

MORE SELF-CONSCIOUS INTEGRATION OF THE ENVIRONMENTAL WATER ACCOUNT WITH OTHER ENVIRONMENTAL WATER PROGRAMS AND TOOLS FOR ENVIRONMENTAL RESTORATION

This report responds to the December 2003 EWA Review Panel's Report, Recommendation # 3, calling for more self-conscious integration of the Environmental Water Account (EWA) with other programs and tools for environmental restoration.

This report briefly reviews the Calfed Program and how the Program elements EWA and Ecosystem Restoration Program (ERP) interact. It describes the ERP tools for environmental restoration and discusses ERP and EWA integration. It also focuses on the integration and coordination among four environmental water management programs available to the agencies responsible for implementing the ERP, and discusses upstream opportunities for using EWA assets.

Calfed, the ERP and the EWA

The Calfed Program is a big, multi-institutional program with four primary objectives; two of those objectives are ecosystem restoration and water supply reliability. The ERP is the primary Calfed Program element responsible for making progress toward the ecosystem restoration objective. The Strategic Plan for Ecosystem Restoration outlines the Single Blueprint concept for all ecosystem restoration efforts under the Calfed Program. The Ecosystem Restoration Program Plan (ERPP) identifies 6 strategic goals, 32 strategic objectives, and more than 300 targets and 600 programmatic actions. Among the tools that the ERP Implementing Agencies have to accomplish these goals are a number of water management programs, including the EWA. The EWA is a multi-objective program, contributing to both ecosystem restoration and water supply reliability. This section of the report highlights the ERP's Single Blueprint approach to integration and coordination of all ecosystem restoration tools, with emphasis on the environmental water management programs and specifically the EWA.

ERP - The Single Blueprint

The Single Blueprint concept for ecosystem restoration and species recovery in the Bay-Delta system is key to implementing the ERP. The Single Blueprint approach ensures coordination and integration, not only within the Calfed

Program, but between all resource management, conservation, and regulatory actions affecting the Bay-Delta system.

In the Calfed Program Record of Decision (ROD), the ERP committed to integrating its activities with other Calfed Program elements, and coordinating with other agency activities within the geographic scope of the ERP. The Single Blueprint is a shared vision of ecosystem restoration that is sustained through collaboration and cooperation among the ERP Implementing Agencies, other Bay-Delta Program agencies and stakeholders. The Single Blueprint is defined by three elements: shared science, shared vision, and a management framework. The ERP planning documents and processes form the framework for advancing the Single Blueprint concept for all Calfed Program elements. Each of these elements is expected to look to the ERP for guidance for all of their ecosystem restoration related activities.

The purpose of the Single Blueprint is to provide a unified and cooperative approach to restoration as defined by three primary elements:

1. Integrated, shared science, and a set of ecological conceptual models to provide a common basis of understanding about how the ecosystem works;
2. A shared vision for a restored ecosystem; and
3. A management framework that defines how parties with management and regulatory authorities affecting the Delta will interact and how management and regulatory decisions (including planning, prioritization, and implementation) will be coordinated and integrated over time.

--Strategic Plan for Ecosystem Restoration, August 2000.

Shared Science. As described in *The Strategic Plan for Ecosystem Restoration*, the shared science element of the Single Blueprint consists of two aspects: integrated, shared science and a set of transparent ecological conceptual models. The ERP, together with the Science Program, addresses the shared science aspect through emphasis on independent peer review, workshops, review panels, science boards, conferences, and white papers. These and other efforts ensure that new information is shared with the Calfed community, and that programs use this information to inform their management decisions.

For example, the ERP and Science Program commissioned a series of white papers covering a variety of topics (including two of particular interest to the ERP and EWA on delta smelt and Central Valley salmonids) important to the Calfed Program. The white papers are prepared by technical experts and provide a synthesis of technical information that reflects the state of knowledge for a particular subject. Each paper is expected to be an important part of the

information base that defines the state of knowledge about topics critical to Calfed.

The ERP has yet to develop a set of transparent ecological conceptual models to help guide implementation of the program. These conceptual models were to help form the foundation for transparent decision making based upon sound science. The ERP is developing a suite of conceptual models as a foundation to refine ERP targets, actions, and milestones, principally through its regional planning process. The ERP also requires that all applicants for ERP funding include conceptual models in their proposals for funding. Several of the programs and tools contributing to the ERP have developed both conceptual and quantitative models, but models are not readily available to help guide coordination and integration with the EWA.

A Shared Vision. The shared vision of ecological restoration defines the desired outcome of the ERP. While each of the management and regulatory programs have their own distinct set of goals, the Single Blueprint concept establishes a unified idea about ecosystem restoration to which these programs can strive while meeting their specific goals. The shared vision for ecological restoration and species conservation established in the ERP planning documents provides a broad set of common goals for the management and regulatory agencies.

The ERP planning documents include the Draft Strategic Plan for the Ecosystem Restoration Program, the ERPP, and the Multi-Species Conservation Strategy (MSCS), all part of the environmental documents for the Calfed Bay-Delta Program. The ERPP includes more than 300 restoration targets, and 40 of these are flow-related.

Management Framework. The management framework defines how parties will interact and how management and regulatory decisions will be coordinated and integrated. The management framework is designed to foster coordinated and consistent decision making. This management framework must be flexible, incorporating and responding to new information and changing Bay-Delta conditions. The framework promotes coordinated planning, prioritization, and implementation and incorporates provisions for resolving management and regulatory conflicts that may arise.

The ERP and EWA, like all Calfed Bay-Delta Program elements, share a management structure. All program elements are overseen and coordinated by the California Bay-Delta Authority, receive advice from the Bay-Delta Public Advisory Committee (BDPAC) and the Independent Science Board, and advice and assistance from the Science Program. In addition to sharing this management structure with all Calfed Program elements, the ERP and EWA also share implementing agencies, who provide updates to the Ecosystem Restoration, Working Landscapes, and Environmental Justice subcommittees of the BDPAC on each programs' status. ERP and EWA also are the first Calfed

Program elements with standing science advisory panels (the ERP Science Board and the EWA Review Panel).

