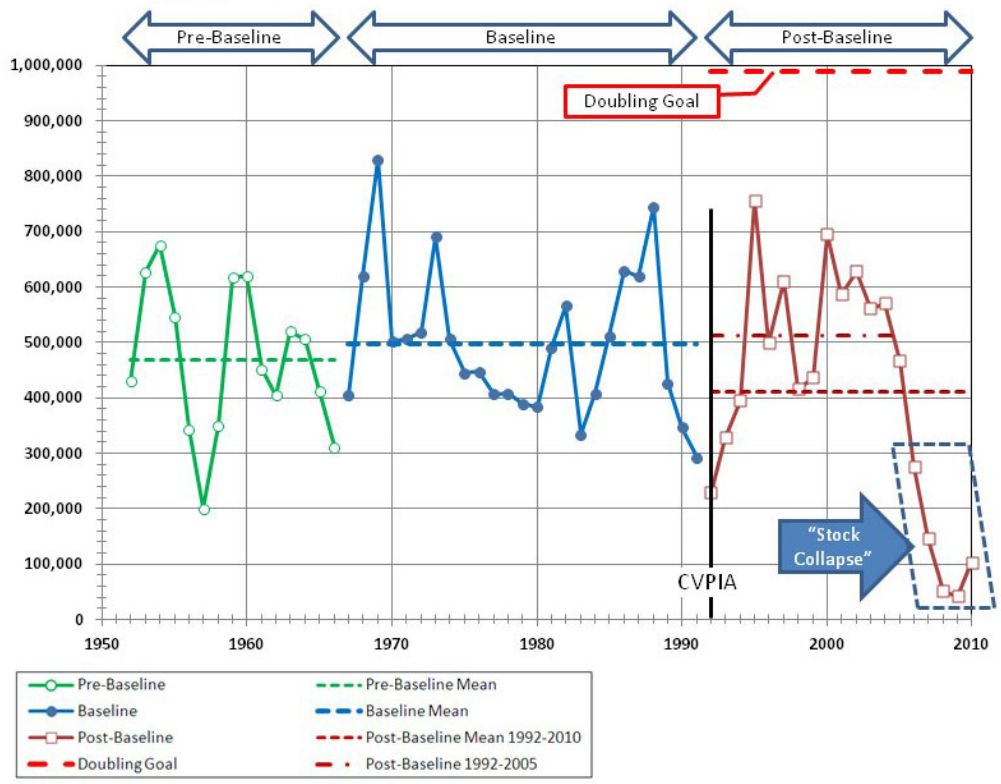


Figure 5: Estimated Natural Production of All Central Valley Chinook Salmon Runs, 1952-2009

One of the most obvious consequences of the population decline is that meeting the fish doubling goal will require more time than estimated. A secondary consequence is that the collapse of naturally produced Chinook salmon has resulted in a gene pool that could easily be overwhelmed by hatchery-produced fish.

The CVPIA Program works to improve the success of the salmon at the beginning and the end of the lifecycle: birth/rearing and returning and spawning. Conditions seaward of the Delta are generally beyond this program's control. Actions taken by the CVPIA Program are recognized to be positive actions to improve habitat for the spawning and rearing of anadromous fish. It could even be said that without the actions taken by the CVPIA Program some races of salmonids might have fared even worse over the past few years. Chapter 2 summarizes measures of progress toward the broad goals of the CVPIA Program for the past 18 years along with other actions that improve the ecosystem.

SCIENCE BASED MANAGEMENT FRAMEWORK

Since 1992, the CVPIA Program has implemented many projects to improve a variety of ecosystem functions (spawning, rearing, migration, etc.) that are known to be beneficial to anadromous fish species. In spite of these actions, conditions that are beyond the authority of the CVPIA Program can overwhelm the system functions that are within the CVPIA authority.

In most cases, the CVPIA Program does not have the ability to determine the exact influence of individual phenomena on program goals. The CVPIA Program requires a system that can separate and quantify the impacts within our control and those outside of our control.

To increase our understanding these phenomena and other cause and effect relationships, the CVPIA Program will develop and implement a science-based management framework (SBMF). The creation of this framework was recommended by the Fisheries Independent Review Panel and is seen by the agencies as a valuable tool. The SBMF will be a process for future decision-making about priorities and actions based on species' needs, monitoring and adaptive management, directed toward specific goals and outcomes. Such a process will improve the CVPIA Program's understanding of the sociological, hydrological, oceanic, meteorological, and biological systems that are the essence of the ecosystems associated with the Central Valley project and its native species. Improved knowledge and understanding of all the ecosystem functions, and the interplay of these functions, will allow the program activity managers to take advantage of the principles of adaptive management. Utilizing the tools of adaptive management will reduce the uncertainty with which we make resource management decisions. This will allow managers to adaptively set priorities on which actions will be most efficient and effective in obtaining the overall goals of the Act.

Friant-Kern Canal

Chapter 2

FISHERIES RESOURCE AREA

Anadromous Fish Restoration Program

3406 (b)(1)

The Anadromous Fish Restoration Program (AFRP) is the overarching program to address anadromous fish doubling in the Central Valley. Natural production of anadromous fish is an outcome based goal of the CVPIA Program. The Act specifically directs Interior to:

"... 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..."

The anadromous fish production targets pertain to Chinook salmon, steelhead, striped bass, American shad, white sturgeon, and green sturgeon, which are believed to have been affected by CVP construction and operation.

Subsequent to CVPIA's passage, the AFRP developed a series of planning reports that culminated in the Final AFRP Restoration Plan (Final Restoration Plan) in 2001. As acknowledged in the CVPIA Record of Decision (ROD), the Final Restoration Plan guides the implementation of the actions and evaluations which were developed to address the doubling goal. The 289 actions and evaluations in the Final Restoration Plan are categorized by six programmatic-level objectives:

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

PERFORMANCE MEASURES

The AFRP goal is to at least double the natural production of anadromous fish from the baseline average established during 1967–1991, and to maintain that population on a long-term, sustainable basis. Table 2 lists the doubling target by species. The AFRP implements actions that will contribute to the doubling of the natural production of anadromous fish populations. To achieve the fish-doubling goal, the AFRP has identified 289 actions and evaluations that support Fisheries restoration. Of the 289, 128 are high or medium priority time-certain, structural (53) and non-structural actions (75).

Table 2: Doubling Goal (Target) by Species

Species	Target
Winter-run Chinook	110,000
Spring-run Chinook	68,000
Fall-run Chinook	750,000
Late Fall-run Chinook	68,000
Steelhead	13,000
Green sturgeon	2,000
White sturgeon	11,000
Striped bass	2,500,000
American shad	4,300

FY 2010 ACCOMPLISHMENTS

The AFRP obligated $4,129,564 from the Restoration Fund in FY 2010. The AFRP continued progress toward the following actions and evaluations in the Sacramento and San Joaquin watersheds to enhance passage and habitat, and reduce loss of fish.

ACCOMPLISHMENTS IN THE SACRAMENTO BASIN

American River – Bathymetric surveys were conducted in support of the development of a 2D model for habitat restoration activities. The environmental documents were completed to begin restoration work, including extending an existing gravel bar across the river, to provide spawning and rearing habitat for one-half mile upstream of the site along both banks. The AFRP also restored a dewatered side channel with the addition of gravel to a downcut section.

Antelope Creek – The Juvenile Fish Passage Improvement Project at Edwards Diversion Dam will prevent out-migrating salmonids from becoming entrained in the two diversion canals at Edwards Diversion Dam. In 2010, the Tehama County Resource Conservation District completed a feasibility study, started the environmental compliance documents, and developed project designs for this effort. Construction is expected to begin in summer 2011.

The Antelope Creek Crossing Repair Project in the Tehama Wildlife Area will remove a road crossing that is a barrier to spring- and fall-run Chinook salmon during dry years. Construction to remove the barrier is expected to begin in 2011. Once completed, the project will improve passage to 13 miles of spawning and holding habitat.

Battle Creek – Wildcat Dam and appurtenant facilities were removed. The majority of fish screen and ladder construction at the Eagle Canyon and North Battle Creek Feeder sites occurred in 2010. The fish screen and ladder are expected to be completed in 2011. Once completed, the project will improve flows and passage to 10 miles of spawning habitat.

Bear River – Thermographs were installed at six locations in Dry Creek, a tributary to the Bear River. Baseline temperature data was collected from May 14 through November 30 to assess summer habitat conditions for steelhead. Results indicate that temperatures may be unsuitable for over-summering steelhead. Future solutions include investigating locations that may offer thermal refugia to rearing fish.

Bear, Cottonwood and Cow Creeks – The video weir monitoring collected Chinook salmon and steelhead fish counts and migration timing and was implemented to determine the feasibility of determining adult steelhead escapement. The information obtained from the video weir monitoring is used to calculate natural production estimates and is used to guide AFRP efforts and evaluate program performance.

Big Chico Creek – The permitting and environmental documentation for the Iron Canyon Fish Ladder Project was completed, and the Section 404 Permit and the Endangered Species Act (ESA) section 7 consultation were submitted. Once construction funding is secured, this project will provide access to an estimated 8 miles of quality spring-run Chinook salmon habitat.

Butte Creek – The AFRP completed two non-structural actions on Butte Creek with the completion of the Lower Butte Creek Project, Phase III Consolidated Action Summary Report.

Cottonwood Creek – The AFRP completed design and permitting for the Anderson-Cottonwood Irrigation District (ACID) Siphon Project. The siphon is becoming exposed and poses a passage problem for adult salmonids. The project will implement repairs to ensure safe passage for salmonids.

Cow Creek – The conceptual design for a boulder weir fishway was developed in FY 2009. In FY 2010, additional biological assessments were completed to assist in analyzing the effects of the proposed action. This project will open up 10 miles of historic habitat to fall-run Chinook salmon and steelhead.

Feather River – A project was initiated to acoustically tag and track North American green sturgeon, which is listed as threatened under the Endangered Species Act. The purpose of this multi-year study is to examine sturgeon migratory, holding and spawning behavior.

Mill Creek – Fixed-location hydro-acoustic techniques were used during the snowmelt runoff when visibility was severely reduced, to calculate natural production

estimates and evaluate program performance. This action supplemented California Department of Fish and Game (CDFG) video weir counts in determining the spring-run Chinook escapement in Mill Creek. The data will be available in FY 2011.

Yuba River – A pre-project assessment (Phase 1 of four phases) was completed at Hammon Bar, upstream of Daguerre Point Dam, for potential riparian habitat restoration targeting juvenile Chinook salmon and steelhead. Four sites totaling 129 acres were identified for planting of cottonwood trees. Also, the VAKI Riverwatcher fish counting system was upgraded. The data from this system is used to better understand the timing, abundance, population trends and response of adult spring-run and fall-run Chinook salmon and steelhead to changing flow and temperature conditions.

ACCOMPLISHMENTS IN THE SAN JOAQUIN BASIN

Calaveras River – Final designs and permits for the Budiselich Flashboard Dam boulder weir retrofit was completed. This project, in combination with others that comprise the Calaveras River Passage Improvement Project, will restore access to about 10 miles of habitat.

Cosumnes River – Final placement of the boulder weirs for the Cosumnes River Passage Improvement Project were completed in 2010. This project improved fish passage at Rooney Dam and restored access to about 10 miles of habitat. The before and after photos show the results of this project.

Merced River – AFRP staff continued to administer the agreement for rotary screw trap monitoring of outmigrant juvenile salmon. The Merced River Ranch Floodplain Enhancement Project final designs were completed in 2010. Construction activities during the summer of 2010 included placement of approximately 12,000 cy of coarse sediment for spawning habitat.

Mokelumne River – 4,166 cy of gravel were placed to improve natural production of Chinook salmon and steelhead at several spawning sites.

San Joaquin River – AFRP staff partnered with the California Department of Fish and Game (CDFG) to install VEMCO acoustic receivers in the San Joaquin River and begin an annual white sturgeon population assessment, from October 2009 to June 2010.

Stanislaus River – FY 2010 accomplishments included the collection of both juvenile and adult passage data via rotary screw trapping (juveniles) and a fish counting weir (adults) operated in partnership with Tri-Dam. A final report of juvenile production estimates from the rotary screw trapping is expected in FY 2011. The weir counted 1390 adult Chinook salmon that migrated into the Stanislaus River. Data from the adult and juvenile monitoring is used to aid Stanislaus Operation Group management on decisions about implementing flow, to support Interior's recommendations to the State Water Resources Control board regarding flow requirements in the San Joaquin Basin, and to calculate natural production estimates used to guide AFRP efforts and evaluate the program's performance. Environmental documents were completed for two floodplain and side-channel enhancement projects that are designed to increase juvenile salmonid rearing habitat and decrease predation. These efforts will restore 640 feet of riparian side channel habitat, 2.47 acres of riparian floodplain, create 0.7 acres of new floodplain, add 8,100 CY of clean spawning gravel to the river, and restore 485 feet of side-channel habitat. Construction will begin in 2011 and is expected to be completed in the same year.

Tuolumne River – The Bobcat Flat Restoration Project continued to restore spawning, rearing and floodplain habitats in the Tuolumne River. Topographic and vegetation surveys were completed in 2010 to compare pre-project habitat conditions with those after the project is completed. The Environmental Assessment, Initial Study/ Mitigated Negative Declaration and ESA section 7 consultation were also completed.

ACCOMPLISHMENTS TO DATE

Chinook Salmon

The baseline average (1967-1991), the fish-doubling goal, and the estimated natural production for each Chinook salmon run, from 2000-2010 are shown in Table 5. Figures 6 (Fall and Late-fall runs) and 7 (Winter and Spring runs) present all runs as the percentage of estimated natural production relative to the Baseline average of each run. The Baseline average is equivalent to the 100% line and the fish-doubling goal is shown at the 200% line. [This allows the reader to compare annual Chinook Salmon estimated natural production to the Baseline average and the fish-doubling goal for the total Central Valley.] Note that these figures are not for specific watersheds; they are for the entire Central Valley. Specific watersheds are discussed in the Comprehensive Monitoring and Assessment Program (CAMP) section.

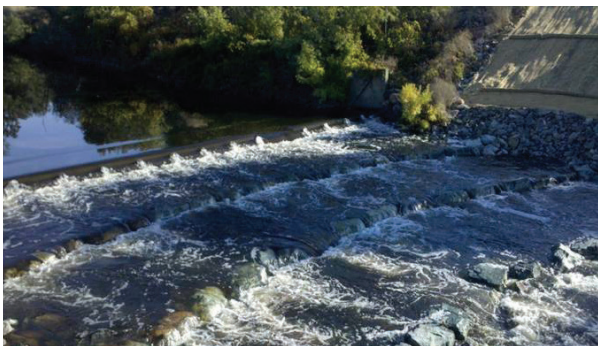
These figures show that in one instance a Central Valley Chinook Salmon run exceeded the fish-doubling goal; this occurred for the Late-fall run in 1998. The fall-run exceeded the baseline average for 11 out of the 19 years since the passage of the CVPIA, but only approached the fish-doubling goal once (1995) during the same period. The natural production of this run was in a continuous decline from 2002 to 2009. The 2008 and 2009 values have been only 11% and 8% of the baseline average, respectively. However, a slight upturn was seen in 2010 with the estimated natural production increasing to 25% of the Baseline average. It remains to be seen if this trend continues. The winter run has never reached the Baseline average since 1992. The natural production was 5%, 7%, and 3% of the baseline average in 2008, 2009, and 2010, respectively. The spring run exceeded the baseline average only in 1995 and 1998. It appeared to show steady improvement from 1999 to 2005 but has declined since that time. The 2008, 2009, and 2010 natural production is 13%, 7%, and 6% of the baseline average, respectively.

Although the data shows overall numbers have declined recently for Chinook salmon natural production, certain streams have shown an upward trend. As seen in Table 3, the AFRP has focused its efforts largely on Butte Creek, Battle Creek, and Clear Creek, with corresponding positive results in production numbers. As a result, the average Chinook salmon production for the period of 1992-2010 has exceeded the doubling goal target on Clear, Butte, and Battle Creeks. Specifically, the Fall-run natural production exceeded the fish-doubling goals most years in Battle, Butte, and Clear creeks (68%, 57%, and 58% of the time 1992-2010, respectively). The Battle Creek Late-Fall run goal was exceeded 63% of the time and the Butte Creek Spring run goal was exceeded 79% of the time. The consistency of these results is clearly a result of CVPIA, State, and local projects, which have restored channel function, improved fish passage, supplemented instream flows, and restored floodplain habitat.

Other Anadromous Fish

The other anadromous fish with CVPIA targets are shown in Table 6. The BOR and FWS depend on the California Department of Fish and Game (CDFG) for fish abundance data pertaining to striped bass, American shad, and white and green sturgeon. As of the date of this report, the CDFG has not provided data that can be used to assess progress toward the production targets for white and green sturgeon since 2005, and data for striped bass have not been made available since 2007. The AFRP production target for white sturgeon was met once in the seven years when monitoring occurred between 1992 and 2005, and the production target for green sturgeon was met twice in the six years when monitoring occurred during that period. In the 16 years between 1992 and 2007, striped bass surveys were done in 11 years, and the AFRP production target for this species was never met. Steelhead production targets cannot be addressed because operational changes at the Red Bluff Diversion Dam after 1994 preclude the ability to collect comparable post-baseline data for this taxon. The American shad is the only non-salmon taxon with an AFRP production target with data available from 1992 through 2009. The baseline average, mid-water trawl index for the shad is 2,129. This fish species' doubling goal was exceeded in three of the 18 years between 1992 and 2009; there were an additional four years in which it exceeded the baseline average (1996 – 1998, and 2006). The last three years (2008-2010) have seen the numbers at 6.3%, 14.5% and 15.9% of the doubling goal, respectively.

The average natural production by species is shown in Table 7. Although not evident in this table due to looking at the "average" over time, the anadromous fish of the Central Valley have been steadily declining, in spite of the CVPIA Program accomplishing significant restoration projects. There have been a number of opinions on why the populations have declined and have remained low but the prevailing theory is a combination of stressors including poor ocean conditions in 2005 and 2006, high harvest rates in 2007, and drought conditions from 2000-2003. These and other causes are more thoroughly discussed by others including Lindley, et al (2009) and Vogel (2011).



The Rooney Brothers Dam in the Cosumnes River prior to (top) and after (bottom) construction of the boulder weir fishway.

Fish Restoration Actions and Evaluations

Table 3 shows the progress toward completing the 289 actions and evaluations listed in the AFRP Final Restoration Plan of 2001. Each action and evaluation is multi-faceted and could involve years of work to complete. The AFRP has been systematically addressing these actions and evaluations in an effort to address the limiting factors on each river and improve fish population numbers. As shown in Table 3, the AFRP has completed 65 actions and evaluations since 2001. Of the 289 actions and evaluations, the AFRP has identified 128 high and medium priority actions: 53 of them are structural and 75 are non-structural. As shown in Table 4, 45 high or medium priority actions have been completed to date (20 structural and 25 non-structural). The AFRP has made substantial progress in addressing the actions and evaluations on Butte Creek, Battle Creek and Clear Creek, but much work remains in these and other areas. The AFRP has greatly improved and refined its scientific knowledge in several key areas: the appropriate timing and temperature of flows, the mechanics of spawning habitat, and the optimal components of channel restoration to support successful spawning, rearing, and outmigration.

LOOKING AHEAD

The AFRP intends to continue to address the 289 actions and evaluations with a focus on the 128 high and medium priority actions and evaluations to meet flow needs, reduce entrainment and improve passage. The AFRP will also continue to collect data and work with partners to maximize efficiencies and leverage funding sources.

Table 3: Summary of Progress Towards Completing 289 Final Restoration Plan Actions and Evaluations by Watershed, FY 1992-2010

Watershed	Total actions and evaluations in Final Restoration Plan	Actions and evaluations completed to date	% of actions and evaluations completed to date
American River	13	2	15
Antelope Creek	2	0	0
Battle Creek	12	8	67
Bear Creek	2	0	0
Bear River	8	0	0
Big Chico Creek	10	3	30
Butte Creek	39	32	82
Calaveras River	6	0	0
Central Valley-Wide	15	1	7
Clear Creek	7	5	71
Colusa Basin Drain	2	0	0
Cosumnes River	9	1	11
Cottonwood Creek	5	0	0
Cow Creek	4	0	0
Deer Creek	5	0	0
Elder Creek	2	0	0
Feather River	12	0	0
Merced River	8	0	0
Mill Creek	5	1	20
Miscellaneous Small Tributaries	1	0	0
Mokelumne River	13	1	8
Ocean	3	0	0
Paynes Creek	2	0	0
Upper Mainstem Sacramento River	22	8	36
Sacramento-San Joaquin Delta	29	0	0
Mainstem San Joaquin River	13	0	0
Stanislaus River	9	1	11
Stoney Creek	1	0	0
Thomes Creek	6	2	33
Tuolumne River	10	0	0
Yuba River	14	0	0
All Watersheds	289	65	23

Table 4: Summary of Progress Towards 128 High and Medium Priority Actions with End Points (53 Structural, 75 Non-Structural)

Watershed	53 Structural Actions		75 Non-structural Actions	
	Number of structural actions completed in FY 2010*	Number of structural actions completed since 1992	Number of non-structural actions completed in FY 2010	Number of non-structural actions completed since 1992
American River		1		1
Battle Creek		3		2
Big Chico Creek		1		1
Butte Creek		13	2	17
Clear Creek		1		
Cosumnes River				1
Mill Creek		1		
Stanislaus River				1
Thomes Creek				2
All Watersheds		20	2	25

* NOTE: Although structural actions were not completed in FY 2010, work continued on 19 watersheds throughout the Central Valley.

