

CALFED Bay-Delta Program

Science Program Program Plan Year 7 (State FY 2006-2007; Federal FY 2007)

Implementing Agencies:

Science Program: California Bay-Delta Authority

IEP: California Department of Fish and Game, California Department of Water Resources, California State Water Resources Control Board, U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S. Geological Survey, National Marine Fisheries Service, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency

August 31, 2006

Introduction

This Science Program Program Plan identifies the CALFED Program activities that are scheduled to be completed during State Fiscal Year (FY) 2006-2007 and Federal FY 2007 (July 1, 2006 and September 30, 2007). The Plan also describes the accomplishments made during the previous year.

Readers familiar with past CALFED Program Plans will notice a difference between this plan and those prepared during previous years. The major variations are that the plan focuses on activities that will be undertaken in the upcoming year. Further, the plan does not contain the various sections found in previous plans such as “Performance Measures”, “Integration of Science, Environmental Justice and Tribal Relations” and “Public Input and Outreach.” However, a comprehensive discussion of the planned activities for the upcoming year can be found in the “Activity” section of this plan.

Priorities

As described in the Record of Decision (ROD), it is expected that the Science Program will develop and provide the best scientific information possible to guide decisions regarding CALFED actions and to evaluate the results of the implemented actions in an open and transparent process. Under the leadership of the Lead Scientist, the Science Program designs an organizational strategy for implementing the broad program objectives that includes suites of actions and program-specific activities that both inform current priority management needs and sustain science integration over the long-term.

In Year 7 (FY 06-07), the Science Program’s focus will be on priorities identified in the CALFED Bay-Delta Program 10 Year Action Plan and actions that will help support upcoming End of Stage 1 decisions and Stage 2 planning efforts. The priority activities for Year 7 are:

- Developing a State of Science for the Bay-Delta System report that will provide a broad interdisciplinary context and describe relevant scientific information for the Bay-Delta system to inform decision making and future Delta management under changing conditions.
- Providing staff and resource support for the reconstituted CALFED-wide Independent Science Board.
- Providing support for End of Stage 1 decisions through programmatic reviews such as Environmental Water Account (EWA) Review, Delta Risk Management Strategy (DRMS) Reviews, and supporting assessments of water quality and ecosystem restoration programs.
- Continuing performance measures and indicators development in collaboration with implementing agency representatives.
- Increasing efforts on information synthesis and communication of scientific understanding to the CALFED community through, for example, the 2006 CALFED Science Conference (October 2006), Delta Science Panel reports, and San Francisco Estuary and Watershed Science on-line journal.

- Continuing to invest in priority scientific information needs through program's Proposal Solicitation Package and providing support to increase data analyses of existing monitoring data sets through CALFED Science Fellows program.
- Supporting ongoing scientific research, projects, and programs across the CALFED Bay-Delta Program by identifying and providing technical expert advisors.

Accomplishments

The Science Program has continued to support and participate in an intensive effort to improve understanding of the Bay-Delta system, as well as improve the application of science throughout the CALFED Program. The activities identified in the Accomplishments section below are part of a long-term strategy to meet the program's objectives while maintaining the ability to respond to unforeseen critical issues facing the CALFED Program. For example, continued investment to increase our understanding of the Bay-Delta system through competitive research grants and CALFED Science Fellows not only yields information to inform pressing questions on Delta ecosystem sustainability with current water operations practices, but also provides the foundation that will support sound resource management decisions over the long-term.

TASK: Investment in Priority Scientific Information Needs

- *Proposal Solicitation Package (PSP) Process*
 - **Funded \$10 million in first Science PSP.** In 2004 the Science Program implemented its first broad call for research proposals covering cross program needs and future change. Thirteen proposals were selected and approved or recommended for funding by the Authority in August 2005. All grant agreements have been executed.
 - **2006 Focused PSP.** Science Program has successfully developed and released its second proposal solicitation. Based on funding limitations and concerns about timeliness and responsiveness to high priorities, the Lead Scientist and Science Program staff have streamlined the previous solicitation process and focused the efforts on implementing agency priorities, while maintaining competitive and scientifically credible processes. Cross-program knowledge gaps and management needs have been identified from recent public efforts such as the Interagency Ecological Program Pelagic Organism Decline Synthesis Report and Workplan Review, Environmental Water Account Technical Workshop, Technical Review of the Biological Opinion of the Long-term Operation of the Central Valley Project and State Water Project, Mercury workshop, Delta Science Panel, and Delta Risk Management Strategy. The PSP, released June 2006, received approximately 35 proposals competing for \$6M available to fund top proposals in 4 tightly focused research topics.

