October 29, 2004

Dear Independent Science Board Member:

Attached please find the agenda for the November 10–12, 2004 meeting of the California Bay Delta Authority (CBDA) Independent Science Board (ISB) and a binder of background reading materials.

The ISB meeting will be held at UC Davis. Wednesday afternoon from 1:30 – 5:30 pm has been reserved as work sessions for the subcommittees and fact-finding teams. The subcommittee meetings will be held in the Alumni Center. Attachments 1 and 2 are provided as information for the Subcommittees and we ask that subcommittee members read this material and be prepared to discuss it on Wednesday afternoon. (If you are not on a subcommittee, reading is optional). If you are a member of two subcommittees or fact-finding teams, you may self-select which meeting you would like to attend. For the subcommittee you choose not to attend, please send any comments to the Chair of that subcommittee. We will follow-up with subcommittee and team members to provide more detail prior to the meeting. If you are not a member of any subcommittee, you are welcome to attend either of the two meetings shown on the agenda.

We anticipate working from 8:30 am to 5:00 pm on the Thursday, with a focus on monitoring and modeling. On Friday we will start early, at 8:00 a.m., and end at noon. Meetings on Thursday and Friday will be held in the Plant and Environmental Science Building. The building is featured on the map quadrant at http://www.cevs.ucdavis.edu/vs_pages/vtour/maps/map_f10.htm.

Please come prepared with your calendar to finalize dates for the 2005 ISB Meeting Schedule. Based on available information on Board member schedules, the following appears to offer the most favorable dates:

- Tuesday and Wednesday, February 22-23
- Tuesday-Thursday: May 10-12 or May 17-19
- Tuesday-Thursday: September 20-22
- Monday-Tuesday: December 5-6

With regard to travel plans, we assume that you have reserved your flights into Sacramento Airport and made your reservations at the Best Western Palm Court in Davis. The hotel is walking distance to the UC Davis campus (6 large city blocks). A map of

the UC Davis campus is included with this letter. We suggest you bring an umbrella in case of inclement weather. After the ISB meeting ends on Friday, a chartered shuttle bus will be available at 12:20 in parking lot #14 to transport ISB members to the Sacramento Airport. Please contact Diana Roberts at DRoberts@jsanet.com to reserve your seat on this shuttle bus.

If you have any questions regarding the ISB or our upcoming meeting, please do not hesitate to contact Elizabeth Soderstrom at (530) 478-5694 or me at (916) 447-7802.

Sincerely,

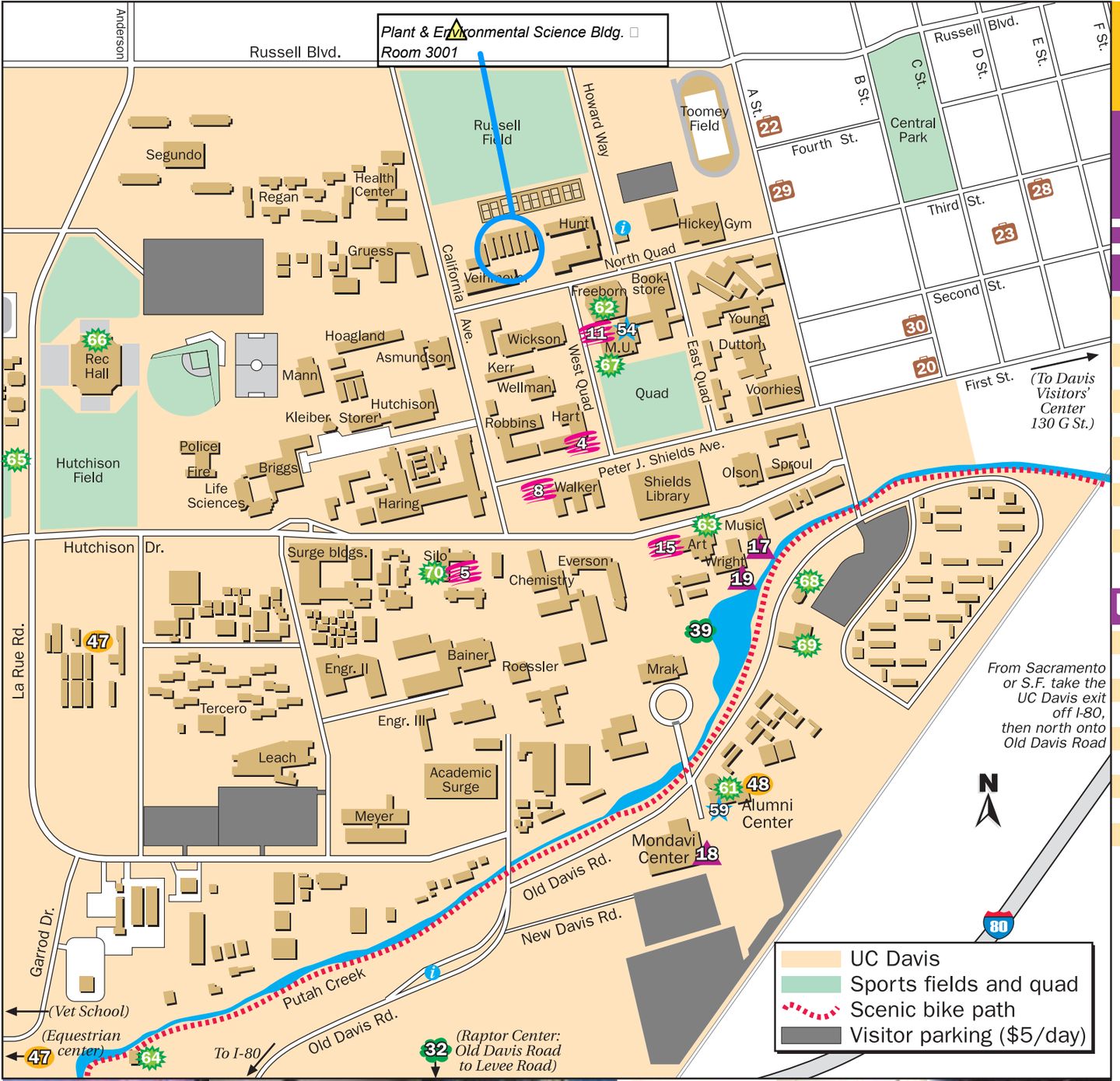
KLEINSCHMIDT ASSOCIATES

Kateri Harrison

Attachments:

Agenda
Map of UC Davis
Table of Contents for Background Materials in Binder

UC Davis Guide & Map



Where to Stay

20 Aggie Inn
21 Comfort Suites (see city map)
22 Davis Bed N Breakfast Inn
23 Econo Lodge
24 Hallmark Inn (see city map)
25 Holiday Inn Express (see city map)
26 Howard Johnson (see city map)
27 Motel 6 (see city map)
28 Palm Court Hotel
29 University Inn Bed and Breakfast
30 University Lodge
31 University Park Inn (see city map)

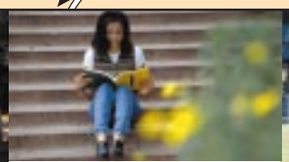
UCD Meeting Spots

61 Buehler Alumni Center
62 Freeborn Hall
63 Main Theater
64 Putah Creek Lodge
65 Recreation Pool Lodge
66 Recreation Hall
67 Memorial Union
68 Wyatt Theater
69 University Club Conference Center
70 Silo Café & Pub

The biggest names on campus this year are at The Mondavi Center. Watch for Urban Tap (right), Yo-Yo Ma (below) and Stephen Hawking (below right).

Whether relaxing at the Rec Pool with friends or studying at the arboretum, UC Davis offers something for everyone.

The Equestrian Center, located at the southwest corner of central campus, offers English or Western horseback riding instruction and practice space.



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 knowledgable 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 though 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 though 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".

Error! Objects cannot be created from editing field codes.

Error! Objects cannot be created from editing field codes.

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

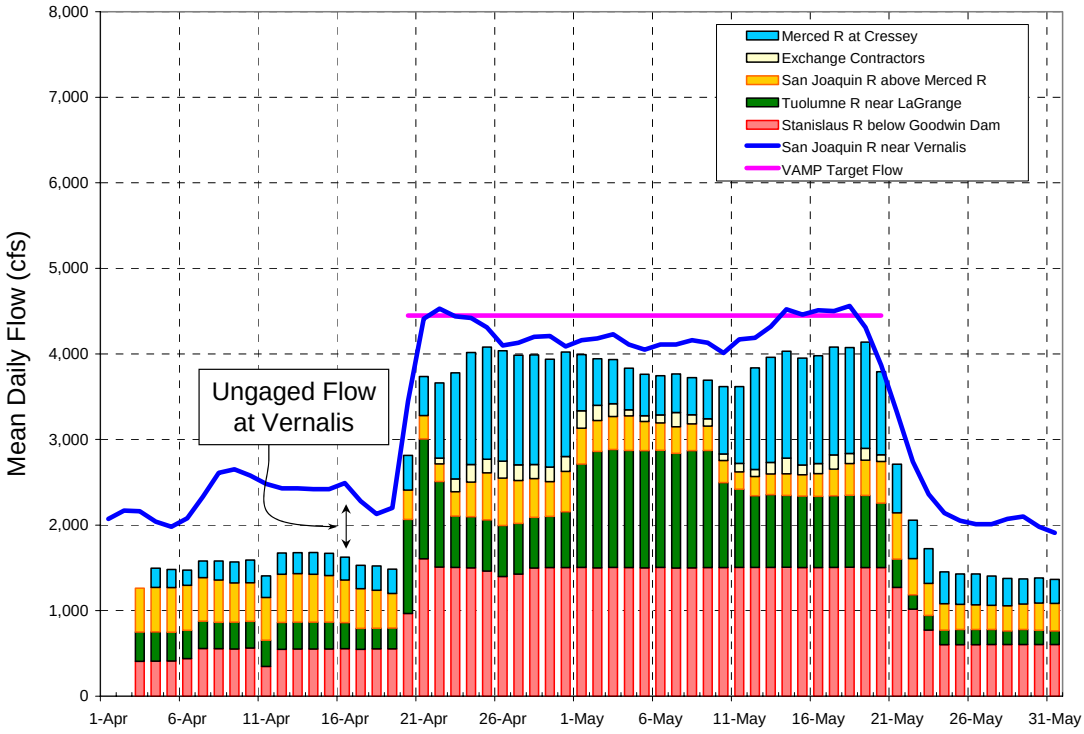


Figure 4. VAMP 2002 --- San Joaquin River near Vernalis With Lagged Contributions from Primary Sources

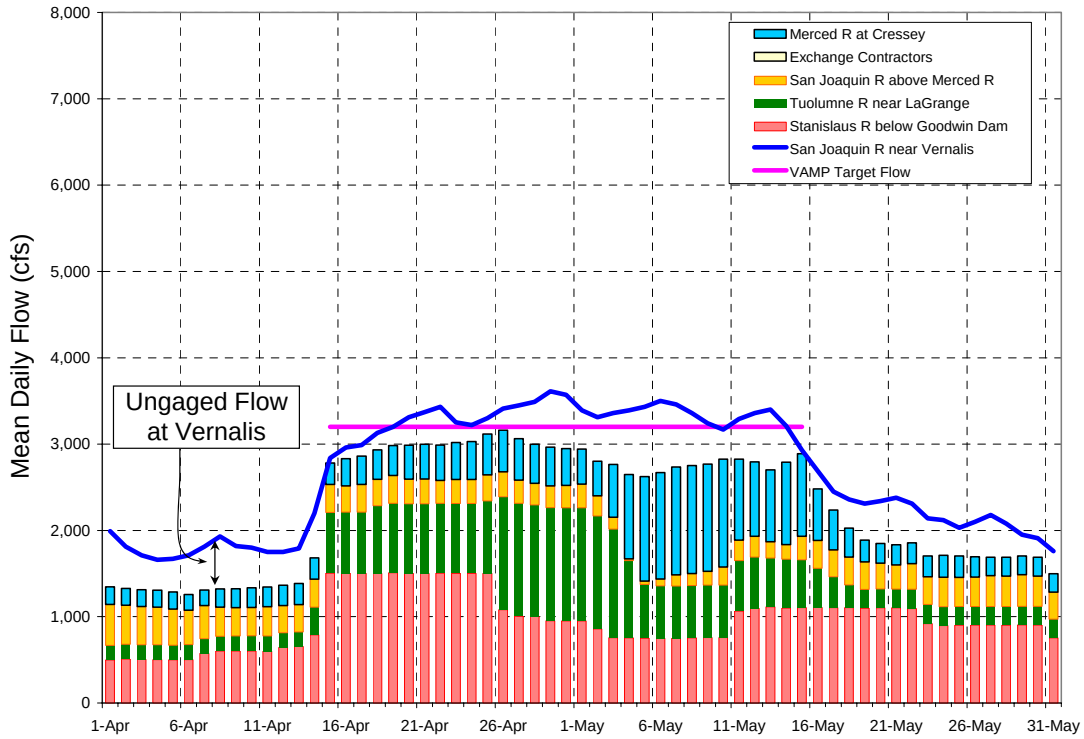


Figure 5. VAMP 2003 --- San Joaquin River near Vernalis With Lagged Contributions from Primary Sources

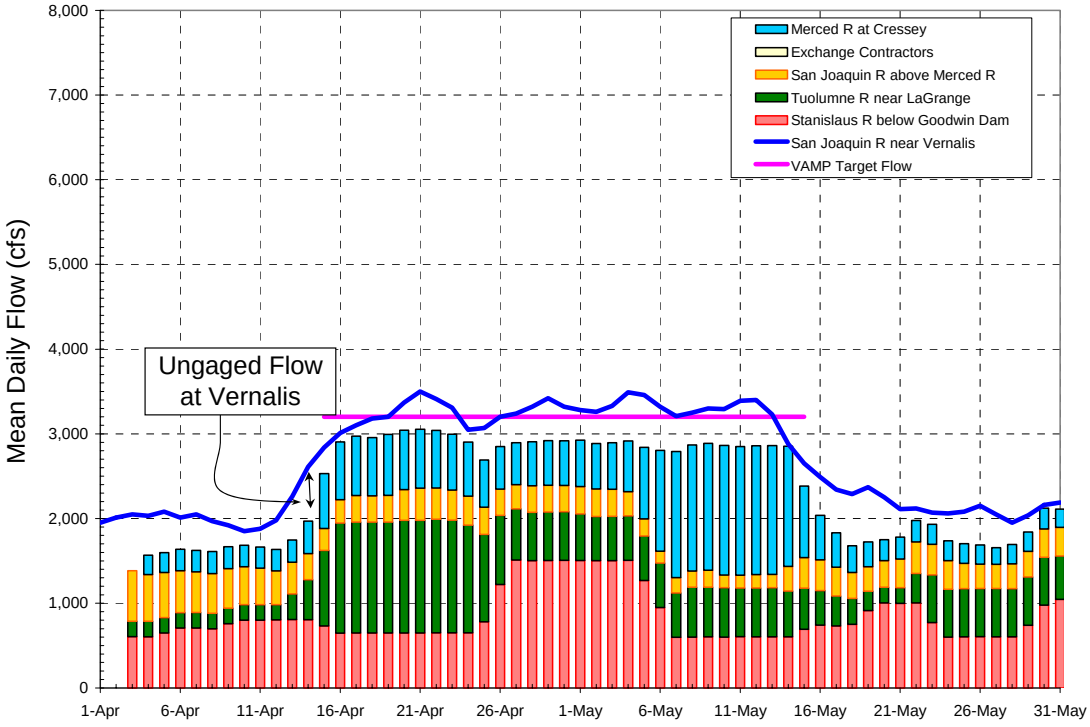


Figure 6. VAMP 2004 --- San Joaquin River near Vernalis With Lagged Contributions from Primary Sources

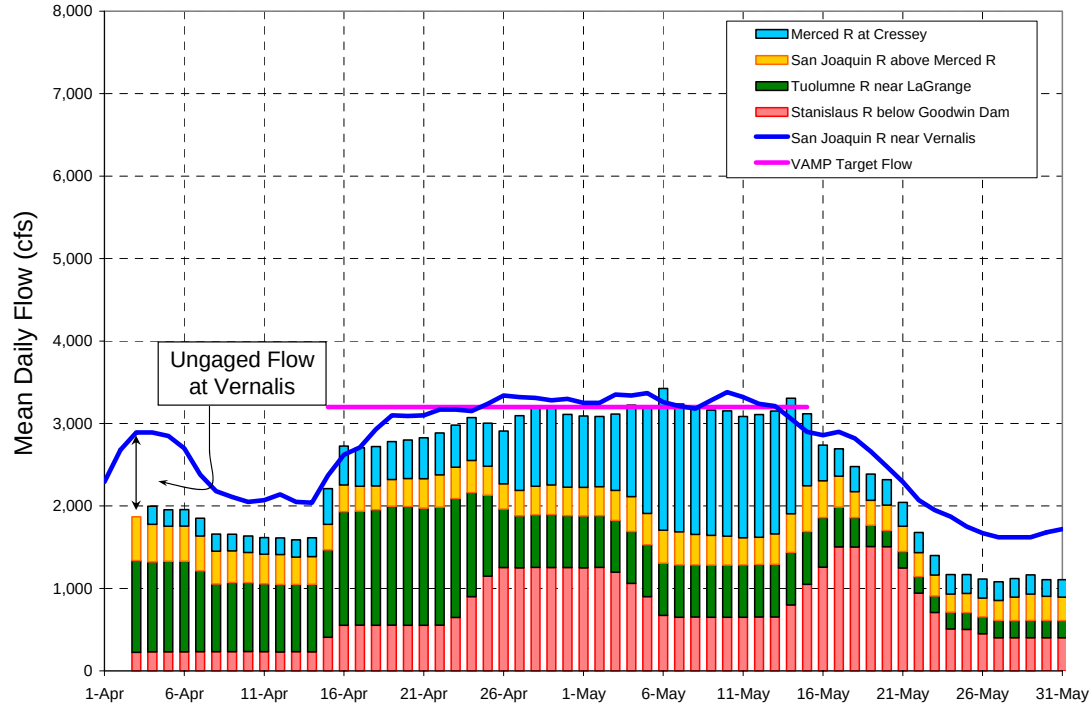


Figure 7. VAMP 2001
Federal and State Exports

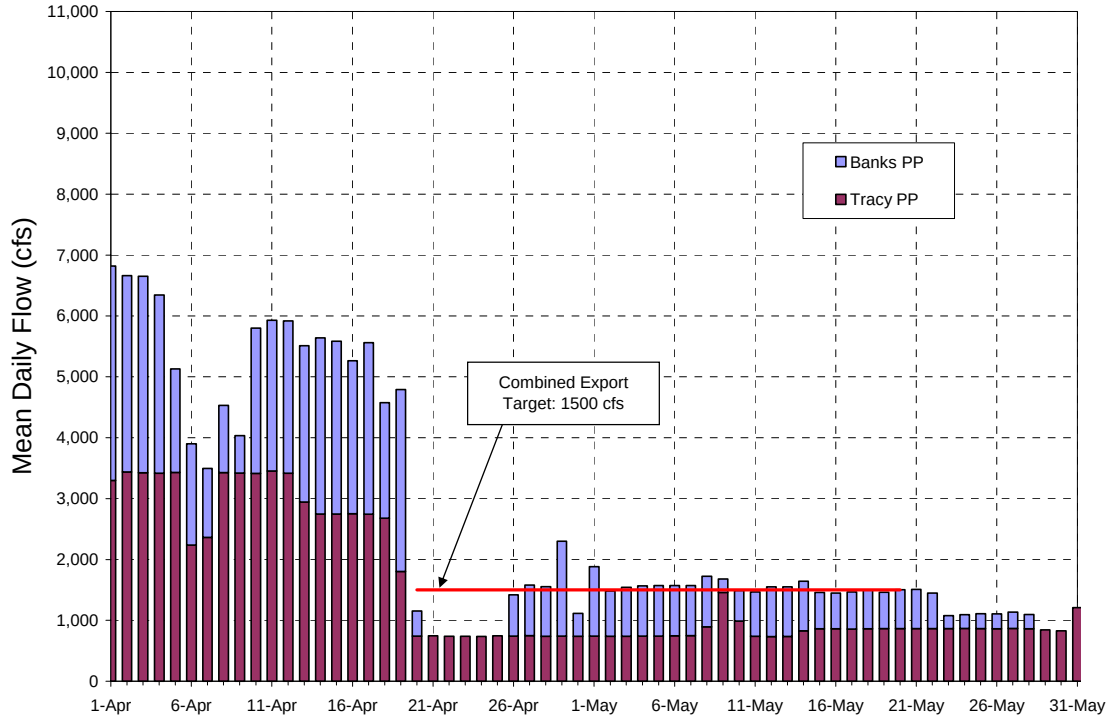


Figure 8. VAMP 2002
Federal and State Exports

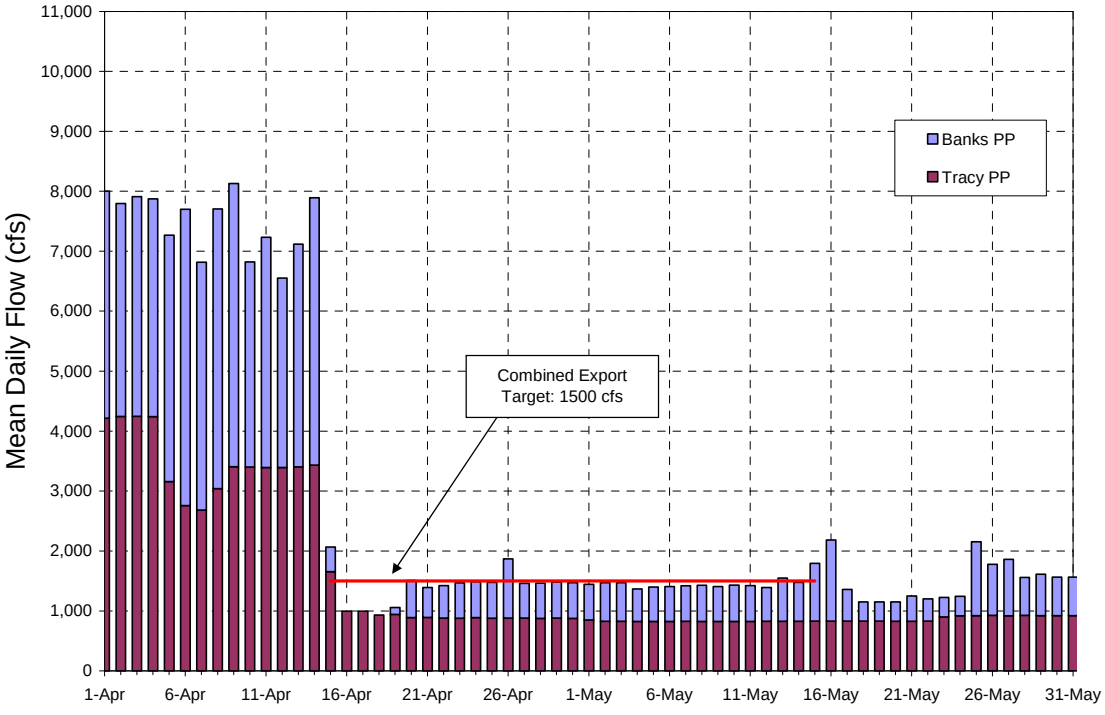


Figure 9. VAMP 2003
Federal and State Exports

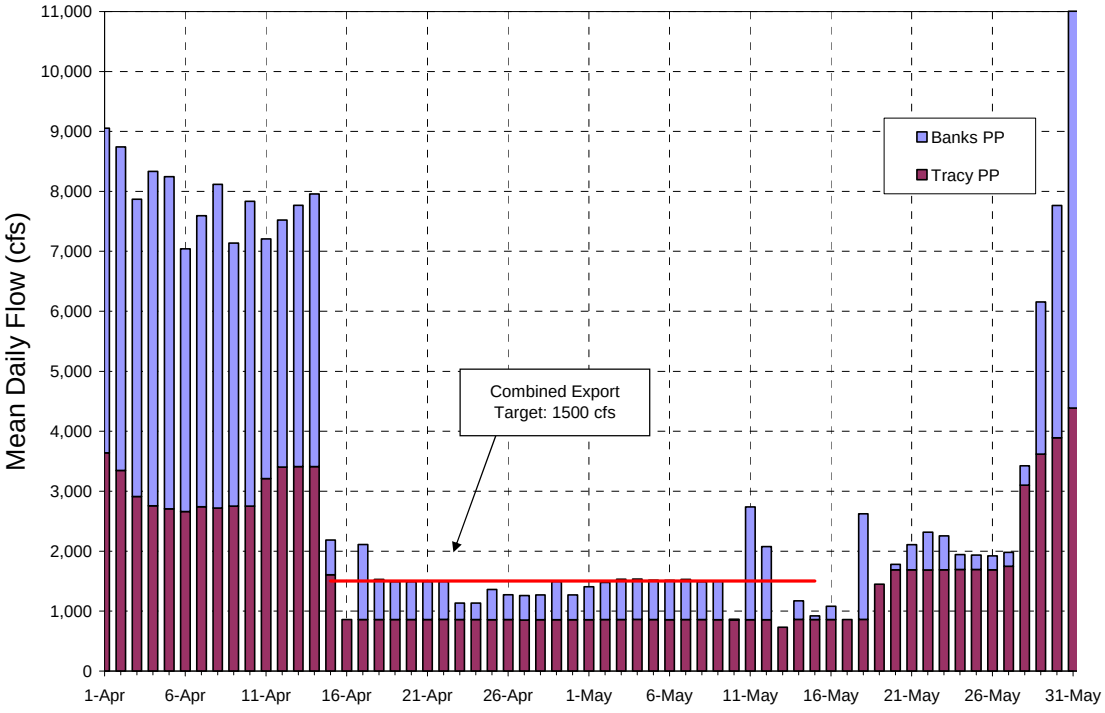
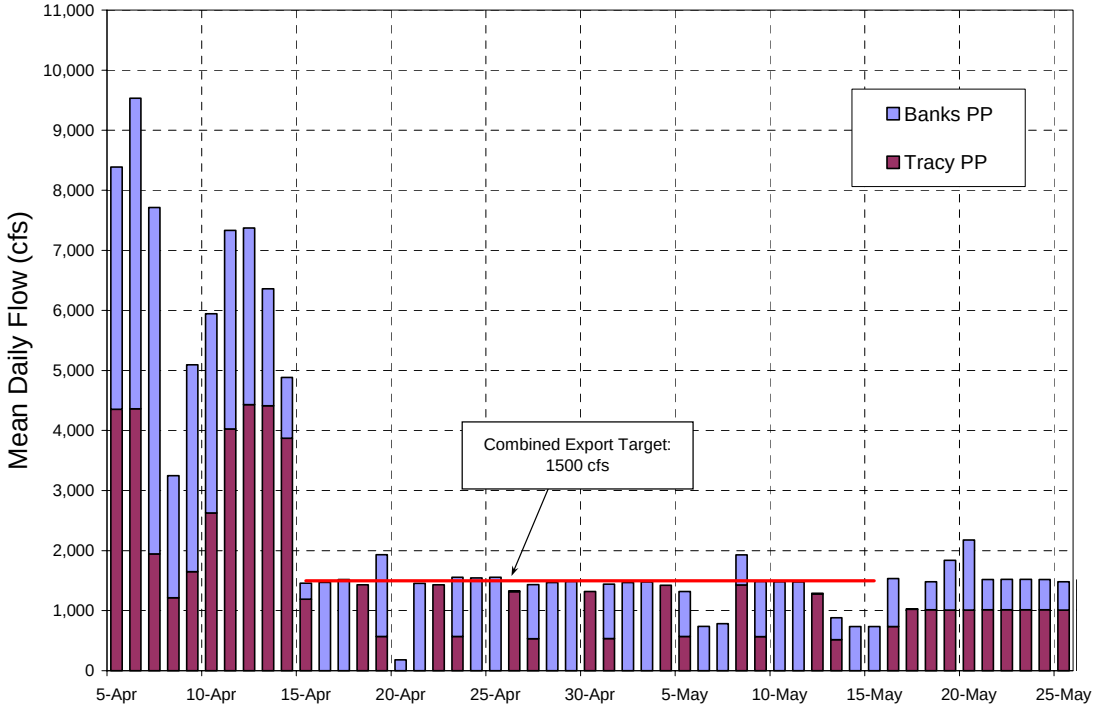


Figure 10. 2004 VAMP
Federal and State Exports



Attachment 1: Detailed description of each of the environmental water management programs.

1. Environmental Water Account (EWA): A Calfed Bay-Delta Program whose purpose is to provide protection to the fish of 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 program acquires and manages water to curtail exports in the Delta and augment instream flows to protect listed species and provide ESA regulatory commitments. The EWA has been funded from Proposition 204 and Proposition 50 funds and purchases surface water and groundwater from willing sellers both north and south of the Delta. The EWA agencies responsible for managing EWA assets and implementing EWA fish actions are DWR, CDFG, FWS, USBR, and NOAA Fisheries.

The technical basis for EWA fish actions includes published literature, CDFG reports, IEP investigations, Biological Opinions for Delta smelt and listed salmonids, Delta smelt and Chinook salmon Decision Trees based on real-time monitoring, and annual external scientific reviews by the EWA Technical Review Panel. EWA fish actions are monitored, evaluated, and may be modified based on the best science available.