Table 5: Central Valley Chinook Salmon, Estimated Natural Production, 2000-2009

	Chinook Salmon Run			
	Fall	Late-fall	Winter	Spring
Baseline Mean (Average)	**374,064**	**34,192**	**54,439**	**34,374**
Doubling-Goal Target	**750,000**	**68,000**	**110,000**	**68,000**
YEAR	Estimated Natural Production Numbers			
2000	661,520	20,002	2,659	11,676
2001	530,360	27,717	9,791	18,581
2002	542,616	56,662	9,215	19,922
2003	528,336	9,059	10,882	13,269
2004	512,657	21,122	14,763	21,613
2005	397,781	20,707	21,572	26,099
2006	227,407	15,603	19,734	11,659
2007	106,225	30,789	4,164	13,183
2008	39,789	4,816	2,555	4,489
2009	30,901	4,350	4,178	2,492

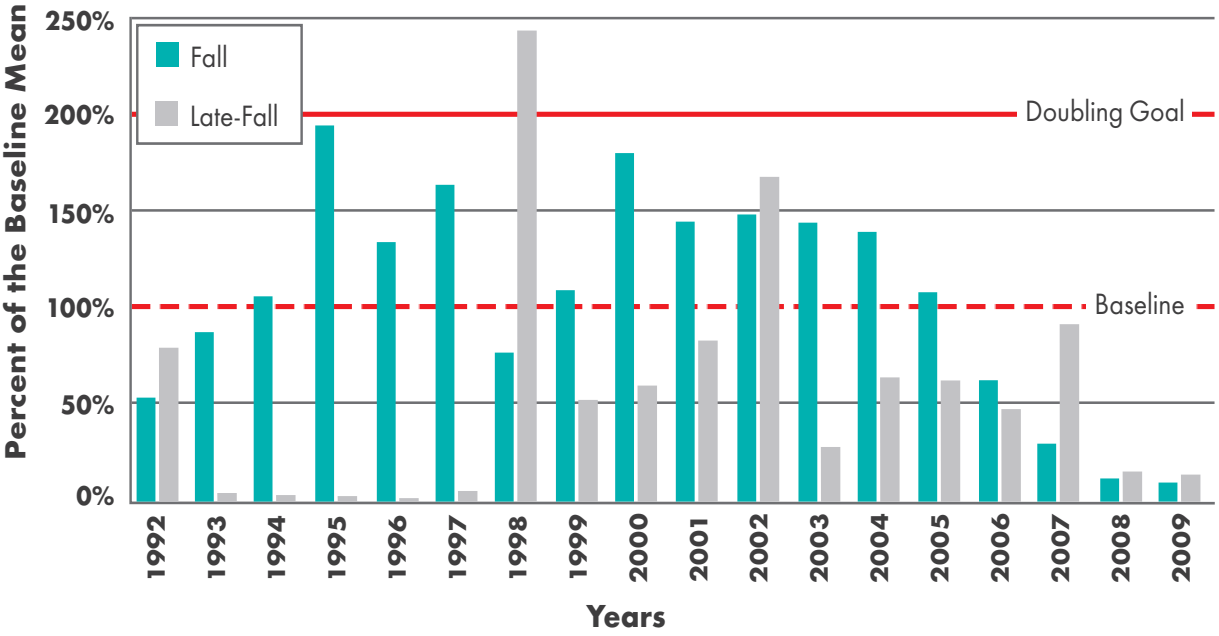


Figure 6: Estimated Natural Production of Fall and Late-Fall Central Valley Chinook Runs as a Percentage of the Baseline (1967-1991) Mean Fall (μ = 374,064) and Late-Fall (μ = 34,192) Runs

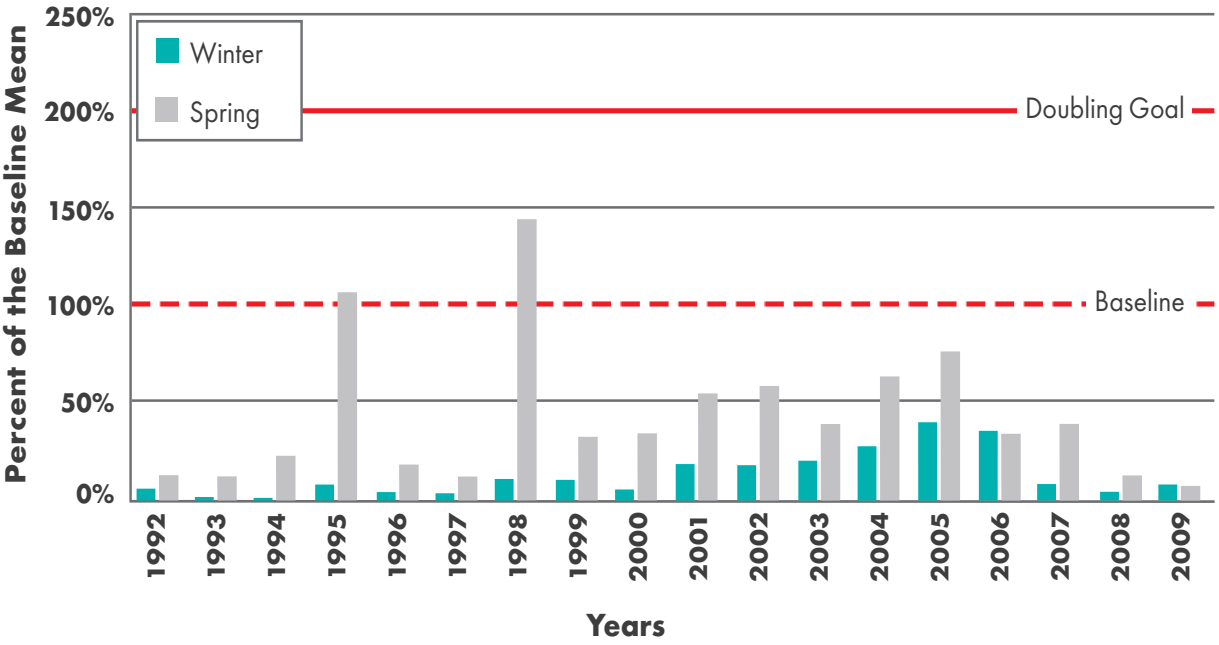


Figure 7: Estimated Natural Production of Winter and Spring Central Valley Chinook Runs as a Percentage of the Baseline (1967-1991) Mean Winter (μ = 54,439) and Spring (μ = 34,374) Runs

Table 6: Estimated Natural Production for Anadromous Fish by Year

Year	Steelhead[a]	American Shad[b]	Striped Bass[c]	Green Sturgeon[d]	White Sturgeon[e]
Baseline	6,586	2,129	1,252,259	983	5,571
Target	13,000	4,300	2,500,000	2,000	11,000
1992	4,086	2,010	777,293		
1993	1,552	5,153	656,506	68	692
1994	2,035	1,318	599,770		6,392
1995	572	6,803			
1996	386	4,260	1,043,239		
1997	1,087	2,591		1,306	11,689
1998	373	4,134	1,356,412	470	8,971
1999	104	715			
2000	906	764	1,591,419		
2001	1,351	761		7,117	5,129
2002	1,745	1,914	945,878	1,690	2,775
2003	2,421	9,342	829,111		
2004	1,060	951	767,312		
2005	276	1,741	738,740	2,555	2,898
2006	404	2,303			
2007	454	551	436,688		
2008	339	271			
2009		624			

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, 1992-2009.

c Estimated abundance of adult striped bass in the Sacramento-San Joaquin River Delta, Sacramento River downstream from the town of
Colusa, and San Joaquin River downstream from the town of Mossdale, 1992-2007. 2004-2007 estimates include only male fish.

d Estimated abundance of green sturgeon >40 inches in total length

e Estimated abundance of 15-year-old white sturgeon

Table 7: Average Natural Production by Species, 1992-2009

Species	Doubling-Goal Target	Average Natural Production (1992-2009)	Doubling-Goal % of Target
Winter-run Chinook	110,000	6,865	6.2
Spring-run Chinook	68,000	14,786	21.7
Fall-run Chinook	750,000	387,188	51.6
Late Fall-run Chinook	68,000	18,910	27.8
Steelhead	13,000	1,127	8.6
Green Sturgeon	2,000	2,201	110
White Sturgeon	11,000	5,507	50
Striped Bass	2,500,000	885,670	35.4
American Shad	4,300	2,567	59.7

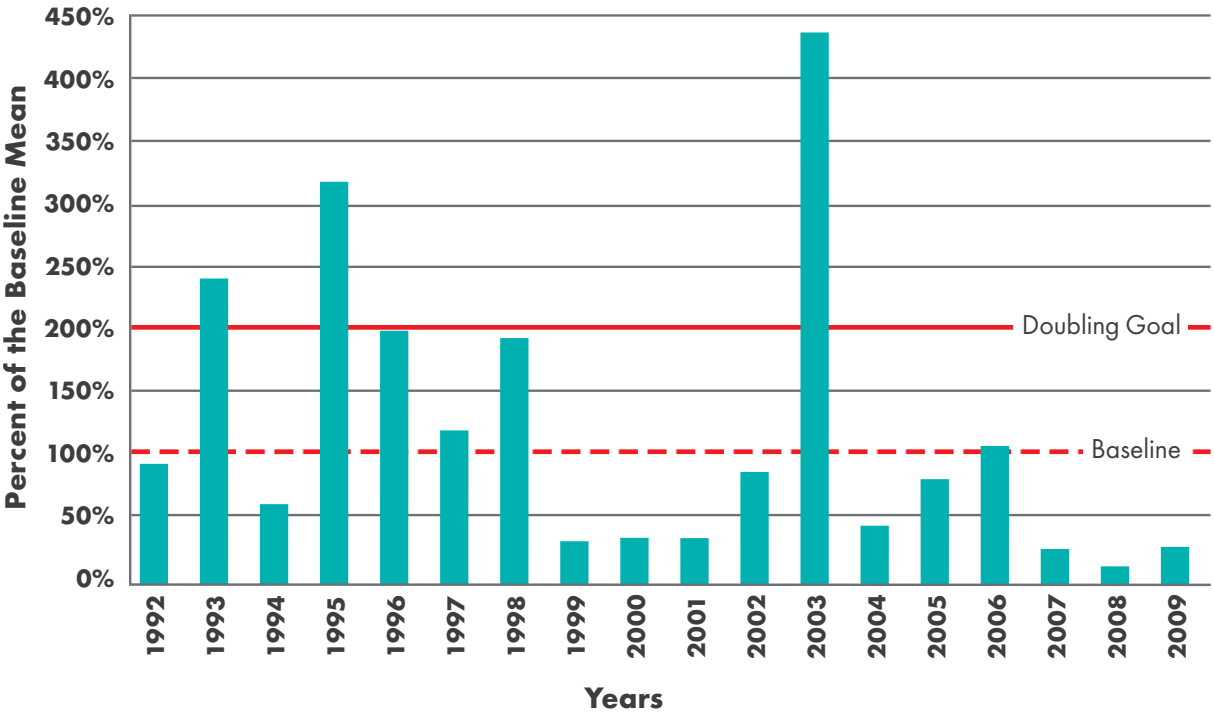


Figure 8: Midwater Trawl Index of American Shad as a Percent of the Baseline Mean (μ = 2,129)

Trinity River Restoration Program

3406 (b)(1) "Other" & (b)(23)

The Trinity River Restoration Program (TRRP) is dedicated to the improvement of anadromous fisheries habitat in the Trinity River Basin. The TRRP uses two authorities: CVPIA section 3406 (b)(1) "other" for river restoration and CVPIA section 3406 (b)(23) for delivering flows.

The Trinity River Mainstem Fishery Restoration Final Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) completed in October 2000, and the Record of Decision (ROD), signed on December 19, 2000, established a comprehensive science-based adaptive management program to restore the fishery resources of the Trinity River.

The TRRP is based upon restoring the attributes of a healthy, alluvial river system by implementing variable annual instream flows, physical channel rehabilitation, sediment management and floodplain infrastructure improvements. Together, these actions will increase habitats for all life stages of anadromous salmonids, increase juvenile production and lead to increased spawning escapement and harvest opportunities. Since the ROD was signed, the TRRP has focused its physical restoration activities—such as gravel placement and removal of structures—on the upper 40 miles[1] of the Trinity River between Lewiston Dam and the confluence with the North Fork of the Trinity River. Other restoration activities such as flow releases and sediment transportation benefit the entire riverine system.

PERFORMANCE MEASURES

The overall success of the TRRP is gauged by natural spawner escapement numbers relative to the goal (target) set for each species, and contributions to dependent tribal and non-tribal fisheries. The TRRP also tracks the hatchery production for anadromous fish to fulfill requirements of the ROD. To achieve this overall goal, the TRRP implements actions in several key areas that support the establishment of a healthy riverine system. Actions include annual flow of water, placement of coarse sediment, reduction of fine sediment transport, and physical channel restoration projects.

Newly constructed point bars and bank rehabilitation at the Reading Creek Site

Flows – The TRRP releases between 369,000 and 815,000 AF each year, in accordance with the ROD. The annual volume target varies according to the water year type. The TRRP is also required to provide peak flows of up to 11,000 CFS annually.

Placement of coarse sediment – The TRRP places up to 7,000 CY of coarse sediment annually.

Fine sediment delivery and transport – The TRRP aims to reduce fine sediment transport by 10,000 to 20,000 CY annually. The goal is to transport as much or more fine sediment downstream as is delivered to the upper river from tributary watersheds.

Channel restoration – The TRRP's channel restoration goal is to restore functioning alluvial river and increase salmonid freshwater habitat. The ROD calls for 44 bank rehabilitation projects and 3 side channels which combine to make 47 sites. Channel restoration progress is currently measured by the

[1] "ISSUE PAPER FOR THE TRINITY MANAGEMENT COUNCIL, Is there a Causal Link Between Restoration Activities in the South Fork Trinity River and other Tributaries and the Trinity River Diversion of the CVP." This issue paper discusses the reasoning behind focusing restoration activities on the upper forty miles of the Trinity River.

number of completed sites. The final measure of the success of channel rehabilitation projects will be their effectiveness of promoting a dynamic alluvial river in conjunction with high flows and coarse sediment augmentation to increase salmonid habitats. This is being evaluated through the TRRP's adaptive management process.

FY 2010 ACCOMPLISHMENTS

In FY 2010, the TRRP obligated $2,699,018 from the Water & Related Fund under Section 3406 (b)(23); and $5,014,146 from the Water & Related Fund, $5,037,919 from the American Recovery and Reinvestment Act (ARRA), $1,787,390 from the Restoration Fund, and $206,085 from Bay-Delta Fund under Section 3046 (b)(1).

Restoration Actions – FY 2010 included significant achievement of TRRP goals. ROD flows were provided according to the normal water year type, with a peak flow of 6,840 cfs. The TRRP placed the largest volume of coarse sediment to date, and achieved 100% completion of five channel restoration activities. Watershed projects implemented in FY 2010 will keep approximately 6,100 CY of fine sediment out of the mainstem. In addition, the condition of the bed indicates that more sediment was transported downstream than came into the upper 40 miles of the Trinity River.

Monitoring – Ongoing monitoring/assessment activities: approximately $4 million was obligated to include stream gaging, sediment transport, juvenile outmigrant and fry utilization surveys, adult run size (weirs), sport and tribal harvest, pre-construction

Table 8: Annual Trinity River, 2006-2010

Fiscal Year	Water Year Type	ROD Flow Target	ROD Flow Provided*	Peak Releases (cfs)
2006	Extremely wet	815,000 AF	809,900 AF	10,100 cfs
2007	Dry	453,000 AF	453,700 AF	4,750 cfs
2008	Normal	647,000 AF	648,700 AF	6,470 cfs
2009	Dry	453,000 AF	445,500 AF	4,410 cfs
2010	Normal	647,000 AF	656,700 AF	6,840 cfs

* computed volumes ±5% based on stream flow measurement accuracy.

Table 9: Placement of Coarse Gravel by Year Toward 10,000 Cubic Yard Target, 2003-2010

Fiscal Year (FY)	Gravel Augmentation Location	Gravel (CY)	Total Gravel per Year (CY)
2003	Cableway	2,000	2,000
2006	Hatchery	1,600	1,600
2007	Hatchery	4,300	4,300
2008	High Flow Injections	2,300	14,400
	Lewiston-Dark Gulch	12,100	
2009	High Flow Injections	2,300	8,000
	Sawmill	5,700	
2010	High Flow Injections	3,100	31,500
	Lowden Ranch Area and Reading Creek	28,400	
	Total	61,800	

Table 10: Rehabilitation Site Construction Summary, 2005-2010

Fiscal Year	Rehabilitation Site	Number of Sites	Earth-work (CY)	Feet of Large Wood Habitat Structures	River Miles	Acres Treated
2005	Hocker Flat (complete)	1	83,000	0	1.0	26
2006	Canyon Creek Sites (complete)	4	91,000	100	1.7	40
2007	Indian Creek Sites (complete)	3	77,800	200	2.8	31
2008	Lewiston and Dark Gulch Sites (complete)	8	56,900	200	3.7	42
2009	Sawmill and Steel Bridge Day Use (complete)	2	87,750	260	0.8	25
2010	Lowden, Trinity House Gulch, Reading Creek	5*	202,600	300	2.4	36
	Total	23	599,050	1,060	12.4	200

* The 5 sites were 75% complete by September 30, 2010. Completion is expected by December 2010.

habitat assessment, juvenile/adult fish health, riparian vegetation and wildlife.

The TRRP also continued planning and engineering for the next four channel restoration projects. Tables 8, 9, and 10 provide more details regarding these activities.

ACCOMPLISHMENTS TO DATE

Spawner escapement – Figures 9 and 10 show the pre-CVPIA and post-CVPIA averages for Adult Spawning Escapement of hatchery and naturally produced anadromous salmonids, respectively against the 1992-2008 averages and the 2009 returns.

Salmon populations are highly cyclical and returns of adult salmon are influenced by many factors including: (1) in-river and oceanic environmental conditions, (2) harvest in ocean and river fisheries, and (3) the number of juvenile salmon originally produced that contribute to adult returns. Recent adult returns have been the first to benefit from full ROD flow volumes due to the litigation that prevented full volumes being released. Additionally, the full benefits from channel rehabilitation will not be realized for some time since the first channel rehabilitation site was constructed in 2005. To date, 17 of the 47 sites have been constructed and construction is 50% compete on five sites.

The TRRP is conducting juvenile and adult salmonid monitoring to track the response of these populations to the cumulative restoration actions being implemented under the ROD. At this time, with only partial implementation of the channel rehabilitation and the watershed restoration aspects of the ROD, it is premature to draw conclusion on whether population targets are being met.

Flows – All infrastructure improvements to allow for full ROD flows were completed in 2006. Following the resolution of litigation in 2005, the TRRP has been able to provide full ROD flows each year, based on the water year type. In 2006, the TRRP also provided a peak flow of 10,100 cfs. Since that time the TRRP has provided, on average, 5,618 cfs per year for peak flows. Table 8 shows the peak flows released each year against the water year type.

Coarse gravel placement – Table 9 shows the amount of coarse gravel placed each year. Over the past six years since the TRRP began, an average of more than 10,000 CY of gravel has been placed annually. The TRPP has improved its ability to place gravel by developing its own gravel processing capabilities in 2007. As a result, the subsequent years show a marked increase in gravel placement. The TRRP has found that the ability to process gravel reduces the environmental impact, and lowers the floodplain. The lowered floodplain provides important habitat, generates gravel, and costs about the same as purchasing gravel from a local supplier.

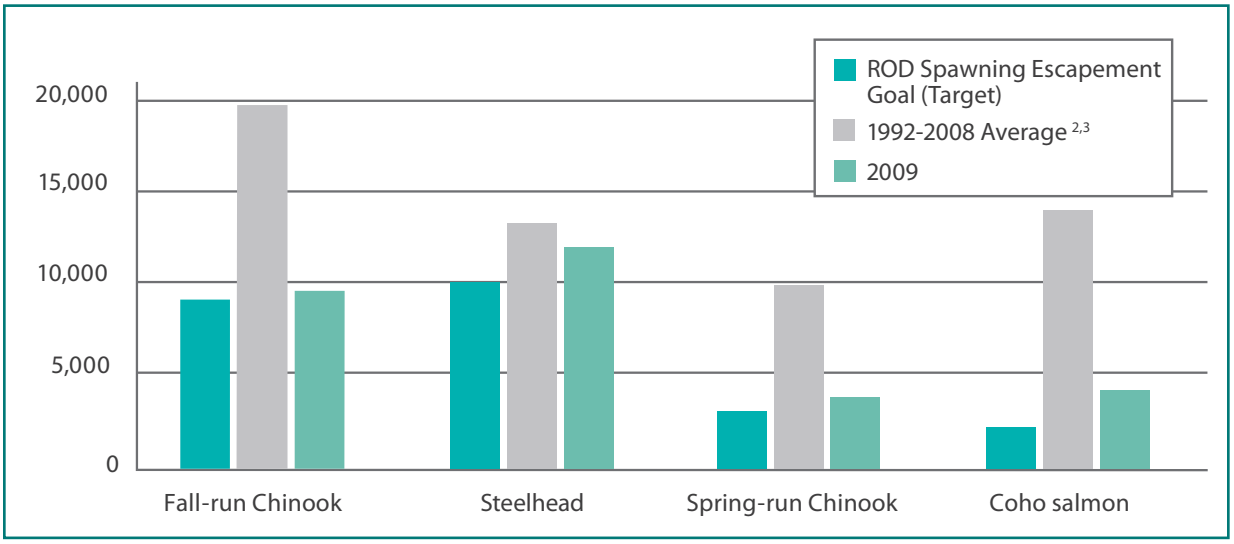
Fine sediment delivery –Sediment monitoring in 2010 has shown significant reductions in the sand content of the channel bed throughout the upper 40 miles of the Trinity River since 2001. The reduction in sand content indicates that ROD flows are improving the habitat conditions to facilitate successful spawning.

Channel restoration – As of December 2010, 23 channel restoration sites have been completed indicating 49% completion of this performance measure. Table 10 shows the steady progress that has been achieved over the past six years in completing these rehabilitation actions. Actions include a combination of substantial excavation of material from the channel bottom, placement of large woody debris in the mainstem and constructed side channels for aquatic and geomorphic purposes, and other restoration activities.

LOOKING AHEAD

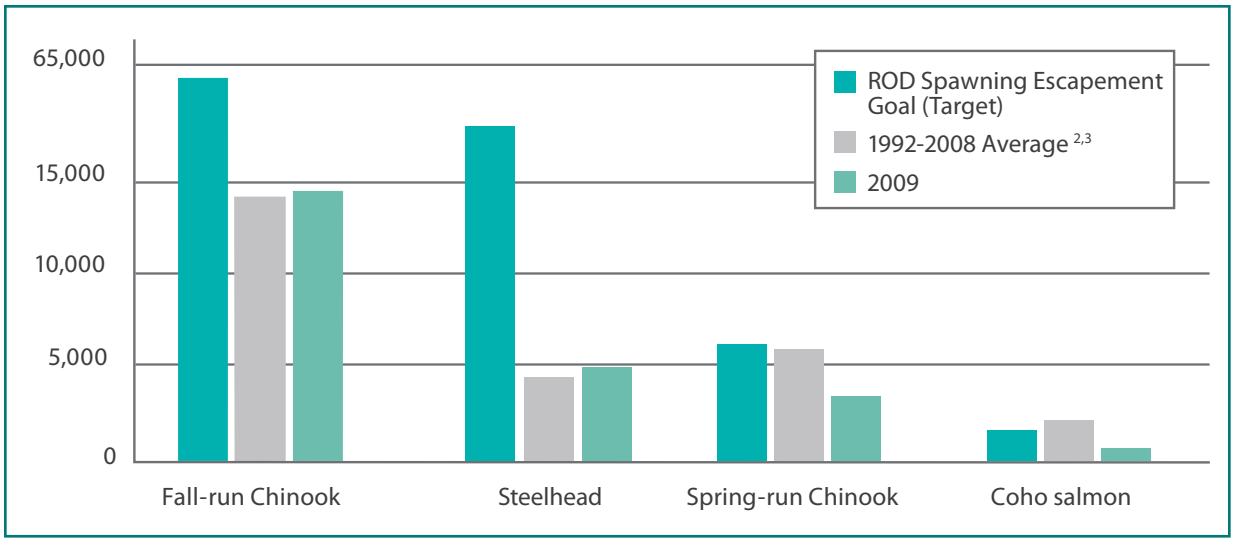
With all of the needed infrastructure in place, the TRRP anticipates that it will continue to be able to meet ROD annual and peak flow requirements in future years. The TRRP has also identified the 24 remaining channel restoration projects, focusing on in-river and side channel construction, floodplain lowering, woody debris placement, spawning gravel processing and augmentation.

Monitoring will be conducted to support the TRRP objective of increasing juvenile rearing habitat for salmonids. In FY 2011, an estimated 3,500-5,000 CY of coarse sediment will be placed through direct injection during high flows, and an additional estimated 5,000-10,000 CY will be placed in conjunction with the channel rehabilitation sites.