The ERP Implementing Agencies are the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (FWS), and the National Marine Fisheries Service (NOAA Fisheries). These agencies are responsible for implementing the ERP, coordinating their administration of the Federal and State Endangered Species Acts with the ERP, and overseeing MSCS implementation. Each of these agencies is also responsible for ensuring that other restoration activities they engage in within the ERP's geographic scope are implemented in a manner consistent with the Single Blueprint concept. These activities include their environmental water management activities.

Three of the five agencies implementing the EWA are also the ERP implementing agencies. These three agencies, commonly referred to as the management agencies, are responsible for managing EWA assets, coordinating EWA actions with other environmental water management actions, and recommending fish actions. The other EWA implementing agencies, the California Department of Water Resources (DWR) and the U. S. Bureau of Reclamation (USBR), commonly referred to as the project agencies, are responsible for acquiring water, accounting for EWA assets, and operating the state and federal water projects. The agencies responsible for managing those aspects of the EWA most closely aligned with Calfed's ecosystem restoration objective are the ERP Implementing Agencies.

Within CDFG, FWS, and NOAA Fisheries, the same individuals are responsible for managing their agencies' efforts for both the ERP and the EWA. Within FWS one individual is responsible for managing staff dealing with all of the environmental water management programs discussed in this report. A shared management structure with the same individuals within the key implementing agencies responsible for both the ERP and EWA helps ensure coordination and integration of these programs.

Four environmental water management programs

There are four environmental water management programs available to the ERP Implementing Agencies for protecting species and restoring ecosystems. Each of these programs complements the other while having differing goals and priorities due to each having specific authorization with a distinct purpose and funding source. This section briefly identifies the four water management programs and how they coordinate and integrate with a specific emphasis on the EWA.

The four water management programs are the EWA, the Calfed Environmental Water Program (EWP), the CVPIA Section 3406 (b)(2) water, and CVPIA Section 3406 (b)(3) Water Acquisition Program (WAP). Briefly, the EWA is a multi-objective program that prioritizes protection of listed species in the Bay-Delta estuary beyond the regulatory baseline through environmentally beneficial changes in SWP/CVP operations at no uncompensated cost to the project's water users. The EWA provides species protection and contributes to ESA regulatory commitments for State Water Project (SWP) and Central Valley Project (CVP) operations. In the context of the Single Blueprint, the EWA has been primarily focused on the ERP's objective to reduce the adverse impacts of diversions at the state and federal pumps in the Delta. The EWP strives to improve salmon spawning and juvenile survival in five priority streams (Clear, Mill, Deer, and Butte Creeks and the Tuolumne River). The Central Valley Project Improvement Act (CVPIA) (b)(2) water and (b)(3) Water Acquisition Program's (WAP) primary purpose is to implement fish restoration measures that contribute to doubling anadromous fish production; (b)(2) water has a secondary purpose of assisting in meeting the 1995 WQCP and post-1992 ESA requirements. The (b)(2) fish actions are implemented on Clear Creek, the Sacramento, American, and Stanislaus Rivers, and in the Delta. Pursuant to the Calfed ROD, the CVPIA (b)(2) water and the Vernalis Adaptive Management Program (VAMP) which gets its supplemental water from the CVPIA (b)(3) WAP Program, are considered part of the Tier 1 baseline level of protection provided by existing regulations and operational flexibility. Tier 2 is defined as the EWA assets combined with the benefits of the ERP, including the EWP. Please see Table 1, Figures 1 and 2, and Attachment 1 for more detailed information about these programs.

These water management programs could be viewed as part of an environmental water management portfolio. Managed together they complement the environmental water quality and flow standards to benefit aquatic species, their habitats, and the ecosystem processes on which those habitats depend. In the context of this environmental water management portfolio, the EWA could be viewed as a substantial but relatively low risk investment. Its species protection and water supply reliability benefits are relatively well accepted by the Calfed community. The EWP could be viewed as a smaller investment in a higher risk area, but with the potential for broader species and ecosystem benefits. Consistent with the perceived higher risk associated with its actions, the EWP takes an experimental approach to each of its actions.

Coordination/Integration Process

Coordination (i.e., the discussion of what to do) and integration (i.e., deciding jointly what to do) of these four environmental water programs takes place at weekly meetings of the Environmental Water Account Team (EWAT), (b)(2) Interagency Team (B2IT), Data Assessment Team (DAT), Water Operations

Management Team (WOMT), and monthly meetings of the Calfed Operations Group. The (b)(2) and EWA are closely coordinated and integrated to maximize fishery benefits. A monthly planning model guides decisions made jointly regarding implementation of EWA, (b)(2) and WAP fish actions; daily operations are discussed at WOMT, EWAT, B2IT, and DAT weekly meetings. See the attached Fish Action Decision Process for more information.

Other coordination efforts take place on a less frequent or on an as-needed basis. For example, the EWA coordinates with the Delta Smelt Work Group, EWA Science Advisors, Operations and Fishery Forum, ERP Implementing Agency Managers, AFRP Habitat Restoration Coordinators, American River Operations Group, and others at their respective meetings or whenever project operations require their input.

The EWP works closely with the other water management staff to coordinate planned actions on their priority streams. Opportunities for shared benefits and costs as well as potential conflicts between these water management programs have been explored for each priority EWP stream. Information from EWP flow manipulation and adaptive management experiments are expected to help inform future water management decisions of the other water management programs. EWP projects closely coordinate with the ERP to enhance existing and planned physical restoration sites.

Examples of Integration and Coordination of EWA fish actions with the other environmental water management programs

The EWA, (b)(2) and WAP have integrated each year since 2001 to help implement the San Joaquin River Agreement (SJRA). The SJRA is a consensus based approach to implementing the State Water Resources Control Board 1995 Water Quality Control Plan for the lower San Joaquin River and the Bay-Delta. A key part of the SJRA is the Vernalis Adaptive Management Program (VAMP). VAMP is designed to protect juvenile Chinook salmon migrating from the San Joaquin River tributaries (Stanislaus, Tuolumne, and Merced Rivers) through the Delta; it is also a scientifically recognized experiment to determine how salmon survival rates change in response to alterations in San Joaquin flows and SWP/CVP exports with the installation of the Head of Old River barrier (HORB). VAMP employs an adaptive management strategy to use current knowledge of hydrology and environmental conditions to protect Chinook salmon smolt passage, while gathering information to allow more efficient protection in the future.¹

The VAMP provides for a 31-day pulse flow (target flow) in the San Joaquin River at Vernalis from approximately April 15 – May 15, along with a corresponding

¹ (2003 Annual Technical Report, San Joaquin River Group Authority).

reduction in SWP/CVP exports (see Table 2), with the HORB in place. Under the SJRA, several water districts agreed to provide the supplemental water, limited to a maximum of 110,000 AF, needed to achieve the VAMP target flows. Annually the WAP pays the water districts to ensure that the VAMP supplemental water is provided from the San Joaquin tributaries during April-May (see Figures 3-6). VAMP supplemental water releases are integrated and coordinated with releases of (b)(2) water on the Stanislaus River.