The EWA was first implemented in water year (WY) 2001 and annual EWA fish actions have ranged from 123,000 to 348,000 acre-feet (AF). The majority of the EWA fish actions taken to date have been Delta export curtailments. EWA purchases have been made both south and north of the Delta, usually from willing sellers in larger tributaries upstream of the Delta that have significant surface storage. Projected cross-Delta conveyance capacity to San Luis Reservoir is a key consideration when deciding how much water to buy upstream of the Delta in a given year type. Consequently, most transfers of EWA water from upstream tributaries to San Luis Reservoir are based on available pumping capacity in summer. However, a few EWA transfers have been timed to augment upstream flows and improve instream habitat conditions for fish. During its first four years, EWA fish actions have been integrated and coordinated with other (b)(2) and WAP fish actions. The integration and coordination occurs through weekly meetings of the EWA Team (EWAT), the (b)(2) Interagency Team (B2IT), the Data Assessment Team (DAT), and the Water Operations Management Team (WOMT).

2. Environmental Water Program (EWP): A Calfed Bay-Delta Program that focuses on acquiring up to 100,000 AF of water per year from willing sellers to improve salmon spawning and juvenile survival in selected upstream tributaries in the Central Valley to assist in carrying out the flow related goals of the Ecosystem Restoration Program (ERP). The EWP is funded through the Calfed Ecosystem Restoration Program and the implementing agencies are CDFG,

FWS, and NOAA Fisheries, in coordination with DWR and USBR.

The technical basis for EWP actions is structured around designing actions to test hypotheses regarding water management in a manner which incorporates appropriate monitoring, facilitates learning through adaptive management, and lends itself to external scientific review prior to approval.

Five priority streams (Tier 1) have been identified for the initial phase of the EWP. They are Clear Creek, Mill Creek, Deer Creek, Butte Creek, and the Tuolumne River. See the attached EWP guidance and EWP status reports.

The EWP planning has been coordinated with the EWA, (b)(2), and WAP water management programs. As the program develops there will be increased opportunities to coordinate and integrate EWP actions with the other water management programs. The Calfed ROD provides that half of any ERP or (b)(2) upstream releases pumped by the SWP after they have served their ERP and (b)(2) purposes becomes an EWA asset.

3. CVPIA Section 3406 (b)(2): A Central Valley Project Improvement Act (CVPIA) program that dedicates and manages annually 800,000 AF of CVP water to augment instream flows in Clear Creek, the Sacramento, American, and Stanislaus Rivers or curtail exports in the Delta for the primary purpose of fish, wildlife, and habitat restoration; to assist meeting the WQCP, and to help meet post-1992 ESA obligations.

The (b)(2) program was authorized by the CVPIA in 1992 and the implementing agencies are FWS and USBR, in coordination with CDFG, DWR, and NOAA Fisheries. The technical basis for (b)(2) fish actions is found in Anadromous Fish Restoration Program (AFRP) documents, IEP and CDFG reports, and in the CVPIA mandate to double the natural production of anadromous fish in all Central Valley rivers and streams. The AFRP documents summarize the flow-related limiting factors as: (1) inadequate timing and/or magnitude of flow to provide suitable conditions for one or more life stage of anadromous fish; (2) water temperatures that exceed tolerances of one or more life stage; and (3) direct and indirect impacts of CVP and SWP Delta pumping. The implementation of (b)(2) fish actions in CVP streams and in the Delta are monitored, evaluated, and may be modified based on the best available science.

Since 1993, this dedicated CVP water for (b)(2) fish actions has been applied to improve instream conditions for anadromous fishes, primarily salmon and steelhead. It has also been directed to help protect species listed under the federal Endangered Species Act and to assist in meeting the CVP share of protecting the Delta through implementation of the WQCP. It is currently implemented consistent with Interior's May 2003 (b)(2) Policy (see attachment) which was issued prior to the January 2004 Ninth Circuit Court Order).

To date, actions under this program have included improved instream flows, Delta export curtailments, and Delta Cross Channel gate closures. These efforts have provided benefits for salmonids primarily in the form of improved adult immigration flows, better instream flows and temperatures for spawning, incubation, and juvenile rearing; and improved flows for juvenile outmigration. The (b)(2) fish actions have also helped to reduce mortality of both anadromous fish and the listed delta smelt in proximity to pumping facilities in the Delta. Application of dedicated water to meet these fish needs may also assist in restoring riparian and adjacent wetland habitats and estuarine areas, and may provide associated wildlife benefits.

Since 2001, Interior has coordinated and integrated the implementation of Section 3406 (b)(2) fish actions with the implementation of the EWA fish actions.

4. CVPIA Section 3406 (b)(3) Water Acquisition Program (WAP): A CVPIA program that acquires additional water for instream purposes to supplement the 800,000 AF of (b)(2) water, as well as level 4 refuge water to supplement level 2 refuge water and meet Interior's obligations under Section 3406 (d)(2) of the CVPIA.

The WAP was authorized by the CVPIA in 1992 and the implementing agencies are FWS and USBR, in coordination with CDFG, DWR, and NOAA Fisheries. The technical basis for WAP actions is found in AFRP documents, IEP and CDFG reports, and in the CVPIA mandate to double the natural production of anadromous fish. In the near future, WAP acquisitions and management will be based on a Decision Support Model (DSM) which integrates hydrology, biology, and economic data. The DSM focuses on the value to anadromous fish by producing four alternative approaches on 19 streams, with relative rankings totaling 76 water acquisition alternatives. See the attached Decision Support Model information. This model and water appraisal technical guidelines currently being developed by the WAP will be available for use by the EWP as well.

Interior has focused its efforts to acquire water in those areas offering opportunities to augment flows primarily for salmonids on non-CVP streams to contribute toward meeting the CVPIA's anadromous fish doubling goals. The main WAP acquisitions for instream flow augmentation have taken place on the San Joaquin River tributaries (Merced, Tuolumne, and Stanislaus Rivers) and Battle Creek (see the attached (b)(3) Acquisition Report 1994-2004).

Since 1994, annual WAP purchases for instream flow augmentation have ranged from 33,000 AF to 172,000 AF. In the lower San Joaquin drainage, WAP has acquired over 844,000 AF of water since 1994 in the Stanislaus, Tuolumne, Merced, and lower San Joaquin Rivers for fall-run Chinook salmon. Since WY 1999 the WAP has supported the San Joaquin River Agreement (SJRA) by guaranteeing flows for the Vernalis Adaptive Management Program (VAMP),

approximately April 15 – May 15 each year. On Battle Creek supplemental water for anadromous fish was acquired by paying for foregone power generation (86,500 AF from 1997 to 2001) to benefit Chinook salmon and steelhead.

Since WY 2001, Interior has coordinated and integrated the implementation of Section 3406 (b)(3) WAP fish actions with the implementation of EWA and (b)(2) fish actions during the spring for the VAMP and during the fall for the Chinook salmon upstream migration flows on the Stanislaus and Merced Rivers.

Fish Action Decision Process

The first EWA fish action was implemented in January 2001. Since that time the process used to decide when and where to use EWA assets has steadily evolved to include multiple groups, the use of decision trees/matrices for salmon and Delta smelt, and improved real-time communications.

In general, the authority to take an EWA fish action resides with the Water Operations Management Team (WOMT) after getting input from the Data Assessment Team, b2 Interagency Team, and the EWA Team. Other groups with specific interests or expertise are also consulted on an as-needed basis. The following descriptions identify the main groups involved and describe their particular role in the process.

Water Operations Management Team (WOMT)

Consists of management-level participants from the Project and Management Agencies. Meets weekly to provide oversight and decision making that must routinely occur in the CALFED Ops process. Relies heavily on the DAT, B2IT, and EWAT for recommendations on fishery actions. It also uses the CALFED Ops Group to communicate with stakeholders.

Environmental Water Account Team (EWAT)

Members are from the Project and Management Agencies. Meets weekly to manage water purchased or gained through operational flexibility for at-risk species. EWAT also coordinates with the B2IT, DAT, and WOMT to develop strategies that maximize benefits derived from implementation of actions under the CVPIA and EWA program.

B2 Interagency Team (B2IT)

Technical staff from the Project and Management Agencies. Meets weekly to discuss implementation of section 3406 (b)(2) of the CVPIA which defines the dedication of CVP water supply for environmental purposes. Communicates with EWAT, DAT, and WOMT to ensure coordination.

- Members – USBR, USFWS, NOAA Fisheries, DWR and DFG
- Meets weekly or bi-weekly as needed to review CVP operations, produce forecasts of operations, review b(2) daily accounting and resolve issues at a technical level.
- Forecasts produced monthly with b(1) and b(2) action placeholders.
- Hypothetical daily operation created using actual hydrology.
- Daily accounting done by a comparison of the hypothetical base operations to actual operations (not including EWA or water augmentation tools).

Data Assessment Team (DAT)

Technical staff from Project and Management Agencies, as well as stakeholders. Meets weekly to review real-time information relating to fish movement, location, and behavior. The DAT makes recommendations regarding potential changes in project operations to protect fish.

Operations and Fishery Forum (OFF)

Stakeholder-driven process to disseminate information regarding recommendations and decisions about the operations of the CVP and SWP. OFF members are considered the contact person for their respective agency or interest group. The OFF may be directed by the CALFED Ops Group to develop recommendations on operational responses for issues of concern raised by member agencies.

CALFED Operations Group

Consists of the Project Agencies, Management Agencies, SWRCB staff, and US EPA. Meets monthly in a public setting with stakeholders to discuss operations of the CVP and SWP, implementation of the CVPIA and EWA, and coordination of endangered species protection.

Fisheries Technical Teams

American River Operations Work Group (AROG)

AROG is open to anyone, but generally includes representatives from several agencies and organizations with on-going concerns regarding the management of the lower American River. Meets monthly or on an as-needed basis during periods of concern, with the purpose of providing fishery updates and recommendations for operations beneficial to fish resources in the lower American River.

Sacramento River Temperature Task Group

Multi-agency group formed pursuant to SWRCB Water Rights Orders 90-5 and 91-1, to assist with meeting Sacramento River temperature objectives to improve and stabilize the winter-run chinook population on the Sacramento River.

Delta Smelt Working Group

Consists of representatives from FWS, CDFG, CDWR, USEPA, USBR, and the California Bay-Delta Authority. This group meets on an as-needed basis in response to triggers incorporated into the Delta Smelt Risk Assessment Matrix (DSRAM), which is part of the FWS Biological Opinion on the Coordinated Operations of the CVP and SWP and the Operations Criteria and Plan (July 2004). The Working Group makes

recommendations pertaining to export reductions, south Delta barrier operations, San Joaquin flows, and Delta cross-channel gate operations.

Delta Cross-Channel Project Work Team

A multi-agency group whose purpose is to determine and evaluate the effects of DCC gate operations on Delta hydrodynamics, water quality, and fish migration.

Other Groups

San Joaquin River Management Group

VAMP Technical Group

Ecosystem Restoration Program Implementing Agency Managers
(ERPIAM's – USF&WS, NOAA Fisheries, CDFG)

EWP Core Team (USF&WS, NOAA Fisheries, CDFG,DWR, USBR, DOJ)

AFRP Habitat Restoration Coordinators

Ecosystem Restoration Program Subcommittee

EWA Science Advisors

EWA upstream actions - water year 2002 (October 2001-September 2002)

Background:

In water year 2002, EWA water was purchased from water districts on several Central Valley streams for the primary purpose of it from upstream reservoirs to San Luis Reservoir for EWA Delta fish actions in the winter and spring. These EWA water acquisitions included: (1) 25,000 acre-feet (AF) from Merced Irrigation District (Merced ID) on the Merced River; (2) 20,000 AF from Placer County Water Agency (PCWA) on the American River; and (3) 135,000 AF from Yuba County Water Agency (YCWA) on the Yuba River. The EWA transfers occurred in October and November, 2001 from the Merced and American rivers and June-September 2002 from the Yuba River. Also, during November 2001 EWA power credits were used to Apay@ for bypassing power generation at Folsom Dam to provide colder water for spawning fall-run chinook salmon in the lower American River. See Figure 1 for a map of these rivers and their proximity to the Delta.

In general, the window of opportunity for transferring the EWA water into San Luis Reservoir was determined by the Project Agencies based on when: (1) the SWP has pumping capacity at Banks pumping plant; (2) the Delta is in Abalanced@ conditions; (3) the agricultural barriers, or their functional equivalent, are in place to avoid impacts to water levels in the southern Delta, consistent with the water level response plan; and (4) there are no adverse impacts to listed Delta fish species. The Management Agencies coordinated closely with the Project Agencies to identify (1) the timing, magnitude and duration of the water transfers to improve instream habitat conditions to the extent practicable, and ensure no adverse impacts on riverine fish; and (2) the export pumping schedule for the transferred water to ensure no adverse impacts to listed Delta fish species.

When EWA water is acquired, stored or moved under a project water right the existing regulatory actions are utilized. This includes the incidental take statements under the existing biological opinions. See the 2002 EWA Interim Protocols in the attached April 12, 2002 letter from the Project Agencies to the Management Agencies. To date, no EWA water has been released from upstream reservoirs without the expectation that it would be pumped in the Delta. Instream habitat improvements have been an incidental benefit of transferring EWA water. Each of the EWA upstream actions are described below in chronological order.

Merced River transfer of EWA water (October and November 2001)

In August 2001, the Project and Management Agencies purchased 25,000 AF of EWA water from Merced ID. The EWA water was released from New Exchequer Reservoir (Lake McClure) during a time when the increased flow would provide habitat benefits to the fall-run chinook salmon in the lower Merced River and also could be exported by the SWP into San Luis Reservoir.

The EWA transfer was coordinated with the release of another 12,500 AF of water acquired from Merced ID using CVPIA and State funds pursuant to the San Joaquin River Agreement (SJRA). The EWA transfer began October 16 and increased flows from a base flow of

approximately 85 cubic-feet per second (cfs) to approximately 700 cfs for a two week pulse flow providing upstream migration benefits to adult salmon. On November 1 flows were ramped down to a salmon spawning flow of approximately 425 cfs compared to a base flow of approximately 220 cfs. The EWA release concluded on November 11. From November 12 through the end of December the spawning flows were maintained at approximately 400 cfs using the SJRA water to supplement the base flow. See Table 1 and Figure 2.

When EWA water is transferred from upstream reservoirs in the Sacramento River basin to the Delta export facilities, less water is pumped from the Delta than was purchased due to carriage water losses. Carriage water losses are associated with the movement of water from upstream sources through the Delta to the SWP export facilities, depending on water quality in the Delta. Modeling is performed in order to determine what the corresponding carriage water losses should be for water transfers. See the attached 2002 EWA Interim Protocols. For past EWA transfers the carriage water losses have been 15-25 percent. Water purchased upstream in the San Joaquin basin is not subject to carriage water losses, however, there is a reduction in transferable quantity (conveyance loss) that occurs as the water flows from the source to the Delta. For the EWA transfer from the Merced River, the conveyance losses were estimated at 10 percent. Consequently, of the approximately 25,000 AF of EWA water released from New Exchequer Reservoir (Lake McClure), approximately 22,500 AF was pumped into San Luis Reservoir for potential EWA Delta fish actions in the winter and spring.

Biological benefits of the EWA upstream action on the Merced River

The biological benefits of the EWA water released in the lower Merced River include improved habitat conditions for fall-run chinook salmon upstream migration, spawning and egg incubation. The CDFG salmon spawning escapement survey for the Merced River estimated that approximately 10,800 adult salmon returned to spawn in fall 2001. This continues a trend of increased escapement in the Merced River since 1992. See Figure 3. The approximately 700 cfs of EWA water released from October 16-31 provided upstream migration benefits to adult salmon. Seasonal increases in streamflow and associated lower water temperatures in the fall provide an important migration cue and upstream migration habitat for adult salmon. The approximately 400 cfs in November and December provided improved spawning and egg incubation habitat. Streamflow influences the quantity, quality, and distribution of chinook salmon spawning habitat. Streamflow directly affects the amount of available spawning habitat by defining the stream area with appropriate combinations of water depths, velocities, and streambed characteristics (e.g., substrate composition). Indirect effects of flow on spawning habitat include effects on water temperature and water quality, which influence the longitudinal extent and seasonal availability of suitable spawning habitat.

The rationale and scientific basis for the improved flows are found in a variety of sources (including Anadromous Fish Restoration Program (AFRP) documents, published literature, CDFG reports, and other restoration programs) and are generally based on results of instream flow and temperature studies conducted by the FWS, CDFG or others, as well as relationships between flow and adult returns, correlation analyses, and other life history information. The Merced River flows supplemented by the EWA water are consistent with the AFRP flow objectives. The AFRP flow objectives are higher than the current existing minimum flow

requirements and will contribute to the AFRP goal of doubling natural production of anadromous fish in the Central Valley rivers and streams.

American River transfer of EWA water (October and November 2001)

In summer 2001, the Project and Management Agencies purchased 20,000 AF of EWA water from PCWA and released it from Folsom Reservoir into the lower American River in October and November for transfer to San Luis Reservoir. Approximately 300 cfs of EWA water was released between October 1 and 5 in coordination with approximately 500 cfs of (b)(2) water to increase flows to approximately 1,500 cfs compared to a base flow of approximately 700 cfs. The (b)(2) water comes from the 800,000 AF of CVP yield dedicated and managed pursuant to the CVPIA, Section 3406(b)(2) for fish, wildlife and habitat restoration purposes and to help achieve the AFRP goals and flow objectives. The implementation of (b)(2) fish actions was coordinated with the EWA upstream and Delta actions. Approximately 300-500 cfs of EWA water was transferred between October 28 and November 14 to help maintain flows of approximately 1,000 cfs. See Figure 4.

Based upon modeling results, a Delta carriage water loss of 25 percent was assessed to this EWA water. Consequently, of the 20,000 AF of EWA water released from Folsom Reservoir, 15,000 AF was subsequently pumped into San Luis Reservoir for potential EWA Delta fish actions in the winter and spring. For more details see the EWA fish action summaries in Appendix ____.

Biological benefits of the EWA upstream action on the American River

The biological benefits of the EWA water released in the lower American River include helping to maintain adequate water temperatures for over-summering juvenile steelhead, as well as provide holding water habitat for fall-run chinook salmon waiting to spawn. The juvenile steelhead temperature objective for the lower American River is to maintain, to the extent possible, a daily average temperature of less than or equal to 65^{o}F between Nimbus Dam and Watt Avenue bridge. The October 2001 water temperatures averaged 67^{o}F at Nimbus Dam and 68^{o}F at Watt Avenue. The CDFG preliminary estimate of salmon spawning escapement for the American River is that approximately 140,000 adult salmon returned to spawn in fall 2001. This continues a trend of increased escapement in the American River since 1992. See Figure 5. Unfortunately, water temperatures in the lower American River exceeded 60^{o}F through mid-November, reducing the flow-related benefits for the adult salmon. Consequently, EWA power credits were used to access cold water in Folsom Reservoir while bypassing power generation.

American River power bypass (November 2001)

One of the AFRP flow objectives is to provide flows of suitable quality, quantity and timing to protect all life stages of anadromous fish. This includes maintaining suitable river temperatures and instream flows for spawning salmon in the lower American River. Mature female salmon subjected to prolonged exposure to water temperatures above 60^{o}F have poor survival rates and may die before spawning or produce less viable eggs than females subjected to lower water temperatures. CDFG reported that thousands of salmon were holding in the lower American River and a significant number of salmon carcasses recovered in the escapement surveys in early

November were fish that had not spawned, likely due to high water temperatures (in excess of 64°F). Furthermore, maximum survival of incubating eggs and yolk-sac larvae occurs at water temperatures between 41°F and 56°F. Survival through emergence decreases at water temperatures exceeding 56°F with no survival occurring at 62°F or higher.

Generally, the temperature shutters (penstock inlet ports)at Folsom Dam are used to manage Folsom Reservoir=s coldwater pool and provide suitable water temperatures for over-summering juvenile steelhead and spawning salmon, while releasing water through the penstocks and generating power. Due to low Folsom Reservoir storage and a significantly diminished coldwater pool last fall, the remaining coldwater was below the elevation of the shutters and was accessible only via Folsom Dam=s lower river outlets. Releases through the river outlets bypass power production facilities. The Project and Management Agencies in coordination with the American River Operations Group (AROG) proposed to release the coldwater through the river outlets to reduce water temperatures for spawning salmon. Arrangements were made to use EWA power credits to compensate Western Area Power Administration (WAPA) for the foregone power generation.

From November 9-26 approximately 500 cfs of coldwater was released through the river outlets of Folsom Dam and blended with 500 cfs of warmer water released through the powerhouse. The water released through the river outlets was approximately 50°F. When it was blended with the warmer water it resulted in the Folsom Dam release temperature cooling from approximately 64°F to 58°F in one day. This led to Nimbus Dam release temperature cooling from approximately 64°F to 60°F by November 13. When the power bypass was concluded on November 26 the water temperature in the lower American River was approximately 56°F. The temperature modeling showed that without the release of the coldwater, Nimbus Dam release temperatures would have exceeded 60°F through November 23 or 24. See Figure 6. For more details see the attached report prepared by the AROG.

Biological benefits of the EWA upstream power bypass

The biological benefit of providing cooler water to the river through the power bypass was improved salmon spawning conditions downstream from Nimbus Dam within a few days and approximately nine days earlier than if the power bypass had not been done. As the water temperature approached less than 60°F, CDFG reported that salmon started spawning and redds were observed. High water temperatures and low flows in October and November 2001 appear to have significantly impacted salmon spawning success in the lower American River. CDFG estimates that approximately two-thirds of the female salmon died without spawning. Without the use of EWA assets to bypass power, the pre-spawning mortality of female salmon would likely have been much higher.

Yuba River transfer of EWA water (June through September 2002)

The Project and Management Agencies purchased 135,000 AF of EWA water from YCWA and released it from Englebright Dam into the lower Yuba River from June through September 2002

for transfer to San Luis Reservoir. The EWA transfer began on June 16 and increased flows to approximately 1,400 cfs compared to a base case of approximately 400 cfs in June and 250 cfs in July and August. It is important to note that YCWA provided additional water in the river before the transfer to avoid large flow fluctuations. The EWA release concluded on September 30. See Figure 7. Based upon modeling results, a Delta carriage water loss of 20 percent was assessed to this EWA water. Consequently, of the 135,000 AF of EWA water released in the lower Yuba River approximately 107,000 AF was subsequently pumped into San Luis Reservoir for EWA Delta fish actions implemented in the winter and spring.

Biological benefits of the EWA upstream action on the Yuba River

The Management Agencies coordinated the EWA transfer schedule with the Project Agencies and YCWA to ensure no adverse impacts on Yuba River fisheries. YCWA has worked collaboratively with the Management Agencies to modify flow release schedules and provided funding and cooperation for monitoring of the transfer. These actions by YCWA, in coordination with the Management Agencies, provide instream fishery benefits and an opportunity to gather more data to evaluate the short- and long-term effects of water transfers on the lower Yuba River. Water temperature and fish movement have been monitored to evaluate potential effects (direct and indirect) of the EWA and DWR Dry Year Program transfers, particularly on over-summering juvenile steelhead.

Literature cited

U.S. Fish and Wildlife Service. 2001. Final Restoration Plan for the Anadromous Fish Restoration Program. January 9, 2001. U.S. Fish and Wildlife Service, Stockton, CA.

U.S. Fish and Wildlife Service. 1995. Working paper on restoration needs: Habitat restoration actions to double natural production of anadromous fish in the Central Valley of California. Volumes 1-3. May 9, 1995. U.S. Fish and Wildlife Service, Stockton, CA.

Reynolds, F.L., T.J. Mills, R. Benthin and A. Low. 1993. Restoring Central Valley Streams: A Plan for Action. November 1993. California Department of Fish and Game, Inland Fisheries Division. Sacramento, CA.

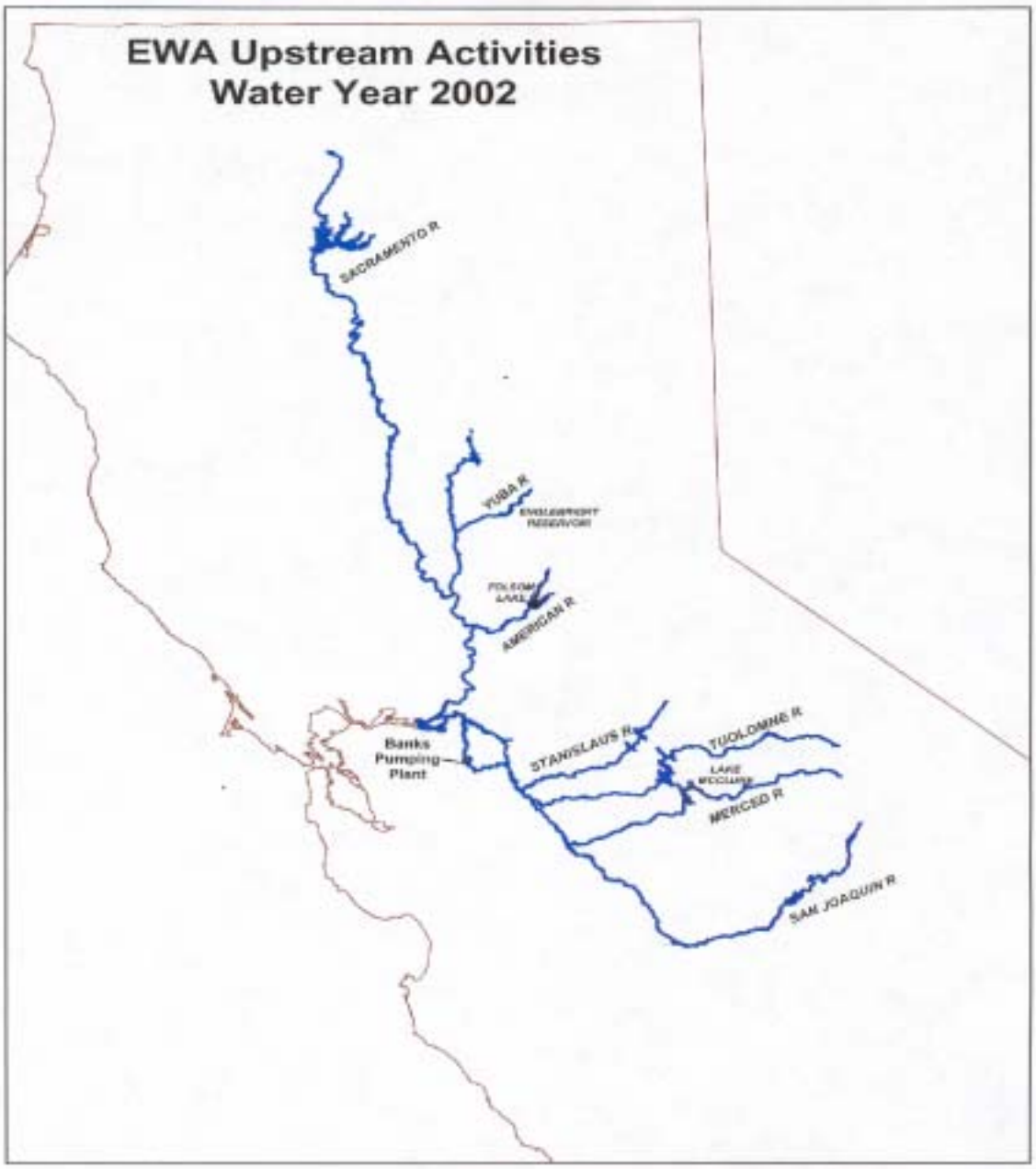
Personal Communications

CDFG personnel concerning preliminary CDFG data for the fall 2001 spawning surveys on the Merced River.

CDFG personnel concerning preliminary CDFG data for the 2001 spawning surveys on the lower American River.