1. Data source: California Department of Fish and Game, North Coast Region Klamath and Trinity River Projects
2. Data not available for spring Chinook salmon in 1995; for fall-steelhead in 1997-2001; for coho salmon in 1992-1996

Figure 9: Adult Spawning Escapement of Hatchery Produced Anadromous Salmonids in the Trinity River[1]



1. Data source: California Department of Fish and Game, North Coast Region Klamath and Trinity River Projects

2. Data not available for spring Chinook salmon in 1995; for fall-steelhead in 1997-2001; for coho salmon in 1992-1996

3. The TRRP spawning escapement goal for all steelhead races is 40,000 adults. There is no goal for steelhead and there are no comprehensive escapement data for all steelhead races. The spawning escapement goal is the Program's goal following restoration.

Figure 10: Adult Spawning Escapement of Naturally Produced Anadromous Salmonids in the Trinity River[1]

Modified CVP Operations

3406 (b)(1)(B)

An adequate flow of water in rivers and streams is essential for all stages of fish life: spawning, fry emergence, juvenile development, outmigration and passage back to spawning grounds. Flows help maintain a healthy environment for fisheries by maintaining sufficient stream depth and optimal temperatures for spawning and rearing. Periods of high flow also move sediments downstream to establish and maintain the river bottom. Reclamation and the Service are dedicated to creating optimal flows to support the goal of doubling the population of anadromous fish.

Determining the instream flow needs in CVP streams is an ongoing process that is being addressed by Instream Flow Incremental Methodology (IFIM). This habitat-based model was developed by the Service to assess instream flow needs for aquatic resources, including anadromous fish.

The program prioritizes IFIM studies based on field surveys to identify areas of critical need. IFIM studies involve four basic steps: 1) monitoring a stream to assess current conditions, 2) modeling to determine optimal flows for current conditions, 3) peer review of modeling results to ensure accuracy, and 4) preparation of a final report to document findings.

Collecting deep topographic data on an upper Clear Creek rearing site

IFIM studies funded under section (b)(1)(B) focus solely on CVP streams: American, Sacramento, and Stanislaus rivers and Clear Creek.

The information developed by the IFIM is used by (b)(2) program managers in developing recommendations for modifying instream flows in CVP streams to reduce redd (fish egg "nests") dewatering, reduce juvenile stranding and provide suitable instream conditions. This involves changing and coordinating planned releases between CVP dams when such releases will improve instream conditions without affecting other CVP obligations or authorized purposes.

PERFORMANCE MEASURES

IFIM Studies – The Modified Operations Program (MOP) goal is to complete up to nine IFIM studies to inform modification of CVP facilities in order to improve instream conditions for all life stages of anadromous fish.

Modify Operations – The IFIM studies will inform how to vary CVP flows modifications depending on hydrology and biological conditions.

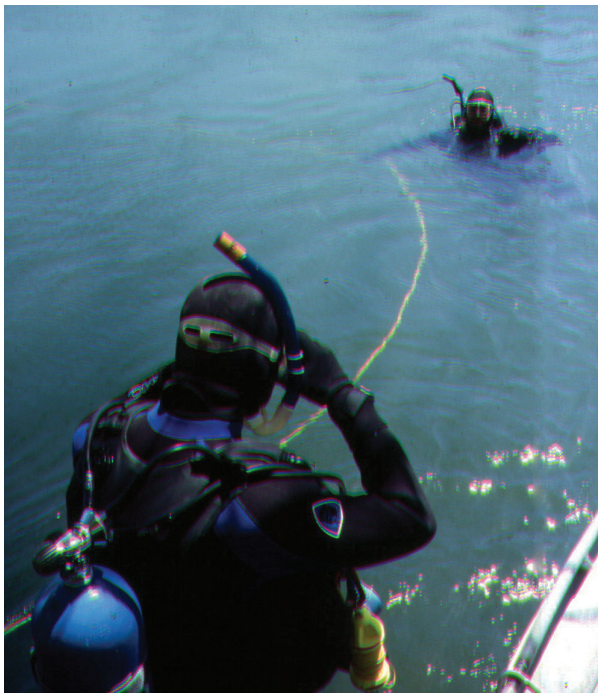
FY 2010 ACCOMPLISHMENTS

The MOP obligated $253,000 from the Restoration Fund in FY 2010 to achieve the following:

The MOP made progress on several IFIM studies that are underway for the following CVP streams:

Stanislaus: The Service completed biological verification field work and hydraulic modeling. The IFIM study is expected to be complete in 2011 and will inform operations of the New Melones Dam.

Clear Creek: A draft report was completed on rearing habitat in the upper two segments of Clear Creek. Peer review of the draft report on spawning



SCUBA diving to collect deep water juvenile Chinook salmon habitat suitability criteria data on the Sacramento River

in the lower segment of Clear Creek was completed. Once the reports were completed, operations occurred intermittently throughout the year to augment low base flows to improve conditions for fish during spawning, incubation and rearing.

ACCOMPLISHMENTS TO DATE

The MOP has completed nine IFIM studies on CVP streams, meeting and exceeding the performance measure. Table 11 lists the studies completed to date, and the operations implemented based on the IFIM results. The data generated by IFIM studies have been used by the program to modify operations on CVP streams, as described below:

American: The three IFIM studies completed for the American River demonstrated that increasing flows from 1,000 to 2,000 cubic feet per second (cfs) would increase spawning habitat for fall-run Chinook salmon and steelhead, by about 16% and 10% respectively. Modified operations occurred on the American River starting in 2009 to maintain flows in the 800 to 950 cfs range from October through February to provide as much spawning habitat as possible for fall-run Chinook salmon and steelhead.

Sacramento: The five studies completed for the Sacramento River demonstrated that flows maintained above 3,750 cfs would greatly reduce stranding of juvenile Chinook and steelhead. More specifically, maintaining flows at about 3,750 cfs could potentially prevent stranding of up to 10,130 juvenile Chinook salmon, and would also reduce redd dewatering. As a result, modified operations occurred on the Sacramento River starting in 2007 to maintain a flow rate of 3,750 cfs.

Stanislaus: The Stanislaus River was selected for an IFIM study, starting in 2010.

Clear Creek: The IFIM study completed for Clear Creek demonstrated that higher releases around the September timeframe would greatly benefit spawning habitat in the upper reach for spring-run Chinook salmon and steelhead. The study indicated that flows of 200 cfs and above would increase the amount of spawning habitat for spring-run Chinook compared to existing conditions. The "Clear Creek Biovalidation" study, which will evaluate how well IFIM compares with field observations, was initiated but then delayed until FY 2011 because additional topographic data is needed.

LOOKING AHEAD

The Stanislaus River IFIM study is expected to be complete in 2011. In future reports, the status of this work may be reported under 3406 (b)(2) Dedicated Project Yield. In future annual reports the status of the Clear Creek IFIM study will be reported under 3406 (b)(12) Clear Creek Restoration Program.

FY 2010 is likely the last year that the (b)(1)(B) program will be obligated funds directly from the Restoration Fund because the MOP has accomplished its goal of nine IFIM studies.

Table 11: IFIM Studies on CVP Streams, 2003-2007

River	Number of IFIM Studies Conducted	IFIM Modeling Project	IFIM Completed	Years Implemented
IFIM Studies Completed				
Sacramento	5	Macroinvertebrate flow-habitat	FY 2007	
		Redd Dewatering and Juvenile Chinook and steelhead stranding	FY 2007 Identified flow fluctuations below 3,750 cfs as potential dewatering/stranding events	Since 2007 Reclamation has minimized fluctuations below 3,750 cfs in fall and winter months
		Spawning flow-habitat Keswick to Battle Creek	FY 2003	
		Rearing flow-habitat	FY 2005	
		Spawning flow-habitat Battle Creek to Deer Creek	FY 2005	
American	3	Spawning flow-habitat for fall Chinook salmon and steelhead	FY 1996	1996–present maintain 800 to 950 cfs range October–February
		Effects of January 1997 flood on spawning flow-habitat	FY 2000	
		Comparison of 1-D and 2-D spawning flow-habitat	FY 2003	
Clear Creek	1	Spring-run Chinook salmon and steelhead upper reach spawning	FY 2007	1999–present The CVPIA IFIM has not been implemented yet. Spring flows were first provided in 1999 using a study not produced by CVPIA.
IFIM Studies Underway				
Clear Creek	3	Fall-run Chinook salmon and steelhead lower reach spawning	(FY 2011)	While the CVPIA IFIM studies for Clear Creek have not been completed, flows have been provided since 1995 using a different IFIM study not produced by CVPIA.
		Juvenile spring-run Chinook salmon and steelhead upper reach rearing	(FY 2011)	
		Juvenile spring-run and fall-run Chinook salmon and steelhead lower reach rearing	(FY 2011)	
Stanislaus	1	Fall-run Chinook salmon and steelhead spawning and rearing	(FY 2011)	Since 1993 the Aceituno IFIM study, produced by FWS and not funded by CVPIA, has been guiding actions; this may be replaced by IFIM results in 2011

Dates in parentheses are estimates and are subject to change

Dedicated 800,000 acre-feet Project Yield

3406 (b)(2)

CVPIA calls for a portion of the CVP project yield to be dedicated and managed for the benefit of fish and other wildlife. Interior has the responsibility to annually dedicate and manage 800,000 AF of CVP (b)(2) water for fish, wildlife and habitat restoration purposes. This water includes both CVP releases and decreased CVP export pumping, relative to a hypothetical pre-CVPIA baseline operation. This accounting is applied specifically to changes in operations on the American River (Nimbus Dam), Sacramento River (Keswick Dam), Stanislaus River (Goodwin Dam), Clear Creek (Whiskeytown Dam) and the Delta pumps. The management of (b)(2) water is informed by the results of Instream Flow Incremental Methodology (IFIM) studies, undertaken as part of Section (b)(1)(B), which identify optimal flow, temperature needs, and timing for the life stages of anadromous fish.

The Dedicated Yield Program (DYP) actions affecting fish fall into the following categories:

- Instream flow augmentations on CVP-controlled streams intended to protect salmon and steelhead, as well as contribute toward meeting Anadromous Fish Restoration Program (AFRP) Final Restoration Plan flow objectives
- Increased releases from Goodwin Reservoir to help meet the Water Quality Control Plan (WQCP) requirements for San Joaquin River flows at Vernalis for fish and wildlife standards
- Increased releases from Keswick and/or Nimbus reservoirs to help meet the WQCP fish and wildlife standards
- Export reductions at the CVP Jones pumps to protect at-risk fish species, notably salmon, steelhead and delta smelt, and to help meet the WQCP Delta standards

PERFORMANCE MEASURES

Annual contribution – Reclamation annually contributes up to 800,000 AF of water from CVP facilities. In dry years, the target is reduced to 700,000 AF. In critically dry years, the target is 600,000 AF.

Contribution to fisheries habitat goal – The 800,000 AF of water contributes towards the 1,000,000 AF fishery habitat goal. The Section (b)(3) Instream Water Acquisition Program contributes the balance, up to 200,000 AF, towards this goal, as described in the CVPIA record of decision (ROD).

FY 2010 ACCOMPLISHMENTS

The DYP obligated $906,031 from the Restoration Fund in FY 2010.

The full 800,000 AF of (b)(2) water was available for fish actions in water year 2010. Table 12 summarizes how the 800,000 AF of (b)(2) water was used in 2010 for fish and wildlife restoration purposes.

Real-time fish monitoring informed when and where action should be taken. On a weekly basis, fishery biologists from the Sacramento, San Joaquin and Delta regions reported on fish movements to a Data Assessment Team. The team, including fishery biologists from Fish and Wildlife Service (FWS), U.S. Bureau of Reclamation (USBR), National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), California Department of Water Resources (DWR), and interested stakeholders, evaluated the data and collaboratively decided where to apply CVP yield. Detailed accounting of (b)(2) fish actions can be found at www.usbr.gov/mp/cvo.

Table 12: Allocation Target and Use of (b)(2) Water, 2001-2010

		Allocation of (b)(2) Water	Use of (b)(2) Water		
Year	Water Year Type*	(b)(2) Allocation Target (acre-feet)	Allocated Flow (acre-feet)	Unused** (acre-feet)	Banked (acre-feet)
2001	Dry	800,000	798,000		
2002	Dry	800,000	793,000		
2003	Above Normal	800,000	796,000		
2004	Below Normal	800,000	800,000		
2005	Above Normal	800,000	672,000		128,000
2006	Wet	800,000	422,000	183,000	195,000
2007	Dry	800,000	798,000		
2008	Critical	600,000	600,000		
2009	Dry	600,000	600,000		
2010	Below Normal	800,000	800,000		

* Water Year Type is based on the Sacramento Valley Index.

** Section 3406 (b)(2)(D): If the quantity of water dedicated under this paragraph, or any portion thereof, is not needed for the purposes of this section, based on a finding by the Secretary, the Secretary is authorized to make such water available for other project purposes.

ACCOMPLISHMENTS TO DATE

The DYP has met the annual contribution requirements since 2000, when the accounting began, including 2008 and 2009, which were officially designated as "critically dry" and "dry" water years. Table 12 presents the historic allocation and use of (b)(2) water. In wetter precipitation years, such as 2005 and 2006, a portion of the dedicated water was banked pursuant to CVPIA Section 3408(d). The use of (b)(2) water has contributed to the 1,000,000 AF fisheries habitat goal by helping to

maintain or improve salmon and steelhead habitat and populations in CVP-controlled streams. Table 13 illustrates how (b)(2) water is used to improve habitat.

LOOKING AHEAD

The DYP plans to complete management guidelines for the reoperation of New Melones Dam. An IFIM study is currently underway that will provide the data to support this action. The program anticipates continued coordination with other CVPIA programs to successfully implement the following 2009 NMFS Operation Criteria and Plan Biological Reasonable and Prudent Alternative actions:

- Modified VAMP – The DYP will participate in a one-year extension of the Vernalis Adaptive Management Plan (VAMP) acoustic tag studies in 2011. Salmon smolts are implanted with hydro-acoustic tags and released in the San Joaquin River. Stationary and mobile receivers track the smolts' route selection and estimate their survival rates.
- Redd (fish egg "nest") dewatering field surveys will help inform modified operations on Clear Creek and the Sacramento and American rivers.
- Analysis of the timing of fall-run Chinook spawning, relative to temperatures and flows on the American and Sacramento rivers, will inform management decisions related to operations.

Table 13: FY 2010 Use of (b)(2) Water by Location in 2010

River	Action	Timeframe	Results
American	(b)(2) water released to help meet WQCP Delta outflow	October 2009	Delta outflows maintained at required level
	(b)(2) water used to augment low base flows for the lower American River	October 2009–January 2010	Contributed toward AFRP Final Restoration Plan flow objectives and improved conditions for fall-run Chinook and steelhead during spawning, incubation and rearing per the Flow Management Standard required by the 2009 NMFS OCAP BO
Clear Creek	(b)(2) water used to augment low base flows throughout water year 2010	October 2009–September 2010	Contributed to AFRP Final Restoration Plan flow objectives and improved instream conditions for fall-run Chinook, spring-run Chinook and steelhead during spawning, incubation, rearing and downstream migration
Stanislaus	(b)(2) and (b)(3) water used to provide fall attraction flow	October 2009	Provided pulse flow to attract adult fall-run Chinook salmon to suitable spawning areas, as required by the 2009 NMFS OCAP BO
	(b)(2) water used to augment low base flows to maintain 200–250 cfs	October 2009–February 2010	Contributed toward AFRP Final Restoration Plan flow objectives and improved instream conditions for fall-run Chinook and steelhead for spawning/rearing as required by the 2009 NMFS OCAP BO
	(b)(2) water used to provide short pulse flows	January–February 2010	Contributed toward AFRP Final Restoration Plan flow objectives and improved instream conditions for fall-run Chinook and steelhead as required by the 2009 NMFS OCAP BO
	(b)(2) water released to help meet WQCP Vernalis flow	February 2010	Assisted in meeting WQCP Vernalis flow objective
	(b)(2) water used to augment flows, to help meet San Joaquin River flow requirement at Vernalis	April–May 2010	Improved survival of fall-run Chinook salmon and steelhead smolts emigrating down the Stanislaus and San Joaquin rivers, and improved habitat conditions in the central and southern delta for listed aquatic species and to meet the Vernalis flow requirement in the 2009 NMFS OCAP BO
	(b)(2) water used for Stanislaus pulse flow of approximately 1,000 cfs	April 25–May 25, 2010	Pursuant to a one-year VAMP extension and the 2009 NMFS OCAP BO; improved survival of fall run Chinook salmon and steelhead smolts emigrating down the Stanislaus and San Joaquin rivers, and improved habitat conditions in the central and southern delta for listed aquatic species
CVP Jones Pumping Plant	Export curtailment to help meet WQCP Delta outflow requirement	November 2009	Delta outflows maintained at required level
	Export curtailment to help maintain WQCP salinity requirements	December 2009–January 2010	Related to Delta Cross Channel gate closure required by 2009 NMFS OCAP BO to protect winter-run Chinook juveniles
	Export curtailments related to Old and Middle River restrictions contained in the 2009 NMFS OCAP BO and 2008 FWS OCAP BO Biological Opinions	Intermittent, February–March 2010	Benefitted salmonids and delta smelt
	Export curtailment to help meet WQCP 35% export/inflow ratio	March 2010	Export/inflow ratio maintained at required level
	Exports limited to 1,500 cfs total for state and federal pumping pursuant to the 2009 NMFS OCAP BO	April–May 31, 2010	Benefitted out-migrating salmon and steelhead smolts; concurrent benefits to delta smelt
	Export curtailments related to Old River and Middle River restrictions contained in the 2008 FWS OCAP BO	June 2010	Benefitted delta smelt

Water Acquisition Program – Instream Water

3406 (b)(3) & (g)

FISHERIES

The Water Acquisition Program (WAP) acquires water to supplement the 800,000 acre-feet (AF) of CVP yield that is dedicated to fisheries. The increased flows benefit numerous resident and anadromous fish species, but primarily benefit Central Valley Chinook salmon, the majority of salmon produced in California. At times, this species has accounted for up to 70% or more of the statewide commercial harvest.

The WAP primarily manages an agreement with the San Joaquin River Group Authority (SJRGA) and its member agencies to provide additional spring and fall fishery flows on the Stanislaus, Tuolumne, Merced, and lower San Joaquin rivers. The flows are used in support of the San Joaquin River Agreement (SJRA) and the Vernalis Adaptive Management Plan (VAMP), which is a scientifically based fishery management plan to determine the relationships between flows, exports, and other factors on fish survival in the Sacramento-San Joaquin Delta. In support of the 2009 National Marine Fisheries Service (NMFS) Operations Criteria and Plan (OCAP) Biological Opinion, the VAMP program is currently funding studies to confirm the outmigration success of salmon smolts. The smolts are released upstream of Vernalis, CA and are recaptured in the western delta.

The WAP also acquires water for CVPIA-designated refuges and wildlife management areas. WAP activities for refuge water acquisitions are discussed in Section 3406 (d)(2), Water Acquisition Program-Refuge Water.

PERFORMANCE MEASURE

Acquire up to 200,000 AF per year to supplement the 800,000 AF dedicated from CVP yield to meet the fisheries flow objective of 1,000,000 AF.

FY 2010 ACCOMPLISHMENTS

The WAP obligated $7,510,630 from the Restoration Fund in FY 2010. The WAP used this funding to acquire a total of 62,480 AF in these areas:

- 12,500 AF for Merced River and Lower San Joaquin River pursuant to the VAMP/SJRA
- 23,980 AF for the VAMP pulse flows in April and May
- 26,000 AF for Stanislaus and lower San Joaquin River flows, along with water quality and other authorized New Melones purposes

ACCOMPLISHMENTS TO DATE

Since the adoption of the SJRA and the VAMP in 2000, the WAP has acquired on average 76,674 AF of the 200,000 AF target (38%). The actual volume of water acquired each year fluctuates based on basin hydrology, reservoir storage and the water supplies available to WAP pursuant to the SJRA.

It has been difficult to acquire the full 200,000 AF due to lack of willing sellers and the high cost of water on the open market. On occasion, WAP has been able to acquire instream flows in the Sacramento Valley by entering into one-year transfers with local water agencies. Table 14 shows the volume of water purchased from 1994 through 2010.

LOOKING AHEAD

Establishing long-term water contracts is an ongoing challenge for the WAP. Even in years when water is available, the cost remains high. The expectation is that water will remain relatively scarce and expensive.

Table 14: Annual (b)(3) Instream Water Acquisitions, Toward 200,000 Acre-Feet Target, 1994-2010

Year	AF Acquired	% of 200,000 AF target
1994	76,441	38
1995	0	
1996	16,161	8
1997	155,983	78
1998	80,000	40
1999	224,498	112
2000	108,880	54
2001	109,785	55
2002	68,105	34
2003	91,526	46
2004	98,211	49
2005	38,500	19
2006	38,500	19
2007	114,645	57
2008	106,490	53
2009	38,500	19
2010	62,480	31

Tracy (Jones) Pumping Plant Program

3406 (b)(4)

The Tracy (Jones) Pumping Plant's six pumps, each capable of pumping 767 cfs into the Delta Mendota Canal, are powerful enough to alter stream flow in the Delta and the San Joaquin River Basin. This disorients migratory fish and draws them toward the pumps where they can become entrained, or trapped.

To mitigate entrainment, the Tracy Fish Collection Facility (TFCF), located adjacent to the pumping plant, collects migratory fish and transports them to the Delta where they can resume outmigration to the ocean. The focus of the (b)(4) program is to improve fish protection and salvage through development of new technologies. Ongoing monitoring of the program's effectiveness helps define best practices that inform decision-making and long-term planning at Tracy and other South Delta facilities.

PERFORMANCE MEASURES

The Tracy (Jones) Pumping Plant program (TPPP) develops and implements actions to mitigate impacts to fisheries, targeting the 23 actions included in The Tracy Fish Facility Improvement Program Plan, as shown in Table 15.

FY 2010 ACCOMPLISHMENTS

The TPPP obligated funding from a variety of sources: $228,887 from the Restoration Fund and $2,682,454 from the Water & Related Resources program for the Tracy Fish Collection Facility; and $330,633 from the Bay-Delta fund for the Two Gates Demonstration Project.

The TPPP constructed a new biological resources building (Action 15) and installed a new trash rack cleaner (Action 16). The TPPP also completed assessments in support of Actions 17 and 18, which will improve the louver cleaner systems. Continued assessments in support of Action 20 were conducted as well, that were intended to reduce fish predation through the construction of a new secondary screening and transfer system.

In addition to the 23 actions listed in Table 15, the TPPP also completed a number of studies that will improve fish capture and reintroduction capabilities. The studies include hydraulic evaluations, fish-friendly vacuum pump system evaluations, an assessment of the efficiency of holding tank screens for juvenile delta smelt, and an assessment of the effect of fin clipping for DNA sampling for Chinook salmon.

Funds were also provided for the Two Gates Fish Demonstration Project. The project would install and operate removable gate structures at two key Delta locations, allowing Reclamation to test whether they improve protection for delta smelt and other sensitive aquatic species. A CALFED Science Program Independent Review Panel completed its evaluation of the two gates project in 2009. The panel recommended that Reclamation continue to collect data and model the correlation between fish behavior and turbidity before implementing the project.

