

# CALFED Bay-Delta Program

## Science Program Program Plan Year 9 (State FY 2008-2009; Federal FY 2009)

### **Implementing Agencies:**

**CALFED Science Program:** Resources Agency/CALFED Bay-Delta Program

**Interagency Ecological Program (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

July 1, 2008

# Introduction

This Science Program Plan identifies the CALFED Program activities that are scheduled to be completed during State Fiscal Year (FY) 2008-2009 and Federal FY 2009. The Plan also describes progress made to date on the previous year's program plan. As appropriate, the Program Plan and activities will be adjusted during the year to reflect, for example, changes in priorities, funding, policies, or program direction.

## Priorities

As described in the Record of Decision (ROD), the Science Program will provide the best scientific information possible to guide CALFED decisions on the four program objectives (water quality, levee system integrity, water supply, and ecosystem restoration) and to evaluate CALFED actions in an open and transparent way. Under the leadership of the Lead Scientist, the Science Program implements a broad program of activities (such as workshops, research grants, program and project reviews, data synthesis, and scientific publication) that inform management and promote science integration.

The Year 9 Science Program management and policy priorities include the Delta Vision (including the role of science in new Bay-Delta governance), the Bay-Delta Conservation Plan (BDCP), and the Central Valley and State Water Projects Operations Criteria and Plan (OCAP) Biological Assessment and Biological Opinions. The following activities will be performed to support these and other priority management needs to invest in a solid scientific foundation for managing the Bay-Delta system.

The planned activities for Year 9 are to:

- Synthesize complex scientific information relevant to priority management needs by conducting workshops and providing special reports by the lead scientist, Independent Science Board (ISB), and science advisors including the completion of the first edition of the State of Bay-Delta Science report (SBDS).
- Communicate science information to targeted audiences within the CALFED community through specific actions and products including *Science Action*, *Science News*, the Science Program website, research grant products, seminars and symposia, and the biennial CALFED Science Conference.
- Facilitate the use of best available science in important CALFED-related efforts by promoting and providing independent science reviews of plans and documents such as the OCAP, the Delta Risk Management Strategy (DRMS report, and the Delta Vision Strategic Plan.
- Invest in priority scientific research with focused grants awarded through the Science Program's Proposal Solicitation Package (PSP) and the CALFED Science Fellows program.
- Support scientific aspects of projects and programs across the CALFED Bay-Delta Program by identifying and providing independent technical experts or advisors.
- Provide staff and resource support for the CALFED Independent Science Board.
- Coordinate with and support the IEP by providing an IEP Lead Scientist and actively participating with the IEP Coordinators and the IEP Pelagic Organism Decline (POD) Management Team.
- Support performance measure and indicator development by working with staff from the CALFED implementing agencies, CALFED Program Performance and Tracking, Delta Vision, and BDCP.
- Support the online peer-reviewed journal San Francisco Estuary and Watershed Science.

# Year 8 Progress Report

Year 8 was a productive year for the Science Program. A large portion of our energy was focused on providing Delta Vision with timely scientific information for use in their planning process (see attachment 1 – Science Program Support of Delta Vision). Another high priority was making substantive progress on the *State of Bay-Delta Science 2008* report. Other management priorities supported by Science Program activities in Year 8 included the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP), the Central Valley and State Water Projects Operations Criteria and Plan (OCAP), and the Delta Risk Management Strategy (DRMS).

The following specific activities performed in Year 8 helped the Science Program to satisfy its operational objectives to provide a solid scientific foundation for managing the Bay-Delta system.

## Objective: Synthesize Scientific Information

Compile, analyze, and integrate scientific information across disciplines.

- **Workshops**

The Science Program convened numerous workshops in Year 8 in order to provide timely information on high priority management needs. The Science Program coordinated and provided a venue for the presentation of scientific knowledge to inform stakeholders, agency staff and the general public on topics important to the region. The following workshops involved experts from multiple disciplines to increase and promote understanding of complex issues in Year 8:

- A Discussion of Delta Conveyance Modeling: Part I - 04/03/08 and Part II - 05/20/08
- Organic Carbon: The Good, The Bad, and The Muddy - 05/16/08
- Temperature Management and Modeling (in support of OCAP) - 04/01/08
- Unraveling the Smelt Mystery: Where Do Delta Smelt and Longfin Smelt Spawn and How Do They Get There? - 11/15/07
- Governing the Delta: Principles for a New Vision - 10/12/07
- Science Issues Relating to Delta Conveyance Infrastructure, Part I - 08/22/07 and Part II - 09/11/07