While operating pursuant to VAMP, the EWA is used to implement SWP export curtailments beyond the Calfed ROD baseline and (b)(2) water is used to implement CVP export curtailments beyond the CVPIA baseline (see figures 7-10). In 2001 and 2002, several Federal District Court decisions resulted in a modification to how (b)(2) water is accounted, thus reducing the amount of (b)(2) fish actions that could be implemented each year. Consequently, the EWA has been used to implement export reductions at the CVP facilities (primarily after the VAMP period) in addition to the export reductions at the SWP facilities.

EWA fish actions are coordinated and integrated with other water management actions as well. For example, annually in October, the SJRA and the WAP release 15,000 AF of water on the Stanislaus River and 12,500 AF of water on the Merced River to improve upstream migration of adult Chinook salmon and increase available salmon spawning and egg incubation habitat. In fall 2001, the EWA and WAP river releases were integrated on the Merced River. The EWA and (b)(2) river releases were integrated on the American River in fall 2001 and 2002. The EWA is coordinated with SWP operations on the Feather River and EWA water has been acquired and released from the Yuba River each year.

The EWA fish actions will continue to be integrated and coordinated with (b)(2) fish actions and VAMP implementation. All water management programs will consider additional opportunities for integration and coordination with the other environmental water management efforts and ERP restoration measures. Each integration and coordination opportunity is unique, yet in the context of the overall Calfed Program contributes to the overall goal of ecosystem restoration.

EWA Upstream actions to date

In the first four years of implementation most EWA fish actions were export curtailments to protect listed fish species near the SWP pumps in the Delta. Several EWA fish actions also curtailed exports at the CVP pumps. As described above, from April 15 through May 15, the export reductions at the SWP using EWA were integrated and coordinated with CVP export reductions using (b)(2) water and the VAMP flow releases using WAP and (b)(2) water from the San Joaquin River tributaries.

The majority of the EWA upstream activities were transfers in which surface water purchased by the EWA was released at an upstream reservoir and moved to San Luis Reservoir via the SWP pumps. These were not considered “fish” actions but were transfers to repay prior EWA debt. For the most part these transfers took place on the Yuba River during the summer months using the 500 cfs of dedicated capacity guaranteed to the EWA by the Operating Principles Agreement in order to pump it into San Luis Reservoir.

On three occasions EWA transfers were specifically timed during the fall to improve instream conditions for salmon and steelhead. As discussed above, in fall 2001, EWA transfers took place on the Merced River (25,000 AF) and the American River (20,000 AF) to improve flows and instream temperatures for fall run Chinook salmon spawning. Both transfers subsequently were pumped at Banks and used to repay prior EWA debt. (See the attached report on EWA Upstream actions – WY 2002 for more information.)

In fall 2002, EWA released 5,000 AF on the American River to improve conditions for fall run Chinook salmon spawning. Of this amount, only 600 AF was captured at the pumps, with the remainder contributing to Delta outflow. The small amount captured and transferred was due to a lack of available pumping capacity at the time of the release.

In addition, the EWA also paid for bypassed power generation due to lower river outlet releases in the American River in fall 2001 and 2002. This allowed for cold water releases below the power penstocks on Folsom Dam, which improved instream temperatures for fall run Chinook salmon spawning. Prior to the lower river outlet releases significant Chinook salmon prespawning mortalities were reported in both years. The EWA compensated the Western Area Power Administration for the foregone electricity. (See the attached report on Folsom Outlet Releases for more information.)

Additional EWA upstream opportunities

The EWA Review Panel also recommended that the EWA Team examine upstream opportunities, especially on those streams with at-risk species present (winter-run Chinook, spring-run Chinook, and steelhead). As discussed earlier, the EWP is actively seeking water on the three streams identified in the 2003 Panel Report (Mill, Deer, and Butte creeks). The EWP is designed to focus on these smaller tributaries and is actively working with stakeholders to obtain water. All EWP acquisitions will be coupled with testable hypotheses regarding water management in a manner that facilitates learning through adaptive management and includes appropriate monitoring. Proposals for EWP acquisitions will be peer reviewed by an external scientific panel prior to approval. The EWP effectively is putting into action management strategies that

are part of the broader EWA; coordinating with the EWP allows the EWA to focus more on environmental water management related to water project operations.

Additional opportunities to coordinate and integrate with other ecosystem restoration and water management programs to meet upstream objectives will occur in the future. As opportunities to use EWA for upstream actions are identified for specific streams, consistent with the EWA goals of providing fish protection and ESA regulatory commitments, the EWA Team will consider the following questions in pursuing a course of action:

- (1) Are ESA-listed fish species present in the specific stream?
- (2) What are the existing flow regimes?
- (3) Are additional fish flows needed?
- (4) Are there other environmental water management programs already being used on the stream?
- (5) What integration or coordination opportunities with the other environmental water management programs exist?
- (6) Are there willing sellers and, if so, how much water is available?
- (7) Can the water be released on a schedule that provides instream benefits for fish and also be exported into San Luis Reservoir?
- (8) What are the hydrologic conditions and project operations, including Delta inflow, balanced or excess conditions, Delta outflow index, export to inflow ratio (E/I), project demands and storage conditions?
- (9) What is the status of EWA assets and budget?

Furthermore, the EWA Review Panel recommended that the EWA Team develop an upstream study that addresses the following tasks:

- (1) Identify the available upstream water resources according to impacts on specific stocks.
- (2) Assess the impact of additional water resources on fish survival with particular emphasis on prespawning mortality and egg to fry survival.
- (3) Estimate the benefit of upstream actions relative to Delta actions by expressing both in a common measure, such as relative adult salmon equivalents.
- (4) Identify policy level issues needed to coordinate changes in upstream water actions that are now distributed across the four water programs.