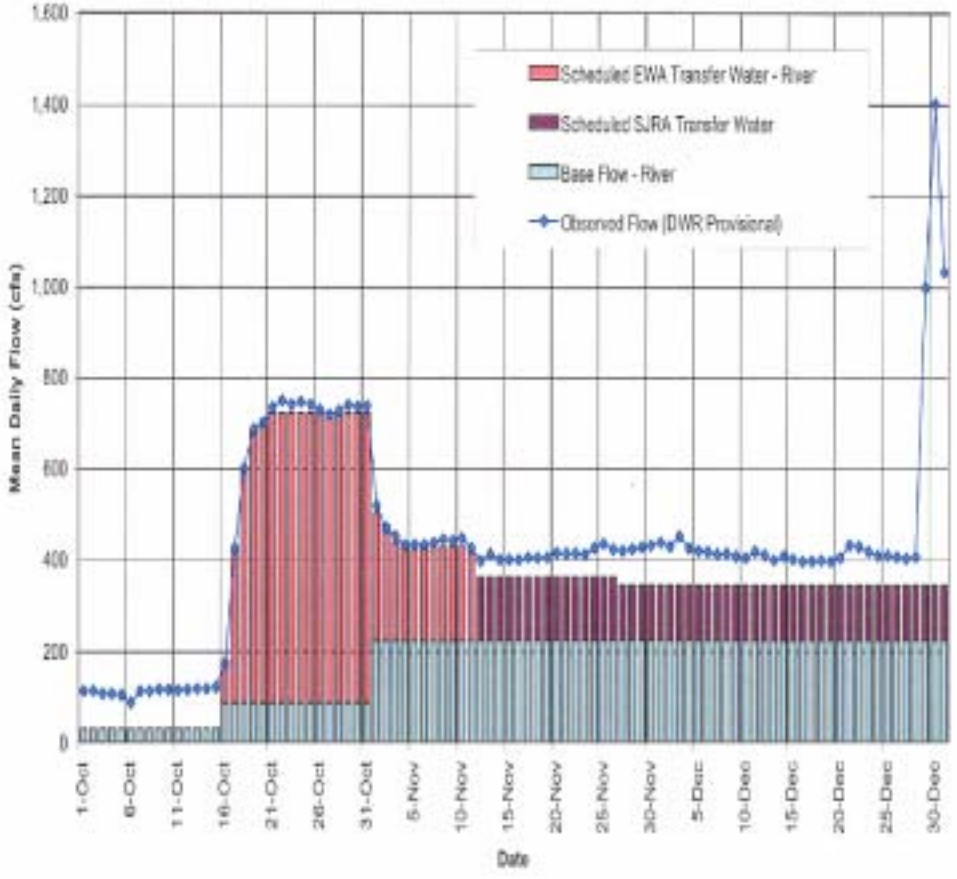
Attachments

April 12, 2002 letter from the Project Agencies to Management Agencies
April 12, 2002 letter from Management Agencies to Project Agencies
EWA Fish Action summaries (www.oco.water.ca.gov/calfedops/2002ops.html)
Report prepared by the American River Operations Group concerning the power bypass for the lower American River, March 7, 2002


EWA Upstream Activities
Water Year 2002
SACRAMENTO R
YUBA R
AMERICAN R
Banks
Pumping
Plant
STANISLAUS R
TUOLOMNE R
MERCED R
SAN JOAQUIN R

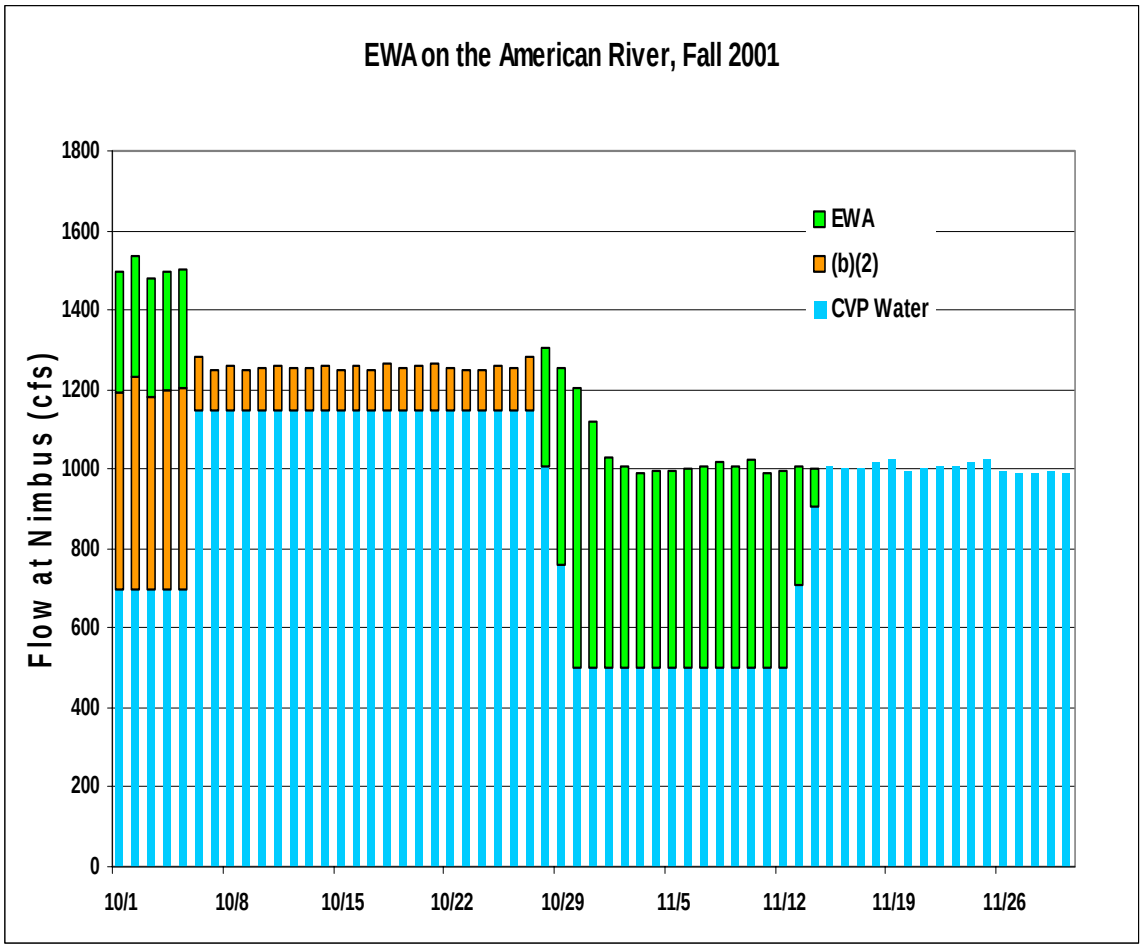
SJRA and EWA Fall 2001 Water Transfer

Merced River Flow at Cressey

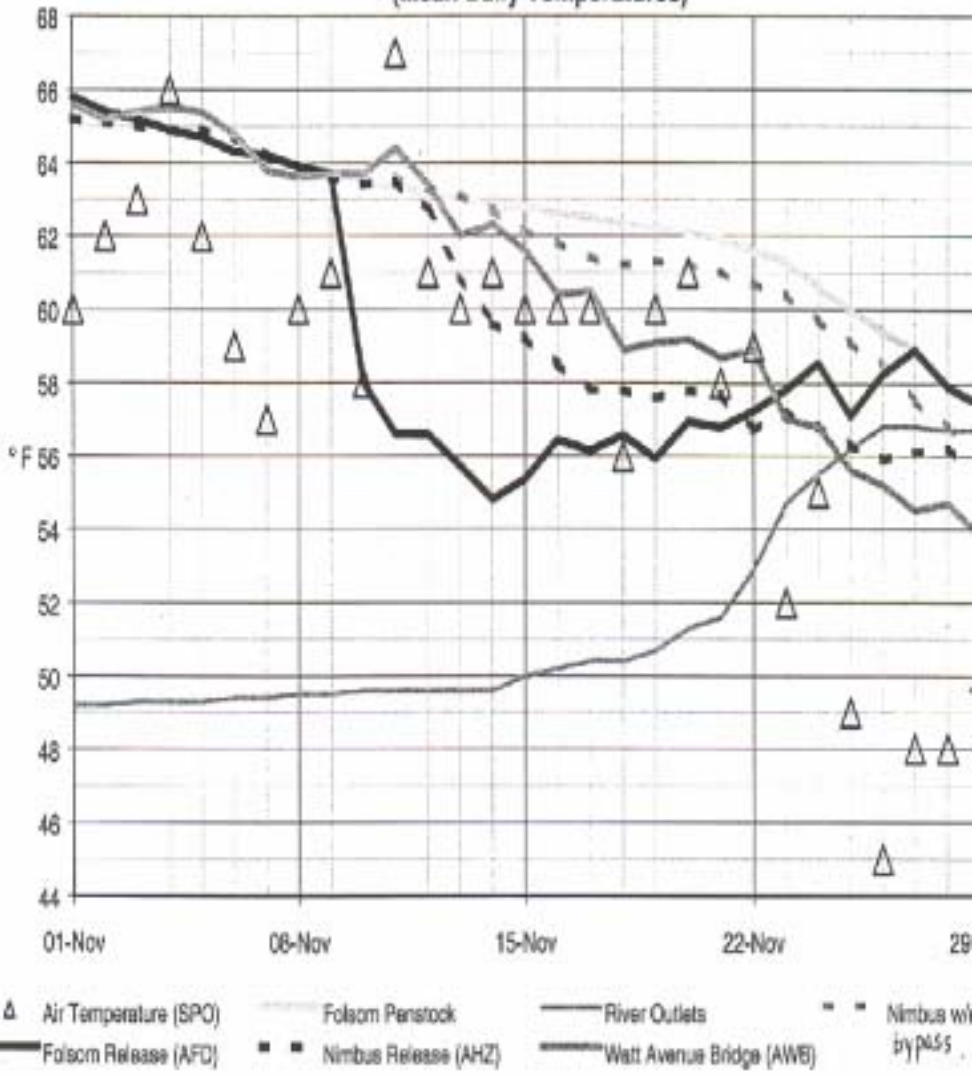


MBK Engineers
Fall 2001 xfer daily table.xls

10/4/02


EWA on the American River, Fall 2001
Flow at Nimbus (cfs)
1800
1600
1400
1200
1000
800
600
400
200
0
10/1
10/8
10/15
10/22
10/29
11/5
11/12
11/19
11/26
EWA
(b)(2)
CVP Water

American River below Folsom Dam
Estimated Effect of Penstock and River Outlet Blending
10 - 26 November 2001
(Mean Daily Temperatures)



Environmental Water Program
Conceptual Proposal
Guidance Document

Prepared for:

Environmental Water Program
2800 Cottage Way
Sacramento, CA 95825
Contact: Campbell Ingram
916/414-6727

Prepared by:

Jones & Stokes
2600 V Street
Sacramento, CA 95818-1914
Contact: Craig Stevens
916/737-3000

April 2003

SECTION 1. INTRODUCTION

Purpose of This Guide

The U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) Fisheries, and the California Department of Fish and Game (DFG) are designated as the implementing agencies for the Ecosystem Restoration Program (ERP Implementing Agencies). The ERP Implementing Agencies, in coordination with the California Bay-Delta Authority (CBDA), are working with local stakeholders to implement pilot water acquisitions in selected watersheds through the Environmental Water Program (EWP).

The EWP will be working in partnership with local interests to identify potential water acquisitions. The process for identifying willing sellers and designing and monitoring water acquisitions will be undertaken by teams including local stakeholders, local agency representatives, a science team, and other agency representatives. This will ensure that all acquisitions are locally sponsored and locally acceptable. All interested parties are welcome to participate on these teams.

These teams will prepare conceptual proposals that describe the proposed acquisition and associated experiment. The purpose of this document is to provide guidance to all participants regarding the format and content requirements for the conceptual proposals. Interested parties are encouraged to contact Campbell Ingram of the USFWS at (916) 414-6727 for more information or for assistance.

Background information regarding the CBDA and the Environmental Water Program are provided in Appendix A.

Guiding Principals

Implementation of the EWP will be guided by several principles intended to provide a fair, locally acceptable, and scientifically sound program. Section 4 of this Guide lists all of these principles. The following three principles are of primary importance in the implementation of the EWP. All acquisitions will be:

- made on a willing seller basis;
- developed jointly by local interests and the ERP Implementing Agencies; and
- designed to test hypotheses regarding water management in a manner that
    - facilitates learning through adaptive management,

- includes appropriate monitoring, and
- will be peer reviewed by an independent scientific panel prior to approval.

Goals of the EWP

The goal of the EWP is to acquire water in support of the ERPP to:

- enhance instream flows that are biologically and ecologically significant,
- improve the state of scientific knowledge related to the effects of instream flows, and
- gain knowledge regarding the institutional and social constraints facing environmental water acquisitions.

Initial Implementation of the EWP

The EWP will be implemented within an adaptive management framework. Adaptive management acknowledges that there is uncertainty related to how an ecosystem functions and what strategies and actions will be most effective in improving conditions for target species. It is based on the need to implement actions to restore ecological health in a manner that increases our understanding of the system over time by constantly monitoring ecological systems and changing actions in response to this increased understanding.

The adaptive management framework contained in the Strategic Plan for Ecosystem Restoration (CALFED 2000) identifies three levels of implementation for restoration actions. Where little information is available about how a system works, targeted research is most appropriate. Where little uncertainty exists regarding the potential benefits of a restoration action, full-scale implementation is most appropriate. Where there is some uncertainty, but credible hypotheses exist, implementation through pilot projects is recommended. More information regarding science and adaptive management requirements is provided in Section 5 below.

A high level of uncertainty exists regarding how the EWP should be implemented—specifically, how much water should be acquired on which streams, what benefits can be expected from enhancing instream flows, and how those benefits can be measured. In addition, during the Steering Committee process, a large number of uncertainties related to the institutional aspects of acquiring water were identified. Given the level of uncertainty associated with the benefits of increased instream flows, the institutional uncertainties that exist regarding how to implement the program, and the cost of acquiring water, full-scale implementation is not yet appropriate for the EWP. However, the availability of some credible hypotheses regarding the benefits of enhanced

flows make implementation of the EWP through pilot projects the most appropriate approach.

Therefore, implementation of the EWP will be carried out as a series of pilot water acquisitions on high priority (first tier) streams within an adaptive management framework. These acquisitions will be undertaken to achieve four objectives (derived through the Steering Committee process described in Appendix A):

- acquire water on one to three priority streams;
- design and apply a science-based adaptive approach to all three acquisitions to increase understanding of how the system works;
- improve conditions for target fish species or reinvigorate flow-related ecosystem functions; and
- achieve, where possible, multiple environmental benefits from each acquisition.

Setting Stream Priorities

Prior to the issuance of this guidance document, the EWP established priorities for the first round of acquisitions. These priorities were developed following a process that involved considerable public review and input.

U.S. Fish and Wildlife Service Biological Prioritization Process

Subsection 3406 (b)(3) of the Central Valley Project Improvement Act (CVPIA) directs the Department of Interior, through USFWS and the U.S. Bureau of Reclamation (USBR), to develop and implement a program to enhance instream flows with the purpose of benefiting native and important fisheries. To this end, Interior created the CVPIA Water Acquisition Program (CVPIA WAP), jointly managed by USFWS and USBR to acquire water for environmental purposes. In 1996, USFWS published *Draft Guidelines for Allocation of Water Acquired Pursuant to Section 3406(b)(3) of the CVPIA* (USFWS 1996) in which flow recommendations were presented for Central Valley streams, divided into blocks of water in priority order. This document was based on an analysis of water needs using the physical habitat simulation model, which is the major component of the Instream Flow Incremental Methodology (IFIM). While this document prioritized water needs for each stream, it did not present priorities among streams. In 2000 and 2001, USFWS held a series of four workshops intended to assist in establishing priorities for Central Valley streams based on biological benefits. USFWS published a Draft Technical Memorandum on August 22, 2001 (CH2M Hill 2001) that summarized the results of the workshops and presented draft stream rankings for 19 tributaries to the Sacramento and San Joaquin Rivers. These workshops included a wide

variety of agency, stakeholder, and consultant fisheries experts, who collaboratively developed the methodology used to rank the streams.

Preliminary EWP Recommendations

The ERP Implementing Agencies and their staff and consultants began with the 12 highest-ranked streams from the USFWS biological priorities. Working with the EWP Steering Committee, the agencies developed a set of screening criteria to further categorize the 12 streams based on:

- the biological priorities assigned by the USFWS,
- which streams were recommended for instream acquisitions during Stage 1 in the ERPP Strategic Plan for Ecosystem Restoration,
- how much money had been invested in each stream by CALFED and CVPIA (as a surrogate for the ecological importance of each stream),
- the number of anadromous fish species present in the stream that were identified for recovery in the CALFED Multi-Species Conservation Strategy,
- whether quantified flow objectives had been identified for the stream,
- whether historical biological monitoring data were available for the stream, and
- whether local watershed management groups were active in the watershed (to act as local partners).

Using these criteria, the 12 streams were prioritized into three tiers, with the first tier having the highest priority. (Note: there is no prioritization within tiers.) The criteria used and how they were applied are documented in a report entitled "EWP Pilot Water Acquisitions—Stream Selection Recommendations (Jones & Stokes 2002). The EWP will focus its initial efforts in identifying water to acquire on the First Tier streams. If opportunities do not exist on enough of the First Tier streams, the Program may evaluate Second Tier streams for possible acquisitions. The stream priorities are:

First Tier

- Butte Creek
- Clear Creek
- Deer Creek

- Mill Creek
- Tuolumne River

Second Tier

- Battle Creek
- Big Chico Creek
- Calaveras River
- Stanislaus River
- Yuba River

Third Tier

- Antelope Creek
- Cow Creek

Geomorphological Priorities

The EWP stream priority recommendations were presented to the EWP Steering Committee and then to the ASET for review and comment. ASET members commented that the criteria used had not fully represented scientific considerations, such as the relative opportunities presented by each stream to yield important information and how well each stream lends itself to scientific inquiry. Based on these comments, the ERP Implementing Agencies hired a consultant to review the current state of knowledge regarding the relationship between flow and geomorphologic processes and to recommend streams where geomorphic experiments would have the most potential to yield new information.

The results of this review are summarized in a report entitled "Environmental Water Program: Restoring Ecosystem Processes through Geomorphic High Flow Prescriptions" (Stillwater Sciences 2003). The recommendations of this geomorphic report are not intended to supplant the priorities established earlier by the EWP but to be in addition to them. In other words, the EWP is interested in acquiring water for experiments related to the direct biological benefits of flow (passage, migration, and habitat improvements) and experiments related to reactivating geomorphic processes through high flow events. Chapter 4 of this report suggests that three streams have the best potential for geomorphic experiments based on the availability of monitoring data:

- Butte Creek,

- Clear Creek, and
- the Tuolumne River.

These streams are all within the first tier of the EWP prioritization.

Coordination with Other Water Acquisition Programs

The Environmental Water Program was formed to acquire water from willing sellers for environmental purposes; however, it is not the only active water acquisition program. Other government-operated environmental water acquisition and management programs exist, most notably the Environmental Water Account (EWA), CVPIA Dedicated Yield Program ([b][2]), CVPIA WAP ([b][3])and the California Department of Water Resources (DWR) Dry Year Water Purchase Program. The goals of some of these programs overlap with the fundamental purpose of the EWP: to purchase water from willing sellers to benefit the environment. Accordingly, coordination with these programs during implementation of the EWP is essential. Staff members of each of these three programs are working to develop plans for coordinating the programs. Additionally, several nonprofit, non-governmental organizations are developing, or are implementing, environmental water acquisition programs. The Environmental Water Program will strive to coordinate with these programs as appropriate. More discussion of this coordination is provided below in Section 2, "Overview of the Process," and in a briefing paper entitled "Coordination between the Environmental Water Program and Related Programs."

SECTION 2. OVERVIEW OF THE PROCESS

The ERP Implementing Agencies recognize that a successful water acquisition program must be locally acceptable. Therefore, they have established a process to acquire water from willing sellers that involves a cooperative effort by agencies, scientists, and local interests. This process, described in detail below and portrayed graphically in Figures 1–4, involves several steps: preparing and reviewing conceptual proposals, preparing and reviewing full proposals, negotiating acquisitions, conducting experiments and monitoring, evaluating results, and publishing peer-reviewed results. This document is intended to provide guidance regarding the initial step in the process, preparing a conceptual proposal.

As a first step, the EWP agencies formed an EWP Core Team composed of representatives from interested agencies to oversee implementation of the EWP (Figure 5). The EWP Core Team will work with agency representatives, watershed groups, and other local interests to form a local proposal preparation team for each of the selected streams. Anyone with an interest in water acquisitions or stream flow experiments will

Draft EWP Proposal Process

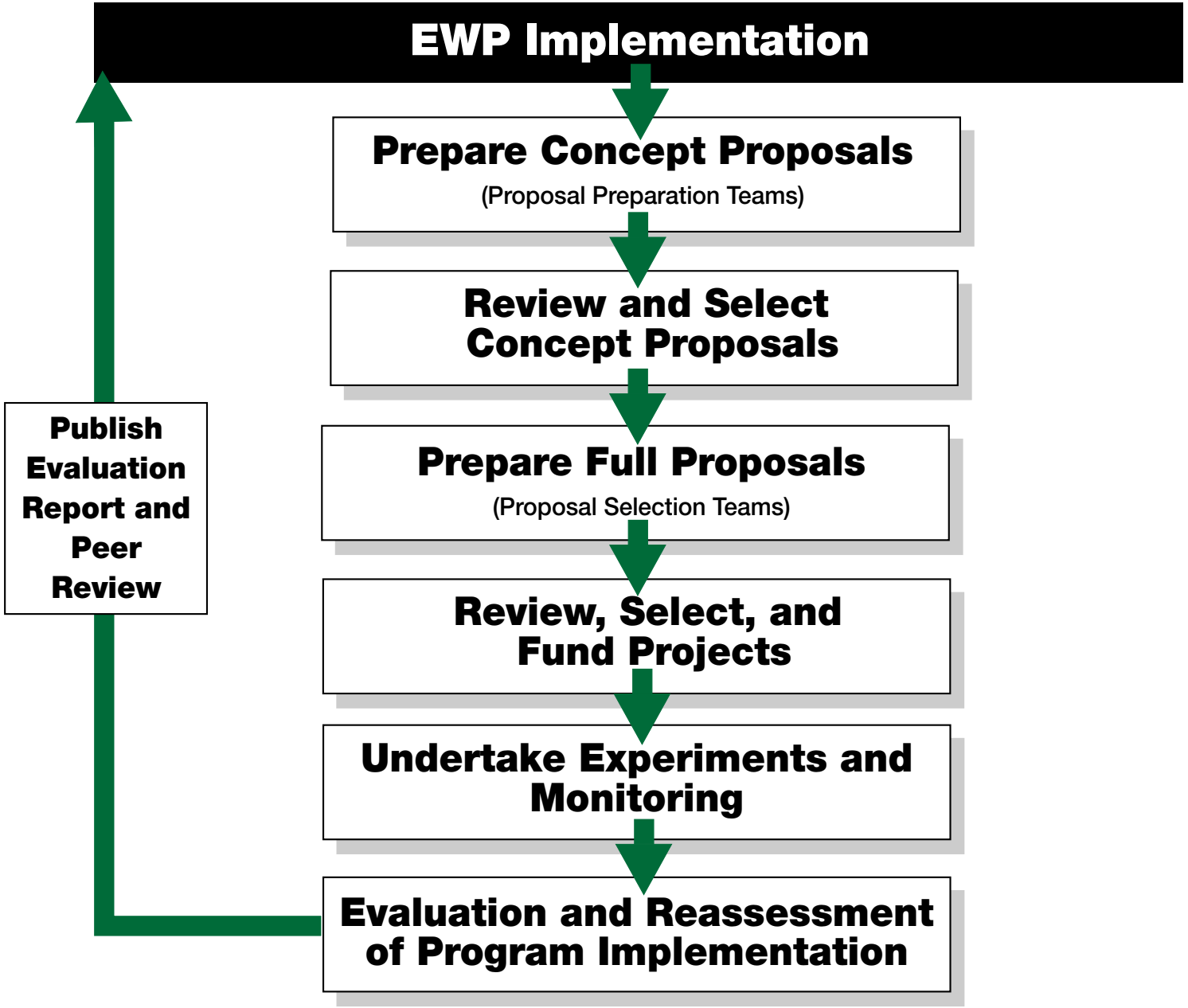


Figure 1

Review and Select Concept Proposals

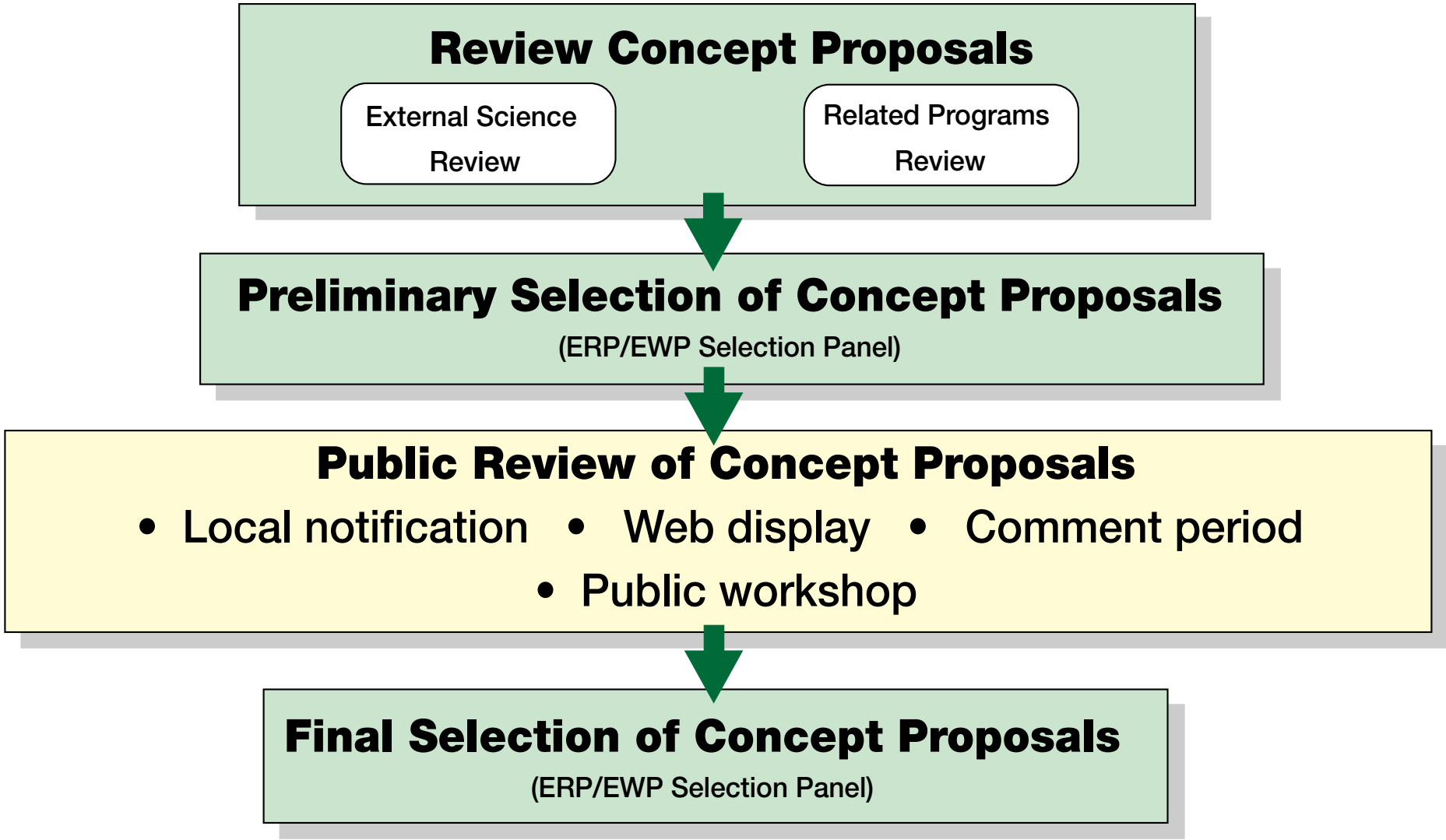


Figure 2

Prepare Full Proposals

Figure 3

Review, Select, and Fund Projects

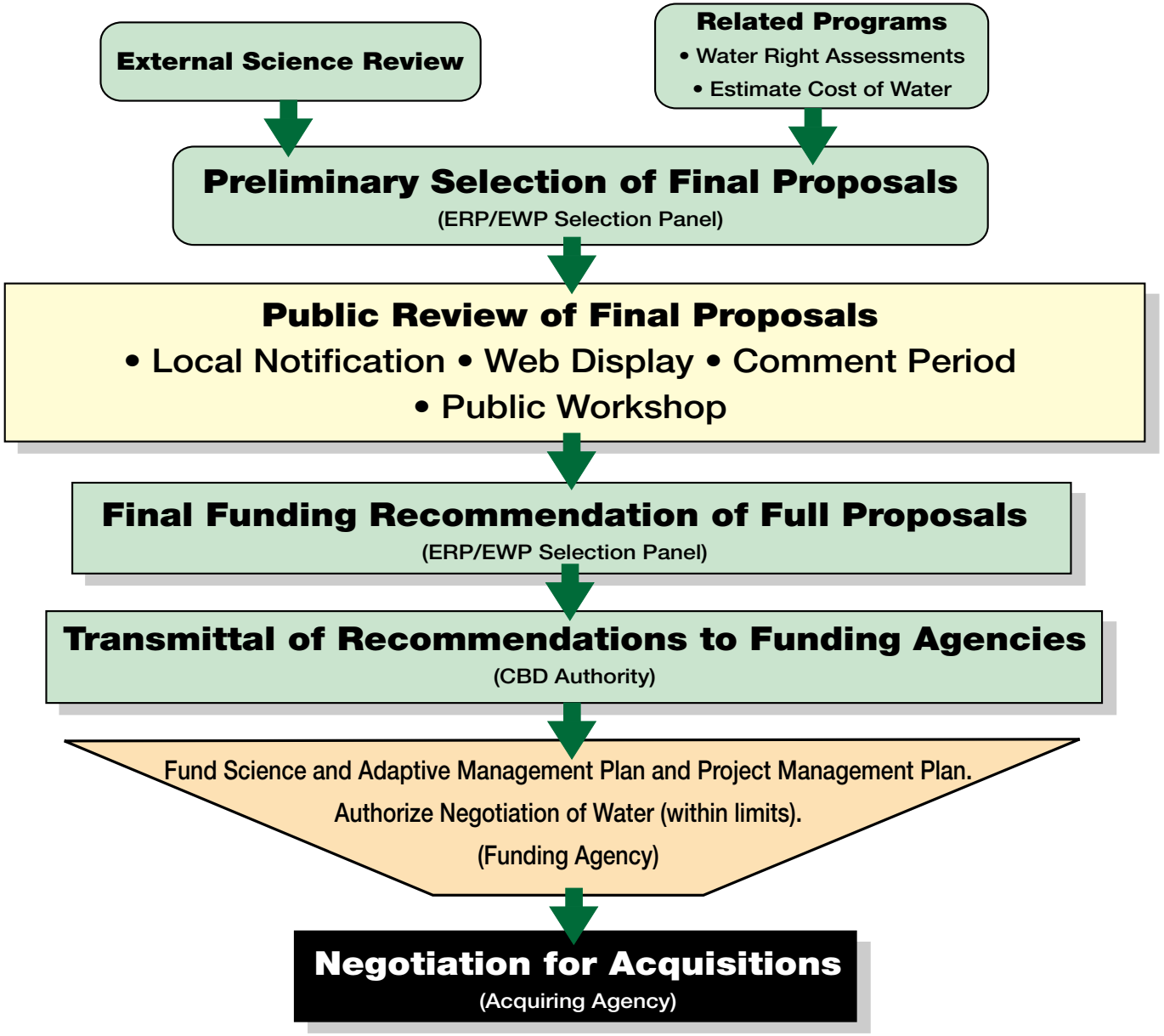


Figure 4

Organization of the EWP

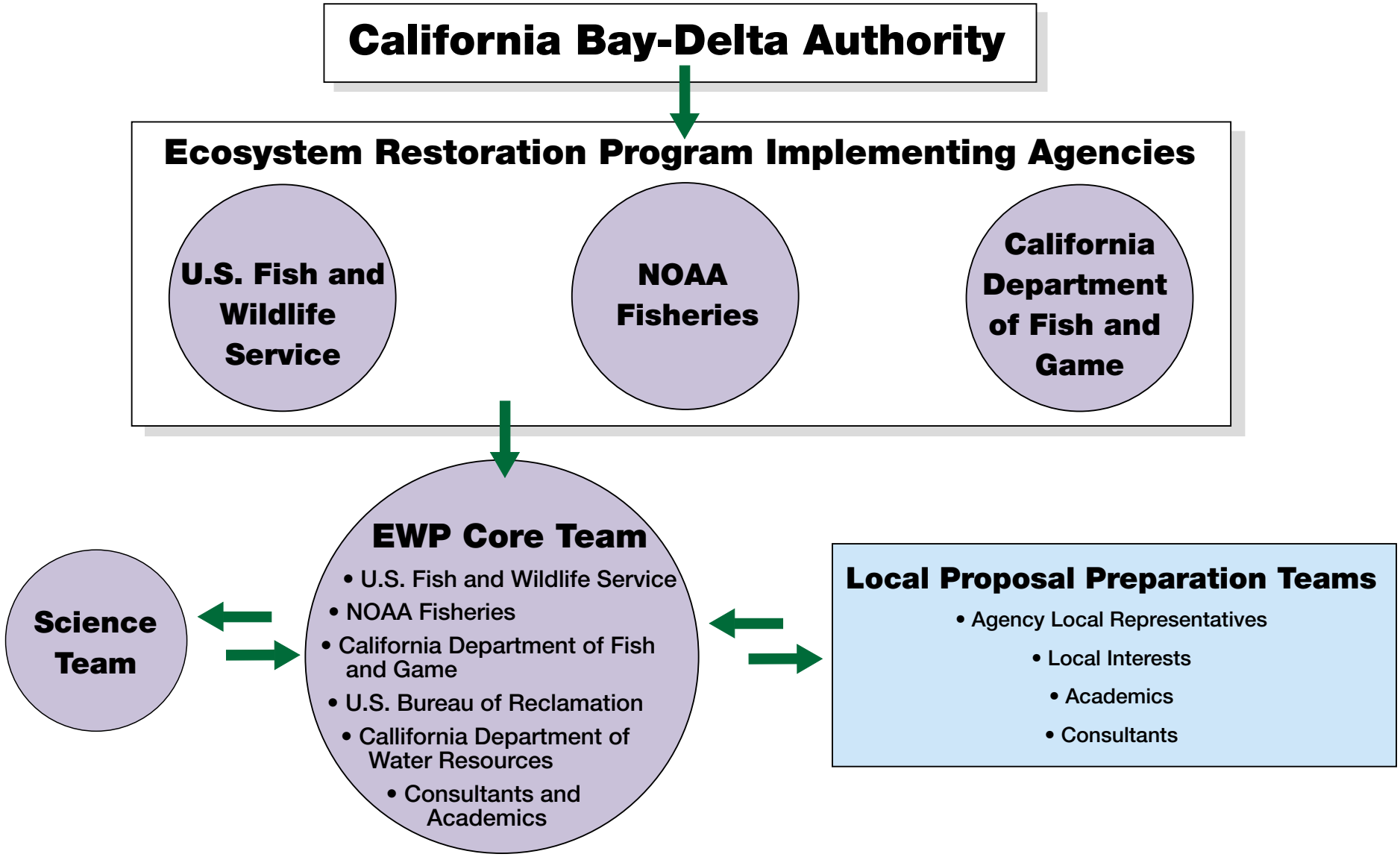


Figure 5

be welcome to participate on the proposal preparation team. The ERP Implementing Agencies also have hired a lead scientist who will oversee all of the scientific aspects of proposal preparation, experimental design, conducting the experiments, and analyzing the results. The lead scientist is responsible for hiring scientific staff to support this effort.