ACCOMPLISHMENTS TO DATE

To date, the TPPP has completed 16 of 23 actions, or 69% of the program's goal. The program anticipates that all actions will be implemented by approximately 2016. Table 15 identifies the 23 actions and progress to date, including estimated completion dates for actions not yet implemented.

LOOKING AHEAD

In 2011, the TPPP is planning to install a secondary louver/cleaning system (Action 18). Data collection,

model calibration, and validation are underway for the Two Gates Fish Demonstration Project. The network of near real-time continuous tidal flow and turbidity monitoring stations has been expanded to include key locations within the Delta to quantify all major sediment inputs to the Delta. The first high winter flow sampling campaign to gather data to calibrate a smelt-turbidity behavior model is expected to be completed in January 2011 and a draft report presenting preliminary results is anticipated in May of 2011. Because this effort involves calibration of a turbidity model, it is difficult to predict when the data collection, model development and calibration, and field conditions will be sufficient to render the efforts complete.

Table 15: Actions to Improve Tracy Fish Collection Facility

	Actions	Start Date	Completion Date
1	Implemented periodic predator removals	1992	"ongoing"
2	Upgraded instrumentation at the TFCF	1992	1993
3	Replaced high pressure utility pump with low pressure utility pump	1995	1996
4	Epoxy coated recessed collection tanks	1997	1997
5	Constructed aquaculture facility onsite	1997	2005
6	Constructed extraction device for Chinese mitten crabs/debris removal	1998	1999
7	Installed air system in recessed collection tanks	1999	1999
8	Developed onsite laboratory for fish taxonomic work	1999	1999
9	Added air system to fish haul trucks	2000	2000
10	Upgraded fish count area to accommodate DNA sampling & fish ID	2000	2000
11	Updated fish identification key for training of operators	2000	2000
12	Replaced worn ("leaky") bypass transition boxes	2003	2004
13	Replaced fish transfer bucket with new/improved fish transfer bucket	2006	2008
14	Replaced fish haul trucks with new/improved fish haul trucks	2006	2008
15	Constructed new biological resources building	2006	2010
16	Replaced existing trash rack cleaner with new/improved trash rack cleaner	2006	2010
17	Replace primary louvers/cleaners with new primary louvers/ cleaning system	2006	2015*
18	Replace secondary louver/cleaners with new secondary louvers/ cleaning system	2006	2013*
19	Develop land onsite to improve ability to conduct research and operate the facility	2006	2013*
20	Construct new secondary screening and transfer system	2010	2016*
21	Construct new aquaculture facility onsite	2012	2015*
22	Automate velocity control pumps for the fish bypass system	2013	2014*
23	Construct third fish release site	2014	2015*

* Estimated Completion Date

Contra Costa Canal Pumping Plant

3406 (b)(5)

The Contra Costa Canal is essential to the Contra Costa Water District, delivering water from the Delta to the district's treatment facilities and raw-water customers. The canal is 48 miles long, starting at Rock Slough in East Contra Costa County and ending at the Terminal Reservoir in Martinez. Four pumping stations currently lift water 124 feet above sea level from Rock Slough, and then gravity propels the water to its terminus in Martinez.

Contra Costa Pumping Plant No. 1 is located at the head of the Contra Costa Canal. Without adequate screening or alternative mitigation, the operation of the Contra Costa Pumping Plant No. 1 results in fish mortality. In addition to the CVPIA mandate, the 1993 Los Vaqueros BO, the 2009 NMFS OCAP BO requires that a fish screen be built at Rock Slough.

PERFORMANCE MEASURES

The Contra Costa program (CPP) mitigates fishery impacts with operational changes and installation of structures, including a fish screen.

FY 2010 ACCOMPLISHMENTS

The CCP obligated funding from a variety of sources: $16,134,822 from the American Reinvestment and Recovery Act (ARRA), $19,638 from the Water & Related Resources Fund, and $2,715 from the Bay-Delta Fund.

The CCP made substantial progress towards construction of the fish screen. The screen will be 320 feet long and 14 feet high, from 7.6 feet below mean sea level to 6.4 feet above mean sea level. By July 2010, the construction of the cofferdams was complete, water had been pumped out to create a dry construction site, and the levee had been excavated to provide access to the site. Several additional Phase II components were completed in FY 2010, including excavation of the fish screen footings, installation of bypass pumping facilities, installation of a replacement irrigation pump, fabrication of composite piles and concrete piles, and placement of the foundation of the facility.

Phase Dewatering Construction Zone – before

Phase Dewatering Construction Zone – After

ACCOMPLISHMENTS TO DATE

On April 15, 2009, Secretary of the Interior Ken Salazar announced that $20 million of American Recovery and Reinvestment Act (ARRA) funding was being obligated to the construction of a fish screen, enabling the project to be implemented. The three-phase project tiers off the CVPIA programmatic Biological Opinion, and is consistent with the 2009 NMFS OCAP BO.

Phase I: Design and permitting

Phase II: Preparatory groundwork

Phase III: Construction of the fish screen

In 2009, the CCP used ARRA funding to complete Phase I of the project, including updating the fish screen design to current construction code and completing environmental documentation and permits.

In September 2009, Phase II of the project was underway, including breaking ground for construction of cofferdams. The cofferdams are temporary barriers that allow a "dry" construction area to be created, protecting fish from harm during the construction of the fish screen, and allowing the levee to be breached to provide access to the construction zone.

LOOKING AHEAD

The fish screen is anticipated to be operational and ready for performance testing by November 2011. Post-construction monitoring will be conducted by Contra Costa Water District and will continue indefinitely to confirm the effectiveness of the new screen. Once the fish screen is operational, the obligations of the 3406(b)(5) will be satisfied and no additional CVPIA funds will be needed under this provision.

Construction in Progress – View of Pier Forms

Flow Fluctuations and Reservoir Storage

3406 (b)(9) & (19)

River and stream flow fluctuations can result in fish losses through mortality of migrating and spawning adults decreased egg viability in redds due to thermal distress, redd dewatering and isolation, and stranding of juveniles. The goal of the (b)(9) Flow Fluctuation Program (FFP) is to minimize these losses by moderating changes in CVP releases on Clear Creek and the Sacramento, American, and Stanislaus rivers.

The (b)(19) Reservoir Storage Program (RSP) seeks to maintain carryover water storage and deliver appropriately timed flows and flows of adequate quality to support fisheries restoration and meet other project purposes.

PERFORMANCE MEASURES

Flow Fluctuation – Eliminate, to the extent possible, fish losses on CVP streams due to flow fluctuations caused by operation of CVP facilities.

Carryover Storage – Maintain 1,900,000 acre-feet (AF) of carryover storage levels at Shasta Reservoir and 600,000 AF at Trinity River Reservoir.

The Reasonable and Prudent Alternative (RPA) contained in the 2009 NMFS OCAP BO includes sets of actions that vary based upon Shasta Reservoir end-of-September storage. These sets of actions broadly relate to the flow release schedule for Keswick Dam to maintain cold water supplies necessary for egg incubation for the following summer's cohort of winter-run. Depending on the water year type and amount of carryover storage at the end of September, the BO mandates close coordination between NMFS, California Department of Fish and Game (CDFG) and the Service to schedule releases for the subsequent year.

FY 2010 ACCOMPLISHMENTS

The FFP obligated $6,145 from the Restoration Fund in FY 2010. There is currently no funding for the RSP, although many (b)(2) program activities support reservoir storage through the dedication and management of project yield.

FLOW FLUCTUATION

Clear Creek and Sacramento River – As part of an investigation funded by the 3406 (b)(2) Dedicated Yield Program, biologists surveyed salmon and steelhead redds in fall and winter of 2009-2010 on Clear Creek and the Sacramento River. Insights gained will help make informed decisions pertaining to flow fluctuations as well as the potential use of (b)(2) dedicated yield.

American River – The American River Operations Work Group commissioned three isolation pool and steelhead spawning surveys (December 15, 2009 – April 20, 2010); a field survey when flows were reduced in August of 2010; and salmon and steelhead redds surveys. No stranded or isolated redds or juveniles were observed in any of the studies.

Stanislaus River – The Stanislaus Operations Group held monthly meetings to discuss and provide recommendations for achieving the minimum instream flow requirements and temperature objectives contained in the BO. The Stanislaus Flow Fluctuation Study was completed by CDFG. The group also helped coordinate fish monitoring studies and habitat mapping.

CARRYOVER STORAGE

The RSP met the carryover targets for Shasta and Trinity reservoirs in FY 2010.

ACCOMPLISHMENTS TO DATE

Flow Fluctuations – Reclamation regularly conducts studies and convenes working groups to discuss operations, timing of releases, and threshold flows and ramping rates to protect fishery resources. Through this coordination, CVP operators minimize extreme flow fluctuations, meeting the intent of this performance measure.

Reclamation developed an Interim Emergency Response Plan for the American and Stanislaus rivers to increase protection of listed anadromous salmonid species during periods when operations could have resulted in stranding or isolation. These actions comply with the Reasonable and Prudent Alternative and support compliance with the BO.

Carryover Storage – As shown in Table 16, the RSP has met the carryover storage goal for Shasta Reservoir 84% of the time since 1998 and has met the Trinity Reservoir target 100% of the time. The "water year type", impacts how much water is available for carryover storage each water year, as it's a direct result of climate and precipitation (PPT). The Service has coordinated closely with NMFS and CDFS on the flow schedule from Keswick Dam to ensure favorable conditions for egg incubations, fry emergence, and juvenile rearing of winter run Chinook salmon.

LOOKING AHEAD

It is likely that Reclamation and other agencies will have to meet new regulatory requirements that could conflict with other program objectives. For example, requirements to meet Delta outflow objectives could make it difficult to meet requirements for carryover storage and instream flows.

Table 16: Carryover Storage at Shasta and Trinity Reservoirs

Water Year	Sac. Valley Index Water Year Type	Shasta Reservoir (1.9 MAF)*	Trinity Reservoir (600 TAF)**
1998	Wet	3.4 MAF	2,077 TAF
1999	Wet	3.3 MAF	1,962 TAF
2000	Above Normal	3.0 MAF	1,791 TAF
2001	Dry	2.2 MAF	1,428 TAF
2002	Dry	2.6 MAF	1,500 TAF
2003	Above Normal	3.2 MAF	1,881 TAF
2004	Below Normal	2.2 MAF	1,591 TAF
2005	Above Normal	3.0 MAF	1,890 TAF
2006	Wet	3.2 MAF	1,795 TAF
2007	Dry	1.9 MAF	1,461 TAF
2008	Critical	1.4 MAF	1,137 TAF
2009	Dry	1.8 MAF	919 TAF
2010	Below Normal	3.3 MAF	1,558 TAF

* million acre-feet
** thousand acre-feet

Red Bluff Diversion Dam

3406 (b)(10)

The Red Bluff Diversion Dam (RBDD) is located on the Sacramento River about 2.5 miles southeast of the city of Red Bluff. The dam has 11 gates that, when partially closed, divert water to the Tehama-Colusa and Corning canals to provide water for farmers, the Sacramento National Wildlife Refuges (SNWR), and minor municipal and industrial uses. In the summer, the dam creates a seasonal lake in a wide portion of the Sacramento River, attracting both wildlife and recreational users.

Construction of the dam has impaired the ability of Chinook salmon to reach historic spawning habitat. To address this impact, a number of operational modifications have been tried and tested since 1986 when the gates were first raised to allow passage from December to April. By 1992, the winter-run population numbers had declined dramatically; an estimated 191 adults returned that year, resulting in winter-run Chinook being placed on the Endangered Species Act List. As a result the program began lifting the gates as an operational measure to promote species recovery. The gates were open for longer periods of time between 1992 and 1994, allowing winter-run population numbers to increase to approximately 20,000.

Red Bluff Diversion Dam – Gates Up

Aerial view of Red Bluff Diversion Dam pumping plant construction site

The NMFS' 1993 BO on the CVP/SWP required that the gates be raised September 15th to May 14th, beginning in 1994. The BO effectively moved the beginning date back from November 1 to September 15th to encourage spawning activity further upstream and moved the ending date forward from April 30th to May 14th to reduce predation losses at the gates (NMFS 1993b, p. 54)

Today, two temporary pumping plants allow the gates to remain open for 10 months each year (September - June). Although gate operations have enabled the fall-run Chinook populations to increase in numbers, the spring-run Chinook populations continue to be impacted. As a result, the 2009 NMFS OCAP BO requires the gates be raised year-round after 2011. However, the temporary pumping plant does not currently meet the capacity needs to deliver year-round irrigation supplies to local farmers. Therefore, the ability to meet the irrigation demand for 150,000 acres of agricultural land in the Tehama-Colusa Canal Authority could be severely compromised, if a new facility is not completed by May of 2012. As a result, the long-term solution is to construct a new permanent pumping plant that will allow the RBDD gates to remain open year-round, without affecting deliveries to water contractors and the Sacramento National Wildlife Refuge (SNWR).

PERFORMANCE MEASURES

The Red Bluff Program's (RBP) current goals include passage of 80–100% of adult spring-run salmon, the run that continues to be significantly blocked. The RBP aims to achieve this target while maintaining water deliveries. This measure includes monitoring to confirm the successful passage of spring-run salmon above and below the dam.

Passage of 50-100% of adult green sturgeon is also targeted while maintaining water deliveries to SNWR and other water contractors. This measure includes monitoring to confirm the successful passage of green sturgeon above and below the dam.

To support annual fish passage, the RBP continues operation under the "minimum gate opening" criteria required by a 1993 NMFS Biological Opinion for Red Bluff Diversion Dam, and construction of a new pumping plant capable of up to 2,500 cfs of pumping capacity.

The last goal of the RBP is to develop capacity for conveyance of 115,000 acre-feet (AF) of refuge water to the SNWR Complex on the west side of the Sacramento River. This performance measure was met in 1999 when a siphon was installed on the GCID Canal at Stony Creek to allow year-round deliveries. The new pumping plant will provide a backup to conveyance via GCID's facilities.

Construction of pumping plant in progress – driving sheet piles toward the settling basin, July 2010

FY 2010 ACCOMPLISHMENTS

In FY 2010, the RBP obligated funding from a variety of sources: $98,898,000 from the American Reinvestment and Recovery Act (ARRA), $12,170,212 from the Water & Related Resources Fund, and $2,230,000 from the State of California cost-share.

PUMPING PLANT AND FISH SCREEN

In FY 2010, construction of an interim 500 cfs pumping plant and fish screen were completed, allowing the program to comply with the operating restrictions imposed by the 2009 BO while still meeting irrigation demands.

Construction of the new, 2,500-cfs permanent pumping plant and fish screen began in FY 2010:

- December 2009: Reclamation awarded a $21 million contract to West Bay Builders to build the bridge, siphon, and canals for the pumping station.
- January 2010: Reclamation awarded a $7 million contract to Moving Water Industries (MWI), Inc. to provide the pumps and motors. MWI is expected to deliver the pumps and motors by June 2011.
- May 2010: Reclamation awarded Balfour-Beatty, Inc. $67 million to complete the pumping station and fish screen contract. The contractor has begun excavation of the forebay, pumping station, switchyard and installation of sheet piles for the fish screen.

Passage of Spring-run Salmon – Based on current gate operations of the facility, approximately 80% of adult spring-run Chinook achieved unimpeded upstream passage in 2010.

In 2010, two acoustically tagged adult green sturgeon successfully passed under the gates in late June. They were subsequently detected downstream by mobile tracking and stationary receivers. The gates were kept open a minimum of 18 inches, which allows safe passage of out-migrating adult green sturgeon.

Compliance with 2009 NMFS OCAP BO – The RBP continued monitoring of green sturgeon, in compliance with the BO-required actions. In 2010, sampling occurred over a 61-river-kilometer range. Preliminary results indicate that green sturgeon spawning occurred from early April to late June, and larvae are leaving the spawning grounds between May and July.

ACCOMPLISHMENTS TO DATE

Chinook salmon and green sturgeon – As of 2010, monitoring indicates that performance measures continue to be met, with the facility achieving approximately 80% passage of returning spring-run salmon and nearly 100% passage of green sturgeon. It is fully anticipated that with the permanent pumping facility and the gates remaining open all year, the fish passage will improve for all runs of salmon to 100% passage. At the present time, 100% of the late fall-run and approximately 80% or more of the

Construction of pumping plant in progress – driving sheet piles toward the settling basin, July 2010

Construction of pumping plant in progress – attaching braces for water onto the sheet pile, August 2010

spring-run, Chinook salmon pass unimpeded, with percentages for other listed species falling between these two numbers.

Compliance with 2009 NMFS OCAP BO RPAs – The Reasonable and Prudent Alternative (RPA) requires ongoing monitoring of green sturgeon movements, including identification of green sturgeon spawning and holding habitat areas upstream and downstream of the dam. The RBP initiated surveys in 2008 and will continue the monitoring program until construction of the pumping plant and fish screen is complete.

LOOKING AHEAD

Construction of the permanent pumping plant and fish screen is expected to be complete in 2012, allowing 100% passage for salmon and green sturgeon and the ability to meet year-round agricultural water supply needs. Monitoring will track the expected rise in safe passage both upstream and downstream of the plant. Future planned monitoring activities include egg deposition and larval drift surveys, and identification of spawning patterns of acoustically tagged adult green sturgeon.

Clear Creek Restoration Program

3406 (b)(12)

Clear Creek suffered widespread degradation through the 20th century due to several factors, including construction of McCormick-Saeltzer Dam in 1903, construction of Whiskeytown Dam in the 1960s, and aggregate and gold mining activities. These actions led to precipitous drops in Chinook salmon and steelhead spawning and juvenile production. In order to reverse the trend, CVPIA is implementing a restoration program to improve instream habitat, allowing greater spawning and rearing success.

PERFORMANCE MEASURES

The Clear Creek Restoration Program (CCRP) focuses on the following areas and uses the following goals to track progress: fish passage; erosion control; gravel placement (creation of spawning habitat); channel restoration; instream flow and temperature of flow releases. All of these goals are in support of the overall CCRP objective of restoring fish populations on Clear Creek, and increasing natural production, to meet the annual target of 7,100 for fall-run Chinook on Clear Creek. Although there is no doubling target for spring-run Chinook on Clear Creek, restoration actions will also help increase spring-run Chinook populations, contributing to the CVPIA's Central Valley-wide goals.

Fish Passage –The fish passage target was achieved in 2000, when McCormick-Saeltzer Dam was removed, opening 12 additional miles of habitat to fish passage.

Erosion Control – The erosion control target was achieved ahead of schedule. All feasible and cost-effective erosion control projects initially identified were completed by 2001 and the necessity for further work will need to be determined.

Placement of woody debris

Gravel Placement (Creation of Spawning Habitat) – The CCRP attempts to replenish Clear Creek spawning habitat areas with 17,000 tons of gravel every year. Gravel placement contributes to the restoration of the 347,288 square feet of spawning habitat that existed before the construction of Whiskeytown Dam.

Channel Restoration – The CCRP is restoring 2 miles of stream channel to support successful spawning and rearing.

In-stream Flows and Temperature of Flow Releases – The CCRP provides instream flows, depending on hydrology and biological conditions, to ensure that flow volumes and temperature meet habitat needs for successful spawning and rearing. Using (b)(2) water and coordinating with operators, the program aims to provide water at 60°F June 1–September 15, and 56°F September 16–October. The goal is to meet these targets at least 98% of days, with no more than two consecutive days of releases when exceeding the temperature target. The timing of flows benefit both spring run and fall run Chinook but are especially important to spawning spring run Chinook. Spring run Chinook adults typically make the upstream migration from late March through early October. These fish need sufficient flows to make it to the upper reaches of Clear Creek where they can spawn in water cold enough to sustain salmon eggs through the warm summer months.

Monitoring and Adaptive Management–Although this is not a distinct goal for the CCRP, monitoring and adaptive management are important because these activities help the CCRP address limiting factors and achieve greater success in meeting its goals and RPAs.

FY 2010 ACCOMPLISHMENTS

In FY 2010, the CCRP obligated $604,609 from the Restoration Fund.

Fish Passage – In August 2010, 15 spring-run Chinook were observed. In 2009, 3,228 fall-run Chinook were observed on Clear Creek. These numbers indicate that despite a Central Valley-wide collapse of the fishery, the program is continuing to sustain fish populations. Although the 2009 numbers were lower than previous years, they were higher than most other watersheds. According to the California Department of Fish and Game's GRANDTab database, one-hundred-twenty spring run Chinook were observed in 2009, which was 54% greater than the 1999-2008 average. The CCRP has also observed a 62% increase in adult steelhead populations over the 2001-2009 average.

Gravel Placement (Creation of Spawning Habitat) –A total of 8,500 tons of gravel was placed in Clear Creek in 2010 representing 50% of the annual target:

- 3,000 tons of gravel were placed at three sites: below NEED Camp, Phase 3A upper, and phase 3A lower.
- An additional 5,500 tons were placed by the Western Shasta Resource Conservation District at five sites using Bureau of Land Management American Recovery and Reinvestment Act (ARRA) funding.

The CCRP expects to see use of this gravel placement in 2011 as fish return to spawn, and will conduct surveys in the fall to evaluate this use. More than 32,000 square feet of spawning habitat was created by the FY 2010 gravel injections.

Channel Restoration – The CCRP completed understory re-vegetation in Phase 3A, now that the initial overstory plants are tall enough to provide shade.

Instream Flows and Temperature of Flows – The CCRP met its goal of providing base flows of 200 cfs between October 1–May 31. In addition, two pulse flows were also provided during spring 2010 to attract spring-run Chinook to Clear Creek. The increase in spring-run population numbers indicate the pulse flows are successfully attracting fish.

Water temperature targets were partially met. The 60°F target from June 1 through September 15 was achieved 100% of the time by adjusting flows from Whiskeytown Dam. These temperatures protect adult spring-run Chinook salmon and juvenile steelhead.

The 56°F target for spring-run Chinook salmon spawning was met only 26% of the time. Cold water inflows to Whiskeytown Reservoir were reduced to allow instream dredging required for the removal of

toxic waste from the Spring Creek arm of Keswick Reservoir. Lack of cold water allowed Whiskeytown Reservoir to warm, resulting in warmer water temperatures in Clear Creek. These warmer water temperatures are potentially lethal for eggs and early life stages of Chinook salmon.

Adaptive Management and Monitoring – In 2010, topographic surveys quantified the amount of fine sediment delivered to Clear Creek via a sub-watershed that experienced a substantial wildfire in 2008. Results indicated that sediment removal, erosion inventory and erosion control should be done in future years. Additionally, spawning studies for channel restoration phases 3A and 3B took place, showing that the amount of spawning habitat was greatly increased in both phase 3A and 3B, but juvenile rearing habitat in phase 3B may need improvements in the future.

ACCOMPLISHMENTS TO DATE

Fish Passage – The CCRP has seen a relatively steady increase in fall-run Chinook population numbers, until recent years. The average natural production from 1992 to 2009 is 11,149, surpassing the target by over 4,000 fish. Although the average production over an 18-year period has shown an increase in fall-run Chinook natural production, the last three years of data have shown a decline. For the years, 2007, 2008 and 2009, fall-run Chinook natural production has been 6,425, 6,142, and 2,582 respectively. According to the California Department of Fish and Game's GRANDTab database, spring-run Chinook numbers have been increasing since 1992. The average escapement of spring-run on Clear Creek from 1993-2009 is 59 fish. For the years 2007, 2008, and 2009, spring-run Chinook escapement has been 291, 105, and 194 fish, respectively.