More detailed information on these workshops can be found at:

[http://www.science.calwater.ca.gov/events/workshops/workshop\\_index.html](http://www.science.calwater.ca.gov/events/workshops/workshop_index.html)

- ***State of Bay-Delta Science 2008***

A major synthesis effort led by the Science Program in Year 8 and continuing into Year 9 is the State of Bay-Delta Science report (SBDS). This report takes a comprehensive look at the entire Bay-Delta ecosystem, synthesizes our understanding of the system, and presents important new policy perspectives arising from recent advances in knowledge. This first report focuses on what was learned during the first stage of the CALFED Program and provides a basis for upcoming decisions during CALFED's stage 2, the Delta Vision Strategic Plan, and other Delta planning initiatives. The summary report, State of Bay-Delta Science 2008 - Summary for Policymakers and the Public, was completed in Year 8 and is available to the public at:

<http://www.science.calwater.ca.gov/publications/sbds.html>

- ***Special reports by the Lead Scientist, Independent Science Board, and science advisors***

Environmental and policy issues in the Delta are often complex and involve multiple scientific disciplines and political interests. The Science Program provided a valuable service to the CALFED program and Delta Vision in Year 8 by supporting individuals and teams of multidisciplinary experts to analyze, synthesize, and clearly summarize complex information into cohesive, understandable, and relevant pieces. Many topics in Year 8

supported Delta Vision including the Sea Level Rise memo by the Independent Science Board (ISB) and the Ecological Principles memo by the Lead Scientist. (see attachment 1 – Science Program Support of Delta Vision).

## Objective: Communicate Science

Interpret and communicate scientific information to policy- and decision-makers, scientists, and the public.

- ***Workshop summaries***

Through its sponsored workshops (described above), the Science Program supported and wrote authoritative and unbiased descriptions of the key findings of workshops. Each workshop summary report was tailored to meet a target audience or specific management need. The information ranged from detailed descriptions of the state of knowledge to brief summaries and syntheses of key findings.

([http://www.science.calwater.ca.gov/events/workshops/workshop\\_index.html](http://www.science.calwater.ca.gov/events/workshops/workshop_index.html)).

- ***State of the Estuary Conference***

The Science Program co-sponsored the Biennial State of the Estuary Conference held in at the Scottish Rite Center, Oakland, CA, on October 16–18, 2007. This conference brought the latest information to scientists, resource managers, stakeholders, and decision makers about the estuary’s changing watersheds, impacts from major stressors, recovery programs for species and habitats, and emerging issues.

- ***Website***

The Science Program website was completely redesigned and reorganized in Year 8 to improve the ease and efficiency of information transfer and to meet State requirements. All of the main pages have been updated with new information. The website is the main place to obtain Science Program information including documents, events, and plans. Please visit <http://science.calwater.ca.gov>.

- ***Direct communication by the lead scientist, Independent Science Board, and science advisors***

An important way the Science Program met the needs of managers and stakeholders in a timely manner was to directly communicate scientific understanding on high priority issues to specific audiences. The CALFED Lead Scientist and the ISB Chair spoke to the Delta Vision Blue Ribbon Task Force at most of their meetings in Year 8 presenting memos on, for example, Delta Ecological Principles, Projections of Sea Level Rise for the Delta, and Ecosystem Performance Measure Development (see attachment 1 – Science Program Support of Delta Vision).

- ***Online journal***

The Science Program supported the online, peer-reviewed journal, San Francisco Estuary and Watershed Science and the companion online Archive. Three new issues encompassing 12 new research papers were released in Year 8.

Additionally, the Science Program has secured a new Editor in Chief and Managing Editor for the Journal. All issues and archives are available through the Journal website at <http://repositories.cdlib.org/jmie/sfews>.

- ***Seminars and symposia***

The Science Program held a seminar series in collaboration with the University of California, Davis, Center for Aquatic Biology and Aquaculture in Year 8. Four seminars featuring numerous speakers were held to present information and new perspectives on science related to resource management needs. Topics presented included estuaries as fish nurseries, Delta smelt refugial populations, salmon mortality, and pyrethroid contaminants. The presentations were open to the public. Archived videos and other series information can be found at <http://caba.ucdavis.edu/activities.htm>.