The EWA Review Panel also recommended that the EWA Team evaluate the potential for EWA integration into proposed Delta research activities (e.g., Delta cross-channel, Franks Tract, or Clifton Court investigations).

The EWA Team has yet to develop either the upstream study or evaluate the potential for integration with Delta research activities. The primary factor for this is insufficient personnel to complete those tasks.

In summary, the EWA fish actions will continue to be integrated and coordinated with (b)(2) fish actions and VAMP implementation. As the EWA Team has gained experience implementing EWA fish actions during the past four years, it has become more knowledgeable and creative in using EWA assets in ways that were not envisioned in 2001. The EWA Team will continue to investigate opportunities to use EWA for upstream fish actions consistent with the EWA goals of providing fish protection and ESA regulatory commitments. The EWA Team remains committed to pursuing coordination and integration opportunities with other Calfed Program elements, specifically the ERP. As one of several environmental water management programs, the EWA contributes a multi-objective, long-term water management strategy for the restoration of the Bay-Delta system.

Table 1. Comparison of the Environmental Water Account, Environmental Water Program, b2, and WAP.

	I. Environmental Water Account	II. Environmental Water Program	III. CVPIA (b)(2) water	IV. Water Acquisition Program
Primary Purpose	Acquire water that can be delivered south of the Delta to replace pumping forgone by CVP/SWP pumps for fish protection and recovery purposes, and augmenting streamflows and Delta outflow. Instream benefits are generally not a primary purpose, but are often a secondary benefit.	Acquire water on streams tributary to the Sacramento and San Joaquin river systems to provide instream benefits to fish and ecological processes. Instream benefits are a primary purpose and all acquisitions must have a demonstrable biological or ecological benefit.	"Dedicate and manage annually 800,000 AF of CVP yield for the primary purpose of implementing the fish, wildlife, and habitat restoration purposes... ..and to help meet WQCP and ESA obligations."	"... for acquisition of a water supply to supplement the quantity of water dedicated to fish and wildlife purposes ..." per CVPIA 3406 (b)(3).
Geographic Range	North and south of the Delta, with the mix depending on cross-Delta capacity, and locations depending on willing sellers of sufficient water volumes from storage reservoirs, groundwater substitution, and groundwater banks.	Pilot effort focused on five streams with highest priority during first phase.	North and south of the Delta.	Throughout the Central Valley purchased from willing sellers. Includes modification of operations, water banking, conservation, transfers, conjunctive use, fallowing, options, etc.
Stream Preferences	Preference for larger streams with significant reservoir storage, ample water supplies, and a history of water sales.	Preference for smaller spring-run salmon streams, relatively minor amounts of storage, and lacking history of water sales.	Limited to CVP-controlled streams and facilities: i.e., Clear Creek, Sacramento River, American River, Stanislaus River, and the Tracy export facility.	Nineteen streams and rivers throughout the Central Valley that have the greatest biological benefit to anadromous fish populations.
Science	Scientific validity of program examined through external scientific review process managed by Science Program. Evaluation of overall program, rather than individual acquisitions. Compliance with environmental documentation for transfers.	Obligation to establish a sound scientific basis and to establish an experimental adaptive management framework for each acquisition.	Scientific basis for (b) (2) fish actions includes AFRP documents, published literature, DFG and IEP reports. (b)(2) fish actions are coordinated with an interagency team.	Acquisition priorities based on the biology, hydrology and economics decision support model which is part of the "Water Management Strategy and Water Acquisition Plan".
External Review Requirements	CEQA/NEPA compliance for most transfers, with SWRCB environmental review for any transfers exempt from CEQA.	Obligation to conduct scientific peer review and agency reviews similar to CBDA Ecosystem Restoration PSP process.	CVPIA mandates that (b)(2) shall be managed pursuant to conditions specified by USF&WS after consultation with USBR, DWR, and CDF&G.	NEPA compliance for all purchases, SWRCB approval for transfers and post-1914 water right purchases and superior court action for pre-1914 water right purchases.
Length of Acquisition	To date, all acquisitions have been short-term (1 year or less).	Program has a goal of purchasing water rights or long term leases.	Long-term. Authorized by CVPIA in 1992. Annual use of 800 TAF.	Short term and spot marked acquisitions have dominated with only one permanent water right purchase to date been limited by funding constraints.
Agency Support	Nearly all work, other than environmental documentation, has been completed by agency staff members from all five implementing agencies.	Primary agency support has been one USF&WS staff member. Preponderance of support has been provided by consultants.	FWS agency support is 3 USF&WS staff and two USBR staff. Additional support from DWR, DFG, and NOAA Fisheries.	Primary support has been one USBR staff and one USF&WS staff, NEPA documentation conducted by contractor.
Method of Acquisition	All acquisitions have been made by DWR staff and USBR staff.	Methods will be project specific and may be made by state agencies or USBR depending on the funding source.	CVPIA authorization of 800,000 AF annually.	All acquisitions have been made by WAP staff of USBR and the USF&WS.
Public Involvement	Public involvement through Calfed Ops, OFF, DAT and for environmental documentation, SWRCB approvals, and approvals by the boards of directors of willing sellers at public meetings.	Extensive public involvement required due to commitment to pursuing locally supported actions.	Public involvement through Calfed Ops, OFF, DAT and biannual stakeholder meetings.	Public involvement required for NEPA documentation, and development of the "Water Acquisition Strategy and Water Management Plan".