- Environmental Water
- Aquatic invasive (Exotic) species
- Trends and patterns of population and system response to a changing environment
- Habitat availability and response to change

The Science Program staff is currently coordinating the peer review phase of the PSP process. Funding recommendations are expected to be presented to the Authority at the December 2006 meeting. For more information on the PSP process, priority topics, and proposal information, please visit: http://science.calwater.ca.gov/psp/psp_package_2006.shtml

- ***CALFED Science Fellows***

- **Funded new group of CALFED Science Fellows.** The Science Program has completed a second round of granting funds to postdoctoral and graduate researchers through the innovative Science Fellows program that brings together community mentors with junior scientists and targets agency research priorities and data analysis gaps. Approximately \$2 million was awarded to eight Fellows in August 2005. More information on the CALFED Science Fellows program and the 2005 class can be found at <http://www.csgc.ucsd.edu/EDUCATION/CALFED/CALFEDIndx.html>.
- **2006 CALFED Science Fellows solicitation.** Science Program released the third call for applications in June 2006 to address priority topics identified in the 2006 Focused PSP as well as specific needs identified by CALFED Implementing agencies for the following topics:
 - Environmental Water Account (EWA)
 - Drinking water quality
 - Pelagic Organism Decline (POD).

The 2006 solicitation resulted in 20 proposals from doctoral graduate students and post-doctoral researchers with funding recommendations expected in October 2006. For more information on the 2006 solicitation, past and current Fellows and projects, please visit: <http://www.csgc.ucsd.edu/EDUCATION/CALFED/CALFEDIndx.html>.

TASK: Communication of Scientific Understanding

- ***Online journal.*** Three issues of the online, peer-reviewed journal, San Francisco Estuary and Watershed Science, were published in Year 6 of the Program. The journal is publicly accessible (<http://repositories.cdlib.org/jmie/sfews/>) and covers topics relevant to resource management questions. A companion service to the peer-reviewed electronic journal is San Francisco Estuary and Watershed Archive (<http://www.estuaryarchive.org/archive/>). The Archive is intended to provide electronic access to legacy documents, including: historical accounts and surveys; project, planning and strategic reports; and non-peer-reviewed environmental

information resources. An initial focus of the Archive is to digitize, index, and post historically important collections of papers and books that are now out of print.

- **Website.** The Science Program uses its website as the primary tool to inform the public on all program products and activities. The website has a wide range of resources including links to the technical panel and workshops, Independent Science Board, and PSP information. In the addition to continued updates of key information and improvements to existing web pages on specific topics such as Indicators and Performance Measures, program staff will begin implementing a new strategy to increase effectiveness of information transfer through the website.
(<http://science.calwater.ca.gov/index.shtml>)
- **Seminar series.** The Science Program has supported speakers for individual seminars on topics relevant to the CALFED Program. In the fall of 2005, the program created a formal quarterly seminar series program in collaboration with University of California, Davis, Center for Aquatic Biology and Aquaculture. The series provides the most current topical information or new perspectives on resource management and water operations to agency scientists and resource managers. To date, the program has sponsored 4 seminars.
- **State of Estuary Conference.** With the San Francisco Estuary Program and others, the Science Program co-sponsored the Biennial State of the Estuary Conference held in October of 2005. The three-day conference brought together nearly thousand scientists, resource managers, stakeholders, and decision makers, and focused on the dramatic changes to the Bay-Delta Estuary, highlighting currently understanding of the system, new scientific knowledge, and implications for future actions.

TASK: Performance Evaluation of CALFED Programs

- **Technical review panels and peer review**

Outside scientific advice and review play critical roles in review of CALFED program elements and are crucial components of making science open and accountable. The Science Program has applied peer review at several levels: proposal review, priority issues, and programs. Over the past year, the program has focused most of its peer review efforts in support of independent technical panels in response to emerging priority issues including OCAP Biological Opinion Review, IEP's POD work plan, CALSIM II San Joaquin Review.