Additionally, Science Program staff identified speakers for the less-formal CALFED brown bag lunch-hour seminars. These seminars conveyed important regional scientific information to agency staff, stakeholders, and the

general public. Summaries of the lunch-hour seminars can be viewed at ([http://www.science.calwater.ca.gov/events/seminars/seminar\\_index.html](http://www.science.calwater.ca.gov/events/seminars/seminar_index.html))

- ***Science Action***

The Science Program's *Science Action* series, after a term of inactivity, was restarted in Year 8. The latest issue was titled, "Tracking Organic Matter in Delta Drinking Water." *Science Action* highlights important Bay-Delta scientific discoveries and hot topics in short layperson-accessible language to a broad audience of stakeholders, managers, and the general public. *Science Action* publications are available for download at [http://www.science.calwater.ca.gov/publications/pub\\_index.html](http://www.science.calwater.ca.gov/publications/pub_index.html).

- ***Science News***

The Science Program released 6 new issues of its newsletter, *Science News*, which highlights the latest information related to CALFED Science Program activities, including upcoming events, research, and key developments. Articles typically summarize an issue and provided links where more information can be obtained. For more information and access to all *Science News* issues please visit [http://www.science.calwater.ca.gov/publications/sci\\_news.html](http://www.science.calwater.ca.gov/publications/sci_news.html).

## Objective: Coordinate Science

Coordinate with CALFED agencies to promote science-based adaptive management.

- ***Independent Science Board***

The ISB, supported by Science Program staff, met 8 times in Year 8 to provide scientific insight, oversight, and foresight for important CALFED related policy issues. The board discussed performance measures, the role of science in water policy, the future role of the IEP, the review of the DRMS report, and issues related to Delta initiatives such as Delta Vision, the Bay Delta Conservation Plan (BDCP), and the Ecosystem Restoration Program (ERP) Conservation Strategy for the Sacramento-San Joaquin Delta and Suisun Marsh and Bay Planning Area. Information from these discussions was integrated into the policy-making process through regular updates and memos. For more information on ISB activities and products, please visit:

[http://www.science.calwater.ca.gov/isb/isb\\_index.html](http://www.science.calwater.ca.gov/isb/isb_index.html)

- ***Coordinate CALFED monitoring and assessment activities***

The Science Program requested a proposal from several Bay-Delta system experts to develop an overall framework for CALFED Program monitoring and assessment. The Science Program will fund the proposal in Year 9 and ensure coordination with current monitoring and performance measure efforts.

- ***Coordinate performance measure activities***

The Science Program worked with the CALFED Performance and Tracking team to actively engage the CALFED implementing agencies to help coordinate the development of performance measures.

- ***Priority Research Topic Selection Panel***

The priorities for new scientific research for Year 8 were developed by a panel consisting of a diverse array of key stakeholders, agency leaders, and independent scientists. Coordinated by the Science Program and chaired by the CALFED Lead Scientist, this panel discussed the research priorities for the upcoming year, identified areas where the need for new research was perceived to be the greatest, balanced the short term pressing needs with the long term goals and objectives of the CALFED program, and developed a brief document to focus the research needs on a limited number of high priority topics.

This priority research topic list was used to direct the research for both the 2007 Supplemental Proposal Solicitation Package (PSP) and the CALFED Fellows program (see the Promote Research objective below).

- ***Interagency Ecological Program***

The CALFED Bay-Delta Program agreed to provide a position and funding for an IEP Lead Scientist. CALFED and IEP Agency staff interviewed candidates in Year 8. The top candidate, Dr. Anke Mueller-Solger, will start in the beginning of Year 9 (July 2008).

IEP Lead Scientist candidates. CALFED staff worked through administrative details for hiring the selected candidate. The CALFED Science Program coordinated with IEP through representation on the IEP Coordinators and POD Management Teams. For a more complete summary of IEP activities in Year 8, please see attachment 2: Interagency Ecological Program, Program Plan.

- ***Science Advisors***

The Science Program provided recommendations for key experts to serve as science advisors and supported the program's science advisors to integrate best science practices and information into CALFED related efforts in a timely fashion. Year 8 science advisors included the CALFED Lead Scientist and ISB Chair, both of which gave numerous presentations and prepared memoranda to advise the Delta Vision Blue Ribbon Task Force (see attachment 1 – Science Program Support of Delta Vision). The science advisor's work helped ensure that best available science is an integral part of the Delta Vision effort.

- ***Delta Regional Ecosystem Restoration Implementation Plan and Suisun Marsh Implementation Plan***

The Science Program provided contracting assistance for various science experts who participated in both DRERIP and the Suisun Marsh Implementation Plan (SMIP). In addition, Science Program staff members participated on the DRERIP executive committee and Adaptive Management Planning Team, and are providing web support for the DRERIP conceptual models.