Figure 1. Environmental Water Management Portfolio

Draft Conceptual Model

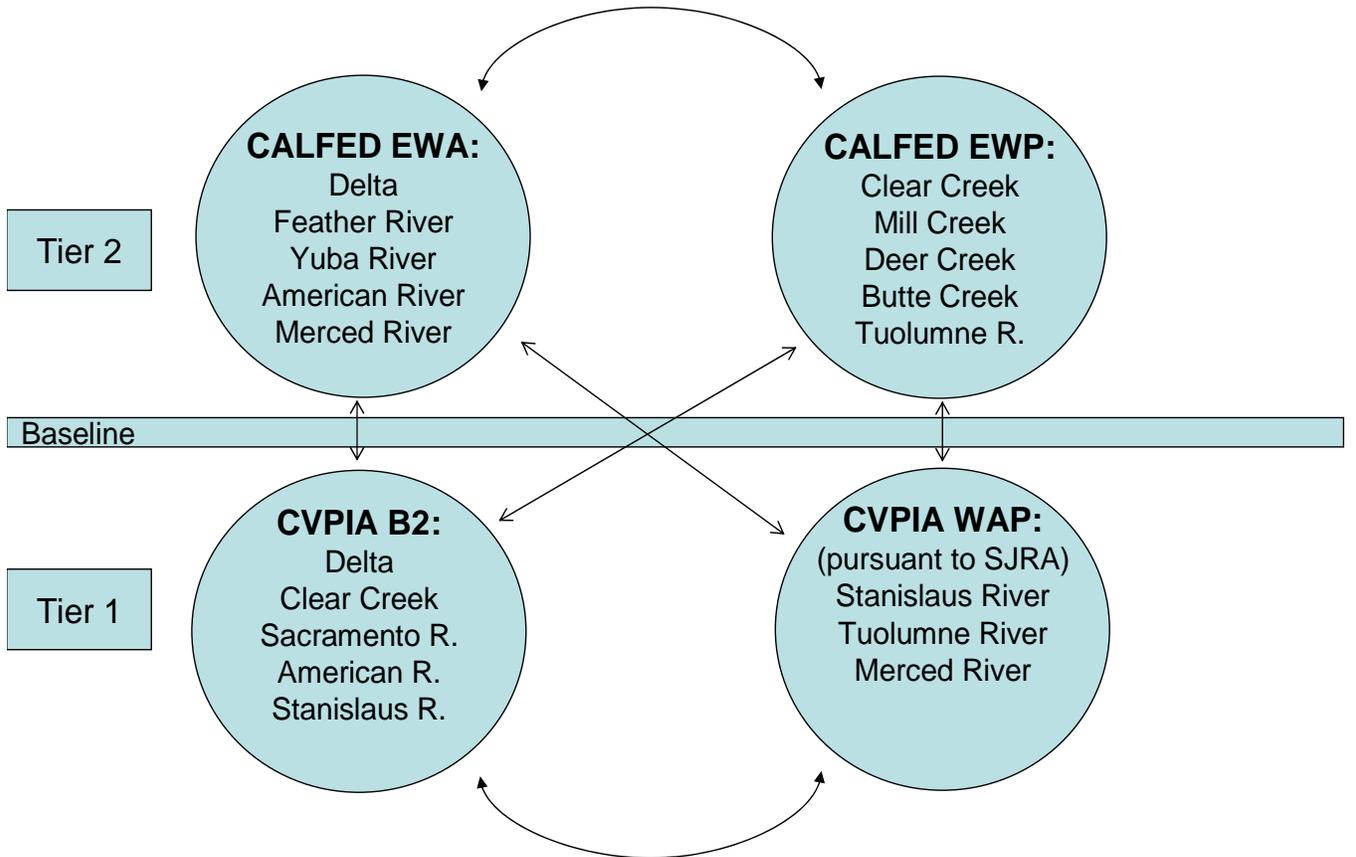


Figure 2. Conceptual Schematic of Habitat Restoration and Water Management Tools

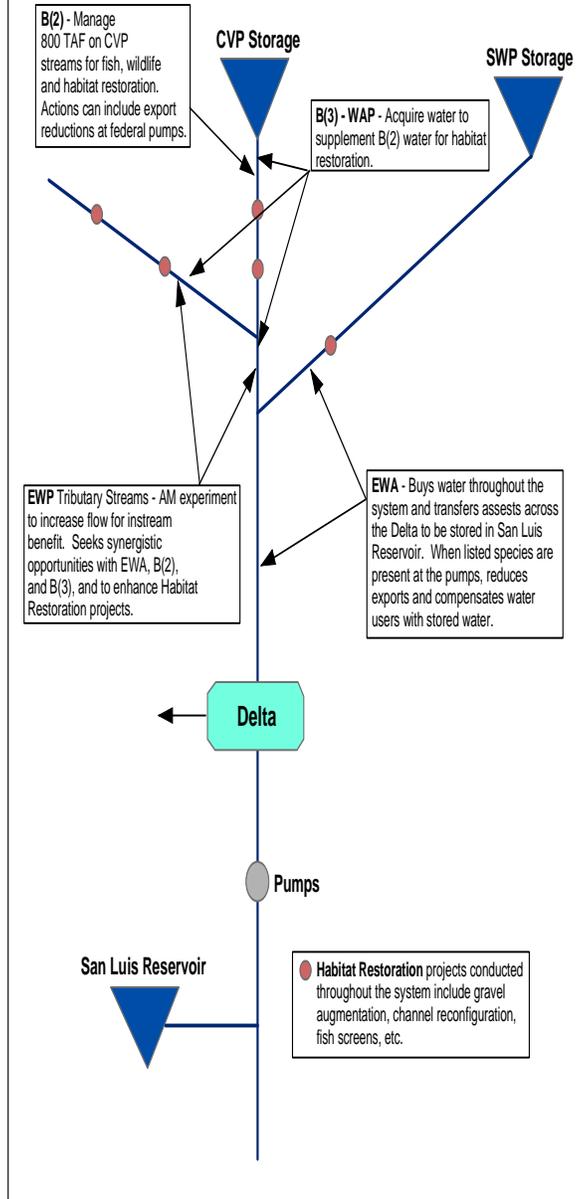
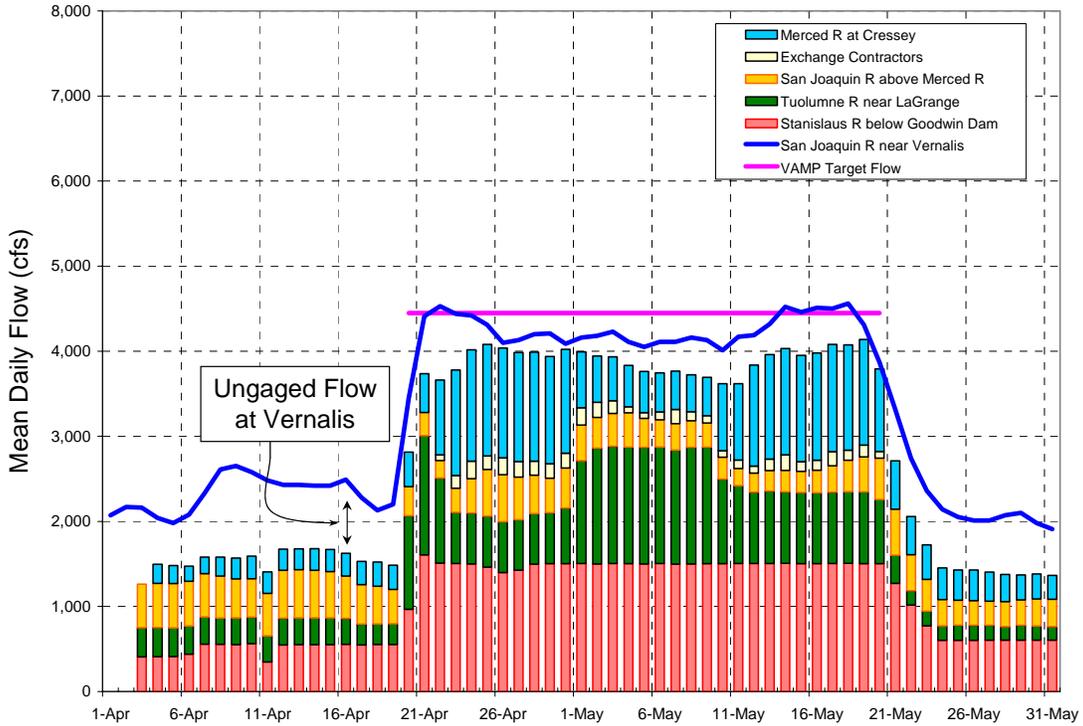