- **Interagency Ecological Program's (IEP) Pelagic Organism Decline (POD) Investigations:** Responding to the recent decline of pelagic fish species in the Bay-Delta, the Science Program co-sponsored an independent external review of the Interagency Ecological Program's workplan to address the POD issues. The panel's report is based on the IEP's Pelagic Organism Decline Investigation 2005 results and draft 2006 work plan presented at a public workshop in November 2005. In January the IEP Directors approved the final 2006 work plan, which included revisions based on the review panel report. The Science Program considered the panel's recommendations in identifying priorities for its 2006 focused research solicitation and Science Fellows program. IEP

POD group has developed a response to the review recommendations, to be released in May 2006. For more information see Science Program website at: http://science.calwater.ca.gov/workshop/workshop_pod.shtml

- **Operations Criteria and Plan (OCAP) Biological Opinion:** At the National Marine Fisheries Service (NMFS) request, the Science Program organized an independent review of the scientific information used to support the 2004 Biological Opinion regarding the coordinated OCAP for the Central Valley Project and State Water Project. A public workshop was held in October 2005. The review panel presented its final report at public workshop January 30, 2006 and the report including the response from NMFS is available on the Science Program website at http://science.calwater.ca.gov/workshop/workshop_ocap.shtml.
- **Environmental Water Account (EWA):** EWA agency biologists and Science Program held a public workshop in December 2005 to review the 2005 EWA water acquisitions and allocations, focusing on the issues of EWA export effects on delta smelt and other sensitive fish populations and addressing how this information would affect EWA operations in 2006. Although this event was not a full-fledged annual program review, four members from the EWA Review Panel participated in the technical workshop and their review comments are available on the Science Program website at <http://science.calwater.ca.gov/workshop/ewa.shtml>.
- **CALSIM II:** The CALFED Science Program and the California Water and Environmental Modeling Forum (CWEMF), in collaboration with the US Bureau of Reclamation (USBR), California Department of Water Resources (DWR), California Regional Water Quality Control Board, Central Valley Region (RWQCB-CVR), and the US Environmental Protection Agency (Water Quality Program), have sponsored and organized a technical review to provide an independent analysis and recommendations about the strengths and weaknesses of the new simulations of the San Joaquin River Valley representations in the CALSIM II model. The review effort was comprised of three public workshops, with final review panel report released in January 2006 (http://science.calwater.ca.gov/workshop/workshop_pod.shtml).
- **Delta Science Panel:** In response to request from the California Legislature, the Science Program convened a technical panel to consider the current scientific understanding of the Sacramento-San Joaquin River Delta and to prepare a report that will be used to help develop a long-term Delta vision. The panel has reviewed, summarized and synthesized information developed by the CALFED Program's science boards, other pertinent literature, and input from other Delta science experts to develop the comprehensive report. The report, *The Role of Science in the Delta Visioning Process*, released in June 2006, is expected to inform upcoming Delta vision discussions among stakeholders and policy makers. The report is available on the Science Program website:

- ***Indicators and performance measures development***
The Science Program has led a renewed effort to develop comprehensive indicators and performance measures for the CALFED Program in order to report on progress and provide critical information for adaptive management. Science Program staff, in collaboration with CBDA and implementing agency staff, developed a framework that will provide guidance for consistent indicator and performance measure development for the program. A multi-agency technical working group refined the framework and developed examples of indicators using the framework. The new framework includes more emphasis on regular independent scientific review and the development of synthesis communication products for both technical and non-technical audiences. In response to the 10-Year Action Plan, the CALFED agencies formed a subcommittee to direct the development of indicators and performance measures related to the Program objectives and actions. The subcommittee formed four subgroups, one for each of the four CALFED objectives: water supply reliability, water quality, ecosystem restoration, and levee system integrity. The subgroups are using a phased approach to develop indicators and performance measures starting with a detailed plan and schedule to complete performance measure development for a core set of indicators, including communication products. A more complete set of indicators will be developed in future phases. The technical workgroup will continue to oversee the technical integration of the various subgroup efforts.

TASK: Application of Scientific Practices

- ***Independent Science Board (ISB)***. The Science Program has supported the ISB since its inception in 2003. Although the board was on hiatus from May 2005 – July 2006 due to an expired contract, the CALFED Program’s ongoing scientific and technical needs were addressed through technical review panels and workshops. The hiatus provided an opportunity to examine the organization and structure of the CALFED science boards and to determine whether they might be improved to better meet the current needs of the CALFED Program and implementing agencies. Working with Science Program staff, CALFED Program managers and lead agency staff, the Lead Scientist developed an approach that would streamline the current board structure, while maintaining the technical oversight and scientific integrity required to support CALFED management needs.

TASK: Program Planning/Reporting/Administration

- ***Lead Scientist recruitment***. The Science Program initiated a nationwide Lead Scientist recruitment effort in the fall of 2005. Although the recruitment was widely advertised and services of a professional recruitment organization were used, the search was unsuccessful and was closed. The Science Program has been working with the US Geological Survey (USGS) to identify an interim candidate to serve after the Lead Scientist’s term ended June 30, 2006.