The details of the proposed acquisitions are to be developed through a collaborative effort of the EWP Core Team, the Science Team, and local interests. These details include the amount, timing, duration, and location of the water to be acquired; the number of years water would be acquired; the specific ecological goals and objectives to be addressed; the scientific basis for the acquisition; and the sources of water.

As described above, the ERP Implementing Agencies have selected five watersheds in which to focus the initial round of acquisitions under the EWP: Butte Creek, Clear Creek, Deer Creek, Mill Creek, and the Tuolumne River.

Preparation and Review of Conceptual Proposals

Preparation of Conceptual Proposals

The first task for these local proposal preparation teams, after getting organized, is to work with the EWP Core Team and Science Team to prepare conceptual proposals for science-based water acquisitions. More than one conceptual proposal may be prepared for each priority watershed. The form and content requirements for conceptual proposals are discussed in Sections 5, 6, and 7 of this Guide. The ideas regarding the scientific questions to be addressed and the specifics of water to be acquired should originate from the proposal preparation teams.

Review of Conceptual Proposals

Once completed, the conceptual proposals will be reviewed by an independent science panel that will review the scientific basis of each conceptual proposal, including the conceptual models, testable hypotheses, and conceptual monitoring programs.

All conceptual proposals will be reviewed by representatives from related water acquisition programs to determine whether any potential synergies or conflicts exist between the conceptual proposals and these related programs. These related programs include but are not limited to the CVPIA Dedicated Yield Program and WAP, the EWA, and the DWR Dry Year Program. This related-programs review will also bring a first-cut hydrologic review of the proposed acquisition to ensure that the acquisition would not harm the water rights of the Central Valley Project (CVP), State Water Project (SWP), or other water users.

The review of conceptual proposals will answer the following questions:

- Is there a conceptual model to support the proposed action?
- Are the key assumptions explained?
- Are the hypotheses to be tested clearly stated?
- Is the conceptual experimental design component appropriate?
- Will the conceptual monitoring program answer the questions posed by the hypotheses?
- Is the project feasible?
- Does the project have sufficient local support, or is there opposition?
- Does the sale of water have the potential to adversely affect the rights of others, including the SWP and the CVP?
- Are there opportunities for the acquired water to achieve multiple environmental benefits through partnerships with other acquisition programs?

Following these reviews, an ERP/EWP Selection Panel will be convened to make recommendations regarding which conceptual proposals merit preparation of a full proposal. The ERP/EWP Selection Panel will be composed of technical and resource-management experts with experience related to water acquisitions, fisheries, riverine ecosystems, and geomorphology. CBDA will determine panel membership and consider nominations from the Independent Science Board (ISB) and ASET.

The ERP/EWP Selection Panel will provide a check on earlier reviews, but their primary purpose in this step is to make strategic recommendations regarding which conceptual proposals are ready to have full proposals prepared. From their own review as well as the previous reviews, the panel will summarize any recommendations to the proposal preparation teams.

In adhering to CBDA's commitment to a public process, the recommendations of the ERP/EWP Selection Panel will be presented to the general public during a public comment period. Because these proposals ultimately will involve negotiations with willing sellers over cost, details of the water acquisition will not be disclosed at that time. Public disclosure will focus on the scientific aspects of each proposed acquisition.

Preparation and Review of Full Proposals

Preparation of Full Proposals

The EWP Core Team will work with the Science Team and Local Proposal Preparation Teams to develop full proposals for those conceptual proposals selected, and to implement the recommendations made by the reviewers. Full proposals should contain very detailed descriptions of the work to be completed, who will be responsible for completing each element of work, and costs for each element of work. Further, full proposals will contain three major components—a science and adaptive management plan, a project management plan, and a proposed transaction. Section 7 of this Guide provides more information about the form and content requirements for preparing a full proposal.

Review of Full Proposals

The process for reviewing full proposals will be similar to that used in reviewing conceptual proposals, with the following exceptions:

- the reviews will be more detailed; and
- decisions for funding proposed acquisitions will result.

An independent science panel will review the Science and Adaptive Management Plan, including the detailed information concerning hypotheses to be tested, monitoring plan, data evaluation plans, and cost estimate. The questions to be answered through this review include:

- Is there a conceptual model to support the proposed action?
- Are the key assumptions explained?
- Are the hypotheses to be tested clearly stated?
- Is the experimental design component sound?
- Does the proposal describe performance measures and metrics?
- Has the monitoring program been set up properly to answer the questions posed by the hypotheses?
- Is the team created to conduct the monitoring qualified to complete the work?

- Is the amount of money requested in the Science and Adaptive Management Plan appropriate for the work described?

The Project Management Plan will be reviewed to answer the following questions:

- Are appropriate systems being proposed to allow the grant recipient to effectively manage the proposed scope of work, subcontractors, and control costs?

- Is the project feasible?

- Does the project have sufficient local support, or is there opposition?

- Has a reasonable environmental compliance strategy been proposed?

- Is the amount of money requested in the Project Management Plan appropriate for the work described?

The proposed transaction will also be reviewed by staff representing other water acquisition programs, including the EWA, CVPIA WAP, the DWR Dry Year Program, and others. This will include water rights specialists from DWR and USBR. This review is intended to answer the following questions.

- Is the water being proposed for acquisition water that the sellers have the right to sell?

- Does the seller's water right correspond to the timing when the water needs to be made available according to the Science and Adaptive Management Plan?

- If the water is being made available through crop idling, has the amount of water available for sale been properly calculated?

- If the water is being made available through sale of water from storage, have appropriate refill criteria been included?

- Would the sale of water adversely affect the rights of others, including the SWP and the CVP?

- Are there opportunities for the acquired water to achieve multiple environmental benefits through partnerships with other acquisition programs?

- Has adequate provision been made for protecting the acquired water along the entire length of stream in which it is needed?

- Is the estimated cost of water within an appropriate range?

The ERP/EWP Selection Panel will provide a check on earlier reviews, but their primary purpose is to make funding recommendations based on the following criteria:

- scientific validity and importance,
- consistency with EWP guiding principles, and
- whether the proposed transaction is complementary to other restoration activities in the area.

As with the conceptual proposals, the recommendations of the ERP/EWP Selection Panel will be presented to the general public during a public comment period. Because these proposals ultimately will involve negotiations with willing sellers over cost, details of the water acquisition will not be disclosed at that time. Public disclosure will focus on the scientific aspects of each proposed acquisition.

Proposals recommended for funding by the ERP/EWP Selection Panel will be reviewed by the CBDA, which will transmit recommendations to the funding agency. The funding agency will authorize funding for the Science and Adaptive Management Plan and the Project Management Plan. In addition, the funding agency will authorize the acquiring agency (if different) to negotiate with the selling party for the acquisition of water.

Conduct Experiments, Evaluate Results, Publish Results

Project proponents, in cooperation with the EWP Core Team and the Science Team, will undertake the experiments described in the full proposals, including the monitoring program. Evaluation of the pilot water acquisitions will involve two elements: evaluation of the selection process, and evaluation of the experimental results. While environmental benefits may not be realized for months or years following initial implementation, the ERP Implementing Agencies will begin immediately to assess the effectiveness and efficiency of the process used to select the first round of pilot acquisitions. This evaluation will be used to modify and improve future rounds of acquisitions.

All experiment results will be subjected to peer review prior to publication to ensure that the results are appropriately interpreted. This peer review will also facilitate incorporation of any new information into future implementation of the ERP as a whole, and the EWP in particular.

SECTION 3. EWP PILOT WATER ACQUISITION PREFERENCES

This section provides information regarding acquisitions of the greatest interest to the EWP. The ERP Implementing Agencies provide the following information to guide potential acquisitions regarding the sources of water to be acquired by the EWP. This information is consistent with guidance provided by DWR regarding acquisitions for the EWA and the DWR Dry Year Program.

Preferred Water Transfer Types

Potential Sources

The following sources of water are of greatest interest to the EWP for the first year of pilot projects:

- **Stored water.** Reoperation of a reservoir or release of water that would remain in storage or would be stored in the absence of the water transfer.

- **Groundwater substitution**. Reduction in surface water use that is offset with additional groundwater pumping.

- **Crop idling/crop shifting.** Reduction in surface water use resulting from a reduction in the evapotranspiration of applied water to agricultural crops that would have occurred in the absence of the water transfer.

- **Other Methods.** Other methods of making water available to the EWP that do not create third party impacts.

Types of Water Transfer of No Interest to the Environmental Water Program

The EWP is not interested in pursing the following water transfers:

- **Transfers that injure legal users of water or cause unreasonable effects to the environment**. Water transfers that simply reclassify existing stream flows from one category to another, making these flows no longer available to historical downstream users, have the potential to injure other legal users of water and cause harm to the environment. Water transfers should focus on either making new surface flows available or reducing surface water use in such a way as to expand the availability of surface water resources for use by others.

- **Direct pumping of groundwater**. Water Code Section 1220 establishes significant barriers to the export of groundwater outside the Sacramento Valley. CBDA is not interested in facilitating the direct transfer of groundwater from one area to another for purposes of the EWP.

SECTION 4. GUIDING PRINCIPLES

EWP acquisitions will be guided by two sets of principles. The first set, Overarching Principles, establishes the broad rules by which acquisitions will be undertaken, in order to adhere to the CALFED Solution Principles, to facilitate the local acceptance of the program, and to ensure fairness and equity in the process. The second set, Legal Principles, ensures that the program will adhere to the provisions of the California Water Code.

Overarching Principles

- Water acquisitions are voluntary transactions, based on willing sellers and willing buyers.

- Water acquisitions will be accomplished through partnerships between the ERP Implementing Agencies and local and regional stakeholders.

- Water acquisitions will be designed to test hypotheses regarding water management in a manner that facilitates learning through adaptive management, includes appropriate monitoring, and will be peer reviewed by an independent scientific panel prior to approval.

- Water acquisitions will consider social and local economic conditions.

- Water acquisitions will be coordinated with other state and federal water acquisition programs.

- Water acquisitions will adhere to CALFED agencies' commitment to environmental justice.

Legal Principles

California law contains numerous protections that apply to water transfers. However, there are three fundamental principles that typically apply:

1. no injury to other legal users of water,

2. no unreasonable effects to fish, wildlife, or other instream beneficial uses of water, and

3. no unreasonable effects on the overall economy or the environment in the counties from which the water is transferred.

The ERP Implementing Agencies will not support or participate in any water transfer where these basic principles have not been adequately addressed.

The following are suggested methods to develop workable water transfers within these guidelines:

1. No injury to other legal users of water
   a. Determine the water available for acquisition based on the conditions that would exist absent the water acquisition or the program that makes the acquisition water available.
   b. Include real-time monitoring programs as a part of the water acquisition to trigger corrective actions that help avoid possible impacts as they may develop. This is especially important for groundwater substitution acquisitions.
   c. Include a mitigation program that specifies the actions that will be taken as quickly as may be necessary to prevent injury from occurring.
   d. Include reservoir "refill criteria" for storage water acquisitions as appropriate to protect downstream users from delayed impacts of the water acquisition. Refill criteria are developed on a site-specific basis and may be different for water acquisitions with places of use within, as opposed to those outside, the Sacramento Valley.

2. No unreasonable effects on fish and wildlife
   a. Coordinate with State and federal fishery agencies to help make water available in the most "fish friendly" method possible, to help avoid

adverse effects on fish and wildlife attributable to the water acquisition, and when possible to enhance fish habitat.
   b. Disperse any cropping land use changes and avoid actions that affect critical habitat of sensitive fish and wildlife species.
   c. Include monitoring programs as may be needed to implement adaptive management efforts to mitigate potential impacts on fish and wildlife.
   d. Adhere to established operational limits in existing permits and licenses.

3. No unreasonable effects on the overall economy in the counties from which the water is acquired
   a. Limit the scope and extent of actions that can affect the local economy.
   b. Recognize that investment of local income from water acquisitions typically goes back into normal business operations and improvements of local water supply systems.
   c. Work with the seller, and, as necessary, county government representatives to help identify actions that may become necessary if the cumulative economic effects of water acquisitions in those counties appear to the ERP Implementing Agencies to reach unreasonable levels.

SECTION 5. SCIENCE AND ADAPTIVE MANAGEMENT

Role of Science and Adaptive Management in Water Acquisitions

The ERP Implementing Agencies are committed to implementing restoration actions in an adaptive management context. Within an adaptive management framework, natural systems are managed to ensure their recovery and/or improvement, while increasing the understanding of how they function. In this manner, future management actions can be revised or refined in light of information generated from previous restoration and management actions. In this respect, adaptive management treats all restoration actions as experiments.

The EWP pilot acquisitions will all be conducted as experiments where hypotheses about the benefits of the increased flows are developed and tested. This will ensure that each acquisition not only results in more instream flows, but also that each generates information that will add to our understanding of the role of flow in riverine ecosystems. All proposed acquisitions will be evaluated based on their ability to generate information about key uncertainties related to flow.

The EWP Core Team will work with local resource managers, stakeholders, and the Science Team to capture their understanding about how their particular stream

functions, how it has been altered or degraded, and how various actions might improve conditions in the system. Through this process conceptual models for each of the five target streams should emerge that can help to highlight key uncertainties where research might be necessary and/or lead to potential flow-related actions.

Resources Available to Aid in Applying Science and Adaptive Management

The Proposal Preparation Teams should use the following five documents to assist in developing the experimental framework and details of each proposal. These documents will provide the information necessary to develop proposals with the scientific framework needed for a proposal to be funded, including developing appropriate conceptual models, testable hypotheses and adaptive management and monitoring programs. The five documents are: the *Ecosystem Restoration Program Strategic Plan for Ecosystem Restoration* (July 2000); the *Ecosystem Restoration Program Draft Stage 1 Implementation Plan* (August 2001); the *EWP Pilot Water Acquisitions—Stream Selection Recommendations* (January 2002); "Draft Summary Report, CALFED Adaptive Management Workshop—Flow Manipulation" (Kimmerer et. al 2002); and the *Environmental Water Program: Restoring Ecosystem Processes through Geomorphic High Flow Prescriptions* (November 2002).

The *Ecosystem Restoration Program Strategic Plan for Ecosystem Restoration*, July 2000, provides broad guidance for restoration of the Bay-Delta ecosystem. It establishes adaptive management as the primary tool for achieving ERP objectives, describes opportunities and constraints, and provides broad goals and specific objectives for flow-related actions. Additionally, the document provides guidance on defining problems, defining goals and objectives, developing conceptual models, defining restoration actions, and monitoring restoration actions. Appendix C of the document provides an example of adaptive management using conceptual models for chinook salmon and Deer Creek.

The *Ecosystem Restoration Program Draft Stage 1 Implementation Plan*, August 2001, is the second iteration of an implementation plan for the ERP and presents the information-gathering and restoration priorities for the 2002 Proposal Solicitation Package. The ERP strategic goals for natural flow regimes are discussed in detail in the document. Additionally, Section 2, "Designing Ecosystem Restoration Projects Using an Adaptive Management Approach," provides guidance on science-based adaptive management approach, developing conceptual models, and defining restoration actions.

The *EWP Pilot Water Acquisitions—Stream Selection Recommendations* (January 2002) presents a final recommendation of five streams for the first round of acquisitions. The document analyzes 12 streams identified by the USFWS as having the highest priority for instream acquisitions, provides a full ranking of all 12 streams in three tiers, and presents the process used to make the selections.

In March 2002, the ERP ISB convened a workshop to discuss implementing full-scale adaptive management experiments within the CALFED solution area. One of the topic areas addressed was flow-manipulation experiments. The deliberations and conclusions of this workshop are presented in "Draft Summary Report, CALFED Adaptive Management Workshop—Flow Manipulation" (Kimmerer et. al 2002).

The report *Environmental Water Program: Restoring Ecosystem Processes through Geomorphic High Flow Prescriptions*, November 2002, provides a framework to identify flows needed to maintain or restore ecological functions and assist with the water acquisition aspects of the 2002 Draft Stage 1 Implementation Plan. The document describes methods for prescribing high streamflows to achieve desired geomorphic functions and objectives. Ecosystem objectives that can be used as testable hypotheses are presented for flows ranging from lower depth-maintaining flows that provide suitable combinations of velocity, depth, and temperature at particular times, to high magnitude floodplain-maintaining flows resulting in channel avulsion and migration. The document also supports prioritization of Clear Creek, Butte Creek, and the Tuolumne River as the streams that have the highest potential for successful geomorphic adaptive management experiments. It also provides example (draft) scientific hypotheses based on the Tuolumne River.

SECTION 6. PREPARING A CONCEPTUAL PROPOSAL

Proposals should be developed using the following format.

A. Project Description

1. Statement of problem—Describe the flow-related problem or scientific uncertainty that the acquisition is designed to address, including a brief narrative of the project location. Clearly state the goals and objectives of the proposed study. Provide a review of relevant past studies of and solutions (if any) to the problem, here and elsewhere.

2. Conceptual model and testable hypotheses—Include a clearly articulated conceptual model that describes the causal interconnections between increased flow and other key ecosystem components and explain the underlying basis for the proposed work. The model should be based on the best information available and should demonstrate how physical and biotic system components are expected to respond to anticipated flow alterations. Models can be presented graphically or as a narrative and should list the source(s) of available information. Clearly identify the testable hypotheses associated with the proposed project and how the project is designed to test those hypotheses. Identify the key uncertainties to be addressed and explain how the proposed work will reduce uncertainty. Describe alternative non-flow restoration efforts, if any, that might effectively address the stated problem.

3. Approach—Provide conceptual study design. Describe the timing, duration, magnitude, and frequency of proposed flows and, in general terms, the methods to be used to gather data and evaluate the effects of these flows. Clearly identify how the approach maximizes the information richness and value to decision-makers.

4. Feasibility—Demonstrate that the described approach is both feasible and appropriate to the proposed work. Describe the potential availability of water to conduct the experiment. Describe any operational considerations or constraints within the watershed that may affect the ability to conduct the experiment. List what permits or agreements are necessary to proceed with the tasks described.

5. Work schedule—Describe the project timeline, including the duration of the experiment and the time needed to acquire, process, and evaluate the data.

B. Regional Context

1. Relationship to other ecosystem restoration projects—Explain the relationship to past and future projects. Explain how this project relates to other previously funded projects including CALFED Program, CVPIA, and other ecosystem restoration activities.

2. Systemwide ecosystem benefits—Identify any synergistic, systemwide ecosystem benefits that may result from the proposed project. Describe how the proposal complements projects or programs in other areas or within the watershed. Examples of proposals with synergistic, systemwide ecosystem benefits might include a fish passage project that opened up habitat in the upper watershed of a stream and a second proposal to acquire water to further enhance passage or habitat for these fish.

C. Qualifications

Provide brief biographical sketches of the principal participants that identify qualifications (education, relevant experience) and contributions (completed projects, published reports on the same topic, etc.) consistent with their roles and responsibilities in the proposed project. In particular, proposals must indicate who will conduct the scientific portions of the project (e.g., development of hypotheses, monitoring, evaluation). Describe the planned organization of staff and other resources to be used in implementing this project. Identify the nature and extent of other collaborating participants in the implementation of this project. Identify specific individual responsibilities covering technical, administrative, and project management roles.

D. Cost

To the extent possible, indicate the magnitude of costs involved in conducting the experiment (include monitoring and evaluation), managing the project, and acquiring the water.

E. Literature Cited

All proposals must include references to related research studies, project reports, scientific reports, and other supporting information cited in the proposal.

SECTION: 7. FULL PROPOSAL PREPARATION

Following selection of conceptual proposals by the ERP/EWP Selection Panel, the EWP Core Team, Science Team, and Proposal Preparation Teams will undertake preparation of full proposals. It is anticipated that these proposals will contain detailed information regarding three components of the proposed project: an adaptive management and monitoring plan, a project management plan, and a proposed water acquisition.

The adaptive management plan will include:

- a detailed experimental design, including testable hypotheses, a monitoring plan, a data evaluation plan, and the costs associated with these efforts.

The project management plan will describe:

- how the work will be managed and by whom,
- the roles and qualifications of all key staff members, a schedule for completion of all work,
- a regulatory compliance plan, and
- the cost associated with these tasks.

The proposed water acquisition will describe:

- the timing, duration, magnitude, and frequency of flows required to conduct the experiment;
- an assessment of the availability of water to be acquired;

- documentation of the water right(s) underlying the proposed water sale;
- an estimate of cost to acquire the water; and
- a plan for protecting the water from being diverted by other users.

A GUIDANCE DOCUMENT PROVIDING DETAILED REQUIREMENTS FOR THE PREPARATION OF A FULL PROPOSAL WILL BE PROVIDED AT A LATER DATE.

Appendix A. Background on the California Bay-Delta Authority and the Environmental Water Program.

THE CALIFORNIA BAY-DELTA AUTHORITY

CALFED Bay-Delta Program (CALFED) is a cooperative effort of more than 20 State and federal agencies with management and regulatory responsibilities for the San Francisco Bay/Sacramento–San Joaquin Delta (Bay-Delta). This cooperative effort resulted in a long-term, comprehensive plan (Plan) to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The Plan has four objectives:

- **Ecosystem Quality.** Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.
- **Water Supply.** Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system.
- **Water Quality.** Provide good water quality for all beneficial uses.
- **Levee System Integrity.** Reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic failure of Delta levees.

CALFED released a Draft Programmatic Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) in June 1999 that analyzed the environmental impacts of the Plan and several alternatives. Following a lengthy public comment period, the CALFED Program released a Final Programmatic EIS/EIR in July 2000. In August 2000, a Programmatic ROD was issued for the CALFED Program, reflecting the final selection of the long-term Plan for the Bay-Delta. Implementation of the Plan is expected to occur over a 30-year period. Stage 1 of implementation covers the first 7 years of this 30-year effort and builds the foundation for long-term actions.

The California Bay-Delta Authority (CBDA) is an agency of the State of California created by the California Legislature to oversee the State's participation in implementing the Plan. The Ecosystem Restoration Program Plan (ERPP) is an element of the overall Plan. The goal of the ERPP is to improve and increase aquatic and terrestrial habitats and to improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. One of the commitments of the ERPP, as defined in the ROD, is to "improve salmon spawning and juvenile survival in upstream tributaries as defined by the ERPP and Strategic Plan, by purchasing up to 100,000 acre-feet (AF) per year by the end of Stage 1." Similarly, the Plan calls for pursuing "full implementation of ERP upstream flow targets through voluntary purchases of at least 100,000 AF by the end of Stage 1." The EWP was developed to

meet this commitment. According to the CALFED ROD, representative ERP actions related to the EWP include:

- acquiring water from willing sellers throughout the Bay-Delta watershed to provide flows and habitat conditions for fishery protection and recovery (page 19);
- restoring critical instream and channel-forming flows in Bay-Delta tributaries (page 19); and
- improving salmon spawning and juvenile survival in upstream tributaries as defined by the ERP, and Strategic Plan, by purchasing up to 100 TAF per year by the end of Stage 1 (page 36).

THE ENVIRONMENTAL WATER PROGRAM

In 1998, the Secretary of Interior allocated money from the federal Bay-Delta Act for environmental water acquisitions. The concept of the EWP was presented to the Ecosystem Roundtable, a stakeholder advisory committee to the ERP, in 2000. Based on comments received from stakeholders, in November 2000 an informal EWP Steering Committee was formed, composed of a large group of stakeholders representing diverse interests. During 11 meetings, the Steering Committee helped to establish goals and objectives for the EWP, to decide that initial implementation of the EWP should be through a series of pilot water acquisition, and to develop a process to set priorities for this first round of acquisitions. When the charter for the Bay-Delta Advisory Committee expired, the work of the Steering Committee ended also, but with the creation of the Bay-Delta Public Advisory Committee (BDPAC) in June 2001, work was taken over by the BDPAC Ecosystem Restoration Subcommittee. Notes for each meeting of the Steering Committee are available on the EWP website at: www.CALFEDEWP.org.

During the review of these priority recommendations, the Agency Stakeholder Ecosystem Team (ASET) expressed concern that the program needed to be implemented as a series of adaptive management experiments that would simultaneously allow implementation of actions believed to improve habitat and maximize learning about ecological and geomorphic processes. Later that year, CALFED sponsored a scientific forum on implementing large-scale adaptive management experiments, including a section on high-flow geomorphic experiments. More discussion of this workshop and its effect on the EWP is presented below under Section 5, "Science and Adaptive Management." As a result, the guiding principles of the EWP have been expanded to require a peer-reviewed science and adaptive management program that includes conceptual models, testable hypotheses, and monitoring for each project. The EWP also has been broadened to include flow experiments related to direct biological benefits (e.g., migration and habitat) and experiments concerning the relationship between high flows and geomorphic processes.

Department of the Interior
DECISION ON IMPLEMENTATION OF SECTION 3406 (b)(2) OF THE CENTRAL VALLEY PROJECT IMPROVEMENT ACT
May 9, 2003

INTRODUCTION

Section 3406(b)(2) of the Central Valley Project Improvement Act, Pub. L. No. 102-575, Title XXXIV (CVPIA), directs the Secretary of the Interior to:

> 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 to 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.

Project yield is defined in section 3406(b)(2) ((b)(2)) as the delivery capability of the Central Valley Project (CVP or Project) during the drought period of 1928 - 1934 as it would have been with all facilities and requirements on the date of enactment of the CVPIA (October 30, 1992) in place.

This modified decision (Decision) sets out the calculation of CVP yield in accordance with the statutory definition, the method of accounting for use of (b)(2) water, and procedures for management and accountability for the dedicated (b)(2) water. This Decision is the final agency action and supersedes all previous decisions. This Decision will be effective as of the date adopted and will be implemented in the 2004 Water Year.