Gravel Placement (Creation of Spawning Habitat) – Since 1995, an average of 8,728 tons of gravel has been placed annually, representing 35% of the target. Overall, a total of approximately 130,925 tons of gravel has been injected at 16 locations within a 15-mile stretch of the creek, resulting in a steady increase in spawning habitat. Placement of spawning gravel in the upper reach has increased spawning habitat from 19,000 square feet to a total 120,000 square feet to date. This represents 35% of the CCRP target.

Spawning gravel ready for placement

Channel Restoration – Approximately 1.5 miles of channel habitat has been restored, representing approximately 80% of the target. Phases 1, 2A, 2B, 3A, and 3B of the Channel Restoration Project are now complete. The Final Phase, 3C, is programmed for implementation by 2015.

In-stream Flows and Temperature of Flow – Approximately 80,000 acre-feet (AF) of (b)(2) water is used annually to meet temperature objectives and the instream habitat goal. Pre-CVPIA baseline flows were 50 cfs between January and October, and 100 cfs in November and December. The CCRP has coordinated (b)(2) water to increase flows to 200 cfs from October through May. During the summer, from June through September, flows are regulated to achieve water temperature targets, and average 135 cfs.

To date, the CCRP has generally been successful at meeting temperature goals June through September, when warm water can be detrimental to salmonids. Since 1999, flows to achieve temperature control of 60°F from June 1 through September 15 and 56°F from September 15 through October 31 have been met approximately 92% of the time.

Monitoring and Adaptive Management – The CCRP has been able to conduct a great deal of monitoring and survey assessments over the years with the help of partners such as California Department of Fish and Game. Over the years, fisheries monitoring geomorphologic monitoring, topographic surveys and snorkel surveys have yielded important information about plan an implement projects. Through these monitoring activities the program has been able to identify sedimentation and habitat degradation, and the effectiveness of gravel placement and channel restoration activities. Monitoring activities and surveys help the program address limiting factors and adaptively manage the program to achieve greater success at meeting its goals.

LOOKING AHEAD

The CCRP has several projects planned and programmed for future years that will make substantial progress towards the performance measures:

Gravel Placement (Creation of Spawning Habitat) - The Long-Term Spawning Gravel Supply Project (2012-2013) will provide a more reliable source of gravel, allowing the program to meet the gravel placement target. Completion of long-term environmental permits for spawning gravel addition projects is anticipated by mid-2011.

Channel Restoration - The Channel Restoration Project Phase 3C (2014-2015) is the last phase in the stream channel restoration project. Implementation of Phase 3C will result in 2 miles of channel being restored.

Erosion Control - The Moon Fire Erosion Control Project (2012-2014) will continue to address the effects of a wildfire that caused extensive erosion and sedimentation in the creek, by identifying sources of sedimentation and removing sediment to avoid further degradation of habitat.

Adaptive Management and Monitoring - In future years, the program plans to support compliance with the following 2009 NMFS OCAP BO RPAs:

- Spring Attraction Flows
- Channel Maintenance Flows
- Spawning Gravel Augmentation
- Spring Creek Temperature Control Curtain
- Thermal Stress Reduction
- Adaptively Manage to Habitat Suitability/IFIM Study Results
- Monitoring and Reporting [in Clear Creek]
- Monitoring Requirements [CV-wide]

The CCRP also will be reporting on the effectiveness of the gravel program by documenting use of the spawning gravel by fall-run Chinook salmon.

Spawning and Rearing Habitat Restoration Program

3406 (b)(13)

In a free-flowing river, rocks, gravel, dirt and other substrates are continually moving downstream, providing suitable habitat for successful spawning and juvenile rearing. The construction of CVP dams has had a dramatic impact on streams, by impeding this natural process.

The (b)(13) program represents a continuous effort to restore spawning and rearing habitat in three Central Valley streams:

- Upper Sacramento River, from Keswick Dam to the Red Bluff Diversion Dam
- American River downstream of Nimbus Dam
- Stanislaus River downstream of Goodwin Dam

The Spawning and Rearing Habitat Program (SRHP) focuses on sites that are thought to have the most benefit to increase the quality and quantity of spawning and rearing habitat. Two criteria guide the identification of gravel placement sites: the need for spawning habitat; and accessibility to the river by truck, helicopter or sluice to deliver the gravel.

Aerial photos, redd (fish egg "nests") surveys, snorkel surveys and boat surveys are used to identify areas for gravel augmentation. Prior to placing gravel, baseline data is collected using aerial photos, spawning surveys and rearing surveys. Once the gravel is placed, the SRHP monitors the spawning and rearing occurring at and near the restored sites to determine the program's effectiveness.

The SRHP relies on other river-wide monitoring to evaluate population level effects. This consists of adult escapement surveys conducted by the Department of Fish and Game in the Sacramento, American (Reclamation funded), and Stanislaus (Reclamation funded) rivers; juvenile production monitoring conducted by the Service in the Sacramento River (Reclamation funded), and private contractor in the Stanislaus River (CVPIA funded). No juvenile production monitoring is currently occurring in the American River. Adult escapement and juvenile production monitoring provides information on the number of juvenile emigrants produced per spawner.

Gravel placement on the American River

PERFORMANCE MEASURES

The SRHP places gravel in the Sacramento, Stanislaus and American rivers on an annual basis to improve spawning and rearing habitat. The annual program targets are 10,000 tons on the Sacramento River, 3,000 tons on the Stanislaus River, and 7,000 tons on the American River.

The program also monitors the effectiveness of gravel placement by surveying for several indicators. The number of redds per square meter indicates whether salmon find the gravel appropriate for spawning (0.03 redds/square meter is a standard guideline). The level of egg retention in females indicates whether there are a sufficient number of suitable sites to spawn (less than 10% retention is a standard guideline). The percentage of salmon using emplaced gravel indicates whether the program is providing habitat that is suitable (the program aims for 10% on the Stanislaus River and 25% on the Sacramento and American rivers).

FY 2010 ACCOMPLISHMENTS

In FY 2010, the SRHP obligated $693,181 from the Restoration Fund.

Sacramento River – In 2010, the program placed 5,500 tons of gravel, or 55% of the annual target.

Stanislaus River – No gravel placement occurred in 2010. Because of controversy in the local community regarding gravel placement, the program attempted to identify suitable sites outside of the town of Knights Ferry, but no sites were selected. FY 2010 studies indicate that approximately 21% of spawning Chinook salmon are using gravel previously placed by the program.

American River – In 2010, 16,000 tons of gravel were placed downstream of Nimbus Dam, 228% of the annual target. The high volume of available gravel, combined with a low level of escapement in FY 2010, resulted in an abundance of spawning habitat, as reflected in the monitoring data. Monitoring indicates that there was 4% egg retention in the fall of 2010—well within the 10% target—indicating that females were able to find suitable sites for spawning. The abundance of spawning habitat also resulted in a lower density of redds, as would be expected. The density was measured at 0.01 redd per square meter of emplaced gravel. The use of emplaced gravel by salmonids was high: 37% of observed steelhead redds were on gravel placement sites and 46% of observed Chinook redds were on gravel placement sites. Overall, the results indicate that there were plenty of gravel sites to choose from in FY 2010, allowing for a lower density on any one site.

Additional monitoring, using a before-after control-impact framework, conducted to evaluate the effectiveness of the projects included: hyporheic water chemistry, flow and temperature; gravel movement and river bed changes; fish community habitat use; macro invertebrate production; and floodplain inundation.

ACCOMPLISHMENTS TO DATE

Table 17 lists the amount of gravel placed since the start of the SRHP.

Sacramento River – Approximately 186,000 tons of gravel has been placed on the Sacramento River, representing an average annual placement of 13,285 tons (132% of the target).

Stanislaus River – More than 18,000 tons of gravel has been placed on the Stanislaus River, representing an average annual placement of 1,285 tons (43% of the target).

American River – Approximately 39,600 tons of gravel has been placed on the American River, representing an average annual placement of 2,828 tons (40% of the target).

LOOKING AHEAD

Sacramento River – The SRHP will focus on identifying new gravel placement sites and potential injection methods for the stretch between Anderson-Cottonwood Irrigation District Dam to the confluence with Clear Creek.

Stanislaus River – The SRHP will focus on identifying new gravel placement sites to meet the 2009 NMFS OCAP BO RPA action prescribing 50,000 CY of gravel to be placed in the river by 2014.

American River – The SRHP will focus on American River Spawning and Rearing Habitat Project Effectiveness Monitoring to evaluate an ongoing series of seven yearly projects in the American River from Nimbus Dam to River Bend Park.

To address the goal of juvenile rearing habitat, work in all rivers will focus on restoration of side channels, channel margins and meander belts.

Table 17: Gravel Placed by Year in CVP Streams, and Percent of Target, 1997-2010

	Sacramento River 10,000 Ton Target	% Target	Stanislaus River 3,000 Ton Target	% Target	American River 7,000 Ton Target	% Target
1997	22,191	221	1,000	33		
1998	22,191	221				
1999	15,341	153			6,000	86
2000	29,850	298	1,300	43		
2001	0	0	500	17		
2002	15,341	153	4,000	133		
2003	15,341	153				
2004	22,191	221	1,200	40		
2005	0		2500	83		
2006	6,000	60	2,500	83		
2007	4,615	46	4,100	137		
2008	17,539	175			7,000	100
2009	9,900	99			10,600	151
2010	5,500	55			16,000	229
TOTAL	186,000		17,100		39,600	

Head of Old River Barrier

3406 (b)(15)

CVPIA has authorized construction of a permanent operable fish gate at the head of the Old River to keep young salmon in the San Joaquin River and reduce their entrainment (entrapment) at CVP and SWP export facilities as they migrate out to the ocean in the spring.

The program also includes the construction of a fish ladder to provide passage for adult salmon from the Delta Channel to the spawning grounds in the San Joaquin River.

The 2009 National Marine Fisheries Service (NMFS) Biological Opinion on CVP/SWP operations precluded the construction of the permanent barrier until more is known about critical habitat and species effects.

PERFORMANCE MEASURE

Construct a permanent operable barrier at the head of Old River.

FY 2010 ACCOMPLISHMENTS

The Old River Barrier Program (ORBP) obligated $179,209 from the Bay-Delta funds.

In cooperation with the California Department of Water Resources (DWR), Reclamation tested a non-physical "bubble curtain" barrier consisting of bubbles, sound and strobe lights. Preliminary results for this barrier demonstrate that it was more effective in 2010 than in 2009.

In FY 2010, deterrence efficiency was lower than 2009. However, in 2010, survival was higher with the non-physical barrier "on" (43.1%), then when it was "off" (25.9%). This represents a 17.2% increase in survival when the non-physical fish barrier was in operation. Higher flow rates in 2010 may have contributed to the increased survival rates. It is hypothesized that higher discharges in 2010 produced swifter passage by juveniles through the area, and that these higher discharges worked synergistically with the non-physical barrier to produce significantly higher survival than was observed in 2009. Additional years of study will be needed before a definitive conclusion can be made regarding the efficacy of the non-physical barrier.

ACCOMPLISHMENTS TO DATE

Prior to 2009, a seasonal, temporary rock barrier was installed most years to keep smolts in the San Joaquin River and prevent diversion via the Old River towards the Tracy (Jones) pumping plant. Because of high flows, the barrier was not installed in 1995, 1998, 1999, and 2005.

In 2009, Reclamation tested the efficacy of a non-physical "bubble curtain" consisting of bubbles, sound and strobe lights. In the first year of study of this type of barrier, a statistically significant proportion—80.4%—of Chinook salmon were deterred by the bubble curtain. However, the level of predation of the juvenile Chinook salmon was so high that the efficacy was not statistically different between having a barrier and not having a barrier. The data suggest that much of the gains accomplished by the bubble curtain were offset by predation in an adjacent scour hole. Barring new flow requirements for protection of delta smelt, the efficacy of temporary barriers will continue to be studied at the head of the Old River.

LOOKING AHEAD

In FY 2011, the ORBP plans to install the non-physical barrier. Ongoing monitoring will continue to evaluate the effectiveness of this barrier in preventing salmon from entering Old River from the South Delta. Although the program is in the third year of monitoring, several more years will be required to establish the effectiveness of this barrier as a permanent solution.

Comprehensive Assessment and Monitoring Program

3406 (b)(16)

FISHERIES

Pursuant to CVPIA section 3406 (b)(16), the Comprehensive Assessment and Monitoring Program (CAMP) was established to assess the biological results and effectiveness of actions implemented by CVPIA in support of the fish doubling goal. To meet this mandate, CAMP produces annual reports that compile and synthesize anadromous fish production data from the Central Valley. These data are used to assess the effectiveness of habitat restoration actions such as water management modifications, structural modifications, habitat restoration, and fish screens. The 2010 CAMP Annual Report reports on 22 Central Valley watersheds, and also reports on a broader area that includes San Pablo Bay, Suisun Bay, and the Sacramento-San Joaquin River Delta.

The CAMP is heavily dependent on other programs and agencies to provide information. To optimize its program budget, CAMP works with partners whenever possible to complete high-priority monitoring projects.

The CAMP Implementation Plan was developed in 1997, and describes methods and procedures for monitoring anadromous fish species in California's Central Valley, and for assessing the biological results and effectiveness of different categories of restoration activities. The plan is based on nine anadromous fish taxa: Chinook salmon (fall-, late fall-, winter- and spring-run), steelhead, striped bass, American shad, white sturgeon and green sturgeon.

CAMP focuses on three program objectives:

Objective #1 – Assess the overall effectiveness of actions implemented pursuant to CVPIA section 3406(b) in meeting AFRP fish production targets.

Objective #2 – Assess the relative effectiveness of categories of CVIPA section 3406 (b) actions (e.g., water management modifications, structural modifications, habitat restoration, and fish screens) toward meeting AFRP fish production targets.

Objective #3 – Establish a data management program to manage CVPIA data (a resource available to all interested parties), provide training in data management, ensure compliance with relevant federal laws and regulations, and ensure the effective and economical management of resources.

PERFORMANCE MEASURES

The CAMP Implementation Plan identifies 82 monitoring elements that are required to assess progress toward the AFRP fish doubling goals. The plan describes these monitoring elements, including an assessment of biological results and effectiveness actions (Objectives #1 and #2). The program goals have recently been expanded to consolidate, standardize, and enhance the collection of data related to the CVP ecosystems (Objective #3).

FY 2010 ACCOMPLISHMENTS

In FY 2010, the CAMP obligated $2,181,178 from the Restoration Fund.

OBJECTIVES #1 AND #2

Annual Report – The FY 2010 CAMP annual report is based on 71 of the 82 monitoring elements. This report synthesizes the data gathered under those 71 monitoring elements and assesses the cumulative and relative effectiveness of actions pursuant to 3406(b) in meeting the AFRP fish production targets. Table 18 shows the 1992-2009 average natural production numbers in each watershed compared to AFRP fish doubling-goal targets.

Acquire New Adult and Juvenile Salmonid Data – CAMP funds were used to acquire rotary screw trap (RST) databases, collect 2009 fall-run Chinook escapement surveys, and mark and tag juvenile Chinook salmon.

Disseminate Chinook salmon data and reports – CAMP program staff updated a website that distributes CAMP-related data and documents to the public and interested stakeholders.

OBJECTIVE #2

Adult Production Monitoring – CAMP developed a catalogue of detailed information from the 27 locations where rotary screw trap data have been collected in the Central Valley since 1992. This document is unique because there are no other comparable references that describe the RST data collection that forms the foundation for research involving Chinook salmon in the Central Valley.

Complete Two RST Feasibility Reports – CAMP completed two reports evaluating the feasibility of developing one centralized RST database.

OBJECTIVE #3

Provide training to all program managers. The CAMP designed a 2.5-hour Data Stewardship class, and held six sessions with a total of 46 students.

Develop a Data Management Plan – The CAMP started developing a CVPIA data management plan.

Develop Metadata Tools – The CAMP developed a GIS tool to provide easily obtained geographic information on streams, dams, and other geo-features related to CVPIA projects. The CAMP also developed an Excel spreadsheet that allows users to enter metadata related to their projects.

Other Data Management – The data manager performed an assessment of data currently being collected by all CVPIA program activities and made updates to the documents database to include missing documents, replace web links with digital documents, and correct errors.

ACCOMPLISHMENTS TO DATE

Objectives #1 and #2 – Since 1997, when the Implementation Plan was developed, CAMP has produced eight annual reports (1997, 1998, 1999, 2000, 2007, 2008, 2009, and 2010). No reports were produced between 2001 and 2006, because the program did not have a manager to analyze the data.

Collectively, the reports confirm that the majority of AFRP fish production targets have not been met on a regular basis, and a substantial increase in habitat restoration efforts will be required to promote measurable increases in Chinook salmon production and achieve the doubling goal. The data confirm that watersheds such as Butte, Battle, and Clear creeks, where sustained restoration efforts have been focused, demonstrate a dramatic improvement in production. It is expected that increased levels of restoration efforts in other watersheds would yield similarly positive results.

Objective #3 – A data manager has been added to support CAMP and is working on developing metadata, databases, GIS information for reporting and is writing the data management plan.

LOOKING AHEAD

Objective #2

Implementing 2009 NMFS OCAP BO RPAs – In the coming years, it is anticipated that the data collected by the CAMP program will support the implementation of the following Reasonable and Prudent Alternatives (RPAs):

- Acquire Instream Flow Incremental Methodology (IFIM) staff support to evaluate relationships between hydrologic variables and the production of juvenile salmon and steelhead in the Stanislaus River. The report associated with this project will be posted on the CAMP website, and any refined Access databases, Excel files or geospatial data will be archived by CAMP.

- Develop the database and programming code necessary to generate statistically robust, consistently generated juvenile Chinook salmon production estimates and confidence intervals from across the Central Valley. Evaluate recovery efforts to collect coded wire-tagged adult Chinook salmon and determine if sampling efforts are sufficient to develop robust inferences of the hatchery proportions in different Central Valley watersheds. Digital files with raw data will be archived by CAMP in Microsoft Excel or Access format. A final report documenting the results of the trapping efforts will be posted to the CAMP website.

Objective #3

Science Based Management Framework – The CAMP plans to develop a Science Based Management Framework (SBMF) consisting of ongoing reviews that will inform decision-making. This framework is rooted in the principles of adaptive management that will be used to guide an iterative process of refining our understanding of the ecosystems from the Sierras to the Pacific that impact the anadromous fish populations and implementing appropriate restoration actions. The SBMF will encourage the design of experiments to address key uncertainties, monitor outcomes, and analyze, learn, and improve management actions. Adaptive management will improve the certainty with which we make resource management decisions.

Fish and Wildlife Service staff collecting data from rotary screw traps below Red Bluff Diversion Dam

Table 18: 1992-2009 Average Natural Production Numbers in each Watershed Compared to the AFRP Doubling-Goal Targets

Watershed	Species	Doubling-Goal Target	1992-2009 Average Natural Production Numbers	Percent of Target
American River	Fall-run Chinook	160,000	114,658	71.6
Antelope Creek	Fall-run Chinook	720	0	
Battle Creek	Fall-run Chinook	10,000	18,807	188
Bear River	Fall-run Chinook	450	n/a	n/a
Big Chico Creek	Fall-run Chinook	800	n/a	n/a
Butte Creek	Fall-run Chinook	1,500	2,625	175
Clear Creek	Fall-run Chinook	7,100	11,147	157
Cosumnes River	Fall-run Chinook	3,300	792	23.9
Cottonwood Creek	Fall-run Chinook	5,900	1,689	32.0
Cow Creek	Fall-run Chinook	4,600	2,145	46.7
Deer Creek	Fall-run Chinook	1,500	884*	59
Feather River	Fall-run Chinook	170,000	96,161	56.5
Merced River	Fall-run Chinook	18,000	7,175	39.8
Mill Creek	Fall-run Chinook	4,200	2,037	47.8
Miscellaneous Creeks	Fall-run Chinook	1,100	80	7.2
Mokelumne River	Fall-run Chinook	9,300	8,174	87.9
Paynes Creek	Fall-run Chinook	330	n/a	n/a
Sacramento River (mainstem)	Fall-run Chinook	230,000	79,016	34.3
Stanislaus River	Fall-run Chinook	22,000	5,555	25.3
Tuolumne River	Fall-run Chinook	38,000	7,557	19.9
Yuba River	Fall-run Chinook	66,000	33,652	51
Central Valley Wide	Fall-run Chinook	750,000	392,154	52.3
Sacramento River (mainstem)	Late-fall-run Chinook	68,000	19,539	28.7
Battle Creek	Late-fall-run Chinook	550	680	124
Central Valley Wide	Late-fall-run Chinook	68,000	20,219	29.7
Butte Creek	Spring-run Chinook	2,000	10,502	525
Deer Creek	Spring-run Chinook	6,500	2,200	33.8
Mill Creek	Spring-run Chinook	4,400	1,269	28.9
Sacramento River (mainstem)	Spring-run Chinook	59,000	815	1.4
Central Valley Wide	Spring-run Chinook	68,000	14,786	21.7
Calaveras River	Winter-run Chinook	2,200	0	0
Sacramento River (mainstem)	Winter-run Chinook	110,000	6,863	6.3
Central Valley Wide	Winter-run Chinook	110,000	6,863	6.2
Total	All races	996,000	434,022	43.5

N/A = no data reported during 1992 through 2009

Anadromous Fish Screen Program

3406 (b)(16)

The Anadromous Fish Screen Program (AFSP) works together with the State of California to construct, replace and rehabilitate fish screens, and relocate diversions throughout the Central Valley and Sacramento-San Joaquin Delta. The AFSP strives to improve the effectiveness and efficiency of fish screens, and collaborates with other agencies to encourage the dissemination of information. The program also seeks to reduce the overall cost of fish screens. These efforts support the fish doubling goal by protecting juvenile Chinook salmon, steelhead, green sturgeon and white sturgeon from entrainment and predation at priority water diversions.

The AFSP provides matching funds for state and local funding, providing up to 50% of the cost of a fish screen project. The AFSP conducts monitoring at diversions and fish screens to determine the critical factors related to fish losses, and to assure the effectiveness of constructed fish screens. Fish screen projects are complex, and are typically constructed in phases over several years. The four key project phases include a feasibility study, preliminary design, final design, and construction. Once a screen is constructed, the diverter is solely responsible for its ongoing operation and maintenance.

154 cfs retractable cylindrical fish screen installed in 2010 at the Sutter Mutual State Ranch diversion

PERFORMANCE MEASURES

The AFSP installs fish screens on high-priority diversions. The AFSP is currently focused on reducing entrainment at two large diversions on the Sacramento and San Joaquin Rivers.

Fish screens under construction include:

- Natomas Mutual Phase 1 (389 cfs)
- Patterson (195 cfs)

The AFSP has provided funding and technical assistance for planning activities involving the following diversions:

- Meridian Farms Phase II (135 cfs)
- Pleasant Grove-Verona (144 cfs)
- RD 2035 (400 cfs)
- West Stanislaus (347 cfs)
- Yuba City (74 cfs)

FY 2010 ACCOMPLISHMENTS

The AFSP obligated funding from a variety of sources: $7,680,143 from the Restoration Fund, $8,779,066 from the Bay-Delta fund, and $500,000 from the Water & Related Resources Fund.