- ***Program planning and reporting.*** The Science Program has developed annual multi-year plans as part of the over all CALFED planning process. The current year's plans were approved by the Authority in September 2005. The program has also produced a Science section for the CALFED Annual Report which was released in the April 2006. In addition to the program plans and annual reports, the Lead Scientist and staff have provided regular updates on program activities and relevant issues through staff report and presentations to the Authority and BDPAC.
- ***Tracking database.***
The Science Program is developing a project tracking database to help track deliverables and progress on research grants, and to support evaluations of progress toward program goals and objectives. The first objective in this effort was to populate the databases with current research information so that Science Program staff can query the database to update and track different aspects of the research they oversee. This activity is about 70% complete.

TASK: Coordination with the Interagency Ecological Program (IEP)

The Science Program has made marked progress in improving communication and coordination with the IEP Directors, Coordinators, and staff. Science has identified a dedicated staff person to act as liaison between the two programs and to facilitate and coordinate recent efforts to address the Pelagic Organism Decline (POD). This effort has resulted in an independent review of the 2006 IEP POD workplan with a commitment to addressing review panels recommendations as outlined in a written response from the IEP-POD management team released in May 2006.

Activities

The following section describes the major projects and activities planned by the Science Program for the next fiscal year (06/07) to address program goals and to meet ROD objectives along with priorities identified in the CALFED Bay-Delta Program 10-Year Action Plan. The Science Program's strategy will be to focus intensively on specific areas to support end of Stage 1 decisions, while designing and implementing practices that will support science integration over the long-term. Examples of this strategy are efforts in support of the Pelagic Organism Decline (POD) studies, including increased coordination with IEP, continued funding of projects to help narrow priority knowledge gaps through focused PSPs and CALFED Science Fellows, support and review of conceptual models to increase our understanding of the system-wide responses, applying and encouraging use of adaptive management strategies in decision-making, providing technical and scientific guidance and oversight through the Independent Science Board (ISB), science advisors, and technical review panels, intensive effort into performance measures development, continued investment into communication efforts, and development of an updated comprehensive science agenda that will help define the priorities for both the near and long-term.

TASK: Investment in Priority Scientific Information Needs

- ***Proposal Solicitation Process***
 - The Science Program released a focused proposal solicitation package in July 2006 to address high priority topics, with approximately \$6 million available. Dedicated program staff will oversee and coordinate solicitation process, including peer review of proposals, convening a technical panel for proposal selection and grant making. It is expected that the projects selected in this solicitation will be able to commence work by February 2007.
 - The Science Program has approximately \$6 million available to conduct two more focused proposal solicitations. Under the guidance of the ISB and the Interim Lead Scientist, staff will work to identify priority topics and develop the 2007 solicitation package using the focused process used in 2006.
- ***CALFED Science Fellows Program***
 - The Science Program has completed a new round of granting funds to postdoctoral and graduate researchers to target agency research priorities and data analyses gaps. Approximately \$2M will be awarded to about eight Fellow projects by November 2006.
 - Under the leadership of an Interim Lead Scientist, the Science Program will develop the scope of the 2007 proposal solicitation using the 2006 Fellows solicitation approach.

TASK: Communication of Scientific Understanding

Communication of current scientific understanding and new technical information is a key component of science-based adaptive management. The Science Program will continue to support ongoing communication activities such as the open-access electronic scientific journal (San Francisco Estuary and Watershed Science) dedicated to Bay-Delta and watershed issues, biennial CALFED Science Conferences with the 4th one to be held in October 2006, and Science Seminar series to bring outside experts to speak on topics relevant to the CALFED Program, while continuing to make Science Program activities, products and new technical information broadly available through its website. In addition, the Science Program plans to increase investments for synthesis of new technical and scientific information with a focus on providing the scientific context for upcoming decisions on CALFED Program implementation. Example products include focused fact sheets, current understanding summary reports such as the Delta Science Panel Report, and a state of scientific knowledge report that would build on information presented at the upcoming CALFED Science Conference. The Science Program will emphasize increasing effectiveness of communication efforts by designing products for target audiences and investigating new media mechanisms to achieve greater awareness and broader distribution of all products communicating scientific understanding.

- ***State of Science for the Bay-Delta System.*** The Science Program is developing a report on the state of scientific knowledge of the Bay-Delta system. It is expected that the first edition of the report will be completed by December 2007 to help inform and support End of Stage 1 decisions/Stage 2 actions. This report will build on information presented at the biennial CALFED Science Conference and incorporate additional information from current scientific literature, CALFED advisory and review panels and recent technical reports. The report will aim to describe our current understanding of the system, including information supporting Program objectives of water quality, levee system integrity, water supply reliability, and ecosystem restoration, and to provide a broad interdisciplinary scientific context to support upcoming decisions on CALFED Program implementation. Areas of focus will include the state of scientific knowledge, state of the system (trends/indicators), recommended future science actions/activities, critical certainties and uncertainties, and specific interrelationships in the system. The report and its technical appendices will be developed with technical oversight from the ISB and independently reviewed.