Interior has been dedicating and managing water pursuant to Section 3406(b)(2) since 1993, the first water year following passage of the CVPIA. Since enactment of the statute, Interior has pursued ways to utilize (b)(2) water in conjunction with modification of CVP operations and water acquisitions to meet the goals of the CVPIA. Interior has used this experience in developing this Decision. Through this Decision, Interior exercises Secretarial discretion to implement (b)(2) in accordance with the language of CVPIA, the intent of Congress, as well as to make this Decision consistent with the rulings of the District Court in *San Luis & Delta Mendota*

Water Authority, et al v. United States, (CIV F 97-6140 OWW DLB) ((b)(2) litigation).[1] This Decision incorporates parts of the October 5,1999 Final Decision upheld by the District Court, modifies other parts and adds new components. The intent of these changes is to simplify and clarify the accounting process for (b)(2) expenditures and to integrate the dedication and management with CVP operations for other Project purposes.

CVPIA Section 3406(b)(1)(B) articulates Congressional intent for (b)(2) water to be used in conjunction with modification of the CVP operations and water acquisitions under Section 3406(b)(3), along with other restoration activities, to meet the fishery restoration goals of the CVPIA. Modification of CVP operations, or reoperation, occurs when the Bureau of Reclamation (Reclamation) alters the operation of the CVP at the request of the Fish and Wildlife Service (Service) so that the operations undertaken are more compatible with the needs of fish. In addition to the flexibility offered in Section 3406(b)(1), Interior is currently acquiring water to supplement (b)(2) water, as specified in Section 3406(b)(3), under both the Water Acquisition Program and the Environmental Water Account (EWA).

This Decision is divided into sections to address each component of (b)(2) policy. The first section addresses Interior's calculation of CVP yield. Interior has calculated the Project yield in accordance with the statutory definition. This calculation of yield was upheld by the District Court in the (b)(2) litigation.

The accounting methodology and procedures set forth in Section II below describe how Interior will account for (b)(2) water. Interior will manage (b)(2) water in order to effectuate the purposes and goals of the CVPIA. Among the purposes of the CVPIA as set out in the statute are to protect, restore and enhance fish, wildlife and associated habitats in the Central Valley and Trinity River basins; to address impacts of the CVP on fish, wildlife and associated habitats; to contribute to the State of California's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; and 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, Sections 3402(a), (b), (e) and (f).

Water dedicated under (b)(2) will continue to be used to implement the fish, wildlife, and habitat restoration purposes and measures authorized by the CVPIA, as well as to assist in meeting the 1995 Delta Water Quality Control Plan (WQCP) requirements and post-1992 obligations under the Endangered Species Act (ESA). This decision also addresses modifications of CVP

[1] The (b)(2) litigation involves a challenge to Interior's implementation of (b)(2) pursuant to the October 5, 1999 Final Decision and earlier decisions. The initial challenge to Interior's (b)(2) policy was initiated in 1997 when Interior released its "CVPIA Administrative Proposal, Management Section 3406(b)(2) Water (800,000 acre feet)". The litigation also addressed the "Interim Decision of Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act, released July 14, 1999 and the Final "Decision on Implementation of Section 3406(b)(2) of the Central Valley Project Improvement Act" issued October 5, 1999.

operations, banking of (b)(2) water and shortage criteria. In addition, Interior addresses the coordinated implementation of (b)(2) with other CALFED agencies and with comparable tools for fishery improvements such as the EWA and ecosystem improvement actions.

Despite the fact that the CVPIA was enacted ten years ago, many of the purposes and goals of the CVPIA, including the doubling of anadromous fish populations in Central Valley Rivers and streams, have yet to be realized. In order to fulfill these goals, Interior will ensure that water dedicated and managed under (b)(2), in conjunction with other tools, is used to achieve measurable benefits within the bounds of scientific knowledge. Interior recognizes a need for the annual accounting and accountability. Interior will continually monitor fish and wildlife and habitat conditions to assess the biological results and effectiveness of use of (b)(2) water.[2] The assessment of decisions for dedication and management of (b)(2) water will be reported to Congress in the annual reports on CVPIA implementation and also annually to the CALFED agencies.

Interior provided a 30-day public comment period on the draft Revised Decision, dated December 18, 2002. Following issuance of the Revised Decision, Interior will continue to consult with the State of California on the Revised Decision and (b)(2) implementation.

I. CALCULATION OF YIELD

Attachment 1 to Interior's October 5, 1999 Final Decision, entitled "Calculation of Central Valley Project Yield for Section 3406(b)(2) of the Central Valley Project Improvement Act", describes the calculation of CVP yield for purposes of (b)(2). In summary, the calculation set out in Attachment 1 of the October 5, 1999 Final Decision is based on the average delivery capability of the Project during the 1928-1934 period, adjusted to reflect requirements in effect on the date of CVPIA enactment (October 30, 1992). The CVP yield as calculated for (b)(2) purposes is 5,990,000 acre-feet.[3] As noted above, this calculation of yield was upheld by the District Court in the (b)(2) litigation.

II. PROCESS AND ACCOUNTING

The accounting methods and procedures set out in this Decision explain how Interior will account for the 800,000 acre-feet annually dedicated and managed. Interior has developed this accounting method to simplify and clarify the process for (b)(2) accounting that was previously

[2] Interior will conduct this monitoring through the various monitoring programs established prior to and since CVPIA, such as Interagency Ecological Program.

[3] The yield is slightly greater than the yield identified in the October 5, 1999 decision and reflects a revision in the modeling as ordered by the District Court on March 13, 2000 to use the D-893 flows at Nimbus.

described in the October 5,1999 Final Decision. Through this Decision, Interior seeks to incorporate this ecosystem improvement tool with the other tools and requirements related to ecosystem improvement in the Bay-Delta and its watershed in a more easily understandable manner.

A. Accounting Period. The accounting period for determining the use of the annual (b)(2) allocation will be October 1 through September 30.

Explanation: The water year October 1 through September 30 begins with the onset of the yearly precipitation season and is the same water year that has traditionally been used at irrigation projects throughout the West. (See U.S. Geological Survey Circular 1123, 1995). The District Court upheld Interior's use of the water year as the accounting period for determining the use of CVP yield dedicated pursuant to (b)(2).

Interior selected the October 1 through September 30 accounting period because it is consistent with the life cycle of most of the salmon and steelhead that spawn in Central Valley rivers and streams, it contributes to meeting the Anadromous Fish Restoration Program (AFRP) doubling goals, and it promotes the efficient use of the 800,000 acre-feet for the primary purpose of implementing the fish, wildlife, and habitat restoration measures authorized by the CVPIA. The flow-related fishery actions specified by the Service pursuant to Section 3406(b)(2)(B) in the fall and early winter target the spawning period for salmon and steelhead. The salmon and steelhead lay their eggs in gravel nests called redds, where the eggs incubate and then hatch after approximately two months. After the eggs hatch and the salmonid fry emerge from the gravel, the fishery actions target the rearing habitat for the juvenile life stage during the winter and early spring. Finally, during April through June, the fishery actions target the emigration habitat for juvenile salmon as they migrate downstream, through the Delta and to the ocean. The spring fishery actions also benefit resident estuarine fish. As described above, the Central Valley salmon and steelhead "planting and growing season" (i.e., spawning, incubation and rearing) generally begins in CVP streams in October and November.

The accounting period of October 1 through September 30 allows the Service to specify late winter and spring fishery actions with a more complete knowledge of the year's salmon and steelhead spawning population, actual and forecasted hydrology and the amount of CVP yield actually used for the fall and early winter actions. Consequently, this will result in fishery actions that make the most accurate and effective use of the 800,000 acre-feet. In order to ensure that sufficient (b)(2) water is maintained throughout the accounting period, the Service will target using approximately 200,000 acre feet of (b)(2) water in October through January for fishery purposes. This target is not a cap, and may vary from year to year depending on fishery needs. However, in the event that the amount of (b)(2) dedicated in the October through January period is projected to exceed 200,000 acre-feet, the Service and Reclamation will confer to determine the best course of action, taking into account the fisheries' needs and the projected and/or realized WQCP/ESA costs for the accounting year. The final determination to exceed 200,000

acre-feet prior to February 1 in any year will require written concurrence of both the Manager of the Service's California Nevada Operations Office and the Director of Reclamation's Mid-Pacific Region to allow for proper planning and coordination with project operations.

B. Accounting Methodology.

The appropriate accounting methodology for the dedication and management of (b)(2) water is based upon how and where the water is used. Interior's new methodology for accounting for (b)(2) will involve only two measurement methods, or metrics, to account for how the water is managed under (b)(2). The two metrics used will be upstream releases and Delta exports. Measurement of water banked, transferred or exchanged will be accounted as set out in section IV.

Explanation: The CVPIA specifies that (b)(2) water is to be used "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 to 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" (Section 3406 (b)(2)). Interior will account for the total amount of CVP water costs associated with meeting the WQCP obligations against the annual (b)(2) allocation remaining at the time the cost is incurred.[4] Similarly, Interior will account for the costs of meeting the CVP's ESA obligations that have been or may be legally imposed after enactment of CVPIA against the annual (b)(2) allocation remaining at the time the cost is incurred.

1. Upstream Actions – October 1 through September 30.

a. Accounting Methodology: Upstream fishery actions from October 1 through September 30 will be accounted as the increase in releases from upstream reservoirs[5] with the fishery actions, compared to releases from the reservoirs that would have resulted from baseline CVP operations[6] during the same period without the fishery actions. The calculation of increase in release with the fishery measures will be based on daily changes in releases resulting from the (b)(2)

[4] In 1995, the State Water Resource Control Board issued its WQCP for the Delta. The CVP and State Water Project are responsible for meeting the flow related objectives contained in the 1995 Delta WQCP.

[5] Releases from Trinity Reservoir for Trinity River flows pursuant to 3406(b)(23) of the CVPIA are excluded from the accounting under this provision. Releases to the river from Whiskeytown Dam, Keswick Dam, Nimbus Dam and Goodwin Dam comprise the basis for this metric.

[6] Interior is currently using the pre-1992 base CVP operations with D-1485 water quality obligations as the baseline CVP operation. The pre-1992 base includes the 1992 Winter Run Chinook Salmon Biological Opinion and other licenses and permits as construed at that time.

measures prescribed by the Service, accumulated over the period.

Explanation: The metric for upstream actions from October through September (releases from upstream reservoirs) reflects the amount of the annual (b)(2) allocation dedicated to (b)(2) purposes through those actions.[7]

b. Upstream Releases may Flow through Delta: If specified by Interior, based on a written assessment of biological benefits to the fishery from the Service, steps will be pursued under California law to allow upstream releases to flow through the Delta. Upstream releases specified to flow through the Delta would be accounted for solely under this provision, and not as Delta actions.

Explanation: Releases from upstream storage may benefit juvenile anadromous fish in their downstream migration to move safely through the Delta into saline water. This provision will permit the upstream releases to assist in the downstream migration when such actions are needed. To accomplish the action, releases specified to flow through the Delta must be excluded from the calculation of the export/inflow ratio necessary to meet WQCP requirements to allow for the full benefit of the outflow through the Delta. This will necessitate coordination with the State of California for project operations in the Delta. If Interior determines the release is needed for Delta outflow, Reclamation will take steps pursuant to their water rights, to protect the specified flows.

If Interior does not specify that the release is needed for Delta outflow, it is available for recapture and reuse pursuant to provisions of the Coordinated Operations Agreement and Environmental Water Account Operating Principles, including use for export south of the Delta. Water released solely for an upstream fishery action under this Section II.B.1b is not available for banking, transfer or exchange under section IV and shall be accounted solely under this section. On the other hand, water released under Section II.B.1a may be banked, transferred or exchanged if the water is identified for banking, transfer, or exchange before it is released. Such releases will be accounted for solely under the applicable provisions of Section IV.

2. Delta Actions that affect Exports – October 1 through September 30

a. Accounting Methodology: Delta actions that affect exports will be accounted throughout the water year as the reduction in exports from the Delta resulting from the prescribed fishery actions. Any export reductions prescribed by the Service below the baseline operation will be accounted as (b)(2) actions.[8] The

[7] Agreements for flows at Clear Creek, Butte Creek and other streams provide for (b)(2) water as a backstop and therefore may require increased releases that will be accounted under this metric.

[8] This metric does not preclude use of the Environmental Water Account (EWA) to allow for export reductions in the Delta. Any export reduction compensated by EWA will not be accounted for as a (b)(2) action.

calculation of decrease in Delta exports with the fishery measures will be based on daily changes in Delta exports resulting from the (b)(2) measures prescribed by the Service, accumulated over the period.

Explanation: This metric applies only to those actions in and upstream of the Delta that affect exports. The metric of export reduction for such Delta measures was selected because it is the most accurate indicator of use of the annual (b)(2) allocation in the Delta. Actions designed to affect conditions in the Delta that entail increased releases from upstream reservoirs will be accounted using the upstream metric. Other fish and wildlife actions upstream that do cause exports to be reduced compared to CVP baseline operations will be accounted using the export metric.

b. Limitation on Delta Actions- February 1 through August 31: During the period February 1 through August 31 (the "low point" for CVP storage in San Luis Reservoir), (b)(2) prescriptions for export reductions will be limited to a maximum of 640,000 acre-feet (80 percent of 800,000 acre-feet of (b)(2) water). This maximum amount will be reduced to 80 percent of the amount of (b)(2) water available when the (b)(2) account is shorted in accordance with the shortage criteria set out in Section VI below.[9]

Explanation: This provision is intended to manage impacts to deliveries south of the Delta prior to the San Luis Reservoir low point in late August. The provision is based on an 80%-20% ratio of unconstrained water supply capability before and after the low point. Under unconstrained conditions, the pumping and storage capability of the Project can provide 80 percent of the annual water supply prior to August 31 (the San Luis Reservoir low point) and 20 percent following low point. Interior will apply that same constraint on its designation of (b)(2) measures affecting export south of the Delta. The CVPIA provides that the 800,000 acre-feet dedicated under (b)(2) may be reduced based on hydrologic conditions. If the amount of (b)(2) water available in any year is reduced pursuant to the Shortage Criteria set forth in Section VI, the maximum amount of (b)(2) available for use in the Delta during this time period will be correspondingly reduced.

C. Accounting Process

To assist Interior in implementing the methodology and (b)(2) policy set forth in this Decision, Interior has established a B2 Interagency Team (B2IT). This interagency team of project operators and project and resource agency biologists currently consists of representatives from the California Department of Water Resources (DWR), the California Department of Fish and Game (DFG), Reclamation, the Service, and the National Marine Fisheries Service (NOAA

[9] Nothing in this section is intended to limit CVP compliance with WQCP and ESA obligations as described in Section V.

Fisheries). The coordination of the (b)(2) fish actions with the implementation of the EWA occurs at EWA Team and Water Operations Management Team (WOMT) meetings, which also include representatives from DWR, DFG, Reclamation, Service and NOAA Fisheries.

To assist the Service in developing the annual actions to dedicate and manage the (b)(2) allocation, Interior will continue to utilize the stakeholder process described in Attachment 2 of the October 5, 1999 Final Decision. The stakeholder process will be used as an opportunity for the project operators and resource agencies to present and discuss information and seek input regarding the development of the annual (b)(2) fishery action plan and how the plan is integrated into the operations forecast. This will be accomplished through bi-annual workshops with all interested parties as described in Attachment 2 of the October 5, 1999 Final Decision.

The process for accounting is as follows:

1. **Reclamation's Forecast.** Reclamation will provide the Service a preliminary 12-month baseline forecast[10] of operations each month, beginning in October. Reclamation's objective is to develop each forecast by mid-month. The forecast will be based on the applicable CVP Operations Criteria and Plan (OCAP).

2. **Service Schedule.** Each month, beginning in October, the Service will submit to Reclamation an updated 12-month schedule for the proposed prescribed fishery measures, including proposed transfers, exchanges and banking. These measures will be adjusted at least monthly, as the season's hydrology evolves and CVP operations respond, and preliminary (b)(2) accounting becomes available, to stay within the target and retain sufficient (b)(2) water to implement desired measures, both in the Delta and upstream.

3. **Monthly and Final Accounting:** Reclamation and the Service will jointly develop an initial daily accounting of (b)(2) water prior to the 15th day of every month showing the current accounting for that accounting year as of the end of the previous month. A final accounting of the amount of (b)(2) water used for actions during the October-January period will be completed by March 25 of each year. Final accounting for all (b)(2) actions during the February-September period will be calculated by November 15.

Interior recognizes that this process for accounting for (b)(2) actions is very time consuming and resource intensive. Interior therefore is reviewing the accounting process to determine possible methods for streamlining the process.

[10] In most months (generally October-May), Reclamation provides both the 90 percent and 50 percent exceedance forecasts to the Service for developing potential fish actions.

III. MODIFICATION OF CVP OPERATIONS

Interior may modify CVP operations in accordance with CVPIA Section 3406(b)(1) to provide flows of suitable quality, quantity, and timing, including timing of exports, for fishery purposes. Determinations on whether to modify CVP operations will be made on a case-by-case basis and will only occur with the concurrence of both the Service and Reclamation. Modification of operations, or reoperation, will occur only after a determination is made that there is no conflict with the fulfillment of the Secretary's remaining contractual obligations to provide CVP water for other authorized purposes. This means that, at the time when an action is requested, Reclamation must know that it has the resources to take compensating actions with no identified impact or foreseeable risk of impact to the Secretary's remaining contractual obligations to provide CVP water for other authorized purposes. An additional factor that will be considered when determining whether it is appropriate to modify operations is whether corresponding actions can be taken close in time to the initial reoperation.

IV. WATER BANKING AND TRANSFER/EXCHANGES OF WATER

Interior has discretion to determine whether to bank (b)(2) water. This discretion was affirmed in the October 19, 2001 District Court decision. Interior plans to develop a banking policy at some point in the future, subject to the criteria outlined below.

A. Banking: Subject to section IV.C below, the Service may request that (b)(2) water be banked in CVP or non-CVP facilities for fish and wildlife purposes. Any amount banked within the reservoir of origin will be accounted as (b)(2) water on a one-to-one basis at the time it is banked. Any water banked elsewhere shall be accounted on a one-to-one basis only once, at the time it is released from the reservoir of origin. Any banked water shall be accounted solely under this provision, regardless of the time of storage or release. The amount banked will not be included for any purpose in the accounting of (b)(2) water under II.B.1 or II.B.2, above.

B. Transfers to or exchanges with other water users: Subject to section IV.C below, the Service may request that (b)(2) water be transferred or exchanged from upstream CVP reservoirs to or with other CVP water users or non-CVP water users during any part of the water year to accomplish (b)(2) purposes. Any amount transferred or exchanged shall be accounted as (b)(2) water on a one-to-one basis as released from the reservoir of origin, and shall be accounted solely under this provision. The Service may request transfer or exchange of (b)(2) water from San Luis Reservoir only to the extent that it has delivered (b)(2) water to that reservoir. The amount transferred or exchanged will not be included for any purpose in the computation of (b)(2) water under II.B.1 or II.B.2.

C. Limitations: The costs of any banking, storage, diversion or delivery (applicable

cost of service rate) necessary to carry out the banking, transfers, and exchanges under this section, including carriage water losses, storage losses, conveyance losses and/or other costs normally incurred with a transfer, exchange, or banking, will be arranged by Interior. Any accomplishment of a transfer, exchange, or banking of water will be dependent upon the capability of the conveyance and/or storage facilities involved. Water transfers, exchanges or banking must comply with state water law and include appropriate environmental documentation. Priority of access to storage or conveyance capacity must be arranged by Interior before the time of the transfer, exchange, or banking transaction. The transfer, exchange, and/or banking of (b)(2) water cannot interfere with the storage, diversion, or delivery of water for other purposes of the CVP.

V. WATER TO MEET WQCP/ESA OBLIGATIONS

Interior will continue to fulfill the commitment to meet the 1995 Bay-Delta WQCP obligations (SWRCB D1641). These costs will be accounted as the increase in releases and decrease in exports, compared to releases and exports that would have resulted from simulated CVP baseline operations during the same period. The CVP will be operated in accordance with the WQCP obligations and ESA obligations. Interior will account for the total amount of CVP water costs associated with meeting the WQCP obligations and ESA obligations imposed after enactment of CVPIA against the annual (b)(2) allocation, up to the balance of (b)(2) water remaining at the time the cost is incurred.

VI. SHORTAGE CRITERIA

CVPIA Section 3406(b)(2)(C) provides: "The Secretary may temporarily reduce deliveries of the quantity of water dedicated . . . up to 25 percent of such total whenever reductions due to hydrologic circumstances are imposed upon agricultural deliveries of CVP water." Interior interprets this to mean that the amount of (b)(2) water available will be reduced when deliveries to CVP agricultural water service contractors north of the Delta are reduced because of hydrologic circumstances. Interior will use the State Water Resources Control Board's Sacramento Valley Water Year Hydrologic Classification (40-30-30 index) as an indicator of whether shortages to CVP north of the Delta agricultural service contractors are due to hydrologic circumstances. If the water year is considered critical or dry, any CVP north of the Delta agricultural water service contractor shortages will be deemed to be due to hydrological circumstances. In critical years, the amount of (b)(2) water available may be reduced by up to 25%, or 200,000 acre-feet. In dry years, the amount of (b)(2) water available may be reduced by up to 12.5%, or 100,000 acre-feet. The percentage by which (b)(2) water is reduced in any year will not be greater than the percentage reduction to CVP agricultural service contractors north of the Delta, based on hydrology. For the purposes of classifying the water year type and developing operation plans, the 90-percent exceedance hydrology will be used.

The formal shortages to (b)(2) water will be established on the same schedule as all CVP water service contractors, beginning in February of each water year. Interior will use the Sacramento Water Year Hydrologic Classification prepared by DWR based on February 1 hydrologic conditions and the allocation to the CVP north of the Delta agricultural water service contractors determined by Reclamation based on its February forecast of CVP water and power operations. If subsequent water year indices prepared in March, April or May indicate a change from a critical year to a dry year or a dry year to a below normal year, the shortage to (b)(2) water will be relaxed accordingly. If, based on update forecasts of CVP operations prepared in March, April and May, Reclamation increases allocation to CVP north of the Delta agricultural contractors to more than 75 percent, the corresponding change to the shortage to (b)(2) will be made. Because the conservative 90-percent exceedance hydrology will be used for determining water year indices and CVP allocations, increased shortages to (b)(2) water after the initial determination in February are not likely; however, under extremely dry conditions in the February through May period, a reduction of (b)(2) water is possible. As the first formal reductions of (b)(2) water will not occur until February, the amount of (b)(2) water actually used in the October-January period is dependent on fishery needs with consideration of current storage and hydrologic conditions.[11]

VII. COORDINATION

Interior recognizes that the implementation of Section 3406(b)(2) is important to many actions that are included in the CALFED Bay-Delta Program, and is particularly critical to the implementation of the Environmental Water Account (EWA), as well as to other actions involving operations that may be affected by this change to (b)(2) implementation. Interior will work with the CALFED Management Group and Policy Group, or their successors, to ensure that this Decision is coordinated with implementation of the CALFED Program.

Interior will use the B2IT, the EWA Team and the WOMT to coordinate the (b)(2) fishery action plan and (b)(2), (b)(1), (b)(3) and EWA operations with other operational programs or resource-related aspects of Project operations. The WOMT will coordinate with the CALFED Operations Group, a stakeholder forum. This coordination serves as an opportunity, in addition to the workshops described in Attachment 2 to the October 5, 1999 Final Decision, for stakeholders to interact with the project operators and resource agency staff. Project operators and resource agency staff will use this opportunity to update stakeholders on the progress of implementing provisions of this Decision and to receive input from individual stakeholder interests.

As mentioned above, the B2IT will also coordinate its actions with the EWA Team. Interior recognizes that there may be the need to revise existing EWA protocols or to develop new protocols to maintain the ESA commitments described in the CALFED Record of Decision. Interior will work with its EWA partners to ensure coordination of EWA with this policy.

[11] See Section II.A. above.

Section 3406(b)(2)(B) provides that the water dedicated under (b)(2) shall be managed pursuant to conditions specified by the Service after consultation with Reclamation and DWR and in cooperation with DFG. In addition, the Service, in managing for anadromous fish species, routinely coordinates and consults with NOAA Fisheries. It is Interior's intent to accomplish much of this coordination through participation and discussion with stakeholders and state and federal agencies in the B2IT and CALFED processes. Additional coordination with these and other agencies and stakeholders may also be necessary and will be carried out.

Interior's policy is that (b)(2) actions will not injure the State Water Project (SWP), operated by DWR. However, this policy does not extend to impacts to the SWP that result from its obligations under either the WQCP or the ESA.

Draft 10/18/2004

Report on Central Valley Project Improvement Act 3406(b)(3) Water Acquisitions for Environmental Purposes, 1994-2004

Section 3406(b)(3) of the Central Valley Project Improvement Act (CVPIA) of 1992 requires the Department of Interior to acquire water to supplement the Central Valley streamflows available for fish and wildlife. Interior has established the Water Acquisition Program to implement this provision. Interior's initial acquisitions in 1994 were to improve salmonid habitat in the spring and fall in the San Joaquin River and tributaries. In 1995 the Anadromous Fish Restoration Program (AFRP) developed flow objectives for Central Valley streams and in 1996 distributed Draft Guidelines for Allocation of Water Acquired Pursuant to Section 3406(b)(3) of the CVPIA. Since its initial acquisition in May 1994, until mid-fiscal year 2004, the Water Acquisition Program has spent approximately $53 million to temporarily increase streamflows in Battle Creek and in San Joaquin River tributaries to increase flows toward AFRP objectives without monetary cost to the Pacific Gas & Electric Company, to San Joaquin basin water purveyors, or to Central Valley Project contractors.

Of the approximate $53 million spent on environmental water acquisitions from Fiscal Years 1994 to 2004, about $38 million was paid to water districts on the Merced, Tuolumne, and Stanislaus Rivers under the 1999 San Joaquin River Agreement as insurance that they would operate their projects to release moderate amounts of water in the spring and fall for the Vernalis Adaptive Management Plan (VAMP) and to aid chinook salmon survival in the San Joaquin River basin and past the State and Federal pumps near Tracy in the southeast Sacramento-San Joaquin Delta . The total volume of water provided for these purposes was about 635,000 acre-feet (Table 1).

Approximately $5.6 million of total expenditures went for approximately 150,000 AF of pre-San Joaquin River Agreement flows from the Merced and Tuolumne Rivers in 1994 and 1997, most of it from the Merced Irrigation District. The acquired flow was intended to reduce adult Chinook salmon straying, improve adult salmon migration conditions, increase survival of juveniles migrating past the Delta pumps, and to reduce fish losses caused by diversion to storage in the tributaries.

Approximately $5.4 million was used to buy about 148,000 AF of Stanislaus River water from the Oakdale Irrigation District and South San Joaquin Irrigation District in 1994, 1995, 1997, and 1998 to increase juvenile salmon survival in the Stanislaus River and during their migration past the Delta pumps. Included in the purchase was 50,000 AF intended to augment low flows during the chinook salmon spawning, rearing, and emigration period, and lost when New Melones Dam filled and spilled in the wet winter of 1998.

About $1,800,000 was paid to the Pacific Gas and Electric Company (PG&E) from 1995 through February 2001 to increase streamflow in certain reaches of Battle Creek by bypassing power production. About 87,000 AF were left in the creek rather than diverted to powerhouses during this period. This ensured minimal flows of 30 cubic feet per second (cfs) in South Fork and North Fork Battle Creek during dry periods when flows could otherwise drop to the minimum 5 and 3 cfs required by PG&E's Federal Energy Regulatory Commission license number 1121.

None of the water acquired under Section 3406(b)(3) or released for VAMP was used consumptively. The San Joaquin basin acquisitions were protected as instream flow only to Vernalis, upstream of the State and Federal export pumps, and the Battle Creek water merely changed uses within the creek. Once it reached Vernalis or the Sacramento River, all the water acquired for stream flows was considered abandoned and could be exported if conditions permitted.

The San Joaquin River Agreement and VAMP

The major emphasis of the 3406(b)(3) Water Acquisition Program has been to support the San Joaquin River Agreement. This is an arrangement between various State and Federal agencies and water districts that provides for payment from the CVPIA Restoration Fund and State funds to water-rights holders on the Stanislaus, Tuolumne, and Merced Rivers to provide water for a 12-year period, avoiding the potential court challenges that were expected if the California State Water Resources Control Board required increased upstream releases for meeting Water Quality Control Plan (D-1641) protection for the Delta.

Part of the San Joaquin River Agreement is the Vernalis Adaptive Management Plan (VAMP), a 12-year study of the relationship between San Joaquin River flows, exports at the State and Federal Delta pumps, the Head of Old River flow-control barrier near the pumps, and the survival of juvenile San Joaquin River Chinook salmon. Annually, Interior pays $4,000,000 for VAMP, escalated each January by the CPI-U index, under Section 3406(g) of the CVPIA, and the State of California reimburses Interior $1,334,000 as part of their CVPIA cost share. Payments go to water districts on the tributaries to ensure that under certain conditions up to 110,000 AF will be provided from the tributaries in April and May to partially replace the spring snow-melt runoff that the districts and the Central Valley Project divert to storage during years of normal or below normal precipitation. Because the basic agreement is capped at 110,000 AF, up to an additional $2.8 million in Federal expenditures may be required to buy more water from the districts to reach the flows proposed for this evaluation.

Although maximum acquisitions under VAMP could rise to about 157,000 AF, they have ranged from approximately 33,000 AF to 147,000 AF. In addition, the San Joaquin River Agreement provides for total yearly payments of about $1,650,000, escalated annually by the CPI-U index, for 27,500 acre-feet from the Merced Irrigation District and Oakdale Irrigation District made available in the fall of each year. This water has been used to raise flows in the Merced and Stanislaus rivers to improve upstream migration of adult salmon and increase available salmon spawning and egg incubation habitat.