Screening Diversions – Construction began on the Natomas Mutual Phase 1 screen. This state-of-the-art vertical flat plate screen is expected to be completed in 2013. It will meet NMFS and DFG fish screening criteria, and will result in the removal of an anadromous fish migration barrier (seasonal diversion dam) on the Natomas Cross Canal.

The AFSP continued to support design, environmental compliance, and permitting activities for RD 2035 Fish Screen project. The screen is anticipated to be ready for construction by 2014, although construction will be dependent on the availability of federal funds and non-federal matching funds.

The AFSP initiated construction of the Patterson Fish Screen, consisting of a 195 cfs capacity vertical flat plate fish screen on the San Joaquin River. This fish screen protects outmigrating Chinook salmon and steelhead as well as resident game and non-game fish from entrapment.

Three cylindrical fish screens were constructed: Sutter Mutual State Ranch (154 cfs), Sycamore Mutual (65 cfs), and River Garden Farms #2 (32 cfs).

The monitoring program associated with these screens is conducted in partnership with the Family Water Alliance. The program collects data to assess the biological benefits of fish screening and to help prioritize future fish screening efforts.

The AFSP also installed an 11 cfs cone screen at the Lake California diversion on the Sacramento River, replacing an old fish screen that was no longer adequate for protecting juvenile salmonids from entrainment. This screen protects outmigrating spring-, fall- and winter-run Chinook salmon and steelhead as well as resident game and non-game fish.

The AFSP continued to support design, environmental compliance and permitting activities for the City of Yuba City Fish Screen project for a 74 cfs diversion on the Feather River.

AFSP Technical Assistance – A two-year (2010-2011) hydraulics and fish behavioral study was initiated at the UC Davis J. Amorocho Hydraulics Laboratory to identify critical factors resulting in fish losses at water diversions. The study will identify potential lower cost options for minimizing fish losses at smaller diversions, such as use of behavioral devices at some diversions rather than use of more expensive positive barrier screens.

ACCOMPLISHMENTS TO DATE

Screening Diversions – Monitoring for the effectiveness of fish screens continues to be an important part of the AFSP and has helped inform future designs. For example, monitoring of the RD 108 Poundstone Fish Screen indicated that it was not performing optimally. The AFSP retrofitted this screen and is using the knowledge gained from this project to inform design modifications for the

RD 2035 Fish Screen. Currently, there are collectively, thousands of unscreened agricultural diversions in the Sacramento River system, the San Joaquin River system, the Sacramento-San Joaquin Delta, and the Suisun Marsh Basin. Since, 1994, the AFSP has assisted the State with fish screening at 29 diversions. Cumulatively, the AFSP has cost shared on fish screen projects, resulting in the screening of over 4,800 cfs.

AFSP Technical Assistance – Table 19 lists the total number of screens installed to date.

Table 19: AFSP Projects by Watershed and Cubic Feet per Second (cfs) Screened, 1994-2010

Watershed	Number of Fish Screens	Flow (cfs)
Sacramento	16	3,928
American	1	210
Yuba	1	65
Butte	4	257
Delta	6	113
San Joaquin	1	260
TOTAL	29	4,833

LOOKING AHEAD

The AFSP plans to continue researching other high-priority diversions for future screening opportunities and plans to seek funding for the construction of screens at the remaining large diversions. The AFSP anticipates continuing its efforts to support fish screen design, environmental compliance and permitting activities. Ongoing monitoring of the effectiveness of existing screens will inform future planning and design.

San Joaquin River Restoration Program

3406 (c)(1)

The San Joaquin River is a major tributary to the Sacramento-San Joaquin Delta, historically providing flows from the southern Central Valley. Section 3406(c)(1) mandates the preparation of a reasonable, prudent and feasible comprehensive plan to reestablish and sustain naturally reproducing salmon in the San Joaquin River below Friant Dam to the confluence with the Sacramento-San Joaquin Delta Estuary.

Subsequent to the passage of CVPIA, a Stipulation of Settlement (Settlement) was reached in September 2006 that resolved long-standing disputes related to Reclamation's operation of Friant Dam. The Settlement ended an 18-year lawsuit between the U.S. Departments of the Interior and Commerce, the Natural Resources Defense Council (NRDC) and the Friant Water Users Authority (FWUA).

Public Law 111-11 authorizes and directs the Secretary of the Interior to fully implement the Settlement and to use the CVPIA 3406(c)(1) to fund and implement a portion of the program. Public Law 111-11 also specifies that "...the Settlement satisfies and discharges all of the obligations of the Secretary contained in section 3406(c)(1)..." The San Joaquin River Restoration Program (SJRRP) implements the Settlement consistent with Public Law 111-11.

The agencies responsible for the management of the SJRRP include Reclamation (lead), the Service, National Marine Fisheries Service (NMFS), California Department of Water Resources (DWR), and California Department of Fish and Game (CDFG). Please refer to the SJRRP website for a complete status of all actions: www.restoresjr.net.

PERFORMANCE MEASURES

The Settlement includes two goals:

Water Management – To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from implementation of the Settlement. (The Settlement calls for interim flows and restoration flows, which are additional releases out of Friant Dam to support fish and wildlife habitat needs.)

Restoration – To restore and maintain fish populations in "good condition" in the mainstem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.

FY 2010 ACCOMPLISHMENTS

The SJRRP obligated $1,272,213 from the Restoration Fund. The SJRRP completed a number of actions in accordance with the Settlement:

Water Management – The SJRRP began the first Interim Flow releases in compliance with the flow release schedule recommended by the Restoration Administrator. Approximately 260,000 AF of water were released from Friant Dam, resulting in continuous flows of the San Joaquin River to the Sacramento-San Joaquin Delta for the first time in a non-flood year in more than 60 years.

During the Interim Flows, SJRRP staff conducted the field work necessary for a qualitative habitat assessment.

Reclamation was able to return approximately 42,000 AF of water back to the Friant Division long-term water contractors through the recapture and recirculation process being developed. Reclamation also was able to allocate 80,000 AF of Recovered Water account water to the contractors, as stipulated in the Settlement.

In compliance with the Settlement, the Program released the fall 2009 Annual Technical Report (ATR) with data collected October 1 through November 20, 2009. In August 2010, the SJRRP released the Draft ATR for spring 2010.

The SJRRP installed more than 90 shallow groundwater monitoring wells to monitor groundwater conditions in response to Interim Flows. The wells provide valuable information about changes in the groundwater elevation that could be caused by Interim Flows. The SJRRP is continuing to work with property owners to develop a process for addressing any adverse impacts due to the increased amount of water in the river.

Restoration – Several key projects are moving forward in accordance with the Settlement and the SJRRP:

- Updated the Fisheries Management Plan in fall 2010. Based on the guidance in the management plan, a Fisheries Implementation Plan was developed, including a prioritized list of actions and studies necessary to inform fish reintroduction by 2012. This effort marks significant progress in meeting the 2012 reintroduction of salmon milestone.
- Released the scoping report for the Mendota Pool Bypass and Reach 2B Channel Improvements Project to the public in February 2010, the Initial Options Technical Memorandum in April 2010, and the Existing Environmental Conditions Data Needs and Survey Approach Technical Memorandum in March 2010.

San Joaquin River, river mile 219.8 before Interim Flows

- Released the scoping report for the Reach 4B, Eastside Bypass and Mariposa Bypass Low Flow Channel and Structural Improvements Project to the public in February 2010, and held an additional scoping meeting on a revised project description in December 2010.
- Completed the 10(a)1(A) permit application to the NMFS for reintroduction of fish in 2012. Reclamation is currently working on the Arroyo Canal Fish Screen and Sack Dam Fish Passage
- Completed preparation of an Ecosystem Diagnostic and Treatment (EDT) model for the upper San Joaquin River; and began a project with the local sponsor–the Henry Miller Reclamation District #2131–to begin the planning, environmental compliance documentation and appraisal-level design efforts.

ACCOMPLISHMENTS TO DATE

The SJRRP has fulfilled a number of its requirements under the Settlement. Table 20 lists the activities that have been completed to date.

LOOKING AHEAD

The SJRRP plans to continue moving forward to reestablish a naturally reproducing Chinook salmon fishery. The draft environmental document (Program Environmental Impact Statement/Environmental Impact Report (DPEIS/PEIR)) is anticipated to be released for public comment in early 2011. Table 20 lists the program milestones in the Settlement.

San Joaquin River, river mile 219.8 after Interim Flows

Table 20: San Joaquin River Restoration Program Progress Toward Milestones

Program Milestones	Status
Publish Notice of Intent and Notice of Preparation for the PEIS/R	Completed 2007
Hold public scoping meetings and issue public scoping report for the PEIS/R	Completed 2007
Issue Draft Alternatives Report	Completed 2008
Develop draft program environmental documents	The PEIS/R is expected to be released in 2011. This document covers channel improvement projects at a program level.
Complete Final Program Environmental Impact Statement/Environmental Impact Report (FPEIS/R)	2012*
Initiate Interim Flows	Completed FY 2010 The program also prepared the environmental compliance documents and permits to continue Interim Flows
Reintroduce salmon	Fish Management Plan and Fisheries Implementation Plan were completed in 2010. Reintroduction expected in 2012.
Complete Phase 1 channel and structural improvements	Efforts are currently underway and expected to be complete in 2015.
Initiate full restoration flows	2014*

* Estimated date of completion

Friant-Kern Canal

Ecosystem and Water Systems Operations Models

3406 (g)

The goal of the Ecosystem and Water Systems Operations Models Program (MP) is to develop broadly available and readily accessible models and supporting data to evaluate water management strategies. By demonstrating the effect of water operations on the quality and quantity of various habitats, these models improve the scientific understanding of ecosystems in the Sacramento, San Joaquin and Trinity watersheds.

As part of the model development process, the program continues to support hydrologic and biologic data collection.

PERFORMANCE MEASURES

Develop Models – Develop broadly available and readily usable models and supporting data to evaluate existing and alternative water management strategies. The Act intends that Reclamation develop a suite of nine integrated model types.

FY 2010 ACCOMPLISHMENTS

The MP obligated $601,564 from the Restoration Fund.

In addition to continuing work on modeling, the MP participated in several professional development events including conferences and training courses. The MP also prepared publications and provided support for model application to stakeholders. Table 21 presents the nine model types and FY 2010 accomplishments.

ACCOMPLISHMENTS TO DATE

Nine models have been developed to support large-scale planning investigations and studies for water operations as well as models for river management, ecology and fisheries. These models fulfill eight of the nine model type categories established by the Act, representing 89% completion of this performance measure. The final model type requiring development is category 7: Ecosystem modeling of sustainable fish harvests.

Several models are available for public review and use and are used by Reclamation, the Service, State water contractors, and public interest organizations. Table 21 summarizes the models that have been developed to date.

Addressing climate change has been an issue for this program. Numerous studies have been done to determine the appropriate inputs to the CalSim II model to reflect a change in conditions due to climate change. The goal is to establish a trend of what the impacts of climate change will be on the systems so that the program can respond accordingly. The program has provided a high level of support for CalSim II model development and applications. CalSim II is available for public use but has primarily been used by agencies such as Reclamation, Fish and Wildlife Service and the California Department of Water Resources for numerous large-scale water supply improvement studies and planning investigations. To respond to the periodic need for less detailed and more rapid analyses, CalSim III and CalLite were developed.

Other types of river management and ecological models have been developed and are used to better understand water quality, hydrology, groundwater, fish populations and riparian habitat processes in the Central Valley. Those models and their functions are listed below.

- **Comprehensive San Joaquin Water Quality Model (SJRSIM)** – for use in planning of

reservoir releases for water temperature management in anadromous fish spawning and rearing habitats

- DSM2 Model – Developed by the California Department of Water Resources (CDWR); and used by CVPIA for use in conducting the hydrodynamic modeling on flow, water quality and mass transport processes of the Delta and the San Joaquin Basin
- Ecologically Cogent Operations Suite of Integrated Models (ECOSIM-W) – for use in analyzing changes to the macroscopic water resources in California's Central Valley, particularly in support of CVPIA (b)(3) water acquisition investigations
- HydroGeoSphere (HGS) – for use in evaluating surface and subsurface hydrologic interactions related to water supply, water quality, and ecosystem restoration
- Riparian Habitat Establishment Model (RHEM) – for use in evaluating regeneration of riparian forests and interactions relating to reservoir management
- SALMOD and inSALMO – for use in evaluating anadromous fish survival at various life stages and in a variety of aquatic environments

LOOKING AHEAD

The DSM2 model is being used for a number of purposes in CVPIA but has had limited contributions from the 3406 (g) program. The DSM2 model is important to the MP because it supports model types 1,2,5,6 and 8. In 2011 and beyond, the MP expects to have a dedicated person working to develop experience and expertise in using the model. The DSM2 model has been used as part of the Bay-Delta Conservation Plan and helps to tie CVP and SWP operations together.

The development of the remaining model type (ecosystem modeling in support of sustainable fish harvest levels) is not currently designated a high priority. The MP has developed models that predict the number of fish going out to sea, but nothing beyond that has been deemed a priority.

Table 21: Models Completed for Each Model Type

Model Type	Models Developed To Date	FY 2010 Accomplishments
1. Comprehensive water budget of surface and groundwater supplies	CalSim II CalSim III CalLite ECOSIM-W DSM2	CalSim II, CalSim III, CalLite were reviewed and improved by Reclamation and Service modelers in an ongoing effort to enhance the water operations and water management tools. HGS-CalSim model is being developed and made progress in 2010. Data generated by UC Davis is nearly ready for input and a pilot project location has been selected (developed by CDWR).
2. Related water quality conditions, including temperature prediction related to storage	Upper Sacramento River Water Quality Model (USRWQM) San Joaquin Basin Temperature Model	San Joaquin Basin Temperature Model was updated with additional water temperature data and salinity modeling capability.
3. Surface-ground and stream-wetland interactions		HGS-CalSim model is being developed and made progress in 2010. Data generated by UC Davis is nearly ready for input and a pilot project location has been selected.
4. Ecosystem modeling – flow needs to meet restored carrying capacity of streams	inSALMO	inSALMO is currently being improved at the direction and guidance of Reclamation and Service staff.
5. Ecosystem modeling – flows to restore and maintain natural channel and riparian habitat values	RHEM	No new work was done in 2010 for this model.
6. Water operations models – CVP and SWP operations	CalSim II CalSim III CalLite ECOSIM-W	CalSim II, CalSim III, CalLite were reviewed and improved by Reclamation and Service modelers in an ongoing effort to enhance the water operations and water management tools.
7. Ecosystem modeling in support of sustainable fish harvest levels, including tradable harvest rights	Preliminary models have been developed but not finalized	This is not currently designated a high priority for the program
8. Ecosystem modeling to identify opportunities to protect and restore wetland and upland habitat	inSALMO	inSALMO is currently being improved at the direction and guidance of Reclamation and Service staff.
9. Water management modeling to increase firm CVP yield	CalSim II CalSim III CalLite ECOSIM-W	CalSim II, CalSim III, CalLite were reviewed and improved by Reclamation and Service modelers in an ongoing effort to enhance the water operations and water management tools.

Chapter 3

REFUGES RESOURCE AREA

Refuge Water Supply Program

3406 (b)(3), (d)(1), (2) & (5)

The Refuge Water Supply Program (RWSP) is comprised of three components:

3406 (b)(3) Water Acquisition Program (WAP) – Acquisition of Incremental Level 4 quantities specified in 3406 (d)(2).

3406 (d)(1), (2) & (5) Refuge Water Conveyance and Construction – Delivery of Level 2 water and Incremental Level 4 water, and construction of water delivery facilities.

Facilities Construction Actions, grouped under section 3406 (d)(5) include:

- Refuge facilities construction to support delivery of water to those lands identified in the Report on Refuge Water Supply Investigations (March 1989)
- San Joaquin Basin Action Plan Lands (SJBAPL) facilities construction to support delivery of water to the lands specified in the San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan (December 1989)

The RWSP's goal is to ensure that all CVPIA identified wetland habitat areas, hereinafter referred to as "refuges", annually receive water of specified quantity, of suitable flow rate and timing, and suitable quality to support their wetland and aquatic environments. A total of 19 refuges are served by the program (shown in Figure 11).

The RWSP's water accounting of acquisitions and deliveries is based on Reclamation's Mid-Pacific Region's water service contract year. The contract year begins March 1 and ends on the last day of February the following year. The RWSP components—acquisition, conveyance, and construction—work together to implement the goals of CVPIA related to refuges.

The RWSP's two water types are defined as Level 2 water and Incremental Level 4 water.

- Level 2 is the amount of water required for minimum wetlands and wildlife habitat management based on historic average annual deliveries before 1989. Reclamation is required to provide full Level 2 water supplies annually. The Level 2 annual water delivery target is 422,251 acre-feet (AF), including 26,007 acre-feet of replacement water.[1]
- Incremental Level 4 water is the difference between Level 2 and Full Level 4 water supplies; it equals 133,264 AF.

Full Level 4 is the total annual amount of water identified for each refuge in CVPIA as required for optimum wetlands and wildlife habitat development and management. The Full Level 4 water delivery target for the 19 refuges is 555,515 AF and is met when Level 2 and Incremental Level 4 water targets are met in full.

Each year, Reclamation strives to provide as much Incremental Level 4 water as possible. The CVPIA specifies that Reclamation must acquire this Incremental Level 4 water supply through voluntary measures such as water conservation, conjunctive use, purchase, lease, donation, or similar activities.

Table 22 shows the Level 2 and Incremental Level 4 amounts of water allocated to each refuge according to the 1989 reports. Allocations under the refuge water supply contracts between Reclamation and refuge managing agencies vary somewhat for

1 Replacement Water is the amount of water that the San Luis, Freitas and Kesterson Units of the San Luis National Wildlife Refuge Complex and the Volta and Mendota Wildlife Management Areas have historically received and used which is more than the Level 2 amounts identified in the "1989 Reports" but may be less than or equal to the Incremental Level 4 amounts. Replacement Water was originally provided by groundwater and tailwater but due to water quality concerns, Reclamation entered into agreements authorized by P.L. 83-674, Waterfowl Management, Central Valley Project, August 27, 1954, as amended by the Act of November 8, 1978, and P.L. 99-456, Water Resource and Small Reclamation Projects Act, October 27, 1986, to provide the Replacement Water prior to CVPIA. Reclamation will acquire and provide water to the Project to replace the Replacement Water when willing sellers and funds are available so as to minimize the impact to CVP contractors South of the Delta.

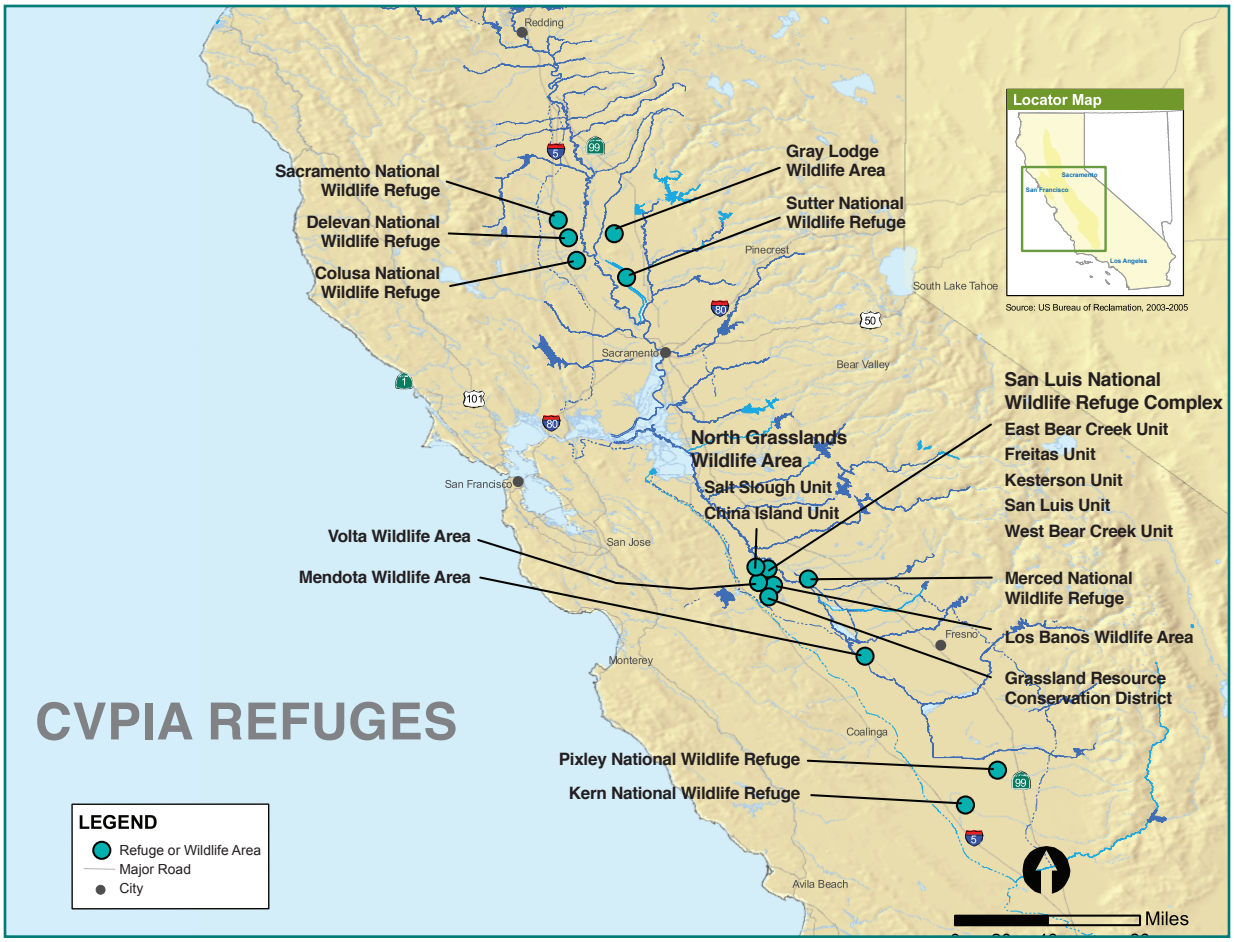


Figure 11: Central Valley Refuges Receiving CVPIA Water Supplies

Level 2 and Incremental Level 4 amounts. However, the full Level 4 quantities for each refuge remain the same.

LONG-TERM SUPPLY CONTRACTS PROVIDE STABILITY FOR REFUGE OPERATORS

To ensure reliability for refuge managers, Reclamation entered into long-term water supply contracts with the three refuge managing agencies: California Department of Fish and Game (CDFC), the Service, and Grassland Water District (GWD). These contracts have a performance period of 25 years and are renewable, representing Reclamation's obligation under CVPIA to provide identified quantities of water to certain refuges in the Central Valley.

Each year in February and monthly thereafter through May, Reclamation's Central Valley Operations Office announces the water supply allocation available to the CVP contractors and CVPIA refuges (Level 2 water) for the current contract year. Each year between February and March, the RWSP provides the Interagency Refuge Water Management Team (IRWMT) with an initial projection of anticipated Incremental Level 4 water purchases for that contract year. The IRWMT determines the allocation of the projected incremental Level 4 supplies. The IRWMT is comprised of representatives from Reclamation, the Service, CDFG, GWD, and the Central Valley Joint Venture. The creation of this team was established through a provision in the long-term water supply contracts. Concurrent to this process, the three refuge managing agencies develop their initial water delivery schedules for each refuge by March 1.