TASK: Performance Evaluation of CALFED Programs

- ***Technical Review Panels and Workshops.*** The Science Program will continue to convene Technical Review Panels and issue workshops as specific needs are identified by the Lead Scientist, the CALFED Program managers or implementing agencies. The Program's focus will be reviews and program evaluations that will inform end of Stage 1 decisions at the end of 2007. Proposed activities for the upcoming year include:
 - Review of Performance Measures Framework (Fall/Winter 2006)
 - Biennial Review of the Environmental Water Account (November 2006)

- Review of Delta Risk Management Strategy (DRMS) (Fall 2006-Summer 2007)
 - Review of Delta Conveyance modeling and research activities (Spring 2007)
 - Continuing Delta Science Panel to support and inform Delta Visioning Process
 - Supporting assessments of water quality and ecosystem restoration programs
- ***Coordinate indicators and performance measures development.*** The Science Program will continue to coordinate the development of performance measures for the CALFED Program in collaboration with the implementing agency-directed Performance Measures subcommittee, the technical workgroup and the implementing agency staff on the performance measures subgroups. The subgroups are performing the bulk of the indicator and performance measure development effort. Subgroup members will discuss integration and linkages across Program objectives in the larger performance measure technical workgroup. The technical workgroup and subgroups report to the Performance Measure subcommittee. Utilizing the framework developed in Year 6, indicators and performance measures for the program will be developed in phases as follows:

Phase 1: Select example core indicators and develop plan

An implementing agency performance measure subgroup has been formed for each Program objective. Each subgroup will complete a plan for developing, evaluating and communicating a set of 3-5 core indicators for their Program objective. The plan will include the selected indicators, a plan and schedule for completing the data collection, analysis, and reporting, an information inventory, and list of resources needed to complete the plan. A science panel will review the framework and plan. A draft plan is expected by September 2006 for review by the BDPAC and subcommittees, ISB, agency directors, and CBDA.

Phase 2: Implement plan to develop core indicators; Report detailed information on web.

The agencies will implement the plan outlined in Phase 1 by compiling necessary data and information and performing the analyses to translate the data into the selected performance measures. The resulting information including identified outcome and driver indicators, conceptual models, summarized data and data analyses will be presented using a web-based reporting system. A science panel will review the resulting products and information.

Phase 3: Review and revise core indicator information; Develop summary publication.

The implementing agencies will revise the core indicator information based on feedback from the Science review panel and will develop a summarized version for inclusion in a publication for non-technical audiences. A science review panel will review the products and outcomes of Phase 3.

Phase 4: Identify additional priority indicators and plan for development. Phase 4 begins the cycle again –identifying the highest priority gaps for additional indicators and performance measures and producing a plan to develop a more complete set of indicators and performance measures.

- ***Coordinate performance measure, monitoring, assessment and research activities.*** There are numerous performance measure, monitoring, assessment and research activities in the Bay-Delta, some under the auspices of the CALFED Program and others that are part of local, regional or other programs. The Science Program is currently coordinating development of performance measures that will be used to help understand cause and effect relationships among actions and outcomes, to evaluate and track program progress and performance, and to inform management decisions on next steps in program planning and implementation during the assessment process. The Science Program is currently developing an approach for CALFED Program monitoring and assessment that will be fully integrated with the performance measure effort. The approach will evaluate existing efforts, identify gaps in monitoring and assessment and recommend priority items for implementation. Although this activity is part of a long-term strategy for meeting program's objectives, significant progress is expected on plan development in Year 7. This effort will have considerable input from technical review panels and the ISB, including review and evaluation of process and products.
- ***Science integration.*** Coordination of activities is one of the main tools for increasing science integration throughout the CALFED Program. The Science Program will continue to dedicate staff resources to help coordinate science efforts in other programs. Examples of these programs include IEP, EWA, Conveyance, Water Quality, and DRMS. In Year 7, Science Program also plans on expanding its use of Science Advisors. The advisors will be subject matter experts and will, in coordination with the Science Program staff, provide advice and technical support to implementing agencies in dealing with complex resource and system management problems.