The VAMP evaluation involves tagging juvenile hatchery salmon and evaluating the effects on their survival under the different flow and export patterns that will occur over the 12 years of the study, which just completed its sixth year. The increased flows released from the upstream diverters are expected to improve survival through the part of the migration path where fish may be drawn toward the Delta export pumps.

Preliminary results are provided annually, and final findings will be available at the study's end.

Pre-VAMP San Joaquin River Acquisitions

Prior to the San Joaquin River Agreement, the Water Acquisition Program acquired water in the San Joaquin River drainage, starting with about 28,450 AF from the Merced Irrigation District and about 15,000 AF from Oakdale and South San Joaquin Irrigation districts in 1994. Approximately, 33,000 AF was acquired from the Oakdale Irrigation District and South San Joaquin Irrigation District in 1995. No water was acquired in 1996. In 1997 spring flows similar to the VAMP evaluation flows were acquired from the Merced Irrigation District, Modesto Irrigation District, San Joaquin River Exchange Contractors, Oakdale Irrigation District and South San Joaquin Irrigation District. The contract with Oakdale and South San Joaquin irrigation districts was 50,000 acre-feet to be used in 1997 and 50,000 AF in 1998. Because 1998 turned out to be an extremely wet year, 50,000 AF of the previously-acquired water was not needed for flow augmentation. It was lost when New Melones Reservoir, where it was stored, filled and spilled in the winter of 1997-98. In addition to these purchases, the program processed a Calfed purchase of 50,000 acre-feet from Oakdale Irrigation District, which was released in the summer of 1999 to reduce Stanislaus River temperatures.

Effects of San Joaquin River Acquisitions

The direct effect of the flow acquisitions was to provide a minimal amount of water for fish and other aquatic animals and plants to live in for brief but possibly critical periods their life cycles. The particular target species of all these actions were Chinook salmon, although steelhead trout and other ecosystem components could also benefit from them.

Figure 1 San Joaquin River Tributaries

Chinook salmon returns to the San Joaquin system tend to fluctuate widely, in a pattern apparently resulting from the magnitude of spring flows in the year when the fish left the river as juveniles. There is a correlation between spring flows in the lower San Joaquin River during the juvenile salmon emigration period and adult salmon returns to the San Joaquin tributaries two and a half years later, with higher flows resulting in higher returns. Figure 2 is a rough indication of this, showing estimated populations of naturally-spawning San Joaquin River salmon from 1967 to 2003, which included dry periods in the 1970's and from the late 1980's to the early 1990's.

As can be seen in Figure 2, the spawning populations have recently started to climb from very low levels during the dry period from 1987 to 1994 to ten and more times as many during the wetter years that followed. Although it was at times far overshadowed by natural flows, acquired San Joaquin River tributary water contributed to the more hospitable conditions for fish during these later years, and contributed to the increased fish production.

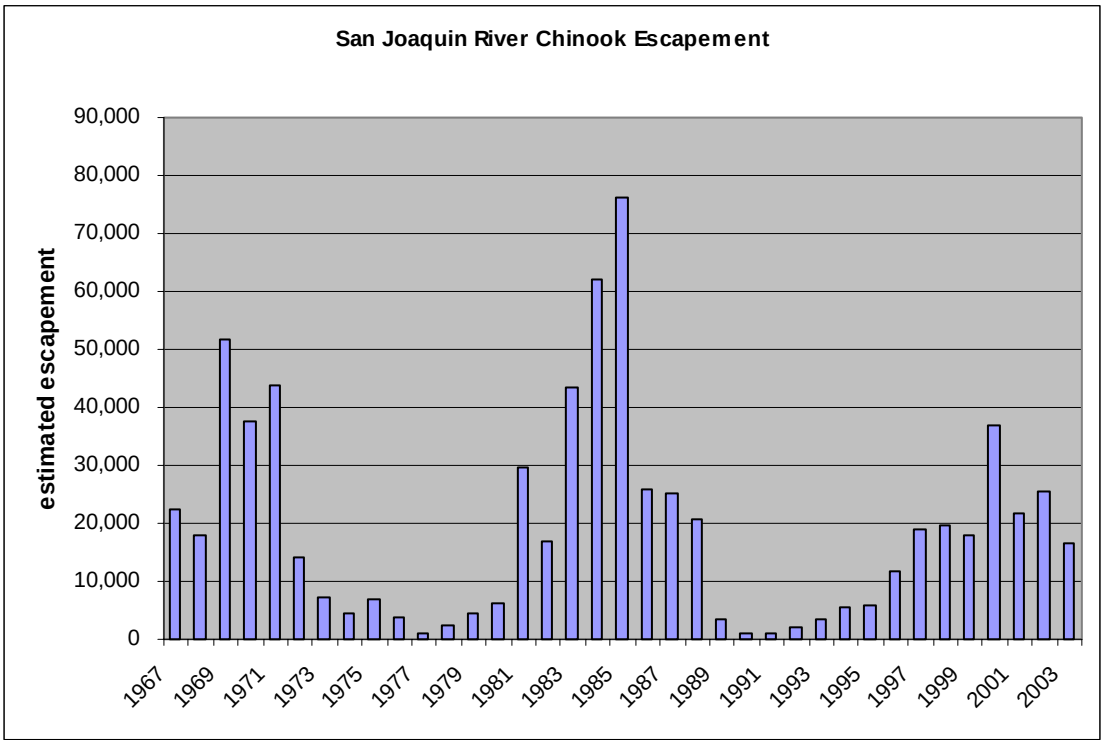


Figure 2 Estimated San Joaquin River Chinook Salmon Escapement, 1967-2003

Figure 3

Evaluating the effect of flows and exports through the area of the export facilities with the Head of Old River barrier in place, while providing a level of fish protection is the primary purpose of the VAMP, and definitive results are hoped for at the end of the program period. The evaluation is built around estimation of the mortality of tagged hatchery Chinook salmon in the area of the pumps, to be used as an index to compare various spring flow and export levels. As noted above, it is expected that by the end of

the experimental period enough data will have been collected to develop a formally statistical evaluation of Central Valley Project and State Water Project operational effects on south Delta fisheries.

Evaluating the effects of the acquired flows in the rivers where they originate, the Merced the Tuolumne, and the Stanislaus is being carried out through expansion of fisheries investigations on the rivers. Figures 3, 4, and 5 indicate that the spawning populations in these San Joaquin tributaries are also increasing from the low levels observed during the 1987-1994 dry period. Until recently, the effects of flows in the tributaries have been gauged largely by evaluations with tagged hatchery fish, which necessarily focuses on the few days of a salmon's life history when it is actively migrating toward the Delta. A much more comprehensive study has been developed for the Merced River, and a plan for the Stanislaus River is in planning stages. The ultimate goal of in-river studies is to determine how periods of high flow have resulted in higher salmon populations, so that the relatively small volumes that can be acquired may be used more effectively.

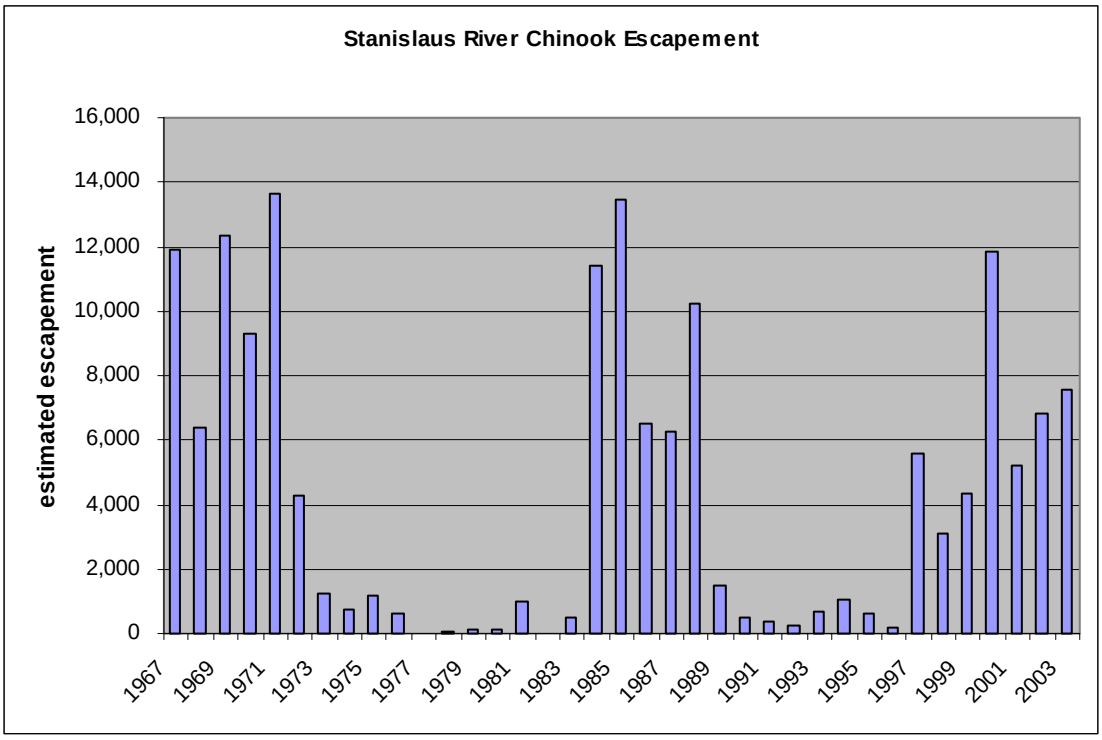


Figure 4 Estimated Stanislaus River Chinook Salmon Escapement, 1967-2003

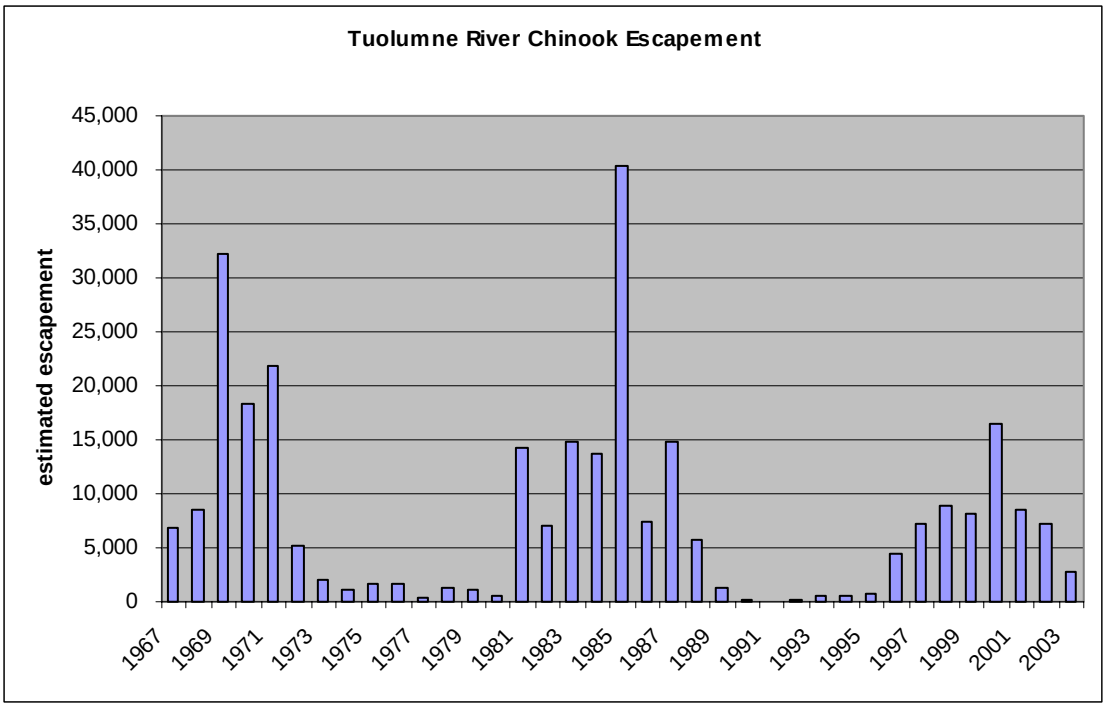


Figure 5 Estimated Tuolumne River Chinook Salmon Escapement, 1967-2003

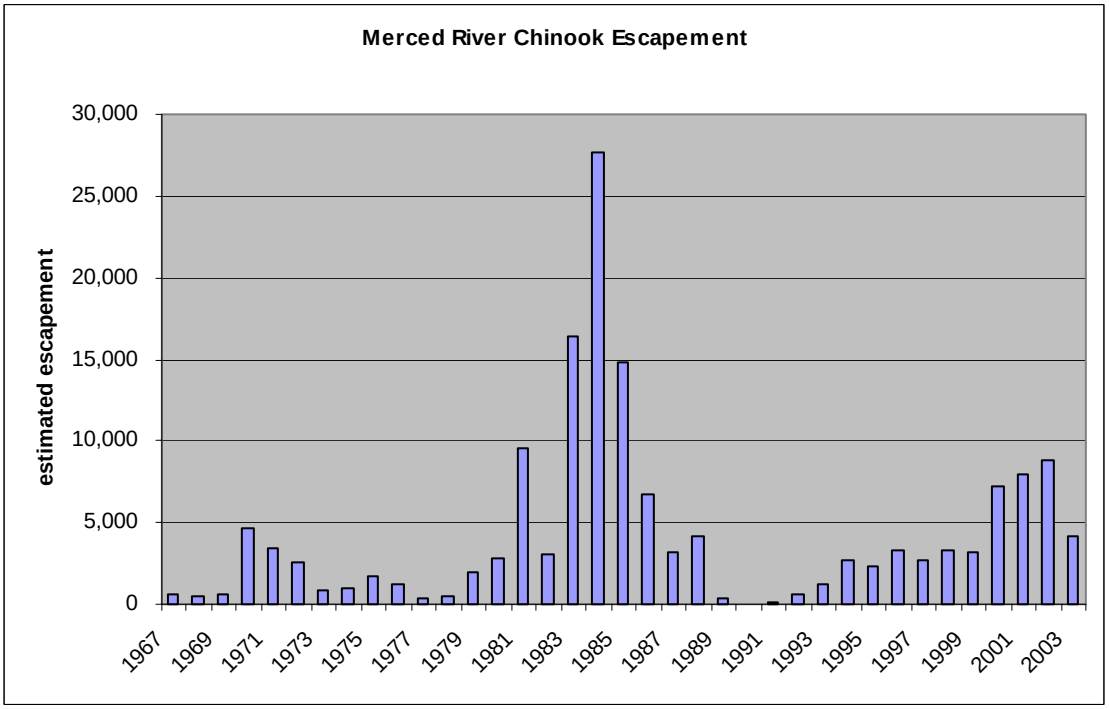


Figure 6 Estimated Merced River Chinook Salmon Escapement, 1967-2003

Increased Flows and Power Generation Foregone on Battle Creek

Under its 1976 Federal Energy Regulatory Commission license number 1121 for power generation on Battle Creek, the Pacific Gas & Electric Company is required to release a minimum of 3 cfs at Eagle Canyon Dam, which is the upper boundary for Chinook salmon and steelhead on the North Fork, and 5 cfs to the salmon spawning and rearing area below Inskip Powerhouse and the Coleman Diversion on the South Fork. These minimum required flows, which by themselves are inadequate for salmon spawning and rearing, are usually met without acquisition from late fall to spring, because natural flows exceed powerhouse diversion capacities. In drier summer and fall periods, however, power

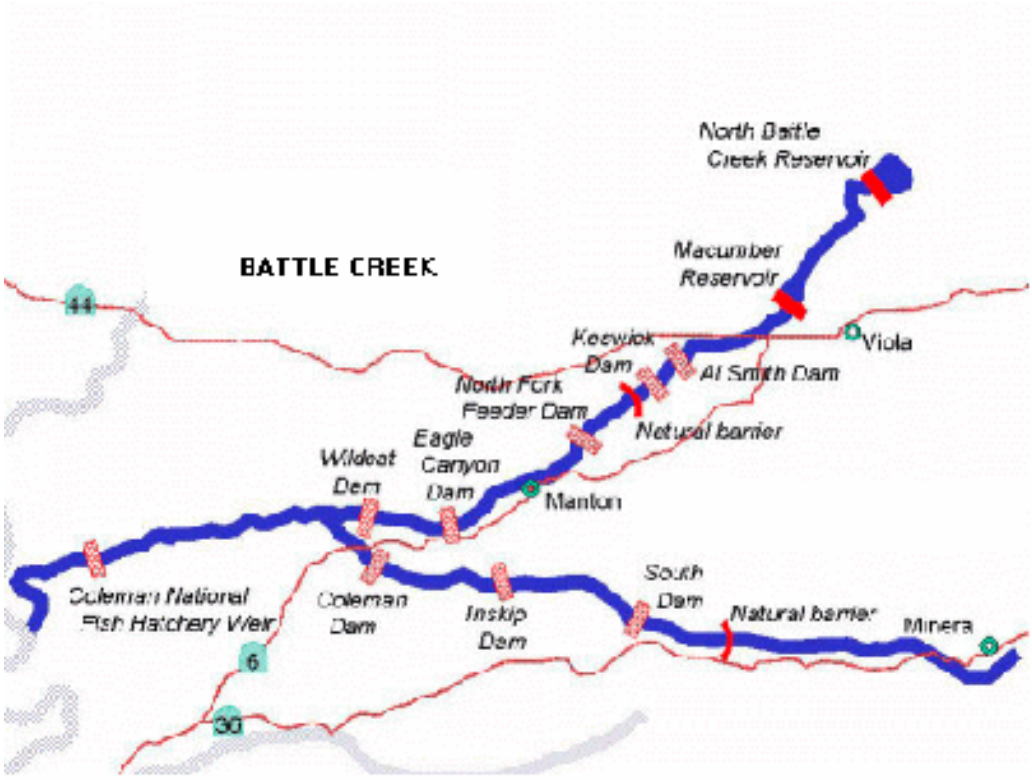


Figure 7 Battle Creek Map Showing Dams and Barriers

developments have the capacity to divert all natural flow, leaving only the minimum flows, which would make the creek unsuitable for the natural runs of spring-run Chinook, fall-run Chinook, and steelhead that used it historically. There is also some evidence for a historical run of winter-run Chinook in Battle Creek, and resource managers are hoping to establish them in the North Fork, which would be impossible at the current required minimum flows.

From 1995 to 2001 the Water Acquisition Program paid the Pacific Gas & Electric Company for the power-generation value of water to provide increased summer and fall flows for Chinook salmon and steelhead habitat, including lower water temperatures. Table 1 includes the flow volumes added to the South Fork downstream from Coleman Diversion and the North Fork downstream from Eagle Canyon Diversion, and their costs. After 2001, Calfed assumed responsibility for flows in Battle Creek.

The program is managed to maintain flows of at least 30 cfs in the South Fork and 30 cfs in the North Fork of Battle Creek. When curtailment of power diversions is necessary to do this, the Pacific Gas & Electric Company provides the first 12.5 cfs at no cost, and if more water is needed the company is paid for power foregone. At times when no payments are shown in the table between 1997 and 2001, either the flow deficit was under 12.5 cfs or natural flows were over 30 cfs even with power diversions.

The goal of the increased flow is modest– to help the remnant populations of steelhead trout and spring-run Chinook salmon survive until the main features of the Battle Creek restoration program being implemented by Calfed are completed. This will include removal of several dams and maintenance of higher minimum instream flows.

Acquiring these flows guaranteed that at least a minimal amount of water would be in Battle Creek during the summer and fall to increase habitat for steelhead trout and spring and fall-run Chinook salmon. Exactly what effect this had on fish populations or production is unknown, and since few data are available on spring-run Chinook or steelhead in North Fork or South Fork Battle Creek, no direct production comparisons can be made.

Recently, however, counts have been made of unmarked and thus naturally reproducing steelhead passing the hatchery diversion dam and proceeding upstream. This has been possible only since 2001, because that was the first year when most returning hatchery steelhead could be assumed to have been marked since the start of a universal steelhead marking program in 1999. In 2001, an estimated 131 natural steelhead ascended Battle Creek between October and the beginning of March. In 2002, an estimated 323 passed the diversion dam. Other available preliminary data at the diversion dam indicate that about 40 possible spring-run or winter-run Chinook may have ascended Battle Creek in 2000, judging primarily by their period of migration between the end of March and mid-July.

These data indicate that Battle Creek steelhead trout and spring Chinook runs, while marginal, are being maintained. The degree to which their continued existence is attributable to the water added by payment for power foregone cannot be estimated with the existing record. However, since both steelhead and spring-run Chinook must at some life-stage spend summer and early fall in the creek, the effect must be substantial if the acquired minimum of 30 cfs in each fork is compared to the 3 cfs and 5 cfs minimum flows.

Discussion

The flows acquired on San Joaquin River tributaries and on Battle Creek were small compared to natural streamflows, and cannot be guaranteed to provide conditions that would cause fish to thrive. For example, the mid-April to mid-May Vernalis flow volume that can be added under the San Joaquin River Agreement ranges from zero to about 157,000 AF. According to California Department of Water Resources estimates, the average unimpaired volume at Vernalis is 918,000 AF in April and 1,440,000 AF in May, so the additional water, relative to natural conditions, does not appear to guarantee long-term ecological health. The highest acquisition program-aided VAMP flows are about equal to the lowest natural unimpaired flows estimated. However, the acquisitions from 1999 to 2004 increased *regulated* base flows at Vernalis by 25 to 50%, i.e., from about 4,600 cfs to 6,900 cfs in 1999, from about 4,800 cfs to 5,900 cfs in 2000, from about 2,900 cfs to 4,200 cfs in 2001, from about 2,700 cfs to 3,200 cfs in the dry spring of 2002, from 2,300 cfs to 3,200 cfs in 2003 and from 2,098 cfs to 3,155 cfs in 2004.

The Water Acquisition Program has concentrated on acquiring relatively large blocks of water offered for sale by San Joaquin basin water districts with large reservoirs and the ability to release water to the Delta. This has permitted increases in fall Chinook salmon spawning habitat, but has not re-created the very high spring flows that are required for the best-quality rearing and migration habitat in the spring. Acquired flows on the San Joaquin tributaries cannot be correctly characterized as restorative. This is particularly true in the case of the San Joaquin River Agreement flows, which are intended as a tool to enable scientific investigations that will be useful in setting permanent flow standards while providing an interim level of protection for fish and other components of the Bay-Delta ecosystem.

It has so far been difficult to acquire water rights to guarantee long-term instream flows. Aside from the major irrigation districts with storage facilities, water ownership tends to consist of a patchwork of small growing-season diversion rights, often controlled by court-appointed water-masters. The main long-term acquisitions that have been considered, small water rights on Butte Creek and Mill Creek, have been impeded by political and procedural delays, which include the need for technical determinations that the water is available on these adjudicated streams, and appraisal of the water's value under Department of the Interior acquisition procedures.

Smaller acquisitions on smaller streams, if it were possible to obtain them, might be the best investment of the Water Acquisition Program. As an example, under the dedicated fishery water provision of the Central Valley Project Improvement Act, Section 3406(b)(2), adequate water was available in Central Valley Project facilities on Clear Creek to double and triple its flows from 50-100 cfs to 150-200 cfs starting in 1995, changing it from a consistently low-flow stream that sporadically produced a few Chinook salmon in wet years to a productive although artificially-controlled salmon stream that is adding thousands of adult salmonids to its spawning population and perhaps millions of juvenile salmon and steelhead trout to the Sacramento River (Figure 7). If ways could be found to combine existing diversions and increase flows on a

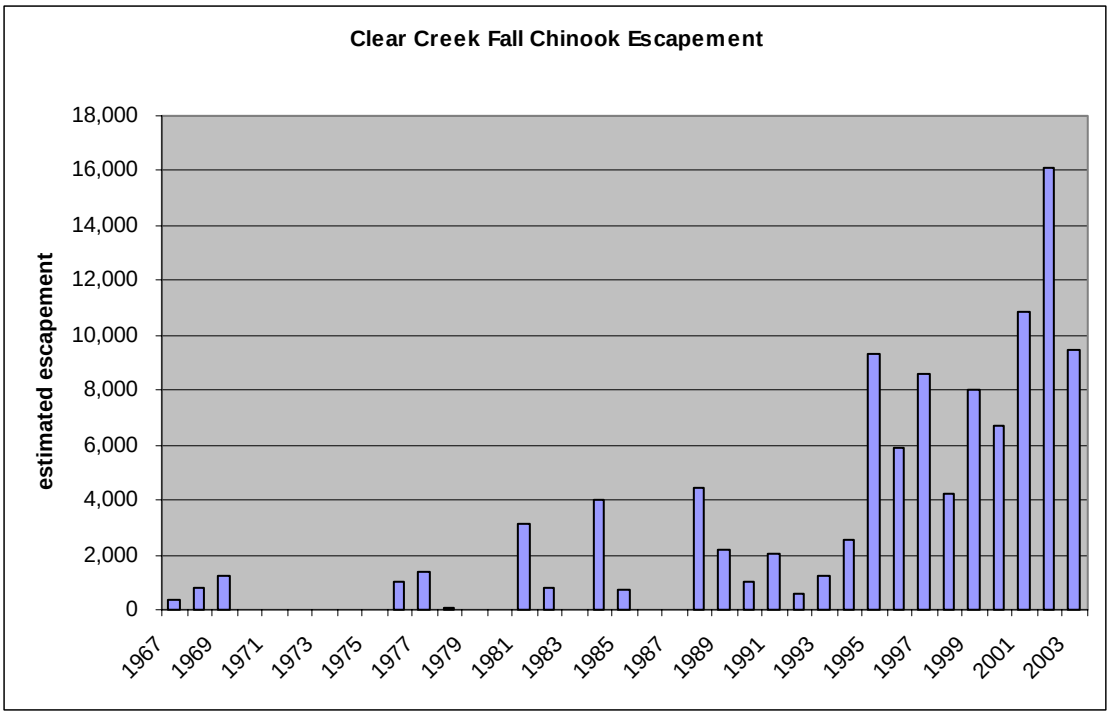


Figure 8 Clear Creek Chinook Salmon Escapement, 1967-2003

number of other Sacramento River tributaries, similar substantial increases in salmon production might be obtainable.

The case of Clear Creek shows that the relatively small amounts of water that can be acquired might be more productive in upstream tributaries, where it would have a proportionally greater effect on habitat, and could produce fish where few are now produced. The greatest drawback to this approach is the complex problem of assembling enough small diversion rights to make a difference, in streams such as Cow Creek, Butte Creek and the Cosumnes River. The Water Acquisition Program should pursue long-term purchases of water rights on smaller streams, and continue coordinating with Calfed to provide water to improve flows in Battle Creek in coordination with the Pacific Gas and Electric Company. The program should investigate improving flows through bypassing power production on other small salmonid streams with hydropower facilities. The acquisitions on the San Joaquin tributaries should continue to be evaluated pursuant to VAMP. Finally, additional acquisitions in the fall may contribute to improving salmonid spawning habitat consistent with the AFRP flow objectives.