TABLE 2

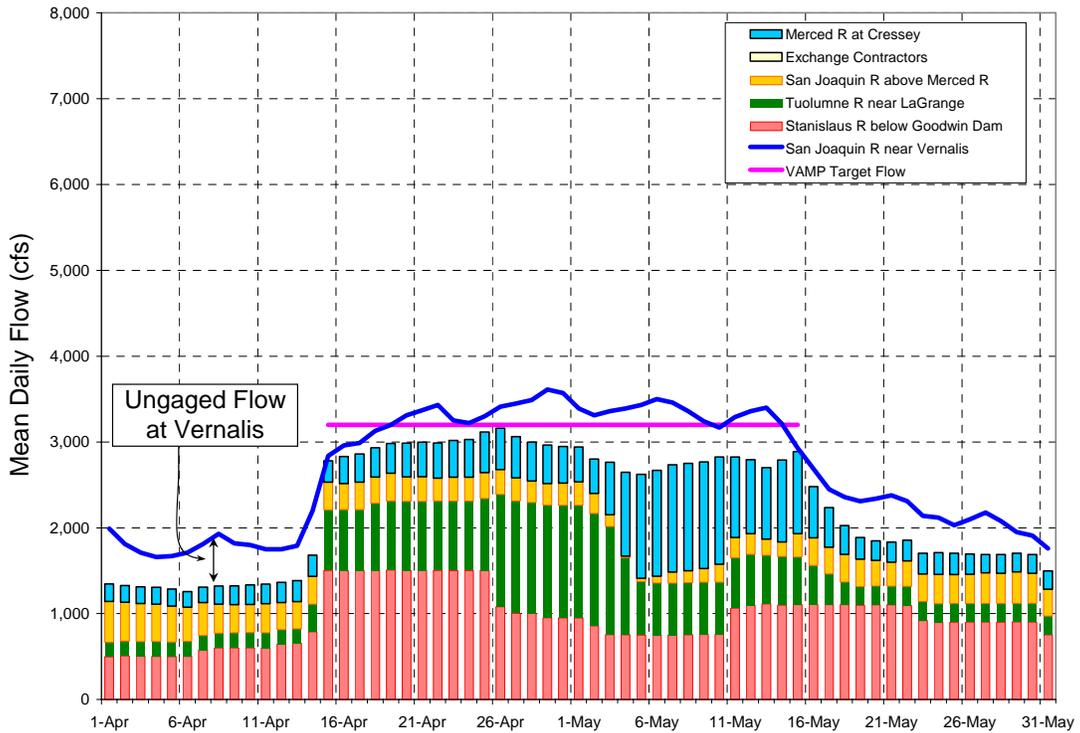
VAMP Vernalis Flow and Delta Export Targets

Existing Flow (cfs)	VAMP Flow Target (cfs)	Delta Export Target Rates (cfs)
0 - 1,999	2,000	
2,000 - 3,199	3,200	1,500
3,200 - 4,449	4,450	1,500
4,450 - 5,699	5,700	2,250
5,700 - 7,000	7,000	1500 or 3,000
Greater than 7,000	Provide stable flow to extent possible	