TASK: Application of Scientific Practices

- ***Independent Science Board (ISB).*** The ISB is a key component in ensuring continuous advancement of credible scientific information for guiding management decisions in the CALFED Program. The Science Program is following the approach developed by the Lead Scientist that streamlines the current board structure. The Lead Scientist nominated a new reconstituted ISB that was approved by the Authority in June 2006 and met in August 2006. Primary near-term ISB activities will include addressing priority issues such performance measures, evaluation of programs and projects to aid in End of Stage 1 decisions, providing technical oversight and review for the State of Science of the Bay-Delta System report, assuring science is used in all programs, helping to select the Lead Scientist, and addressing requests for National Research Council (NRC) reviews. It is expected that the ISB will meet at least quarterly and that the ISB chair will provide updates on Board activities to the Authority and BDPAC. For more information on ISB activities, charge, and products, please visit: http://science.calwater.ca.gov/sci_tools/isb.shtml

TASK: Program Planning/Reporting/Administration

- **Lead Scientist recruitment.** The Science Program, with guidance from the ISB and Selection Panel, will renew efforts to identify a permanent Lead Scientist for the CALFED Bay-Delta Program. Discussions have been initiated to elevate the Lead Scientist position to an academic appointment under the University of California Office of the President in hopes of attracting more of qualified, high stature candidates. The Science Program is expecting these negotiations to continue through 2006, with a new recruitment process launched prior to the end of Year 7.
- **Tracking database.** The Science Program is developing a database to help track deliverables, progress on research project, and support evaluations of progress toward stated goals and objectives. The first phase of the project, to populate the database with current research information, is expected to be completed by fall 2006. The long-term vision is to link the Science Program database with GIS applications, and integrate with CALFED-wide program tracking database. Science Program staff will continue to attend and participate on Program and Fiscal Tracking workgroups to ensure database linkages.

TASK: Coordination with the Interagency Ecological Program (IEP)

The Science Program and IEP staff will continue to work to more clearly define their relationship and coordinate their activities. They will continue to develop plans for comprehensive monitoring, proposal solicitations, data analysis and synthesis; and to address POD related issues. They will also coordinate other ongoing multidisciplinary studies, monitoring program review and transformation of monitoring program information into knowledge. The CALFED Science Program will continue to participate with IEP through representation on the IEP Management Team; support for planning through data and programmatic reviews via Technical Panels, new investments in research and analysis via proposal solicitation, and focused technical expertise via recruitment of Science Advisors and Science Fellows.

Funding

CALFED Science Program (\$ in millions)	Yr 7	Total
CALFED Science Program	\$	\$
Investment in Priority Scientific Information Needs	4.06	4.06
Communication of Scientific Understanding	2.25	2.25
Performance Evaluation of CALFED Programs	1.59	1.59
Applications of Scientific Practices	0.85	0.85
Program Planning/ Reporting/ Administration	1.84	1.84
Coordination with IEP	0.10	0.10
Total Available Funding	\$10.69	\$10.69

CALFED Science Program (\$ in millions)	Yr 7	Total
State	9.99	9.99
Federal	.70	.70
Available Funding Total	\$10.69	\$10.69

Attachment I: Interagency Ecological Program Plan

Goals and Objectives

The mission of the Interagency Ecological Program (IEP) is, in collaboration with others, to provide ecological information and scientific leadership for use in management of the San Francisco Estuary.

The long-term goals and objectives of IEP are to fulfill its mission by:

- (1) describing the status and trends of aquatic ecological factors in the estuary;
- (2) developing an understanding of environmental factors that influence observed aquatic ecological status and trends;
- (3) using knowledge of the previous information in a collaborative process to support natural resource planning, management, and regulatory activities in the estuary;
- (4) continually reassessing and enhancing long-term monitoring and research activities that demonstrate scientific excellence;
- (5) providing scientific information about the estuary that is accurate, accessible, reliable, and timely; and
- (6) responding to management needs in a timely fashion.

In the next five years, the IEP objectives are to:

- (1) complete its monitoring program elements;
- (2) conduct technical reviews of its delta smelt and Chinook salmon monitoring programs and conduct an external review on the structure and function of the program. In the program review, the IEP will work with CBDA Science Program to define the relationship of these two programs;
- (3) provide near-real time data for use in water operations management, and continue providing data from the sampling programs to the public, via website access or personal requests;
- (4) report the abundance and distribution of numerous estuarine organisms in the annual Status and Trends issue of the IEP Newsletter; and
- (5) in collaboration with the Science Program, develop a plan for implementation of a comprehensive monitoring and assessment program.