TABLE I: SUPPLEMENTAL WATER ACQUISITION PROGRAM SUMMARY
FROM 1994 TO PRESENT
BY WATER YEAR

CONTRACTING ENTITY	TERM BEGIN	TERM THROUGH	CONTRACT QTY (af)	DELIVERED QTY (af)	PRICE (per af)	TOTAL COST	REMARKS
WATER YEAR 2004-2005							
San Joaquin River Group Authority	03/01/99	12/31/09	110,000	67,000	See Remarks	$4,384,785.74	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State will reimburse $1,334M per their cost share.
San Joaquin River Group Authority	03/01/99	12/31/09	26,000	15,000	$60.00	$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement. Includes 15,000 af plus af "difference" water. (Used FY03 funds)
San Joaquin River Group Authority	03/01/99	12/31/09	12,500	0	$0.00	$0.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
TOTAL (To Date)			**148,500**	**82,000**		**$5,284,785.74**	
WATER YEAR 2003-2004							
San Joaquin River Group Authority	03/01/99	12/31/09	110,000	58,065	See Remarks	$4,303,028.20	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State will reimburse $1,334M per their cost share.
San Joaquin River Group Authority	03/01/99	12/31/09	26,000	20,961	$60.00	$1,193,644.10	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement. Includes 15,000 af plus 5,961 af "difference" water. Actual cost was $1,257,660. (Used FY02 funds of $64,015.90)
San Joaquin River Group Authority	03/01/99	12/31/09	12,500	12,500	$64.55	$806,875.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement. (Used FY03 funds)
TOTAL			**148,500**	**91,526**		**$6,303,547.30**	
WATER YEAR 2002-2003							
San Joaquin River Group Authority	03/01/99	12/31/09	110,000	33,430	See Remarks	$4,202,176.00	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State reimbursed $1.334M per their cost share.
San Joaquin River Group Authority	03/01/99	12/31/09	26,000	22,205	$60.00	$1,332,300.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement. Includes 15,000 af plus 7,205 af "difference" water.
San Joaquin River Group Authority	03/01/99	12/31/09	12,500	12,470	$63.03	$785,984.10	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
TOTAL			**136,000**	**55,635**		**$5,534,476.00**	
WATER YEAR 2001-2002							
Pacific Gas & Electric Company	11/17/98	02/28/01	See Remarks	See Remarks	See Remarks	$512,214.24	Increased flows in Battle Creek. Payment is for electrical energy foregone due to decreased diversions from Battle Creek. Total paid under agreement - $1,112,214. Total af - 37,302
San Joaquin River Group Authority	03/01/99	12/31/09	110,000	78,650	See Remarks	$4,136,000.00	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State reimbursed $1.334M per their cost share.
San Joaquin River Group Authority	03/01/99	12/31/09	26,000	18,635	$60.00	$1,118,100.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement. Includes 15,000 af plus 3,635 af "difference" water.
San Joaquin River Group Authority	03/01/99	12/31/09	12,500	12,500	$62.04	$775,500.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
TOTAL			**148,500**	**109,785**		**$6,541,814.24**	
WATER YEAR 2000-2001							
San Joaquin River Group Authority	03/30/00	02/01/01	110,000	77,680	See Remarks	$4,000,000.00	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. State reimbursed $1.334M per their cost share.
San Joaquin River Group Authority	03/01/99	12/31/09	26,000	18,700	$60.00	$1,122,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement. Includes 15,000 af plus 3,700 af "difference" water.
San Joaquin River Group Authority	03/30/00	02/01/01	12,500	12,500	$61.32	$766,500.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
TOTAL			**148,500**	**108,880**		**$5,888,500.00**	
WATER YEAR 1999-2000							
Pacific Gas & Electric Company	11/17/98	02/28/00	See Remarks	See Remarks	See Remarks	$600,000.00	Increased flows in Battle Creek. Payment is for electrical energy foregone due to decreased diversions from Battle Creek.
San Joaquin River Group Authority	04/12/99	02/01/00	110,000	110,000	See Remarks	$4,000,000.00	Compensation for providing the VAMP pulse flow pursuant to the San Joaquin River Agreement. (State reimbursed $1.334M per their cost share.
San Joaquin River Group Authority	04/17/99	05/17/99	47,000	37,500	$60.00	$2,250,000.00	Acquisition to achieve the Double Step Target Flow

TABLE I: SUPPLEMENTAL WATER ACQUISITION PROGRAM SUMMARY
FROM 1994 TO PRESENT
BY WATER YEAR

CONTRACTING ENTITY	TERM BEGIN	TERM THROUGH	CONTRACT QTY (af)	DELIVERED QTY (af)	PRICE (per af)	TOTAL COST	REMARKS
San Joaquin River Group Authority	04/12/99	02/01/00	15,000	15,000	$60.00	$900,000.00	Water acquired from Oakdale ID pursuant to the San Joaquin River Agreement.
San Joaquin River Group Authority	04/12/99	02/01/00	12,500	11,998	$60.00	$719,880.00	Fall flows acquired from Merced ID pursuant to the San Joaquin River Agreement.
Oakdale & South San Joaquin Irrigation Districts	07/27/99	09/30/99	50,000	50,000	$60.00	$3,000,000.00	Improve emigration flows for juvenile chinook salmon and temperature conditions for juvenile steelhead
TOTAL			**234,500**	**224,498**		**$11,469,880.00**	
WATER YEAR 1998-1999							
Pacific Gas & Electric Company	06/10/96	02/28/98	See Remarks	See Remarks	See Remarks	$222,306.25	Increased flows in Battle Creek. Payment is for electrical energy foregone due to decreased diversions from Battle Creek. 06/10/96-12/31/96@ .0348/kWh 01/01/97-02/28/98@ .0384/kWh Total paid under agreement - $722,306.26 Total af - 49,267
Oakdale & South San Joaquin Irrigation Districts	04/29/97	09/30/98	50,000	50,000	$30.00	$1,500,000.00	Instream flows in the Stanislaus River
San Joaquin River Group Authority	03/31/98	12/31/98	42,500	30,000	$15.00	$450,000.00	Increase flows on the Merced, San Joaquin and Tuolumne Rivers
TOTAL			**92,500**	**80,000**		**$2,172,306.25**	
WATER YEAR 1997 - 1998							
Merced Irrigation District	10/01/96	02/28/98	25,000-100,000 (97)	45,332(Spr 97) 43,496(Fall 97) 2,157(Fall 97)	$15.00 $35.00 $50.00	$2,315,190.00	Instream flows in the Merced River. $15.00 per af (re-regulated releases), $35.00 per af (when some o all is from storage and not re-regulated releases), $50.00 per af (storage). Incl $5,000 to facilitate transfer.
Pacific Gas & Electric Company	06/10/96	02/28/98	See Remarks	See Remarks	See Remarks	$500,000.00	Increased flows in Battle Creek. Payment is for electrical energy foregone due to decreased diversions from Battle Creek. 06/10/96-12/31/96@ .0348/kWh 01/01/97-02/28/98@ .0384/kWh
Oakdale & South San Joaquin Irrigation Districts	04/29/97	09/30/98	50,000	50,000	$30.00	$1,500,000.00	Instream flows in the Stanislaus River
Modesto Irrigation District	05/12/97	05/31/97	5,000	4,998	$70.00	$349,860.00	Instream flows at Vernalis
San Joaquin River Exchange Contractors Water Authority	05/09/97	05/15/97	10,000	10,000	$70.00	$700,000.00	Instream flows at Vernalis
TOTAL			**90,000 - 165,000**	**90,985**		**$5,365,050.00**	
WATER YEAR 1996 - 1997							
Merced Irrigation District	10/01/96	02/28/98	20,000	16,161	$50.00	$808,050.00	Instream flows in the Merced River. $15.00 per af (re-regulated releases), $35.00 per af (when some o all is from storage and not re-regulated releases), $50.00 per af (storage).
TOTAL			**20,000**	**16,161**		**$808,050.00**	
WATER YEAR 1995 - 1996			**0**	**0**		**$0.00**	
TOTAL			**0**	**0**		**$0.00**	
WATER YEAR 1994 - 1995							
Merced Irrigation District	04/01/94	05/31/94	15,000	13,450	$50.00	$672,500.00	Fish Flow/Delta Outflows
Merced Irrigation District	04/01/94	05/31/94	15,000	15,000	$50.00	$750,000.00	Fish Flow/Delta Outflows
Oakdale & South San Joaquin Irrigation Districts	05/17/94	05/23/94	15,000	14,872	$50.00	$743,600.00	Fish Flow/Delta Outflows
Oakdale & South San Joaquin Irrigation Districts	09/01/94	10/01/94	33,119	33,119	$50.00	$1,655,950.00	Increase fish flows
TOTAL			**78,119**	**76,441**		**$3,822,050.00**	

Attachment 2

Please see the following Science Program website for their guidance on performance measures:

http://science.calwater.ca.gov/sci_tools/performance_measures.shtml

California Bay Delta Authority
Independent Science Board Meeting
California Bay Delta Authority, Bay-Delta Conference Room, Sacramento, CA
Tuesday, September 21, 2004, 8:30 a.m.–5:00 p.m.
Wednesday, September 22, 2004, 8:30 a.m.–5:00 p.m.
Thursday, September 23, 2004, 8:30 a.m.–5:15 p.m. (Field Trip)

Action Items

Open Meeting Act/Conflict of Interest

1. Staff will meet with counsel to:
   - Outline a working process for drafting documents (i.e., Is input from less than a quorum permitted?)
   - Clarify issue related to remote interest associated with private universities (i.e., Should those ISB members at private universities not participate in any discussion of the PSP process given that a colleague from their university might apply to the PSP once it is issued?)
   - Further explain COI related to attending workshops (e.g., When are ISB members acting in an ISB public capacity and when are they not? Generalized suggestions about research priorities are often suggested to management by workshop reports, but are only a part of the input to a PSP.)
   - Consider legislative options.

ISB Activities

DIP Subcommittee

2. Establish two 2-person teams for joint fact-finding associated with monitoring and modeling:
   - Modeling – Melack and Koseff
   - Monitoring – Glaze and Meyer

ERP/EWA Subcommittee

3. Staff (Castleberry, Guinee, Campbell) will prepare a briefing paper to the EWA/ERP Integration Subcommittee and this paper may be shared with the full ISB. The Subcommittee will report back to the ISB at next meeting.

Levees Team

4. Motion to release intellectual property rights (see Agreements below).
5. Mount will provide his preliminary presentation at the CALFED Science Conference.
6. Mount will send a draft manuscript to a few ISB members for preliminary review prior to the November meeting.
7. If after further discussion of levee issues, the Board develops significant findings relevant to the CBDA program, a draft ISB report on the subject, including discussion of science implications, will be developed and circulated to all ISB members for review and comment (Moore to clarify quorum issues). After ISB review, the ISB report will undergo outside peer review which will be organized by the Science Program. Scientific and policy implications related to levees may be discussed at the next ISB meeting.

Science Program Activities

8. Staff to provide a broader picture of investments in science in other CALFED programs to complement the Science Program Financial Plan.

9. ISB Team (Cummins and Rose) will work with Lead Scientist on the legislative request regarding development of a plan to determine water requirements to restore listed and threatened fish species. Lead Scientist will present a draft Plan to the ISB in November.
10. Lead Scientist will clarify potential conflict of interest concerns related to ISB members working on the Science Strategic Plan. Consider ISB involvement in strategic planning for the Science Program at the next meeting.
11. ISB members are invited to send information on new members (resource economist, risk assessment) to the Lead Scientist, who will consult widely and make the final decision on new members.

Administrative

12. Staff to finalize dates for three ISB meetings in 2005.
13. Staff to invite Dr Antonia Baptista of Oregon Science University to make a presentation at the November meeting on the applicability of Data Assimilation Systems to large environmental management programs such as the CBDA restoration program

Agreements

Set the Draft Operating Guidelines and revisions to the Charge aside and re-visit them in three or four meetings in order to give the ISB additional work experience in terms of defining specific roles for the ISB, especially in relation to the other Science Boards.

The ISB releases today's levee presentation to Mount as his personal intellectual property provided that acknowledgement for support is appropriately noted. It is the ISB's intention to utilize the information provided in the presentation to produce a full ISB report/product at a later date.

Agenda for November 10-12, 2004 ISB meeting

The next ISB meeting will be November 10, 11 & 12, 2004. The afternoon of November 10 will be reserved for Subcommittee work sessions. ISB meeting will end Friday, Nov. 12 at noon.

The ISB members discussed a desired agenda for the next meeting and arrived at the following preliminary agenda:

- Presentation on data assimilation system and new modeling/data analysis technologies. (Example: Columbia River Estuary)
- Levee Team and potential policy implications.
- Report from DIP Subcommittee
- Report from EWA/ERP Subcommittee may include a duplicate of the oral presentation Rose will have just given to EWA panel, summary of results.
- Science Program Update including status of legislative request on water supply, new members, strategic planning for the Science Program
- Report from Performance Measure Subcommittee (*Cummins, Ingram, Meyer, Reed, Keller*)

The chair and vice chair will work to further develop the agenda.

Future ISB Meeting Dates (tentative)

– Feb. 22-23
– May 10-12 or May 17-19
– Sept 20-22 or Sept 22-29
– Oct 25-27
– Dec 5, 6

Other Upcoming Meeting Dates

– CALFED Science Conference, October 4 – 6.
– EWA Year 4 Review, Nov. 8 – 10.
– Restoration Conference December 6 – 10 (Orlando, Florida)

Handouts

– *Memo from Jack Keller, Scott McCreary, and Eric Poncelet to Johnnie Moore, Lead Scientist, CALFED Science Program, regarding Nominations for the Water Management Science Board*. Keller. Handout.
– *Water Management Science Board (WM-SB): Some Cross-Program Element Issues/Questions.* Keller. Handout.
– *WM-SB Nominee Biographies*. Keller. Handout.

Presentations

– *CVPIA/CALFED Coordination.* Darrin Thome.
– *Delta Operations 101*. Curtis Creel.
– *Ecosystem Restoration Program Overview*. Dan Castleberry.
– *EWA Technical Review Panel: Organization and Workings*. Kenny Rose.
– *Overview of EWA,Coordination and EWP*. Roger Guinee and Dave Harlow.
– *Overview of Sacramento-San Joaquin River Delta Water Quality Issues* Fred Lee, Ph.D., member of the Public.
– *Performance Measures: A Quick Update*. Tom Gohring.
– *Subsidence, Seismicity, and Sea Level Rise: Impacts on the Delta, CBDA Programs and the Science Agenda*. Jeff Mount and Bob Twiss.
– *What the ERPSB is, and how it is different from ISB.* Bob Twiss.
– *History of Water Quality Standards in California*. Jerry Johns.

Meeting Summary, November 21, 2004

ISB Members in Attendance

Tom Dunne, Ph.D.	Jeff Koseff	Duncan Patten, Ph.D.
David Freyberg, Ph.D.	Sam Luoma, Ph.D.	Denise Reed, Ph.D.
Bill Glaze, Ph.D.	John Melack, Ph.D.	Kenneth Rose, Ph.D.
Helen Ingram, Ph.D.	Judith Meyer, Ph.D.	Robert Twiss, Ph.D.
Jack Keller, Ph.D.	Jeff Mount, Ph.D.	

.

ISB Members Absent

Ken Cummins, Ph.D.

CBDA Staff

Virginia Cahill	Johnnie Moore	Kim Taylor
Dan Castleberry	Tim Ramirez	Patrick Wright
Zach Hymanson	Rhonda Reed	
Jana Machula	Chris Stevens	

Agency Staff

Campbell Ingram (EWP)	Jerry Johns (DWR)

Invited Guest

Gary Hunt

Stakeholders

Gary Bobker	Bernie Sullivan

Consultants

Suzanne Gilmore	Diana Roberts
Kateri Harrison	Elizabeth Soderstrom

Meeting convened, 8:45 a.m.

Welcome (Dunne)

Dunne welcomed everyone and introduced Elizabeth Soderstrom as the new meeting facilitator. Members of the public who wished to speak were invited to complete a blue comment card. In response to questions from Dunne, Gary Hunt (BDPAC Chair and Committee representative to the California Bay-Delta Authority) clarified that the ISB has two roles (1) as an oversight or review board, and (2) as an activist board that identifies gaps in science. Hunt emphasized the need for objective scientific involvement and the need for the ISB to remain "independent".

The meeting summary of the April 22–23 ISB meeting was approved with the correction noting that Koseff was present on April 22.

Overview of Bagley-Keene Open Meeting Act 2003 (Stevens and Cahill)

Chief Counsel CBDA Chris Stevens and Deputy Attorney General, State Department of Justice Virginia Cahill indicated that the Science Program's Policy on Conflict of Interest (COI) and Bagley-Keene Open Meeting Act cover the basic principles of meeting access and conduct, including requirements that subcommittees of three or more ISB members have open and publicly noticed meetings.

Stevens and Cahill advised that ISB members avoid serial meetings including sequential e-mail exchange and telephone calls. In general, they advised avoiding email exchange regarding agenda items, and recommended deliberating in public instead. ISB members may bring fact-specific questions/comments to the Lead Scientist who can respond and share pertinent information. Information that is distributed to the ISB (or more than a quorum) becomes part of the public record.

Discussion

Meeting agendas should be specific enough to allow the public to attend topics of interest while general enough to allow new or related ideas.

Draft documents may be sent to less than a quorum of ISB members for comment. If the draft document needs to be distributed to more than a quorum of Board members, it may be posted on the ISB website for distribution to the ISB and to the public. Dialogue or e-mail about the document should not take the place of deliberations in public. Generally, draft documents should be included as part of the ISB's pre-meeting packet and ISB member comments and discussion should be provided during the public meeting.

ISB members noted the difficulties created by the Open Meeting Act, given that the scientific process requires an intellectual exchange, scientific inquiry, blending of complex perspectives, and an analysis of technical flaws before a document is made public. The draft paper by Mount and Twiss on levees was noted as an example of these difficulties. Wright noted that it was not the intent of the legislature or administration to stymie the scientific process and that the current process may not work for the ISB.

It was noted that the EPA Advisory Science Board operates under similar open meeting rules and relies heavily on staff to collate the results of meetings and conference calls. However, CALFED does not have this level of staff support available. Major concerns were raised about inefficiencies and significant restraints presented by the Open Meeting Act and related processes to the ISB's ability to fulfill its charge.

CDBA counsel expressed understanding of the unique needs of the ISB and agreed to work with the Lead Scientist to develop solutions for these issues and concerns. Parts of the solution may include differentiation between information exchange and actions, and may include approaching the legislature with an alternative model allowing for more flexibility where appropriate for the ISB. Staff will research the various options and discuss them with state attorneys and members of the Authority.

Conflict of Interest Policy (Moore)

Staff and CBDA counsel provided a brief overview of the Conflict of Interest document outlining specific categories which may apply to individual board members. If ISB members have a clear financial interest, it is strictly prohibited to be involved with a PSP or similar grant solicitation processes. Board members should direct any fact-specific questions to the Lead Scientist or to Chris Stevens.

Discussion

General discussion involved the concepts of financial interest when making scientific recommendations. The purpose of CALFED's science boards is to recruit the nation's best scientists, if they must recluse themselves from crucial discussions, then the program is not doing what the public needs. Considering that CALFED is involved with a range of agencies, unknown conflicts may exist and additional clarification is needed.

Chris Stevens and Virginia Cahill agreed to give additional thought to the issues of remote interests for those ISB members that work for private universities and to Board member participation in workshops when the results of those workshops may be part of a long chain that eventually leads to a PSP. Staff agreed to consider the development of future PSPs that generally describe the type of science needed, with no relationship to specific applicable studies.

Disclosure Statements (Dunne)

ISB member disclosures and affiliations (with the exception of five board members) are posted on the ISB website at http://science.calwater.ca.gov/sci_tools/isb.shtml

The five Board members whose disclosures and affiliations were not yet posted on the website provided a verbal disclosure. Patten noted his ERP contract includes a riparian white paper which could be considered a non-competitive contract. Mount stated that he is currently Chair of a panel for the North Delta Improvements Project which involves an EIR process. Meyer stated that she is Chair of the scientific and advisory committee for American Rivers. Rose was recently reimbursed for attending the EWA workshop. Glaze stated he has no present conflicts and noted he has been invited to serve on the Water Management Science Board. Keller noted that his statement was recently posted on the website.

Director's Update (Wright)

The U.S. Senate passed a CALFED authorization bill last week. Differences between the House and Senate versions of the bill remain, particularly those relating to pre-authorization of water storage projects. It is hoped that an agreement will soon be reached. Funding for the levee and water quality programs is behind schedule and imbalances among the programs will be addressed within the next few sessions. If the bill is successful, it will confirm the state-federal partnership and CALFED will remain a state entity with federal participation. In summary, it is hoped that federal funding for CALFED will be provided.

The last Authority meeting had two significant approvals: (1) 2004 Program Plans, posted on the CBDA website, containing goals, objectives, and accomplishments since adoption of the ROD; and (2) Delta Improvements Package, approved as a framework document with the intent to develop linkages between DWR's expansion of permanent pumping capacity and water quality, biological opinions, and other relevant parameters.

Prior to the December Authority meeting, staff will draft a comprehensive finance plan for the entire program, including cost estimates for project completion, quantity of money from various sources, identification of funding gaps, and potential sources to fill these gaps. It has been suggested that the finance plan be re-evaluated every 2-4 years rather than locked in for a 10-year time period. The Levees program may be subject to closer scrutiny during this process.

Trends in water diversions have changed since adoption of the Water Accord, and this trend is part of the debate associated with the Delta Improvements Package. The underlying premise of the ROD is to expand the flexibility of the pumps by pumping water during those times when fish are less vulnerable to loss. The Bobker memorandum questions whether this enhanced pumping

capacity and flexibility is sustainable over the long run. Other debates focus on the question of whether the Delta really can serve as the hub of California's state water system, while still protecting fish and prime agricultural land. It would be helpful for the ISB to provide insight on these topics to the three policy forums (DIP, state standards, and Delta levees) and to think fundamentally about the Vision for the Delta.

The Delta Wetlands project is on hold because stakeholders are not comfortable providing additional funding to this effort, given the findings of the Science Panel and the Economic Review Panel. Luoma noted that this project received a truly independent review that provides objective information to the public. Scientific review was completed early in the process, but has not been discussed further due to the program's need for economic partners and input.

Staff is continuing efforts to incorporate additional scientific and peer review into Program Plans. Agencies such as DWR and the Bureau of Reclamation authored the Program Plans and submitted them to CBDA staff for review. ISB members are encouraged to read the Program Plans.

Science Program Update (Moore)

Moore noted that the Authority has appointed Tom Dunne and Sam Luoma as formal ISB members. The CALFED Science Conference scheduled on October 4-6 will likely be a success with 600 registrants and 190 abstracts. PSPs for the Science Program and the ERP are publicly available at: https://solicitation.calwater.ca.gov.

Workshops:

- Rivers, Rocks, and Restoration Workshop in July 2004
- EWA first 4 years, September 8-9
- EWA Review, November 8-10
- Possible water quality workshops next year

Legislative Directive

The California legislature has given CALFED, and in particular the Science Program, a deadline of January 10, 2005 to devise a plan for the development of a research agenda regarding how much water is needed in the Delta for dependent endangered/threatened fish species. Moore hopes ISB and ERP Science Board members will help develop this plan. The plan may call for something similar to the Mercury Strategy with a large scale, system-wide approach which will include public workshops.

ISB members noted that this legislative directive raises several questions, including

- What is the cumulative risk and uncertainty within the Delta?
- What is the minimum amount of water required for full recovery of fish?
- Who will allocate the water?
- How do water and fish interact with the entire biogeochemical system?

Luoma noted that the way to address these questions is to construct a plan for the research and for a constructive scientific dialogue that will reframe the debate around the important issues. Existing studies can form the foundation of the future research agenda, and preparation of background documents on these issues may provide an opportunity to educate the legislation about the complexity of the system.

Bobker noted that the Legislature is concerned because the dueling conceptual models for the Delta have not yet been resolved. Increased water pumping has been proposed, but hydraulic alterations and ecosystem needs have not been clearly identified.

Two ISB members (Cummins and Rose) will assist Moore, along with others, to formulate an approach and submit a draft Plan for comment to the ISB at the November meeting. Staff will incorporate suggestions from the ISB and others before the January 10 deadline.

Ten-Year Finance Plan

Moore identified three major future efforts included in the 10-year Finance Plan request for the Science Program.

1. Identifying important scientific issues (~$3.5 million)
   - Support for ISB and staff identification of issues
   - Workshops
   - Staffing levels
2. Investing in critical unknowns (~$24 million)
   - Grant program via a yearly PSP
   - Post doctoral scholars and graduate fellowships
3. Scientific communication (~$2.5 million)
   - Between CALFED and agencies and general public
   - Within the scientific community using conferences and on-line journal
   - Communication coordination within the CBDA
   - Monitoring and design review

The ISB requested that staff provide information regarding the total investment in science throughout CALFED, with the intent to identify other leveraged funds.

Performance Measures

Tom Gohring outlined a schedule for development of performance measures, noting that these measures can help determine whether investments have been effective. Three levels were identified:

1. Administrative Actions
2. Direct outcomes (fish counts, observed water conservation)
3. Indicators inferred from basic data

ISB discussion noted that the broader CALFED approach drives governing questions such as: Are water supplies more reliable? Is drinking water quality improving? Are levees more reliable? Is the ecosystem restored? Choosing specific metrics to measure and track is a challenge. One approach is to utilize existing data and track metrics for which we have data. Science-based monitoring guidelines are needed that would provide guidance on what is needed in both short and long-term monitoring programs.

New ISB Member Recruitment

Moore suggested two disciplines be added to the ISB: (1) Risk/Decision Analysis and (2) Environmental/Resource Economics.

Science Program Strategic Plan

Moore introduced the idea of the Science Program developing a long-term Strategic Plan and the possibility of ISB members contributing to the development of the Plan.

Delta Water Quality Standards: Lunch Presentations

Taylor provided an introduction to water quality standards and their relation to monitoring efforts and CALFED.

History of Water Quality Standards in California (Johns)

Jerry Johns, DWR, provided a verbal presentation outlining broad issues related to history of water quality standards, including lawsuits in the early 1900's, attempts by the city of Antioch to divert water, the first comprehensive California Water Plan in 1957, and the establishment of water rights. Johns noted that the Water Code's D-1485 fish and wildlife conditions which regulate CVP and SWP Delta operations were imposed under a reservation of SWRCB's jurisdiction.

The State issued the first water rights permits to the USBR for operation of the Central Valley Project in 1958 and to DWR for operation of the SWP in 1967. Key features of these water rights permits were the ability to divert water from the Delta and to send it west to the San Francisco Bay area and to central and southern parts of the state. The permits issued for the CVP and SWP reserved jurisdiction for the State to formulate or revise terms and conditions relative to salinity control, to impacts on vested rights, and to fish and wildlife protection in the Sacramento-San Joaquin Delta. The State Water Resources Control Board has a dual role of both issuing water rights permits and regulating water quality.

The CALFED program is struggling with how best to engage in the standard review process. Issues include fish, especially the Delta smelt, VAMP, X2, salinity, and water temperature.

ISB discussion focused on the issues of riparian rights and appropriative water rights and the goal to provide a scientific foundation for water rights. It was noted that the State Water Board's involvement in CALFED has been limited to date.

Water Quality Objectives for the San Francisco Bay Estuary (Kimmerer)

– *Water Quality Objectives for the San Francisco Bay Estuary: Scientific Basis & Status.* Kimmerer. Presentation.

Kimmerer's presentation discussed the scientific basis for X2 and flow standards. X2 is an index used to assess the location and thus movement of salinity inland from the ocean to the Delta and is defined as the distance in kilometers inland from the Golden Gate Bridge to the area where a salinity of 2 parts per thousand is found. Flow dynamics can be directly correlated with X2 measurements just as flow can be correlated to various other scientific parameters. As flow patterns are dominated by tides, there is variation in biological species with respect to X2. At this point, we have the basis for the standards and the relationships, but now we need to understand how they work.

There is some level of skepticism regarding the E/I ratio in the context of a tidally influenced system. Modeling studies which are in progress to track particles suggest a high level of fish entrainment at the pumps (radio tags suggest that fish do behave like particles). The freshwater supply during low summer flows is provided for agricultural uses, and tends to be more fresh (as well as less variable) than historical data suggests. Data assimilation models of the system currently do not integrate real time measurements. There is opportunity to improve real time computation and integration of data.

Delta Operations (Creel)
– *Delta Operations 101*. Creel. Presentation.

Creel stated that operational decisions for the Delta are based on five parameters:

1. Exports
2. Flows
3. Control structures
4. Water Quality (monthly conductivity, daily chloride titrations)
5. Fish

To comply with regulations, there are three basic techniques in operational procedures: (1) change reservoir releases; (2) change export amounts; and (3) change flow patterns (salinity control gates, cross channel gates, and barriers in the South Delta). All data is captured monthly for QA/QC and hourly for operations. X2 requirements are measured by electrical conductivity at three different stations.

Discussion
While the decision documents describe the State Board's reasoning for the standards, some extrapolation is necessary. This fact, coupled with the fact that the EIR/EIS is 10 years old, suggests that they should be reconsidered.

Different water quality standards are applied differently month-to-month and year-to-year, based on median forecasts for a hydrologic year. Forecasts are based on snowmelt and remote sensing data. A particular standard may be more or less sensitive to dry/wet time periods compared to other standards. A wet year is defined in 1641; if the climate is drier, costs increase and water supply for all State and Federal water contractors becomes more difficult to guarantee. Science (as part of the ISB or other processes) can help answer the question whether standards for other parameters such as organic carbon or nutrients need to be considered.

Creel indicated that additional analysis and scientific information are needed to inform water managers where the fish are located and how they are predicted to respond to various operations.

CALSIM (which has a monthly time-step) and other modeling systems do not have enough detail to model the location of the spring run or the estimated size of individual fish within a population. CVPIA requires a dedication of water for environmental uses including upstream flow and downstream temperature requirements.

Public comment by Bobker focused on use of adaptive management techniques versus prescribed standards, noting that the unique X2 approach, including correlations and methods, could be applied to other types of water quality standards. Operational decisions to meet some standards and not others create legal, scientific, and policy problems. Bobker suggested refinements to water operations be considered in order to reflect more sensitivity to the ecology of the Delta and Estuary.

Many of the standards apply to the entire estuary. Linkages among the various standards are difficult to obtain because the State Regional Water Quality Control Boards work within specified regions with variations in supply and water rights. While today's ISB discussion focused only on standards related to water quality operations, upstream standards (such as temperature near Lassen) can constrain flows downstream. Since 1994 there has been a gradual trend away from prescriptive standards towards more flexible tools such as EWA and X2.

DIP Discussion in context of Water Quality Standards (D. Reed)

Assessing real-time data and developing more flexible operations may not work in this case due to a lack of data and analysis. Instead, the ISB's diverse expertise may help provide some guidance on integration or on the development of conceptual models to support future changes to the regulations. Modeling in a complex environment with many variables is difficult. CBDA's role in the regulatory process needs further clarification. Wright suggested several ways that the Science Program could help the SWRCB develop policies in a more collaborative, science-driven way; however, this is dependent on the SWRCB's schedule and interests. These include the following.

- Considering the basis for the standards and determining whether they have held up over time.
- Evaluating or creating conceptual models for standards.
- Determining the inter-relationships between standards.
- Determining what kinds of additional data, information, and analysis are needed.

The larger question for the Science Program and the ISB is how to reform the planning process so that it is informed by scientific principles.

EWA/ERP Integration (Rose)

Rose, as Chair of the ISB Subcommittee on EWA/ERP Integration, discussed the EWA and introduced the speakers: (1) Roger Guinee, Overview of EWA; (2) Dan Castleberry, Overview of ERP; and (3) Robert Twiss, ERP Science Board. The power point slide show provided by each of the guest speakers is posted on the ISB's website.

- http://science.calwater.ca.gov/sci_tools/isb.shtml.

ISB discussion included participation of all guest speakers as well as meeting attendees.