- ***Tracking database***

The Science Program has entered all of its contract and grant information into a database developed by the ERP to help track deliverables and progress, and to support evaluations of progress toward program goals and objectives and share this information with other CALFED related efforts (see objectives Communicate Science and Coordinate Science). Improvements such as identifying projects by priority topic areas have been initiated.

## **Objective: Facilitate Independent Peer Review**

Promote and provide independent, scientific peer review of processes, plans, programs, and products.

- ***Review Panels***

Several technical review panels, consisting of teams of nationally recognized independent experts, were coordinated by the Science Program to give independent opinions on emerging priority issues. These review panels included:

- The DRMS Independent Review Panel
- Regional Salmon Outmigration Study Plan Review & Workshop
- The 2007 Supplemental PSP Technical Selection Panel
- Draft Final Water Quality Program Stage 1 Final Assessment Review

More information on these panels and efforts can be found at:

[http://www.science.calwater.ca.gov/science\\_index.html](http://www.science.calwater.ca.gov/science_index.html)

- ***Database of experts***

In Year 8 the Science Program began work with database experts to refine a database of people with expertise relevant to CALFED issues to be used to quickly search for reviewers, panelists, and advisors. The database should be ready for use in Year 9.

# Objective: Promote Research

Initiate, evaluate and fund research that will fill critical gaps in our understanding of the current and changing Bay-Delta system.

- ***2007 Supplemental Proposal Solicitation Package***

The Science Program made a small amount of supplemental funds available through a supplemental PSP to current Science Program Grant recipients.

Proposals for supplemental PSPs were accepted from December 1, 2007 - January 17, 2008. Seventeen proposals were submitted for a requested total of over \$4 million. Recommendations by an independent Technical Selection Panel for funding nine proposals totaling \$2.2 million were approved in May, 2008.

The Science Program was unable to issue a full PSP due to uncertainties in securing future funds.

Grants from previous PSPs continue to be invoiced, tracked and paid, deliverables collected, and information dispersed as their research continues. More information can be found at:

[http://www.science.calwater.ca.gov/psp/psp\\_package\\_2007.html](http://www.science.calwater.ca.gov/psp/psp_package_2007.html)

- ***CALFED Science Fellows***

Through the CALFED Science Fellows Program, early-career scientists, CALFED agency scientists and senior academic research mentors collaborate on research of direct relevance to CALFED's broad goals of maintaining a reliable water supply and improving ecosystem health.

The Science Program, in collaboration with California Sea Grant, reviewed and selected 6 New Science Fellows in Year 8 as a result of a solicitation for proposals in Year 7.

The Science Program has solicited for another round of Fellows in Year 8 to be reviewed and funded in Year 9. The topics for research were identified by a panel of stakeholders, independent scientists, and Science Program staff.

More information can be found at: [http://www.science.calwater.ca.gov/research/research\\_fellows.html](http://www.science.calwater.ca.gov/research/research_fellows.html)

# Year 9 Objectives and Activities

The priority management efforts that the Science Program will support in Year 9 (FY08/09) include Delta Vision (including the role of science in implementing the Delta Vision Strategic Plan) and the BDCP. The following activities will be performed to support these and other priority management needs to help provide a solid scientific foundation for managing the Bay-Delta system.

## Objective: Synthesize Scientific Information

The complexity of the Bay-Delta system results in management problems best understood by compiling, analyzing, and integrating scientific information across multiple disciplines.

- ***State of Bay-Delta Science 2008***

The State of Bay-Delta Science 2008 (SBDS) is a major synthesis effort by the Science Program to be completed in Year 9. This report highlights our current state of knowledge for the Estuary-Delta system divided among the four CALFED Program objectives: water supply reliability, levee system integrity, water quality, and ecosystem restoration. Additional chapters will provide the historical context for Delta science and policy, a synthesis of our knowledge of the system, and recommendations to decision-makers.

The report will emphasize our new understanding about the importance of external influences on the Delta-Estuary ecosystem services, the scale of demands on those services, the importance of uncertainty in our understanding of the Delta, and the influence management decisions have on the entire system. Most importantly, the report will conclude with a number of urgent policy recommendations for helping the Delta while meeting California's needs.