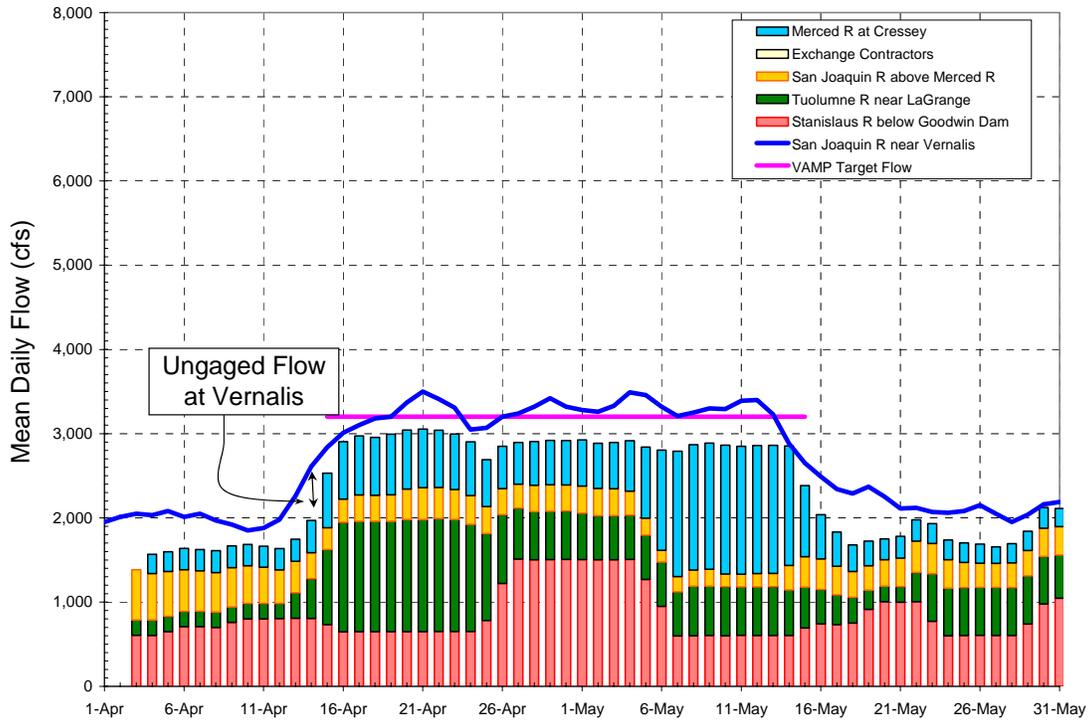
**Figure 3. VAMP 2001 --- San Joaquin River near Vernalis
With Lagged Contributions from Primary Sources**



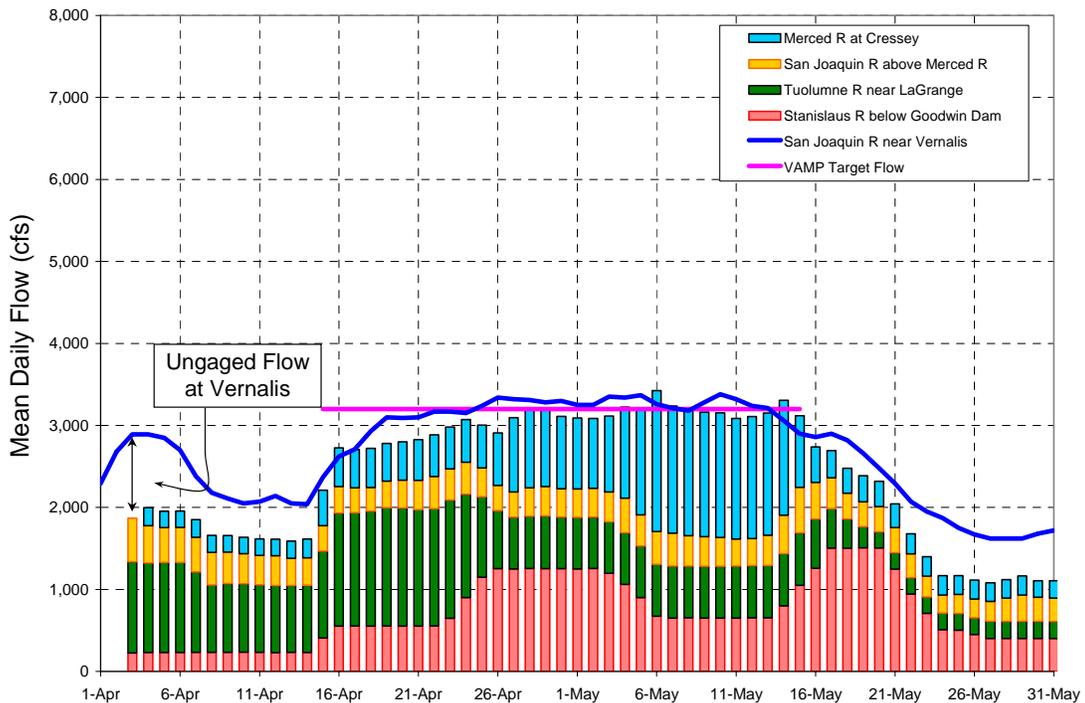
**Figure 4. VAMP 2002 --- San Joaquin River near Vernalis
With Lagged Contributions from Primary Sources**



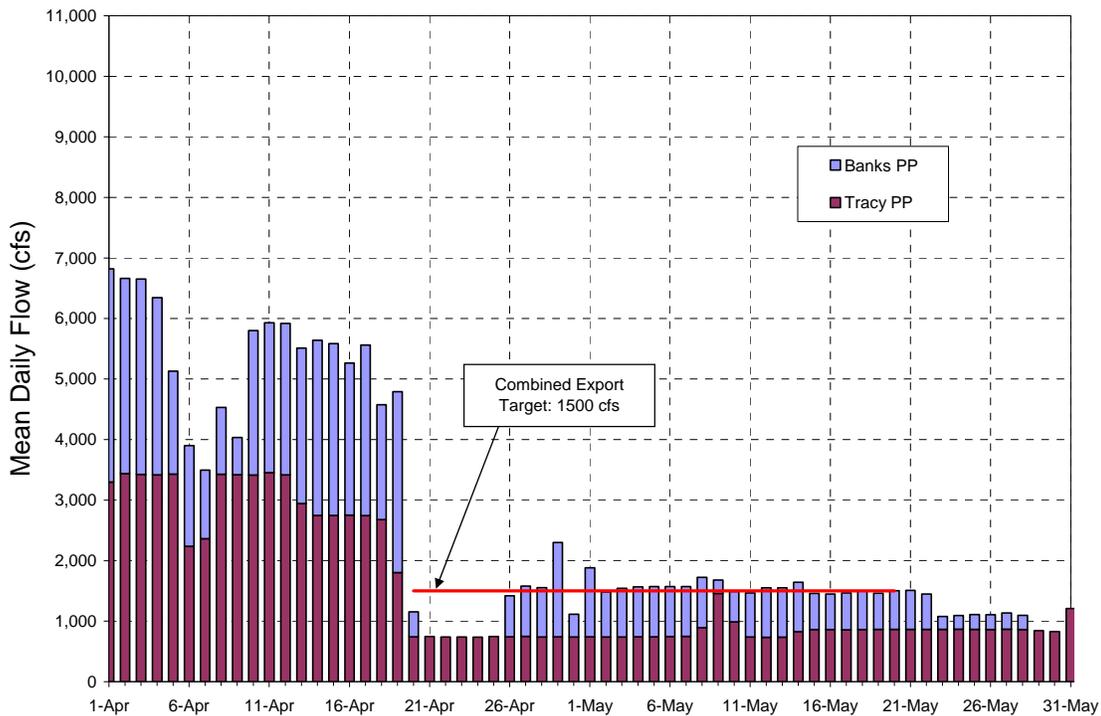
**Figure 5. VAMP 2003 --- San Joaquin River near Vernalis
With Lagged Contributions from Primary Sources**