Table 22: Water Allocations by Refuge

Refuge	Total Full Level 4 Water (acre-feet)	Level 2 Water (acre-feet)*	Incremental Level 4 Water (acre-feet)
Grassland Water District (private) – San Joaquin Valley			
Grassland Resource Conservation District	180,000	125,000	55,000
CA Department of Fish and Game – Sacramento Valley			
Gray Lodge	44,000	35,400	8,600
CA Department of Fish and Game – San Joaquin Valley			
Volta	16,000	13,000	3,000
Los Banos	25,000	16,670	8,330
Salt Slough	10,020	6,680	3,340
China Island	10,450	6,967	3,483
Mendota	29,650	27,594	2,056
U.S. Fish and Wildlife Service – Sacramento Valley			
Sacramento	50,000	46,400	3,600
Delevan	30,000	20,950	9,050
Colusa	25,000	25,000	0
Sutter	30,000	23,500	6,500
U.S. Fish and Wildlife Service – San Joaquin Valley			
San Luis Unit	19,000	19,000	0
Kesterson	10,000	10,000	0
West Bear Unit	10,810	7,207	3,603
Freitas	5,290	5,290	0
Merced	16,000	13,500	2,500
East Bear Creek	13,295	8,863	4,432
U.S. Fish and Wildlife Service – Tulare Lake Basin			
Kern	25,000	9,950	15,050
Pixley	6,000	1,280	4,720
TOTAL	555,515	422,251	133,264

*this includes Replacement water

Pintail ducks

USE OF GROUNDWATER FOR REFUGE WATER SUPPLIES

The RWSP strives to diversify its water sources. For example, the RWSP pursues groundwater projects in partnership with local water districts because groundwater does not require external conveyance if the source can be located at or near a refuge. The lower cost of groundwater is also an advantage, although downsides include groundwater of poorer quality in some locations, particularly in the San Joaquin Valley; threat of aquifer depletion; and land subsidence. The RWSP relies on refuge managers to monitor groundwater quality for toxins, pollutants and salinity so as not to degrade the general quality of water on the refuges.

In FY 2010, Reclamation initiated the design and construction of new groundwater pumping wells at Gray Lodge and Volta Wildlife Areas, Pixley National Wildlife Refuge; and the rehabilitation of existing wells and construction of new wells at the Grassland Resource Conservation District under the American Recovery and Reinvestment Act (ARRA). These pumping well projects have all been awarded and several projects are now underway.

IMPROVING QUALITY OF WATER SUPPLIES

The RWSP has developed a draft Refuge Water Quality Best Management Practices (BMP) Plan. The BMP Plan is a requirement of the 2005 CALFED legislation to reduce water quality impacts of refuge discharges that receive federal water and discharge into the San Joaquin River. The plan is expected to be finalized in FY 2011 and its conclusions will be put into practice in future years. The RWSP has already initiated a BMP that is included in the draft plan. This BMP implements a water quality monitoring program to track flows and discharges from CVPIA refuges to the San Joaquin River.

REFUGE BENEFITS

Numerous biological benefits have resulted from a reliable year-round water supply through CVPIA that adequately meets the delivery schedule for wetland management on CVPIA refuges. Habitat is now available during the months of August and early September that benefits early arriving migrant waterfowl and shorebirds; habitat is also provided for resident wildlife and their young during the spring and summer, when wetland habitat can be particularly limited by hydrology. Introducing water for semi-permanent and permanent wetland habitat in the spring and summer directly benefits the recovery of special status species such as the giant garter snake, and tricolored blackbirds.

Wintering wildlife also benefit from this habitat diversity, as seasonal wetlands are now managed to coincide with peak migration times of shorebirds and waterfowl. Timely de-watering and irrigations promote the germination and irrigation of important moist-soil food plants, such as swamp timothy and watergrass. These plants provide a high-energy food source through both their seeds and associated invertebrate communities.

Water Acquisition Program - Refuge Water

3406 (b)(3) and (d)(2)

PERFORMANCE MEASURES

The program goal is to acquire 133,264 acre-feet (AF) of Incremental Level 4 water annually, excluding replacement rates.

FY 2010 ACCOMPLISHMENTS

The program obligated $5,825,425 from the Restoration Fund, and $488,626 from the Water and Related Resources Fund.

The Water Acquisition Plan (WAP) purchased 64,880 AF of water, representing 49% of the Incremental Level 4 target.

ACCOMPLISHMENTS TO DATE

From 2002 through 2010, the program acquired between 37,000 and 85,000 AF each year of Incremental Level 4 water for CVPIA refuges. Table 23 presents the total acquisitions by year. The acquisitions generally reflect the type of water year, with wetter years affording more opportunities for acquisition and drier years reflecting higher prices and fewer willing sellers. This level of acquisition represents approximately 22 to 64% of the 133,263 AF target for acquisition of incremental Level 4 water.

The sources for water acquisition typically include the following:

- Transfers from the San Joaquin River Exchange Contractors
- One-year transfers from other CVP contractors
- Groundwater purchases
- Stevinson Water District
- Grasslands Water District

LOOKING AHEAD

The WAP continues to look at the potential for using groundwater to lower costs and increase reliability. Reclamation continues to work with the Service, California Department of Fish and Game (CDFG) and the Grassland Water District (GWD) to develop a Strategic Wetland Best Management Practices Plan, consistent with the requirement in the 2005 CALFED legislation to improve water quality by reducing contaminants, and improving flows and conveyance.

Black necked stilt

Table 23: Total Acquisitions by Contract Year, 2002-2010

Year	Water Year Type	Incremental Level 4 Water Acquisitions (Percent of 133,264 AF Target)*	Percent of Target
CY 2002	Dry	85,390	64
CY 2003	Above Normal	70,000	53
CY 2004	Below Normal	73,610	55
CY 2005	Above Normal	76,024	57
CY 2006	Wet	84,410	63
CY 2007	Dry	41,111	31
CY 2008	Critical	42,995	32
CY 2009	Dry	37,550	28
FY 2010**	Below Normal	64,880	49

* This table reflects acquisitions starting with Contract Year (CY) 2002, the first year that CVPIA mandated Full Level 4 deliveries for all refuges [Section 3046 (d)(2)].

** 2010 is the first year this program is reporting acquisitions by fiscal year (FY), (October 1 to September 30 of the following year). Previous years are reported by contract water year (CY), (March 1 to the last day of February of the following year).

Refuge Water Conveyance

3406 (d)(1)

PERFORMANCE MEASURES

Delivery – The program goal is to provide Level 2 water supplies at 422,251 acre-feet (AF) per year (including 26,007 acre-feet of replacement water); and Incremental Level 4 water at 133,264 AF per year.

Diversification – To help offset reliance on CVP yield in meeting Level 2 requirements, the RWSP seeks other sources of water to fulfill this requirement. Reclamation is directed to replace the Replacement Water[1] when willing sellers and funds are available to do so to minimize impact to CVP contractors South of the Delta.

FY 2010 ACCOMPLISHMENTS

The program obligated $7,974,611 from the Restoration Fund, $105,360 from the Water and Related Resources Fund, and $205,747 from the Bay-Delta Fund.

Delivery – In 2010, a total of 390,546 AF of Level 2 water was delivered to the refuges, representing 92.5% of the target. Of this total amount, 336,211 AF was from CVP yield, and 54,335 AF was from non-CVP diverse sources.

A total of 58,021 AF of Incremental Level 4 water was delivered, representing 43.5% of the target. Table 24 shows the targets and deliveries for each refuge for the 2010 Fiscal Year.

Diversification – A total of 54,335 AF was delivered from non-CVP diverse sources, including riparian water rights water, pre-1914 water rights water, groundwater, and water provided under Merced Irrigation District's existing mitigation agreement with the Federal Energy Regulatory Commission.

ACCOMPLISHMENTS TO DATE

Delivery – From 2002 through 2010, Reclamation has delivered between 319,354 AF and 416,520 AF of Level 2 water, representing between 76 and 99% of the 422,251 AF target.

Throughout the period, the RWSP was not able to meet the conveyance target for the following reasons: a) inadequacy of conveyance facilities to specific refuges, b) not being able to deliver water during the times that it is needed due to pumping restrictions at the Delta, c) because the allocation was reduced during dry years, and d) in wet years some refuges do not order delivery of full Level 2 supplies.

Over this same period, the program has delivered between 37,988 and 100,057 AF annual of incremental Level 4 water, representing between 29 and 75% of the 133,264 AF target.

From 2002 through 2010, Reclamation has delivered between 385,500 and 516,577 AF of full Level 4 water, representing between 69 and 93% of the 555,515 AF full Level 4 target.

Diversification – On average, from 2002 through 2010, Reclamation has delivered on average between 42,498 AF and 60,149 AF of water through non-CVP sources, representing between 10% and 14% of the 422,251 AF Level 2 target. These sources include refuge riparian water rights water, pre-1914 water rights, groundwater, accretion water and water provided under Merced Irrigation District's existing mitigation agreement with the Federal Energy Regulatory Commission.

[1] Replacement Water is the amount of water that the San Luis, Freitas and Kesterson Units of the San Luis National Wildlife Refuge Complex and the Volta and Mendota Wildlife Management Areas have historically received and used which is more than the Level 2 amounts identified in the "1989 Reports" but may be less than or equal to the Incremental Level 4 amounts. Replacement Water was originally provided by groundwater and tailwater but due to water quality concerns, Reclamation entered into agreements to provide the Replacement Water prior to CVPIA. Reclamation will acquire and provide water to the Project to replace the Replacement Water when willing sellers and funds are available so as to minimize the impact to CVP contractors South of the Delta.

Table 24: Water Targets and Deliveries for Each Refuge (FY 2010)

	WATER ALLOCATION TARGETS			2010 DELIVERIES			% TARGET ACHIEVED		
Refuge Name - Region	Level 2 Water (AF)	Incremental Level 4 Water (AF)*	Full level 4 Water (AF) (= L2+IL4)	Level 2 Water (AF)	Incremental Level 4 Water (AF)	Total Delivered (AF) (= L2+IL4)	Level 2 Water (%)	Incremental Level 4 Water (%)	Full level 4 Water (AF) (= L2+IL4)
Grassland Water District (private) — San Joaquin Valley									
Grassland RCD	125,000	55,000	180,000	118,609	38,583	157,192	95	70	87
CA Department of Fish and Game — Sacramento Valley									
Gray Lodge WA	35,400	8,600	44,000	34,319	0	34,319	97	0	78
CA Department of Fish and Game — San Joaquin Valley									
Volta WA	13,000	3,000	16,000	11,719	0	11,719	90	0	73
Los Banos WA	16,670	8,330	25,000	17,304	1,816	19,120	104	22	76
Salt Slough Unit	6,680	3,340	10,020	8,771	1,222	9,993	131	37	100
China Island Unit	6,967	3,483	10,450	6,348	2,388	8,736	91	69	84
Mendota WA	27,594	2,056	29,650	26,553	0	26,553	96	0	90
U.S. Fish and Wildlife Service — Sacramento Valley									
Sacramento NWR	46,400	3,600	50,000	35,688	0	35,688	77	0	71
Delevan NWR	20,950	9,050	30,000	19,397	3,315	22,712	93	37	76
Colusa NWR	25,000	0	25,000	17,843	0	17,843	71	N/A	71
Sutter NWR	23,500	6,500	30,000	18,556	0	18,556	79	0	62
U.S. Fish and Wildlife Service — San Joaquin Valley									
San Luis Unit	19,000	0	19,000	19,060	0	19,060	100	N/A	100
Kesterson Unit	10,000	0	10,000	10,604	0	10,604	106	N/A	106
West Bear Creek Unit	7,207	3,603	10,810	8,107	0	8,107	112	0	75
Freitas Unit	5,290	0	5,290	6,605	0	6,605	125	N/A	125
Merced NWR	13,500	2,500	16,000	12,008	4,000	16,008	89	160	100
East Bear Creek Unit	8,863	4,432	13,295	5,300	0	5,300	60	0	40
U.S. Fish and Wildlife Service — Tulare Lake Basin									
Kern NWR	9,950	15,050	25,000	13,217	6,697	19,914	133	44	80
Pixley NWR	1,280	4,720	6,000	538	0	538	42	0	9
TOTAL	422,251a	133,264	555,515	390,546	58,021	448,567	92	44	81

a This includes approximately 26,000 AF of replacement water.

* Does not include replacement water

LOOKING AHEAD

The program plans to continue looking for new Level 2 Diversification opportunities, monitor conveyance losses and water quality to better understand the dynamics of water quantity and quality used to manage refuges.

Refuge Facilities Construction and San Joaquin Basin Action Plan Lands

3406 (d)(1)

PERFORMANCE MEASURES

The goal of the Refuge Construction component is to ensure that all 19 CVPIA refuges have the external conveyance capacity to receive Full Level 4 Water, totaling 555,515 acre-feet (AF), on an annual basis. The program has identified 46 projects that, when implemented, will allow this measure to be met.

Twenty of the projects are located on lands known collectively as San Joaquin Basin Action Plan Lands (SJBAP Lands). The SJBAP Lands were identified in 1989 as part of the 1989 San Joaqiun Basin Action Plan/Kesterson Mitigation Plan. The remaining 26 projects fall under the Refuge Facilities Construction Program.

FY 2010 ACCOMPLISHMENTS

The program obligated $412,299 from the Restoration Fund, and $275,123 from the Water and Related Resources Fund.

The program completed construction and testing of East Bear Creek Unit Phase I Pumping Plant and Pipeline for the San Luis National Wildlife Refuge (NWR), and revised operating procedures were implemented and tested with Service staff. The program also completed a one-year extension for continued monitoring of canal water levels and flows at Biggs West Gridley Water District. This data will be used to refine the HEC-RAS model as final design commences in late 2010.

ACCOMPLISHMENTS TO DATE

As of FY 2010, the Refuge Construction component has completed conveyance facilities improvements and new construction, providing adequate external conveyance capacity to deliver Full Level 4 supplies to 14 of 19 refuges.

In all, the Refuge Construction component has now completed 31 of the 46 projects, representing 67% completion of the performance measure. Implementation of the remaining 15 projects will allow Full Level 4 external conveyance capacity to all 19 refuges. Table 25 lists the refuges and the conveyance capacity constructed to date, representing 100% conveyance capacity for those completed systems; and also the estimated dates for completion of the remaining conveyance capacity projects.

LOOKING AHEAD

The program plans to coordinate construction of an automated trash rack on the Newman Canal to improve removal of debris at the gate and improve deliveries to China Island in 2011. The program anticipates continued planning and design work to meet the full Level 4 external conveyence capacity requirements at the remaining five refuges: Gray Lodge WA, Sutter NWR, Pixley NWR, Mendota WA, and East Bear Creek Unit. The 10-year plan includes the following actions:

Gray Lodge – Construct facilities for Level 2 and Level 4 deliveries of surface supplies. Construction is planned for 2012 through 2014.

Mendota – Develop an approved long-term water supply reliability plan for Mendota. The plan is contingent on San Joaquin River Restoration Project and an acceptable cost share agreement.

Sutter – Update and implement the conveyance plan, including any necessary construction and agreement negotiation.

East Bear – Continue planning activities for the Phase II project. The project will include re-evaluation and updating costs of the proposed Island C Pumping Plant and river crossing on the East Bear Unit of the San Luis NWR.

Pixley – Update and implement the conveyance plan, including any necessary construction and agreement negotiation.

Table 25: Level 4 Target vs. Actual Conveyance Capacity by Refuge

Refuge Name - Region	Target Level 4 Capacity (in acre-feet)	Actual Conveyance Capacity (in acre-feet)	% of Target	Expected Date for Completed Conveyance Construction
Grassland Water District (private) – San Joaquin Valley				
Grassland Resource Conservation District	180,000	180,000	100%	
CA Department of Fish and Game – Sacramento Valley				
Gray Lodge Wildlife Area	44,000	18,000	41%	2014
CA Department of Fish and Game – San Joaquin Valley				
Volta Wildlife Area	16,000	16,000	100%	
Los Banos Wildlife Area	25,000	25,000	100%	
Salt Slough Unit	10,020	10,020	100%	
China Island Unit	10,450	10,450	100%	
Mendota Wildlife Area	29,650	26,000	91%	2020
U.S. Fish and Wildlife Service – Sacramento Valley				
Sacramento National Wildlife Refuge	50,000	50,000	100%	
Delevan National Wildlife Refuge	30,000	30,000	100%	
Colusa National Wildlife Refuge	25,000	25,000	100%	
Sutter National Wildlife Refuge	30,000	0	0%	2016
U.S. Fish and Wildlife Service – San Joaquin Valley				
San Luis Unit	19,000	19,000	100%	
Kesterson Unit	10,000	10,000	100%	
West Bear Creek Unit	10,810	10,810	100%	
Freitas Unit	5,290	5,290	100%	
Merced National Wildlife Refuge	16,000	16,000	100%	
East Bear Creek Unit	13,295	8,863	67%	2018
U.S. Fish and Wildlife Service – Tulare Lake Basin				
Kern National Wildlife Refuge	25,000	25,000	100%	
Pixley National Wildlife Refuge	6,000	0	0%	2017

Chapter 4

OTHER RESOURCE AREA

Habitat Restoration Program

The Habitat Restoration Program (HRP) benefits federally listed Central Valley species and habitats impacted by construction and operation of the CVP. Habitat loss and fragmentation occurred across significant acreage as a result of CVP construction, and the program is charged with contributing to the compensation of an equal number of acres to offset this loss.

The HRP's priorities include purchase of fee title or conservation easements on lands where threats are significant. The program also focuses on restoration of CVP-affected habitats, and research to facilitate species recovery. In addition, HRP supports public outreach, education, planning, land management, and captive breeding.

PERFORMANCE MEASURES

Protection and Restoration – The program contributes to the protection and restoration of the 2.7 million habitat acres affected by the construction and operation of the CVP. Protection includes both fee title acquisition and/or conservation easements.

Other – The program also provides funding for captive breeding of threatened and endangered species, research, surveys, studies, planning, management and outreach to support the recovery of listed species.

The program contributes towards the protection or restoration of 45,391 acres identified in the 1999 State Water Control Board Decision 1641.

HRP program managers and stakeholders conducting a site visit at the Elgorriaga Ranch in Fresno County

FY 2010 ACCOMPLISHMENTS

The program obligated $1,268,000 from the Restoration Fund to achieve the following:

Protection and/or Restoration – HRP funding helped protect 2,049 acres of land through fee title acquisition of 640 acres on Peppergrass Flat at the Elgorriaga Ranch in Fresno County and acquisition of a conservation easement on 1,409 acres of the JCR Ranch (East) property in Merced County. One hundred and fifty-four (154) of these acres also count towards the State Water Control Board Decision 1641 acreage.

HRP funding helped restore approximately 18 acres, including restoration of native vegetation along 1.8 miles of levee at the San Joaquin River National Wildlife Refuge in Stanislaus County, as well as 20 acres at the Pine Hill Preserve in El Dorado County.

Other – The HRP provided funds for an effort to map vernal pool habitat within the Sacramento and San Joaquin valleys. The project will map and quantify acreages of occupied and suitable vernal pool habitat present in 2005 and 2009 in Sacramento, Placer and Merced counties. This work will contribute to the recovery of endangered species such as vernal pool fairy shrimp, vernal pool tadpole shrimp, succulent owl's clover and midvalley fairy shrimp.

ACCOMPLISHMENTS TO DATE

To maximize the program's effectiveness, the HRP enters into partnerships with other agencies and public

Pine Hill flannelbush at Pine Hill Preserve in El Dorado County

entities to achieve its goals. Partners have contributed approximately 89% of total program funding.

PROTECTION AND RESTORATION

As shown in Table 26, the program and its partners have protected and restored approximately 107,667 acres, representing 4.0% of the target.

Protection: Since 1996, HRP funding has helped protect approximately 100,233 acres for federally listed, proposed, and candidate species and species of special concern, through acquisition of fee title or conservation easements. The protection of 6,678 of these acres also counts towards the goals of the Water Right Decision 1641.

Restoration: Since 1996, the HRP has helped restore more than 7,000 acres for listed, proposed, and candidate species and species of special concern. The 7,000 acres include more than 1,700 acres of riparian restoration, which is a high-value habitat that supports foraging, breeding, and roosting for many terrestrial species, while also potentially enhancing restoration efforts of the fisheries program.

Through these actions, the program has contributed to implementing actions recommended in recovery plans for numerous species including San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, California red-legged frog, giant garter snake, bay checkerspot butterfly, valley elderberry longhorn beetle, riparian brush rabbit, riparian woodrat, Lange's metalmark butterfly, vernal pool species, and gabbro soil plants.

OTHER

Since 1996, over 70 surveys and studies and 13 planning, management and outreach actions have been funded by the HRP. These actions contribute to the recovery of the species listed above.

Table 26: Acres Protected and Restored

Year	Acreage Protected	Acreage Restored
1996	3,018	0
1997	284	617
1998	74,146	0
1999	1,180	0
2000	1,426	206
2001	2,831	0
2002	2,211	0
2003	2,866	0
2004	719	432
2005	755	3,370
2006	193	731
2007	1,603	122
2008	1,787	1,908
2009	5,165	0
2010	2,049	48
TOTAL	100,233	7,434

LOOKING AHEAD

For future years' efforts, the HRP's main focus will be on acquisition and restoration projects, with additional focus on research that would be limited in scope and based on specific criteria, such as how the projects would gauge the biological responses to restoration projects, or how the projects would help determine which habitats should be acquired and/or restored in order to achieve program priorities. All projects will focus on compensation for impacts from the CVP within the boundaries of the program's Priority Project Area boundary which includes the Consolidated Place of Use; considers priority habitats; and considers the requirements of California State Water Resources Control Board Decision 1641.

Land Retirement Program

3408 (h)

The Land Retirement Program (LRP) purchases land, water and other property interests from willing sellers who receive CVP water. By ceasing irrigation of these agricultural lands, the program reduces the volume of agricultural drainage produced, and provides the opportunity to protect and restore the retired land for wildlife habitat.

The Land Retirement Demonstration Project (LRDP) was implemented in 1999 at two sites in the western San Joaquin Valley (Tranquillity, managed by Reclamation) and the Tulare Lake Basin (Atwell Island, managed by the Bureau of Land Management (BLM)) to study the environmental impacts of land retirement and to evaluate cost-effective restoration strategies for retired lands.

Atwell Island restoration in spring,
Vegetation: Valley Phacelia (Phacelia ciliata), White Layia (Layia pentachaeta ssp. albida), Goldfields (Lasthenia californica), and Bush Seepweed (Suaeda moquinii). Soil type: westcamp silt loam. Habitat type: alkali sink.

PERFORMANCE MEASURES

Retire agricultural land – The program goal is to retire (remove from irrigated agriculture) 15,000 acres of agricultural lands by 2014 for the Land Retirement Demonstration Project. This acreage included 7,000 acres at Tranquillity and 8,000 acres at Atwell Island.

The program has completed its acquisition and restoration work in the San Joaquin Valley (Tranquillity site). Westlands Water District retired approximately 100,000 acres, which fulfilled and exceeded the goals of the CVPIA land retirement program and the San Joaquin Valley Drainage Report (1990) for acquisition in the San Joaquin Basin.

The program continues to pursue land retirement at the Atwell Island site to fulfill the goal of retirement of 8,000 acres in the Tulare Basin.