Overview of EWA (Guinee)

There will be a review of the EWA program in November. USFWS is the implementing agency. EWA is designed to protect fish in the Bay-Delta estuary beyond the regulatory baseline. The EWA has coordinated with WAP[b3] releases on the San Joaquin tributaries and the CVP[b2] export reductions during the VAMP program (April 15–May 15). Weekly coordination takes place all year with water managers, agencies, science advisors, and other interested parties. EWA is currently paid for with funds from Prop 50 and Prop 204. The EWA has had a budget of $30-40 million per year during the first four years. Discussions will take place to extend the EWA program for at least 3 years and possibly 7-10 years.

The EWA and the EWP are separate programs. The goals of the EWP are principally focused on improving ecosystem conditions in tributary streams by increasing instream flows during key periods. The EWP acquires permanent water supply and is funded by the ERP program within CALFED, whereas EWA provides flexible water supply response to reduce impacts on fish in the Delta. An analogy was made to characterize the EWA as "rented water" whereas the EWP seeks to "own" water to provide permanent flows to restore fish populations and/or habitat. EWP water actions are designed to test hypotheses and includes adaptive management. In addition, the EWP is in its formative years and is a much smaller program than EWA.

Overview of ERP (Castleberry)

Castleberry's presentation provided an overview of ERP and noted that the ERP has three implementing agencies, USFWS, DFG, and NOAA. The ERP's planning foundation is provided in several documents including the ROD, Strategic Plan, ERP Program Plans I and II, and the Multi-Species Conservation Plan. These planning documents provide the ERP with goals, objectives, targets, milestones, and actions. A recent Milestones Assessment found that the

program is currently on schedule for 84% of the milestones, ahead of schedule for 3%, and behind schedule for 13% of the milestones.

EWA Review Panel (Rose)
Rose provided an overview of the EWA Review Panel and stated that during their annual meeting, the panel receives a detailed review describing when water was released and considers whether these management decisions were sound. The 2003 review noted new challenges around long term opportunities and risk. The 2004 review will be cumulative. The most challenging issue is defining program success.

Data used for the EWA Review Panel is from the IEP monitoring program. VAMP and other specific projects contain a separate monitoring component. Originally, the EWA was focused on the operations and take at the pumps, but due to the Panel's efforts, agencies are now open to considering population indicators such as carcass counts and utilizing other tools that are more critical to species recovery. Implementation of recommendations by the Review Panel tends to be limited by lack of qualified personnel. For example, it was noted that a lack of staffing and funding prevents more detailed population modeling of species life-stage to identify bottlenecks in the system.

There are many areas of overlap between the ERP and EWA programs. For example EWA acquires water in many of the same locations that ERP conducts restoration. Science is used in both programs, although differently—EWA has a Review Panel and ERP uses a PSP mechanism. It was noted that the EWA is politically successful because it is flexible and provides benefits to all parties, including a financial incentive to organizations willing to sell water.

ERP Science Board Charge, Role, Operations and Activities (Twiss)
The ERP Science Board's focus is to highlight the scientific basis and research needs of topics that lie at the root of policy questions. The ERPSB is currently involved with clarifying the scientific basis for adaptive management, DRERIP, low-resolution modeling, vision for the Delta, and review of the Yolo Bypass.

The ISB noted opportunities for integration between the ERP and the EWA, including:

- Working together to meet the water needs of fish and plants, which often have variability in their annual hydrographs, meaning that an irregular water is needed.
- Integration across geographic scales, considering that in altered systems, actions at diversion sites may affect natural habitats elsewhere in the watershed.
- Studying relationships between the number of fish saved due to water releases and the related improvement of habitat (i.e. due to increased flow).
- Identifying joint data needs and pursuing them.
- Recognizing water as the common factor between the two programs and using that as a lever.

ISB Operating Guidelines (Twiss and Ingram)

Twiss and Ingram provided an introduction to the ISB's Draft Operating Guidelines and draft modifications to the Charge (pre-meeting materials, Attachment G). The ISB asked staff to clarify relationships to other science boards within CALFED, noting that the graphic provided within the draft document was not sufficient for this purpose. Overlapping membership among the various boards will assist in the identification of commonalities and gaps between the boards.

The ISB requested additional clarity regarding their scope of work, types of reports to produce, types of advisement needed and what workshops to organize. In general ISB members preferred

to have tangible products and topics identified for upcoming year. Meyer suggested that these concerns be addressed by completing two specific tasks:

1. An annual work plan for the ISB
2. A report on the state of science every two years

It was noted that collaboration with other Boards would be needed to develop a report on the state of science. This report could also suggest new directions, or expansion of existing programs.

ISB members noted that their dual role of serving in both a review and activist capacity is substantial and could include providing analysis, projecting next steps, and identifying potentially important future problems. Specific issues that the ISB could address over the coming months include performance measures, EWA/ERP integration, and DIP. It was noted that given the small staff in the Science Program, it would be difficult for the Lead Scientist to assume complete responsibility for bringing specific topics to the ISB. The reduced level of staffing indicates a need for a more activist board that can roll up their sleeves and assist in brainstorming and identification of issues.

Luoma noted that the Charge and the Draft Operating Guidelines are not set in stone, but rather can be modified to reflect the capacity, interest, perspective, and constraints of the ISB. Developing these operating guidelines will be a long-term process in which there is no specified deadline. The ISB agreed to re-visit the Draft Operating Guidelines and revisions to the Charge in three or four meetings in order to give the ISB additional work experience in terms of defining specific roles for the ISB, especially in relation to the other Science Boards.

First day session adjourned 5:00 p.m.

Meeting Summary, November 22, 2004

ISB Members in Attendance

Ken Cummins, Ph.D.	Jack Keller, Ph.D.	Denise Reed, Ph.D.
Tom Dunne, Ph.D.	John Melack, Ph.D.	Kenny Rose, Ph.D.
David Freyberg, Ph.D.	Judy Meyer, Ph.D.	Bob Twiss, Ph.D.
Bill Glaze, Ph.D.	Jeff Mount, Ph.D.	
Helen Ingram, Ph.D.	Duncan Patten, Ph.D.	

ISB Members Absent

Jeff Koseff, Ph.D.	Sam Luoma, Ph.D.

CBDA Staff

Dan Castleberry	Jana Machula	Rhonda Reed
Lauren Hastings	Johnnie Moore	Kim Taylor
Zach Hymanson	Tim Ramirez	Patrick Wright

Agency Staff

Roger Guinee (USFWS)	Diana Jacobs (DFG)	Diane Windham (NOAA Fisheries)
Campbell Ingram (EWP)	Dave Harlow (USFWS)	

Stakeholders

Gary Bobker (The Bay Institute)	Larry Smith (USGS)
Michelle Diaz (California Farm Bureau Federation)	Bernice Sullivan (Friant Water Users)

Consultants

Suzanne Gilmore	Diana Roberts
Kateri Harrison	Elizabeth Soderstrom

Second day session convened, 8:35 a.m.

Welcome (Dunne)

Minor rescheduling of agenda items was agreed on:

1. Schedule 2005 meetings
2. Presentation and Discussion on Levees (Mount and Twiss) (1 hr 15 min)
3. Break
4. Water Management Science Board Update (Keller)
5. Subcommittee work sessions: 3 groups previous defined: DIP, EWA/ERP, Levees

6. Lunch break
7. Reconvene as full group; next steps for subcommittees
8. ISB feedback to Lead Scientist, particularly on yesterday's presentation, in response to his request for discussion
9. Public forum comments
10. Review action items and next steps for ISB
11. Briefing about tomorrow's field trip

Tentative meetings dates for ISB 2005 meetings (Dunne)

ISB members and Science Program staff discussed whether the full Board should meet three or four times a year. If three times per year, meetings could be three rather than two days, and subcommittees could accomplish work through additional meetings between formal full ISB meetings. The Science Program could provide public meeting and the subcommittee members could meet in person or via conference call.

More frequent meetings may be necessary to enable the Board to make decisions because of constraints placed on serial meetings (such as email or phone exchanges on a topic) by the Open Meeting Act. More frequent meetings, however, could result in a smaller percentage of members at each meeting.

Board members provided possible dates for the next meeting. Staff will send these dates to members for further input before a tentative 2005 schedule is drafted.

Presentation and Discussion on Levees (Mount and Twiss)

– *Subsidence, Seismicity, and Sea Level Rise: Impacts on the Delta, CBDA Programs and the Science Agenda*. Mount and Twiss. Presentation.

Twiss and Mount considered the potential effects of levee failure on a landscape scale, rather than on the scale of individual levees.

Since the 1880s, the Delta has lost more than 2 billion cubic meters of sediment through subsidence of islands in the Delta, caused by (1) microbial oxidation of organic matter (in a system that was previously anaerobic), (2) compaction, (3) de-watering, and (4) wind erosion and similar processes. Levees protect islands diminished by subsidence from inundation. The annual deposition in the Delta is 1.7 million cubic meters, far from enough to make up for the current loss. Further, the land in the Delta continues to subside, and if sea levels rise approximately 2–3 mm/yr, by 2050, there will be an additional 2.4 million cubic feet of water in the Delta.

Mount developed a *Delta Instability Index* (DII) based on *accommodation space*. Accommodation space is a measure of disequilibrium of Delta volume below mean sea level. The DII relates anthropogenic accommodation space (that area behind levees and below sea level not filled with soil or water) and subaqueous accommodation space. As the value of DII increases, instability increases. Based on past trends, the DII will increase, which will likely indicate increased instability in the Delta system. Single-island and multi-island levee failures are likely to increase because of stresses from accommodation space changes and sea level rise. An additional risk factor is 100-year storm events that typically cause flooding.

Seismicity is also a significant risk factor. The Delta lies above five major fault zones, including the Hayward and San Andreas. Magnitude 6 ground accelerations are likely. Levees have poor foundations and would be easily damaged. The entire Delta could be changed from a freshwater tidal marsh to a brackish lake in a matter of seconds in a significant seismic event.

Only one contractor rebuilds failed levees in the Delta. Currently there is capacity to rebuild only three levees in a year. Levees are armored on the outside but not on the inside, so if one fails, it erodes inside. If it is not repaired quickly, it might not be possible to repair it. If one levee fails, it increases the chances that other levees will fail.

The implications for the CALFED program are extensive. Water supply reliability, drinking water quality, and ecosystem restoration as currently implemented are dependent on the Delta system remaining as it is. However, this study suggests that it is unlikely that the Delta will remain in its current state—it is not a fixed system. How can CALFED respond?

Possible responses include the following.

- Develop risk assessment principles and methods for all program elements.
- Test the robustness of specific program plans against potential change. Prioritize ERP actions and milestones; check cross-dependence on water management actions (such as OCAP).
- Develop several "reasonably probable states of the Delta" for estimating future costs, benefits, and environmental impacts and benefits of programs. Feed these states into modeling efforts.

Discussion

This study does not have the resolution to determine which levees need the most care to prevent catastrophic levee failure. A "sacrifice" of a levee would not help the system because flooding in one place increases pressure throughout the system. The study did not consider the influence of upstream areas. The analysis is probably very conservative, and the risk is probably greater than portrayed.

Water Management Science Board Update (Keller)

– *Water Management Science Board (WM-SB): Some Cross-Program Element Issues/Questions.* Keller. Handout.
– *Memo from Jack Keller, Scott McCreary, and Eric Poncelet to Johnnie Moore, Lead Scientist, CALFED Science Program, regarding Nominations for the Water Management Science Board. Keller*. Handout.
– *WM-SB Nominee Biographies.* Keller. Handout.

Nominees for new WMSB have been identified. The handouts identify them and describe their qualifications. ISB members should review the list of candidates and indicate to the Lead Scientist their approval.

The WMSB will involve all Program elements.

Discussion

Not only rivers and the Delta but also the floodplains/riparian habitat are important and are not being addressed adequately now. Ecologists on this Board should help address the whole river system.

Other Board members, especially ERPSB members, might participate in task forces, panels, and subcommittees related to the WMSB to cover issues that require different skills.

Second day, morning session adjourned 10:30 a.m.

Subcommittees convened 10:30–12:00

DIP Subcommittee

DIP Subcommittee Convened 11:00 a.m.
Bay Delta Room, 5th Floor, 650 Capitol Mall, Sacramento.

Attendees

Denise Reed, Johnnie Moore, Kim Taylor, Zach Hymanson, David Freyburg, Judith Meyer, Bill Glaze, John Melack, Elizabeth Soderstrom.
Audience: Roger Fugii (USGS), Ron Ott (CBDA), Diana Jacobs (DFG).

Session Summary

After the last meeting, an ISB memorandum on DIP identifying three questions was submitted to the Authority. We should consider one aspect at a time, and water quality could be the first we address. By 2007, phase one is to have the planning component complete or the project implemented. The Authority is not directly responsible for water quality standards, but we can raise the level of awareness.

Reed suggested the following possible ways to move forward:

1. Recommend to the Authority additional exploration of monitoring operations and use of those data. Subcommittee can ask how new technology can improve monitoring techniques.
2. Consider a few data rich issues and ask how can CBDA learn from changes in operational functions. Issues could include the VAMP study or X2, as each have sufficient amounts of data. Possibly invite briefing speakers and/or hold work group fact finding sessions.

Subcommittee discussion included an overview of how to identify current modeling and monitoring approaches. Modeling efforts within the Delta system include CALSIM, Delta Simulation Models (DSM), 3D models (DCC 7 Harbor), as well as various efforts regarding VAMP, Hydro-dynamics, B2 and B3 models and the operation of barriers on Franks Tract. It will be useful to synthesize and compile all data sources in order to accurately evaluate what is needed for sound scientific recommendations.

During public comment CALFED staff and other stakeholders offered various suggestions including the CA Water Environmental Modeling Forum by SWRCB (Rich Soqouski), and historical water quality data from the Municipal Water Quality Investigation by DWR (Brian Bergamowski).

Action: Ron Ott to provide the subcommittee with a website describing monitoring in the Delta having some relation to IEP.

In general, a common theme of this discussion agreed that monitoring and modeling should be more closely connected.

On the subject of water quality, the point was raised that there is a significant focus on salinity when it comes to water quality. It was suggested that various other water quality parameters such as chlorides, nutrients, and metals such as selenium and mercury be considered.

Currently, the IEP is under review and their current timeline requests the scope to be finalized in November with a panel review in Feb/March 2005. A workshop will be held in late winter/early

spring 2005. Documents and reports produced during this review should be considered by this Subcommittee's monitoring fact finding team.

Action: Two fact finding teams; (1) monitoring and (2) modeling will begin by identifying what is currently being done is these two areas, initially focusing on the Bay Delta system. Each team will provide a brief update at the ISB's November meeting with a more substantial update to follow at the subsequent 2005 meeting.

EWA/ERP Integration Subcommittee

EWA/ERP Integration Subcommittee convened 11:00 a.m.

Sonoma East/West Room, 1st Floor, 650 Capitol Mall, Sacramento.

Attendees

Kenny Rose (Chair), Helen Ingram, Duncan Patten, Ken Cummins (subcommittee members). Tom Dunne, Dan Castleberry, Kateri Harrison, Diana Roberts.
Audience: Gary Bobker (TBI), Michelle Diaz (CFFB), Roger Guinee (USFWS), Campbell Ingram (EWP).

Session Summary

EWA has emergency water, and ERP needs water to restore river channels, wetlands, riparian habitats, wetlands, channel-forming flows, water velocities. More information is needed about existing coordination, ecological response to water, and the politics of buying and leasing water. Some coordination is happening, but this subcommittee wants to explore integration in the sense of joint decision-making rather than just coordination.

EWA adds its water to the system when it is needed, not planned or predicted in advance. It provides water supply reliability benefits. ERP presently can take the EWA contribution into account but cannot plan on its water on a large scale. EWA managers would be amenable to using water for restoration but it is unclear how it could be supplied as a long-term repetitive event.

To judge how EWA could benefit ERP, key measures of habitat and fish provided by ERP would be useful to EWA. EWA has gained a great deal of expertise and would like to transfer the knowledge. Modeling may lead to structural changes and efficiencies in decision-making.

While EWA enjoys a good reputation among farmers in general, currently there is litigation between the Farm Bureau and agencies over EWA (Michelle Diaz, California Farm Bureau Federation). If EWA water is used for ERP, there may be problems for using the water in other ways. Farmers are also uncomfortable with EWP (Bernice Sullivan, Friant Water Users Authority) because the PSP process defining water use under this program can be a 3–4 year process.

One way to integrate EWA and ERP is to create a portfolio of "tools" for water management, species protection, and restoration. EWP is one such tool.

Castleberry, Ingram and Guinee will provide this subcommittee with

- A table of available tools for water management, species protection, and restoration.

- A diagram and narrative (conceptual model) describing current coordination efforts among the two programs including weakness, barriers, and constraints to coordination, and suggestions for new tools to promote integration.

Lunch 12:00 p.m.

Full ISB Reconvened 12:50 p.m.

Report from DIP Subcommittee (D. Reed)
Modeling and monitoring should be integrated to provide information in a more timely manner. Existing models are difficult to change to fit current needs. Developing modeling tools to fit questions and types of answers needed by CALFED program elements might be more successful than trying to adapt existing models.

Many aspects of CALFED programs are not immediately amenable to models, for instance biological processes. A monitoring scheme can identify trends and data can feed into models for other purposes. It was proposed that there should be a monitoring initiative that considers what questions should be measured and at what level of science.

It would be useful to have fundamental biological information, such as genetic data at all trophic levels, which could be utilized for multiple purposes. Using modern programming techniques, it may be possible to link data assimilation with data distribution, data retrieval systems or GIS capability.

There was a suggestion to invite Antonio Baptista from the Columbia River Estuary to describe his experience with data assimilation to the next ISB meeting.

Two new standing teams will address the following issues:

- Monitoring (Glaze and Meyer)
  - IEP document
  - SP IEP review workshop
  - Investigate information assimilation
  - Presentation to ISB
- Modeling (Melack and possibly Koseff)
  - CALSIM review
  - Develop future agenda item to report on California Environmental Water Model Forum
  - Presentation to ISB, possibly including work on the Columbia River

Report from EWA/ERP Subcommittee (Rose)
Rose summarized the results of the Subcommittee meeting and indicated that next steps are for CBDA staff (Castleberry, Guinee, and Ingram) to document the portfolio of "tools" for water management, species protection, and restoration and to document existing coordination efforts among the two programs.

Public comment noted that although more information is needed from EWA, ERP, and EWP managers, it was also clear that integration is already being attempted and they need guidance with conceptual models, management of assets, and decision-making. The Science Program should anticipate needing to respond, and the ISB might be involved.

Roger Guinee said that water managers could be more responsive if they could get a clear message from CALFED about what is envisioned in terms of EWA/ERP integration.

The EWA/ERP Subcommittee will give further consideration to integration issues during the November 10 work session and provide a briefing to the ISB at the next meeting.

Report from Levees Team (Mount)

Mount plans to present a paper at the CALFED Science Conference focusing on the science aspects of the September 21 ISB presentation. He has also been invited by the Authority to speak about the material. He would speak as an individual rather than representative of ISB.

He challenges the assumption of the CALFED ROD that the Delta should be maintained in its current state. The Delta is a system in constant change. In the long-term, the Delta may not be usable for conveyance and if brackish water intrudes into the Delta, a new canal to send fresh water to the southern part of the state may become necessary.

Discussion

Any presentation on this topic should include a discussion of implications, with perspectives on how to address adverse impacts of likely change (for instance, through a proposal for a research agenda to address critical unknowns). In particular, in response to the presentation's main point, the implication is the necessity to re-think programs that are predicated on a static Delta system, to suggest how they may be re-thought, and suggest research to accomplish this.

Whether this document is an ISB product or the product of an individual was discussed in great detail. Mount developed the analysis and index alone, though in response to a request for information on prospects for levee integrity. The scope and level of detail of Mount's work went beyond the ISB's original charge. On the other hand, it is intimately tied with ISB direction, recommendations, and reputation. A more formal process for ISB-related research is necessary in the future to avoid any possible misunderstandings of who is responsible for the work—the individual or the Board. If the ISB is responsible, a standard process for peer review should be followed. If a Board member does work based on ISB ideas, the work should in the future remain a Board product if CALFED funding is accepted. The product requested by a CALFED entity should also be clearly delineated; for instance, in this case, the ISB and Science Program asked for a report, whereas Mount developed a presentation and drafted a paper larger than the scope of the requested report. To resolve this question, the ISB voted to release the levee analysis to Mount as his intellectual property, with the understanding that this vote applies only to the current circumstance, and with the understanding that support be acknowledged. The ISB intends to use the information for a future report on implications. (Freyberg and Mount abstained. Glaze and Reed voted no. All other ISB members present voted yes.)

It was suggested that formal ISB documents be reviewed by the ISB, be peer reviewed, and then receive formal approval by the ISB. Moore will also inform ISB members what process to follow for ISB member review and comment on draft technical documents (such as Mount's levee manuscript) in conformance with requirements of the Open Meeting Act.

It was recommended that for this topic (and possibly for future topics for which this is a precedent), the ISB should address policy implications only after it has discussed science implications. An alternative viewpoint asked whether the ISB should discuss policy implications at all.

Public Forum Comments

Public forum comments were taken one agenda item earlier than planned because only one audience member requested to speak.

Fred Lee, Ph.D., DEE gave a brief presentation on Sacramento-San Joaquin River Delta water quality issues, based on his work and that of Anne Jones-Lee, Ph.D. He outlined many causes for impairments to water quality (see presentation for discussion). These include pesticides and "legacy" pesticides, mercury, low dissolved oxygen, heavy metals, nutrient levels, pathogens, salt/EC in South Delta channels, sediment accumulation, total organic carbon, excessive selenium, exports of Delta water to San Francisco Bay Region and Central and Southern California, inadequate water quality monitoring, and CALFED funding issues.

Lee recommends that an expert panel be appointed to define data gaps, develop a comprehensive water quality monitoring and evaluation program, oversee and review monitoring results, recommend additional studies, and work with Regional Water Quality Control Boards. Further, a multi-million-dollar per year monitoring and evaluation program funded in perpetuity is needed to evaluate and manage Delta water quality.

ISB Feedback to Lead Scientist

Performance Measures

Moore asked for input and guidance on performance measures. Evaluation of success of a project or program is based on three points: (1) whether it was funded (and details), (2) whether it was implemented (and details), and (3) how it performed ("validation monitoring"). This last emphasizes impacts.

Discussion

Performance measures for system response are complex and are often assessed on the project level. The vetting procedure to be performed by DRERIP can help reveal what information is needed. Data rating (whether the data is available) is a factor in moving from list-based performance measure (level 2) to science-based performance measures (level 3). It is essential to determine the length of time to collect data so that significance beyond natural variation can be determined. This could be a matter of a few decades. Jim Cowan of EWA could provide guidance or advice. Monitoring is essential to measuring performance.

Response to Legislative Trailer Bill

The Science Program intends to draft a plan to respond to the Legislative trailer bill's question on water for fish by the January 10th deadline. The plan may propose an approach similar to the Mercury Strategy, which could include a steering committee to identify workshop topics, track work on existing panels, and develop the strategy as a proposal for the Science Program. The response document (Plan) could serve as a working document reviewed and updated every six months.

Rose and Cummins will help draft the response, to be reviewed by the ISB during the November meeting.

Discussion

Developing and implementing a research agenda on this issue will take place over many years, so the response to the Legislature must assume that the Delta is not static. The response should recognize impending change and the uncertainty around that change. A key to the success of the

Mercury Strategy was the three outside specialists who were deeply invested. This new strategy should appoint people with good connections.

The question posed by the trailer bill is expressed problematically; the consideration should not be how much water is needed, but rather what regime of water is needed, and for what goals. Water for capacity versus water for process and water quality are also relevant.

A new Subcommittee could be instituted to deal with long-term questions such as this and also a strategic plan for the Science Program.

New ISB Member Appointments

Moore is ready to appoint a representative of two disciplines: Environmental or Resource Economics and Risk or Decision Analysis.

Other disciplines are also needed on the ISB, with possible trade-offs in effectiveness if the Board becomes too large (up to 25 members). The Authority has agreed to all disciplines proposed except the position of an attorney, but urged representation for agriculture (possibly resource economics for agriculture). Moore asked ISB members to consider these suggestions from the Authority.

Moore will make appointments with non-binding advice from ISB members.

Discussion

Moore should request recommendations for individuals in these two disciplines directly from select ISB members.

The risk management person should understand risk in broad systems and have experience in more than one area. If a specialist is necessary, the specialty should be ecological risk assessment. Scientific and engineering risk assessment is more mature than risk assessment involving policy-making and is more appropriate to CALFED's needs. The appointee must understand the implications of language use; language used in different subfields of risk assessment is different enough that cross-communication could be difficult.

The other disciplines should be chosen with the Legislative trailer bill question in mind. What disciplines are necessary to respond to its mandate? Current recommendations include environmental law, resource economics, risk/decision analysis, social geographer, innovation and change, management science.

An individual can reasonably serve on one or two Boards and it is desirable for ISB members to serve on one other Board. The new Water Management Science Board will have a quarter of its members serving on two other Boards. This is useful for the start-up phase so that the WMSB becomes effective more quickly, but it should not be a long-standing situation.

Day 2 session adjourned 4:50 p.m.

Fieldtrip, Thursday, September 23, 2004, 8:30 a.m.–5:15 p.m.

Field Trip attendees convened 8:40 a.m.
Rio Vista City Hall Chambers Room

Attendees

Roger Fujji (USGS), Terry Macaula (DHS), Miranda Fram, John Burau (USGS), Brian Bergam, Gita Kapahi (SWRCB), Karen Schwinn (EPA), Lenny Grimaldo (USGS), Steve Ford (DWR), Lisa Holm (CALFED), Tom Gohring (CALFED), Tom Dunne (ISB), John Melack (ISB) Judith Meyer(ISB), Bill Glaze(ISB), Kennith Rose(ISB), Ken Cummins(ISB), Kim Taylor (CALFED), Elizabeth Soderstrom (NHI), Suzanne Gilmore (Kleinschmidt)

Session Summary

John Burau: Bay Delta Introduction

- Overview of: tidal dispersion, water quality parameters, Delta outflow sites, flow measuring devices, timeframe of data collection, monitoring of chlorophyll, 30 monitoring station locations.
- Modeling components
- Dynamic Conceptual Model: The Delta as a River
    - Delta tidal changes
    - Suisun Bay tidal currents
    - Shear flow dispersion
- Tidal excursions
    - Distance a current will go over the tide; Fish move large distances with the tides
    - Tidal excursions are large
- Monitoring of water quality
    - If collecting salinity, should do it continuously
    - Only IEP, MWQI, water operations doing long-term monitoring of water quality
- Super Stations
    - Flow station network
    - IEP Review has plans for strategic station locations
    - Currently long term monitoring is through the IEP & Municipal testing
    - The idea is to co-locate the measurement of many constituents

Boat Tour South Delta from Rio Vista: 9:40 a.m. to 12:25 p.m.
During the boat tour, issues discussed included the scale of restoration efforts and the various roles of the Delta, from water delivery to flood protection, canal system, and habitat.

Ryde Hotel 12:50 – 2:30 Lunch Presentations

Lenny Grimaldo: Origins of Food Web Theory

- Tidal Marsh Ecology
    - Food productivity
- Estuarine Food webs
- Restoration opportunities
- Problems with Initial Conceptual Model
- Breach studies
- 100s of years for sub-tidal elevation – inter-tidal elevation
- Lessening of fishes in flooded islands

- Results of near-shore, offshore food web studies

Miranda Fram: Why DOC is Important

- Drinking water quality
- DOC & DBP formation; DBP Mitigation
- DOC origins
    - Soil organic matter
    - Plants, animals, humans
    - Algae and bacteria
    - Sweetwater Reservoir Case Study

Brian Bergamaschi: Photo oxidation & Photo exposure

- DOC Concentration
- DOC Quality. DOC quality is as important as quantity
- Both will vary significantly
- Average SUVA values
- STHMFP
    - Sacramento River
    - Island dam
    - Pumps
- Where does DOC come from?
    - Peat Islands
    - Tidal wetlands
    - How much DOC is added in the Delta, what will be the effects of large-scale wetland restoration on DOC? Only 25% of DOC coming from the Delta, the rest is coming from upstream—need to address changes upstream.
- Clifton Court chemical composition
- Preliminary estimates
    - Tidal wetlands
    - Agricultural operations on peat soils
    - Non-tidal wetlands

Erwin Van Neuwinhouse: IEP/EMP Review

- 12 agencies involved
    - 7 federal/5 state
    - IEP focus is on the Delta, whereas CALFED focus is broader
    - EMP Review is a 2-3 year consultation
- IEP: Ecological Variables
    - Phytoplankton, zooplankton, benthos, water quality
    - 2000 Review Process
    - Monitoring/Modeling Integration

John Burau: Tendencies of fish with relation to the Delta Cross Channel Gates

- Fish data and flow velocity
- Radio tagged fish results

Boat Tour Central Delta (Georgiana Slough, Delta Cross Channel Gates): 3:45 p.m. to 5:15 p.m.

Field trip adjourn 5:15 p.m.

Attachment 4

MEMORANDUM

TO: CBDA Independent Science Board

FROM: Kateri Harrison, Kleinschmidt

RE: Funding for Science with Calfed

DATE: October 28, 2004

During the September meeting of the Independent Science Board (ISB), information regarding past and projected funding for science activities within Calfed was requested. Staff began researching funding for science and found that the information was not readily available in an easily understandable format. However, Science program staff did request specific projected finance information from each individual program as summarized and shown in Attachment 4A. Attachment 4B is a copy of the Science program's section of the Draft 10 Year Finance Plan. Science program staff recognizes that this does not fully address the ISB's request and will continue working to provide a more complete answer to the ISB in February 2005.

Attachment 4B

Please see the Science Program's proposed 10-year finance plan available at the following website:

http://calwater.ca.gov/FinancePlanning/FinancePlanning.shtml

Attachment 5

See the following website for background information on the Center for Coastal and Land-Margin Research:

http://www.ccalmr.ogi.edu/