This report will provide a basis for implementing the Delta Vision Strategic Plan and other Delta planning initiatives. The report, planned to be updated every few years, will be available through the Science Program website at <http://www.science.calwater.ca.gov/publications/sbds.html>.

- ***Report card pilot***

In coordination with the National Center for Ecological Analysis and Synthesis (NCEAS) at UC Santa Barbara and the Interagency Ecological Program (IEP), the Science Program plans to support the development of a pilot "Synthesis Report." This report will use a series of indicators from multiple scientific disciplines that present the status of the Bay Delta system in a Report Card format. This approach has been successful in the Chesapeake Bay and Australia.

The initial pilot effort will focus on the Pelagic Organism Decline (POD). The structure of the effort will likely involve Science Program staff, interns or fellows, and academic and agency mentors.

- ***Workshops***

The Science Program will convene workshops involving experts from multiple disciplines to increase and promote understanding of complex issues. A multidisciplinary approach to complex problems allows problems and solutions to be framed, shared, or identified in new ways that can lead to a more complete understanding. A critical component of all workshops will be to communicate this understanding, or state of knowledge, to the appropriate target audience through summaries, memos, full reports, or presentations (see Communicate Science objective).

Workshop topics will involve high priority issues (e.g. Delta Vision, Bay Delta Conservation Plan (BDCP), Operations Criteria and Plan (OCAP), etc.) that will be identified over the year by the Lead Scientist, CALFED Program staff, or the implementing agencies. More information on Science Program workshops can be found at [http://www.science.calwater.ca.gov/events/workshops/workshop\\_index.html](http://www.science.calwater.ca.gov/events/workshops/workshop_index.html).

- ***Special reports by the Lead Scientist, Independent Science Board, and science advisors.***

The Science Program will hire individuals and teams of multidisciplinary experts to synthesize, interpret, and summarize scientific information on high-priority environmental and policy issues in a timely manner. Each report will be tailored to a special audience such as the Delta Vision Blue Ribbon Task Force, BDCP, and OCAP.

## Objective: Communicate Science

Communication of current scientific understanding and new technical information to a diverse audience of policy- and decision-makers, scientists, and the public is a top priority of the Science Program.

- ***Website.***

The CALFED Science Program website (<http://science.calwater.ca.gov>) will be updated as information becomes available. The website will continue to serve as the primary place to find the latest information Science Program events, efforts, and products.

- ***Workshop summaries***

As mentioned previously under the synthesis objective, a critical component of all workshops is to communicate the understanding, or state of knowledge, to the appropriate target audience through summaries, memos, full reports, or presentations. Each workshop summary report will be tailored to meet one or more target audiences or specific management needs. The summaries will include a range of information – from detailed descriptions of the state of knowledge to brief summaries and syntheses of key findings.

- ***CALFE Science Conference***

The goal of the biennial CALFED Science Conference is to make new scientific information relevant to the CALFED Bay-Delta Program available to the broad community of scientists, engineers, managers, and stakeholders working on Bay-Delta issues. The 2008 conference, *Global Perspectives and Regional Results: Science and Management in the Bay-Delta System*, will be held October 22-24 at the Sacramento Convention Center. The 2008 conference will feature poster sessions and oral presentations that describe scientific advances in ecosystem restoration, levee system integrity, water quality, and water supply reliability.  
(<http://www.science.calwater.ca.gov/events/conferences/index.html>)

- ***Direct communication by the CALFED Lead Scientist, Independent Science Board, and science advisors***

Science and politics change quickly in the Bay-Delta environment. An important way the Science Program will meet the needs of managers and stakeholders in a timely manner will be to directly communicate to them the scientific understanding on high priority issues. The Science Program will provide reports as-needed by using its resources of readily accessible scientific experts including the Lead Scientist, ISB members, and science advisors.

- ***Online journal***

The Science Program will support the online, peer-reviewed journal, San Francisco Estuary and Watershed Science and the companion online Archive (<http://repositories.cdlib.org/jmie/sfew>). Several issues are expected to be released in Year 9.

- ***Seminars and symposia***

The Science Program will sponsor a regular seminar series in collaboration with the University of California, Davis, Center for Aquatic Biology and Aquaculture (<http://caba.ucdavis.edu/activities.htm>). The series will provide current and highly relevant technical information or new perspectives on science related to resource management and water operations to an audience of agency scientists, resource managers and university researchers. The series will be open to the public and archived videos of presentations will be available online.