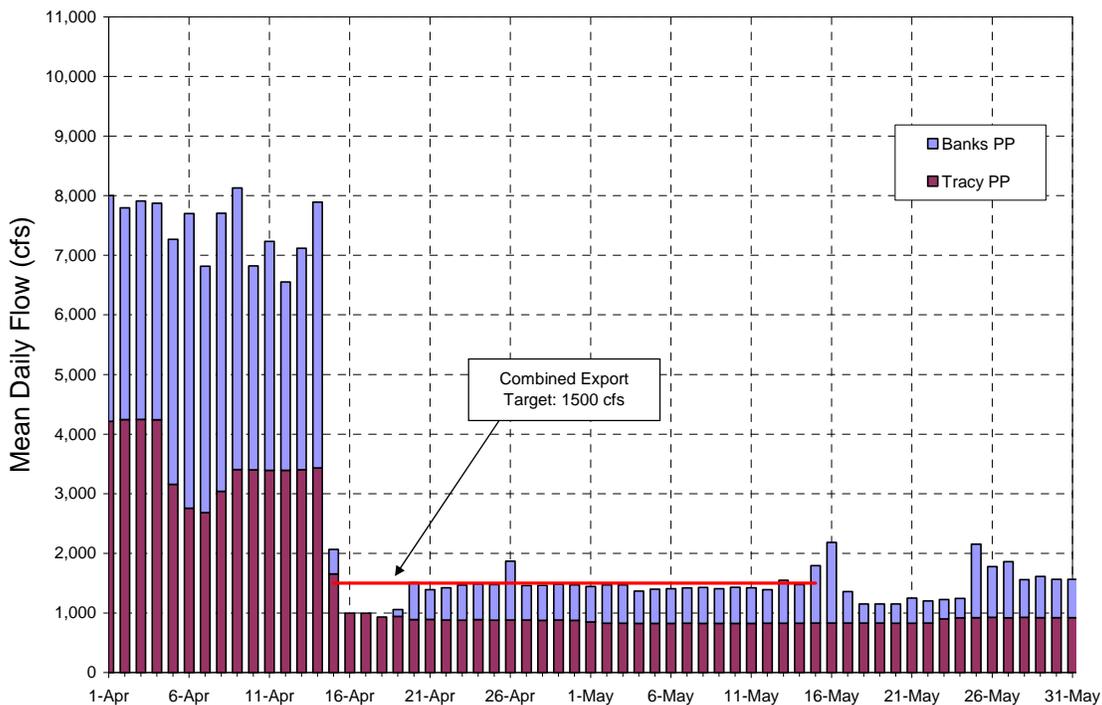
**Figure 6. VAMP 2004 --- San Joaquin River near Vernalis
With Lagged Contributions from Primary Sources**



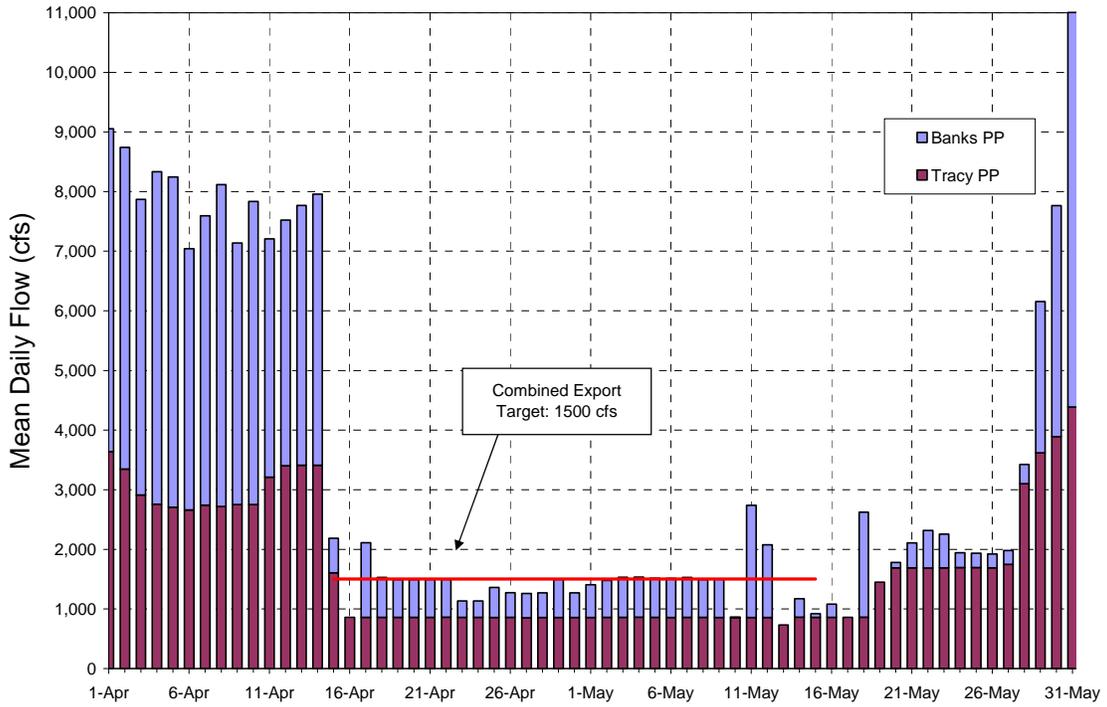
**Figure 7. VAMP 2001
Federal and State Exports**



**Figure 8. VAMP 2002
Federal and State Exports**



**Figure 9. VAMP 2003
Federal and State Exports**



**Figure 10. 2004 VAMP
Federal and State Exports**