Accomplishments

In 2005, the IEP continued its long-term monitoring studies, as well as all of its on-going special studies and initiated new POD related studies. IEP technical staff participated in several forums to share information about the estuary and its living resources, including IEP and Science Program sponsored workshops, Environmental Water Account (EWA) workshops, agency meetings on new biological opinions for the CVP/SWP operations, the CALFED Science Conference, the State Water Resources Control Board water quality control plan workshops and other professional conferences. IEP continued to upload its data sets to the Bay Delta and Tributaries website (BDAT, <http://bdat.ca.gov/>) and the California Department of Fish and Game website (<http://www.delta.dfg.ca.gov/>). Two IEP monitoring programs also provided near-real-time data on delta smelt abundance and distribution needed to make day-to-day water operations decisions during Data Assessment Team (DAT) conference calls and Water Operations Management Team (WOMT) meetings. The status and trends of fish, shrimp, crabs, zooplankton and phytoplankton as well as water quality parameters were reported in the annual Status and Trends issue of the IEP Newsletter. Several journal articles and peer-review technical reports were completed for specific studies. The latest bibliography of IEP publications can be found at http://www.iep.ca.gov/report/iep_bibliography.html.

The Interagency Ecological Program's commitment to collaborative work of direct relevance to CALFED program issues is demonstrated by short-term special studies that provide mechanistic understandings of the physical, chemical, biological, and ecological processes. Two on-going undertakings in 2005 that demonstrate this are the Yolo bypass fish monitoring study and the Hydrodynamics studies in the Delta. The Yolo bypass study collects baseline data on lower trophic levels, fish, hydrology, and physical conditions; examines fish community trends; determines whether managed seasonal flooding supports splittail and food web production; and evaluates potential effects of pesticides. The Hydrodynamics study collects data at a variety of locations that are suspected to be significant transport pathways to the export facilities. Data is analyzed with respect to the influence of pumps on transport of water and salt. Accomplishments for the major categories of IEP activities are summarized below.

Mandated Monitoring

Mandated monitoring includes those IEP monitoring program elements required through regulatory processes (e.g., SWP and CVP water right decision or biological opinions for SWP and CVP operations). Monitoring programs under this category include the Fall midwater trawl survey, 20 mm survey, Delta smelt larva survey, Summer townet survey, Spring Kodiak trawl, Upper estuary zooplankton/neomysid monitoring, Juvenile Chinook salmon monitoring at Knights Landing, Mill and Deer creeks, Bay salinity monitoring, Estuarine and marine fish, Shrimp and macro-invertebrate study, Delta juvenile fishes survey and the Environmental monitoring program. Annual accomplishments include the successful completion of all mandated monitoring programs, data processing, quality assurance, posting of all monitoring data, data analyses, index computation, and annual

reporting of status and trends. The IEP also reported data from key monitoring programs on a near-real-time basis to aid in EWA decisions.

Water Operations Monitoring

Water operations monitoring includes those IEP monitoring program elements that generate data and information used in managing SWP and CVP water project operations. Reservoir releases, Delta export levels, and operation of the Delta cross channel gates are all part of water project operations. Monitoring programs under this category include Delta flow and water temperature monitoring and database management, Sacramento and Chipps Island fish trawl surveys, SWP and CVP fish salvage programs. Annual accomplishments include the successful completion of all monitoring programs. Successful near-real time reporting of data on water conditions (e.g., flows and temperature) and fish distributions to the Data Assessment Team (DAT) and Water Operations Management Team (WOMT) for use in managing water project operations.

Fish and macro-invertebrate monitoring

IEP programs under this category include monitoring to determine the abundance and distribution of bay shrimp and crabs, and mitten crab monitoring and reporting. Annual accomplishments include the successful completion of all monitoring programs, data analyses, and annual reporting of status and trends.

Salmonid migration and survival studies

This category of IEP activities includes genetic studies that help identify races (e.g., winter-run, spring-run, or fall-run) of emigrating Chinook salmon captured at various locations in the system. In addition, there are several projects that mark and recapture young salmon to determine survival rates over various stages of their life cycle. Data and information from these studies is used to evaluate the effectiveness of various actions occurring under the Environmental Water Account program and the Vernalis Adaptive Management Plan. These studies also provide baseline life history information of wild and hatchery steelhead collected at the CVP and SWP salvage facilities and provides data to determine if environmental differences can be detected when the two groups are entrained.

Studies of Ecological Processes

These studies are aimed at increasing our understanding of how water flow and circulation affect the estuary environment and its living resources. Studies under this category include development of a 3-dimensional hydrodynamic model, use of a particle-tracking model to understand how SWP and CVP exports may affect the distribution and entrainment of young fishes, and detailed modeling studies to determine how water flows and Delta cross channel operations may affect the distribution of young salmon emigrating from the Sacramento River watershed. The IEP is also completing studies to define and better understand predator-prey dynamics of fishes inhabiting near-shore habitats in the Delta. All of these studies are in-progress.