Restore habitat – Restore 400 acres of retired lands per year on Land Retirement Demonstration Project sites.

Reduce agricultural drainage volume – Reduce the production of agricultural drainage water annually by 6,000 AF upon completion of the Land Retirement Demonstration Project.

FY2010 ACCOMPLISHMENTS

The program obligated $377,238 from the Restoration Fund, and $2,292 from the Water and Related Resources Fund.

Retire agricultural land – Of the remaining 670 acres to be acquired at the Atwell site, the program made offers to purchase 220 acres of land in FY 2010. Of that, offers were accepted for 30 acres. Willing sellers have been identified for an additional 280 acres and preliminary work on those parcels is underway.

Atwell Island restoration in spring,

Vegetation: Valley Phacelia (Phacelia ciliata), White Layia (Layia pentachaeta ssp. albida), Goldfields (Lasthenia californica) and Valley Saltbush (Atriplex polycarpa). Soil type: Posochanet silt loam. Habitat type: Atriplex scrub (Allscale Series).

Restore Habitat – Four-hundred acres were planted with seeds of native plants adapted to local conditions. An excellent response of annual flora was observed at the restoration sites in the spring of FY 2010, contributing habitat for sensitive species.

Reduce agricultural drainage volume – The program reduced the amount of agricultural drainage water in the valley by approximately 3,700 acre-feet in FY 2010.

Other – The program completed a report on the Atwell Island Demonstration Project that documents the success of its restoration activities. The report identifies what type of restoration activities were most cost effective, providing valuable data for future restoration work in the Tulare Lake Basin.

ACCOMPLISHMENTS TO DATE

Retire Agricultural Land – As previously noted, the program has completed its goal to retire 7,000 acres at the Tranquillity site. Of the targeted 8,000 acres at the Atwell Island site, to date Interior has retired 7,247 acres from agricultural production, representing 91% of the target for this site. Willing sellers continue to be identified and the program continues to implement the appraisal and acquisition process to facilitate future land retirement.

Restore Habitat – Since 1998, the LRP has restored approximately 5,686 acres of habitat, meeting the goal of restoring 400 acres annually. According to BLM criteria, more than 70% of the habitat restored by this program has met or exceeded the threshold for success, meaning that there is 15% native plant cover and 1% native shrub cover on these acres.

Reduce agricultural drainage volume – The program has eliminated the production of approximately 2,175 AF of poor quality drain water annually through FY 2010, representing approximately 36% of the target. In total, since 1995, the program has reduced agricultural drainage volume by over 34,800 AF.

Five years of groundwater monitoring at the LRDP sites show that the shallow ground water is declining at a rate of approximately 4 inches per year for a total average decline of between one and two feet in response to land retirement. The declining shallow water table is important because groundwater beneath LRDP lands tends to have high concentrations of salt and trace elements such as selenium. As long as the water table continues to decline in response to land retirement, the selenium in the groundwater should have no effect upon biota at the site.

LOOKING AHEAD

The program plans to continue to acquire the remaining land to complete the Atwell Island project. It is anticipated that this program will be complete by 2014.

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APPENDICES

Appendix A: Acronyms

AF	acre-feet
AFRP	Anadromous Fish Restoration Program
AFSP	Anadromous Fish Screen Program Team
ARRA	American Recovery and Reinvestment Act
ATR	Annual Technical Report
BDCP	Bay Delta Conservation Plan
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	Biological Opinion
CAMP	Comprehensive Assessment Monitoring Program
CALFED	CALFED Bay-Delta Program
CCWD	Contra Costa Water District Statement
CDFG	California Department of Fish and Game
CPAR	CVPIA Program Activity Review Statement
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CY	contract year
DHCCP	Delta Habitat Conservation and Conveyance Program
DOI	Department of the Interior
DWR	Department of Water Resources
ECOSIM	Ecology Cogent Operations Suite of Integrated Models
EDT	Ecosystem Diagnostic and Treatment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EWSOMP	Ecosystem and Water Systems Operations Models Program
FWS	US Fish and Wildlife Service
FWUA	Friant Water Users Authority
FY	Fiscal year
GCID	Glenn-Colusa Irrigation District
GWD	Grassland Water District
HGS	HydroGeoSphere
HRP	Habitat Restoration Plan
IFIM	Instream Flow Incremental Methodology
Interior	Department of the Interior
IP	Implementation Plan
IRWMT	Interagency Refuge Water Management
LRP	Land Retirement Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic Atmospheric Administration
NRDC	Natural Resources Defense Council
NWR	National Wildlife Refuge
OCAP	Operating Criteria and Procedures
OMB	Office of Management and Budget
PART	Program Assessment Rating Tool
PEIS	Programmatic Environmental Impact
PIMS	Performance Information Management
POD	Pelagic Organism Decline
RBDD	Red Bluff Diversion Dam
RHEM	Riparian Habitat Establishment Model
ROD	Record of Decision
RPA	Reasonable and Prudent Action
RST	Rotary Screw Trap
RWSP	Refuge Water Supply Program
SJBAPL	San Joaquin Basin Action Plan Lands
SJBAP	San Joaquin Basin Action Plan
SJRA	San Joaquin River Agreement
SJRGA	San Joaquin River Group Authority
SJRR	San Joaquin River Restoration
SMUD	Sacramento Municipal Utility District
SNWR	Sacramento National Wildlife Refuges
SWP	State Water Project
TFCF	Tracy Fish Collection Facility
TRRP	Trinity River Restoration Program
US	United States
USBR	US Bureau of Reclamation
USFWS	US Fish and Wildlife Service
USRWQM	Upper Sacramento River Water Quality Model
VAMP	Vernalis Adaptive Management Plan
WAP	Water Acquisition Program

Appendix B: Glossary of Terms

Acre-foot (AF): The quantity of water required to cover one acre to a depth of one foot: equal to 1,233.5 cubic meters (43,560 cubic feet)

Anadromous fish: Those stocks of salmon (including other species, e.g., steelhead, striped bass, white and green sturgeon, and American shad) that ascend the Sacramento and San Joaquin rivers and their tributaries and the Sacramento-San Joaquin Delta to reproduce after reaching maturity in San Francisco Bay or the Pacific Ocean; fish species that spend most of their lives in the ocean but reproduce in fresh water

Anadromous Fish Restoration Program (AFRP): A program authorized by the CVPIA to address anadromous fish resource issues in Central Valley streams that are tributary to the Delta

Biota: Total collection of organisms of a geographic region or a time period

CALFED Bay-Delta Program: A unique collaboration among 25 state and federal agencies that came together to improve California's water supply and the ecological health of the San Francisco Bay/Sacramento-San Joaquin River Delta

Capillary rise: Movement of water upwards from the watertable (the top of the groundwater) into the unsaturated soil above; can be likened to a dry sponge (the unsaturated soil) being placed on top of a wet surface (the watertable), the sponge sucking up water being similar to capillary rise in soils

Central Valley: Area in the central portion of California bounded by the Cascade Range to the north, the Sierra Nevada to the east, the Tehachapi Mountains to the south and the coast ranges and San Francisco Bay to the west

Central Valley Project (CVP): As defined by Section 3403(d) of the CVPIA, "all Federal reclamation projects located within or diverting water from or to the watershed of the Sacramento and San Joaquin rivers and their tributaries as authorized by the Act of August 26, 1937 (50 Stat. 850) and all Acts amendatory or supplemental thereto, ..."

Central Valley Project water: As defined by Section 3403(f) of the CVPIA, "all water that is developed, diverted, stored, or delivered by the Secretary in accordance with the statutes authorizing the Central Valley Project in accordance with the terms and conditions of water rights acquired pursuant to California law."

Central Valley Project Improvement Act (CVPIA): Public Law 102-575, Title 34. This law was passed in 1992 for the following purposes:

a) Protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California

b) Address impacts of the Central Valley Project on fish, wildlife and associated habitats

c) Improve the operational flexibility of the Central Valley Project

d) Increase water-related benefits provided by the Central Valley Project to the State of California through expanded use of voluntary water transfers and improved water conservation

e) Contribute to the State of California's interim and long-term efforts to protect the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary

f) Achieve a reasonable balance among competing demands for use of Central Valley Project water, including the requirements of fish and wildlife, agricultural, municipal and industrial and power contractors

Central Valley Habitat Joint Venture (CVHJV): The association of federal and state agencies and private parties established for the purpose of developing and implementing the North American Waterfowl Management Plan as it pertains to the Central Valley of California

Constant fractional marking program (CFM): When fish are counted for CVPIA monitoring, program managers differentiate between wild and hatchery fish; hatcheries mark a percentage of juveniles before

they are released and when fish come back to spawn, the mark will indicate which were hatchery-born

Diversion: Area where river water is rerouted in a direction other than its natural course

Entrainment: When fish are diverted from their natural spawning course (e.g., caught in a water pump or diverted from the river into a canal)

Environmental Impact Statement (EIS): An analysis required by the National Environmental Policy Act (NEPA) for all major federal actions, which evaluates the environmental risks of alternative actions

Escapement: Measurement of adult spawning anadromous fish (e.g., salmon) that manage to return to their spawning stream

Firm water supplies: Non-interruptible water supplies guaranteed by the supplier to be available at all times except for reasons of uncontrollable forces or continuity of service provisions

Flow: The volume of water passing a given point per unit of time, usually in cubic feet per second (cfs)

Habitat: Area where a plant or animal lives

Level 2: A term used to refer to refuge water supply deliveries; the 1989 and 1992 Refuge Water Supply Studies define Level 2 refuge water supplies as the average amount of water the refuges received between 1974 and 1983

Level 4: A term used to refer to refuge water supply deliveries; Level 4 refuge water supplies are defined in the 1989 and 1992 Refuge Water Supply Studies as the amount of water for full development of the refuges based upon management goals developed in the 1980s

Measure: A type of program activity defined by the provisions of CVPIA that includes specific physical or structural actions

Metric: The defined quantifiable measurement of outputs or outcomes

Mitigation: One or all of the following: (1) Avoiding an impact by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating an impact over time by preservation and maintenance operations during the life of an action; and (5) compensating for an impact by replacing or providing substitute resources or environments

Natural Production: As defined by Section 3403(h) of the CVPIA, "fish produced to adulthood without direct human intervention in the spawning, rearing, or migration processes"

Outcome: The intended results or consequences to be achieved through implementing measures and programs described in the CVPIA

Output: The specific actions, measures, programs and services produced by Reclamation and the Service and provided to the public or others; outputs are the activities of the CVPIA Program to achieve the outcomes defined by the Act or developed by Reclamation and the Service to achieve the environmental restoration purposes

Pelagic Organism Decline: A recent decline in both abundance and species richness of pelagic (living in water above the bottom) organisms within the Sacramanto-San Joaquin Delta; pelagic organisms include, most notably, the delta smelt and longfin smelt, federally-listed endangered species of fish

Program: The overall effort to implement the provisions of CVPIA

Program Activity: The individual provisions of CVPIA that are being implemented by "program managers" at Reclamation and the Service

Program Manager: The staff at Reclamation and the Service that oversees implementation of the CVPIA program activities; each active program activity has a program manager from its respective agency

Redd Dewatering: Occurs when redds (fish egg "nests") are left exposed by receding water levels

Restoration Fund: The fund established by Section 3407 of the CVPIA to contribute resources for the environmental restoration provisions of the Act; revenue comes into the fund primarily through surcharges on water and power contract rates

Restoration Fund Roundtable: A collective of stakeholders representing environmental organizations, federal and state resource agencies, water and power contractors, and other interested parties who meet as needed to discuss issues, news and activities related to the Central Valley Project Improvement Act (CVPIA) and provide information to Reclamation and the Service

Riparian: Of or relating to or located on the banks of a river or stream

South Delta: Sacramento-San Joaquin Delta

Stranding: Stranding is a term used to describe fish that are trapped in pools of water that have no connectivity to the larger stream because of insufficient flow

Target: The quantifiable or otherwise measurable characteristics that tell how well a program must accomplish a performance measure.

Taxa: designating an organism or group of organisms

Timeframe: The period of time when program activities occur (e.g., annual or long term) that combine with a performance measure and target, establish a performance goal

Water Acquisition: The purchase of water from willing sellers

Weir: Type of fish ladder that utilizes a series of small dams and pools to create a long channel and allow spawning fish to get around an obstruction, like a dam

WY: Water year

Appendix C: CVPIA Title 34 of Public Law 102-575

ANADROMOUS FISH RESTORATION PROGRAM – SECTION 3406(b)(1)

"The Secretary ... is authorized and directed 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." The section also states, "this goal shall not apply to the San Joaquin River between Friant Dam and the Mendota Pool, for which a separate program is authorized under subsection 3406(c) of this title; Provided further, That the programs and activities authorized by this section shall, when fully implemented, be deemed to meet the mitigation, protection, restoration, and enhancement purposes established by subsection 3406(a) of this title; And provided further, That in the course of developing and implementing this program the Secretary shall make all reasonable efforts consistent with the requirements of this section to address other identified adverse environmental impacts of the Central Valley Project not specifically enumerated in this section."

HABITAT RESTORATION PROGRAM – SECTION 3406(b)(1) "OTHER"

"...in the course of developing and implementing this program the Secretary shall make all reasonable efforts consistent with the requirements of this section to address other identified adverse environmental impacts of the CVP not specifically enumerated in this section."

Trinity River Restoration Program – Section 3406(b)(1) "other" and 3406(b)(23)

"...That in the course of developing and implementing this program the Secretary shall make all reasonable efforts consistent with the requirements of this section to address other identified adverse environmental impacts of the Central Valley Project not specifically enumerated in this section"; and

"In order to meet Federal trust responsibilities to protect the fishery resources of the Hoopa Valley Tribe, and to meet the fishery restoration goals of the Act of October 24, 1984, Pub. L. 98-541, provide through the Trinity River Division, for water years 1992 through 1996, an instream release of water to the Trinity River of not less than 340,000 acre-feet per year for the purposes of fishery restoration, propagation, and maintenance..."

MODIFIED CVP OPERATIONS – SECTION 3406(b)(1)(B)

"As needed to achieve the goals of this program, the Secretary is authorized and directed to modify CVP operations to provide flows of suitable quality, quantity, and timing to protect all life stages of anadromous fish, except that such flows shall be provided from the quantity of water dedicated to fish, wildlife, and habitat restoration purposes under paragraph (2) of this subsection; from the water supplies acquired pursuant to paragraph (3) of this subsection; and from other sources which do not conflict with the fulfillment of the Secretary's remaining contractual obligations to provide CVP water for other authorized purposes. Instream flow needs for all Central Valley Project controlled streams and rivers shall be determined by the Secretary based on recommendations of the U.S. Fish and Wildlife Service after consultation with the California Department of Fish and Game."

DEDICATED 800,000 ACRE-FEET PROJECT YIELD – SECTION 3406(b)(2)

"...dedicate and manage annually 800,000 acre-feet of Central Valley Project yield for the primary purpose of implementing the fish, wildlife, and habitat restoration purposes and measures authorized by this title; to assist the State of California in its efforts to protect the waters of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; and to help meet such obligations as may be legally imposed upon the Central Valley Project under state or federal law following the date of enactment of this title, including but not limited to additional obligations under the federal Endangered Species Act..."

WATER ACQUISITION PROGRAM - INSTREAM WATER – SECTIONS 3406(b)(3) AND 3406(G)

"The Secretary ... is authorized and directed to develop and implement a program in coordination and in conformance with the plan required under paragraph (1)

of this subsection for the acquisition of a water supply to supplement the quantity of water dedicated to fish and wildlife purposes under paragraph (2) of this subsection.... The program should identify how the Secretary intends to utilize, in particular the following options: improvements in or modifications of the operations of the project; water banking; conservation; transfers; conjunctive use; and temporary and permanent land fallowing, including purchase, lease, and option of water, water rights, and associated agricultural land."

TRACY (JONES) PUMPING PLANT PROGRAM – SECTION 3406(b)(4)

"Develop and implement a program to mitigate for fishery impacts associated with operations of the Tracy Pumping Plant. Such program shall include, but is not limited to improvement or replacement of the fish screens and fish recovery facilities and practices associated with the Tracy Pumping Plant."

CONTRA COSTA CANAL PUMPING PLANT - SECTION 3406(b)(5)

"...Develop and implement a program to mitigate for fishery impacts resulting from operations of the Contra Costa Canal Pumping Plant No. 1. Such a program shall provide for construction and operation of fish screening and recovery facilities, and for modified practices and operations."

FLOW FLUCTUATIONS AND RESERVOIR STORAGE – SECTION 3406(b)(9) AND (b)(19)

"(9) Develop and implement a program to eliminate, to the extent possible, losses of anadromous fish due to flow fluctuations caused by the operation of any Central Valley Project storage or re-regulating facility..."

"(19) Reevaluate existing operational criteria in order to maintain minimum carryover storage at Sacramento and Trinity River reservoirs to protect and restore the anadromous fish of the Sacramento and Trinity Rivers in accordance with the mandates and requirements of this subsection and subject to the Secretary's responsibility to fulfill all project purposes, including agricultural water delivery."

RED BLUFF DIVERSION DAM – SECTION 3406(b)(10)

"Develop and implement measures to minimize fish passage problems for adult and juvenile anadromous fish at Red Bluff Diversion Dam..."

CLEAR CREEK RESTORATION PROGRAM – SECTION 3406(b)(12)

"Develop and implement a comprehensive program to provide flows to allow sufficient spawning, incubation, rearing, and outmigration for salmon and steelhead from Whiskeytown Dam as determined by instream flow studies conducted by the California Department of Fish and Game after Clear Creek has been restored and a new fish ladder has been constructed at the McCormick-Saeltzer Dam..."

SPAWNING AND REARING HABITAT RESTORATION PROGRAM – SECTION 3406(b)(13)

"Develop and implement a continuing program ... to restore and replenish spawning gravel...and rearing habitat ... on the American, Stanislaus and Sacramento Rivers ... shall include preventive measures..."

HEAD OF OLD RIVER BARRIER – SECTION 3406(b)(15)

"Construct, in cooperation with the State of California and in consultation with local interests, a barrier at the head of Old River in the Sacramento-San Joaquin Delta to be operated on a seasonal basis to increase the survival of young outmigrating salmon that are diverted from the San Joaquin River to Central Valley Project and State Water Project pumping plants and in a manner that does not significantly impair the ability of local entities to divert water..."

COMPREHENSIVE ASSESSMENT AND MONITORING PROGRAM – SECTION 3406(b)(16)

"...Establish, in cooperation with independent entities and the State of California, a comprehensive assessment program to monitor fish and wildlife resources in the Central Valley to assess the biological results and effectiveness of actions implemented pursuant to this subsection...."

ANADROMOUS FISH SCREEN PROGRAM – SECTION 3406(b)(21)

"Assist the State of California in efforts to develop and implement measures to avoid losses of juvenile anadromous fish ... measures shall include but shall not be limited to construction of screens on unscreened diversions, rehabilitation of existing screens, replacement of existing non-functioning screens, and relocation of diversions to less fishery-sensitive areas."

SAN JOAQUIN RIVER RESTORATION PROGRAM – SECTION 3406(c)(1)

"The Secretary shall " ... develop a comprehensive plan which is reasonable, prudent, and feasible to address fish, wildlife, and habitat concerns on the San Joaquin River, including but not limited to the streamflow, channel, riparian habitat, and water quality improvements that would be needed to reestablish where necessary and to sustain naturally reproducing anadromous fisheries from Friant Dam to its confluence with the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary."

REFUGE WATER SUPPLY PROGRAM – SECTION 3406(b)(3), 3406(d)(1), 3406(d)(2), 3406(d)(5)

"3406 (b)(3) Develop and implement a program in coordination and in conformance with the plan required under paragraph (1) of this subsection for the acquisition of a water supply to supplement the quantity of water dedicated to fish and wildlife purposes under paragraph (2) of this subsection and to fulfill the Secretary's obligations under paragraph 3406(d)(2) of this title...."

"3406 (d)(1)Upon enactment of this title, the quantity and delivery schedules of water measured at the boundaries of each wetland habitat area described in this paragraph shall be in accordance with Level 2 of the "Dependable Water Supply Needs" table for those habitat areas as set forth in the Refuge Water Supply Report and two-thirds of the water supply needed for full habitat development for those habitat areas identified in the "San Joaquin Basin Action Plan/ Kesterson Mitigation Action Plan Report..."

"3406 (d)(2) Not later than ten years after enactment of this title, the quantity and delivery schedules of water measured at the boundaries of each wetland habitat area described in this paragraph shall be in accordance with Level 4 of the "Dependable Water Supply Needs" table for those habitat areas as set forth in the "Refuge Water Supply Report" and the full water supply needed for full habitat development for those habitat areas identified in the "San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan Report..."

"3406 (d)(5) The Secretary is authorized and directed to construct or to acquire from non-Federal entities such water conveyance facilities, conveyance capacity, and wells as are necessary to implement the requirements of this subsection; provided, that such authorization shall not extend to conveyance facilities in or around the Sacramento-San Joaquin Delta Estuary..."

ECOSYSTEM AND WATER SYSTEMS OPERATIONS MODELS – SECTION 3406(g)

"The Secretary, in cooperation with the State of California and other relevant interests and experts, shall develop readily usable and broadly available models and supporting data to evaluate the ecologic and hydrologic effects of existing and alternative operations of public and private water facilities and systems in the Sacramento, San Joaquin, and Trinity River watersheds. The primary purpose of this effort shall be to support the Secretary's efforts in fulfilling the requirements of this title through improved scientific understanding concerning, but not limited to, the following:

(1) a comprehensive water budget of surface and groundwater supplies, considering all sources of inflow and outflow available over extended periods;

(2) related water quality conditions and improvement alternatives, including improved temperature prediction capabilities as they relate to storage;

(3) surface-ground and stream-wetland interactions;

(4) measures needed to restore anadromous fisheries to optimum and sustainable levels in accordance with the restored carrying capacities of Central Valley rivers, streams, and riparian habitats;

(5) development and use of base flows and channel maintenance flows to protect and restore natural channel and riparian habitat values;

(6) implementation of operational regimes at State and Federal facilities to increase springtime flow releases, retain additional floodwaters, and assist in restoring both upriver and downriver riparian habitats;

(7) measures designed to reach sustainable harvest levels of resident and anadromous fish, including development and use of systems of tradeable harvest rights;

(8) opportunities to protect and restore wetland and upland habitats throughout the Central Valley;

(9) measures to enhance the firm yield of existing Central Valley Project facilities, including improved management and operations, conjunctive use

opportunities, development of offstream storage, levee setbacks, and riparian restoration."

USE OF PROJECT FACILITIES FOR WATER BANKING SECTION 3408(d)

"The Secretary, in consultation with the State of California, is authorized to enter into agreements to allow project contracting entities to use project facilities, where such facilities are not otherwise committee or required to fulfill project purposes or other Federal obligations, for supplying carry-over storage of irrigation and other water for drought protection, multiple-benefit credit-storage operations, and other purposes. The use of such water shall be consistent with and subject to State law. All or a portion of the water provided for fish and wildlife under this title may be banked for fish and wildlife purposes in accordance with this subsection."

LAND RETIREMENT – SECTION 3408(h)

"The Secretary is authorized to purchase from willing sellers land and associated water rights and other property interests ... which receives Central Valley Project water under a contract executed with the United States, and to target such purchases to areas deemed most beneficial to the overall purchase program, including the purposes of this title."