Fish Facilities Studies

IEP efforts under this category include studies to investigate the stress, predation, and acute mortality of delta smelt during the collection, handling, trucking and release phases of the fish salvage process. IEP scientists also collaborate with researchers conducting

studies of fish salvage dynamics at the CVP facilities, including peer-reviews of proposals, technical reports and articles. All of these studies are in-progress.

Habitat Restoration Studies

Over the years, the IEP has offered technical assistance in the development, review, and monitoring of various projects to restore aquatic habitats in the San Francisco Estuary. IEP scientists also collaborated in the completion of the *Napa River Fisheries Monitoring Program Annual Report 2004*.

Pelagic Organism Decline Studies

In response to IEP abundance indices showing marked declines of four pelagic species, a large effort was initiated to evaluate the potential causes of the decline and the first completed product was the 2005 Synthesis Report. Major findings in 2005 were synthesized using two conceptual model approaches. First, species matrices were used to examine which stressors (toxic effects, entrainment, harmful algal bloom, food availability, and disease and condition) were most likely to be important and which stressors we had the least information about. Secondly, two narrative explanations for the recent step decline in the abundance of pelagic species in the context of their long term trends or previous patterns were constructed. The *Winter Entrainment Hypothesis* focuses on sources of mortality in the central and southern Delta, and the *Bad Suisun Bay Hypothesis* focuses on food web effects in Suisun Bay and the west Delta.

IEP Program Management and Communication

As with any large, multidisciplinary program, a portion of the IEP effort goes to ongoing program management and planning. Activities under this category include development and approval of the annual IEP work plan, ongoing management during implementation, program element reviews, IEP database and website management, support for the IEP Newsletter and annual science meeting, and support of the external Science Advisory Group (SAG). Accomplishments in 2005 include successful implementation of the program, development of the 2006 work plan, publication of the quarterly IEP Newsletter, completion of the annual meeting; CALFED Science sponsored peer review of the Pelagic Organism Decline 2005 Synthesis report and 2006 work plan, and continued functionality of the public database and website.

Activities

The Interagency Ecological Program has been comprised of long-term monitoring, water operations monitoring and special studies. As mentioned previously, the special studies component has been cut back due to funding constraints; monitoring studies will be impacted as well if more funding is not identified. Major activities in the future will be dependent on how these funding issues are resolved. The IEP is committed to conducting the mandated monitoring studies required by NOAA Fisheries and FWS biological opinions and SWRCB Water Rights Decision D-1641. There is also a commitment to continue providing the “real-time” data needed to make water operation decisions. If additional funding is available, special studies will be solicited, evaluated, selected and implemented.

Recent concerns of low abundance indices calculated from the IEP monitoring studies for several pelagic fishes in the Sacramento-San Joaquin Delta and zooplankton prompted IEP to develop a “Pelagic Organism Decline (POD)” work plan. The work plan delineates expansion of existing IEP monitoring studies, analyses of existing data, new studies, and ongoing studies that will investigate whether there is a new threat to pelagic fish and their prey, and if so, what has caused it.

Following are the major tasks the IEP plans for 2006 and out-going years.

Monitoring

IEP monitoring activities focus on aquatic habitats and living resources in the San Francisco Estuary, Sacramento River, and San Joaquin River. Monitoring activities address all of the goals and objectives established for IEP. Monitoring activities are:

- Hydrodynamics monitoring
- Environmental monitoring
- Fish and macro invertebrates monitoring
- Water operations monitoring
- Estuarine monitoring

Special Studies

The IEP special studies component provides mechanistic understanding of the physical, chemical and ecological processes and evaluates current and new technology, sampling methodology and overall study design. These studies will provide additional information on how alterations of physical conditions and ecological interactions (e.g., predator-prey interactions) affect native and resident fishes in the estuary. These special studies address IEP goals 2, 3, 5, and 6. Special studies are:

- Salmonid migration and survival studies
- Resident fishes studies
- Ecological processes studies

- Fish facilities studies
- Agricultural and municipal diversion evaluation
- Habitat restoration evaluation
- Contaminants

Program Management

Ongoing program management activities are dedicated to annual program planning and program implementation, IEP database and website management, and program element reviews. Program management activities address IEP goals 4-6. Program management activities are:

- Program planning and implementation
- Data Management and utilization
- Program element reviews of: 1) the delta smelt monitoring program, 2) the salmon monitoring program, and 3) the structure and function of IEP and IEP-Science Program integration
- Initiate activities to develop a comprehensive monitoring and assessment plan