Additionally, Science Program staff have identified speakers for the less-formal CALFED Brown Bag lunch-hour seminars focused on conveying important regional scientific information to agency staff, stakeholders, and the general public. ([http://www.science.calwater.ca.gov/events/seminars/seminar\\_index.html](http://www.science.calwater.ca.gov/events/seminars/seminar_index.html))

- ***Science Action***

The much praised *Science Action* series highlights important Bay-Delta scientific discoveries and hot topics in short layperson-accessible language to a broad audience of stakeholders, managers, and the general public. The Science Program intends to release several *Science Action* publications this year.

- ***Science News***

The Science Program will regularly prepare and release its newsletter, *Science News*, to highlight the latest information on CALFED Science Program activities, including upcoming events, research, and key developments. Articles will summarize an issue and provide links where more information can be obtained.

- ***Grant Updates***

Through the Proposal Solicitation Packages (PSPs) and CALFED Science Fellows projects the Science Program has funded over 57 research projects totaling over \$21 million. Many of these grants are coming to maturity and final reports and publications are beginning to be produced. Much information from this research has already provided critical information to management on a variety of high priority items including POD, Delta Vision, salmonids, environmental water, restoration, climate change, and drinking water quality. The Science Program will continue to share final information from these grants through our website, seminars, newsletters, and conferences.

## Objective: Coordinate Science

As one of the most important and impacted ecosystems and water supply region on the West Coast, the Bay-Delta system is the focus of an array of scientific activities. The Science Program is in a unique position to support the CALFED implementing agencies by coordinating many of these science efforts. This coordination will help catalyze increasing cooperation and collaboration among institutions, prevent the overlap of projects and resources, and foster the production of high quality and quantity science unattainable by institutions working alone.

- ***Interagency Ecological Program***

The CALFED Bay-Delta Program will support the new IEP Lead Scientist to help the IEP guide its monitoring and special studies program and to improve coordination with the CALFED Science Program. Both the IEP Lead Scientist and IEP Operations Manager will have offices available to them in the CALFED Program office.

In addition to supporting the new IEP Lead Scientist, the CALFED Science Program will participate on the IEP Coordinators and POD Management Teams. Coordination between the Science Program and IEP may involve developing plans for comprehensive monitoring, proposal solicitations, data analysis and synthesis, and transforming monitoring information into knowledge.

For a complete version of IEP activities, please see attachment 2: Interagency Ecological Program, Program Plan.

- ***Independent Science Board***

The ISB ([http://www.science.calwater.ca.gov/isb/isb\\_index.html](http://www.science.calwater.ca.gov/isb/isb_index.html)) will be supported by Science Program staff to provide CALFED with scientific insight, oversight, and foresight for important policy decisions on a scale that encompasses the CALFED jurisdiction. ISB activities will include addressing priority issues such as evaluating programs and projects, promoting development of performance measures, and submitting memos or reports on important topics as needed. Additionally, the ISB will examine its own structure and suggest possible changes to increase its effectiveness.

- ***Science Advisors***

The Science Program will continue to recommend and support science advisors to help integrate best science practices and information into CALFED-related efforts. The CALFED Lead Scientist and ISB Chair are science advisors to the Delta Vision Blue Ribbon Task Force and are working to help ensure the best available science is an integral part of the Delta Vision effort. Through contracting support, the Science Program will provide science advisors and experts for the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP) and the US Fish and Wildlife Service Native Fish Recovery Plan.

- ***Coordinate performance measure activities***

The Science Program will work with the CALFED Performance and Tracking team to engage the CALFED implementing agencies in developing performance measures for the CALFED Program. Science Program staff will also track and support performance measure development in Delta Vision and BDCP, as well as the related monitoring framework and report card pilot work mentioned below and previously.

- ***Priority Research Topic Selection Panel***

The priorities for new scientific research for Year 9 will be selected by a panel consisting of a diverse array of key stakeholders, agency leaders, and independent scientists. The panel, chaired by the CALFED Lead Scientist, will use the priority research topic list from the previous year to help focus discussion on the research priorities for the upcoming year. The panel will identify areas where the need for new research is greatest, balance the short term pressing needs with the long term goals and objectives of the CALFED program, and revise the priority research topic list to focus the research needs on Year 9 priorities. This revised topic list will be used to direct the research for the 2008 PSP and the CALFED Fellows program (see below under the Promote Research objective).

- ***CALFED monitoring framework***

There are numerous monitoring and assessment activities in the Bay-Delta, some under the auspices of the CALFED Program and others that are part of local, regional, or other programs. In Year 8, the CALFED Lead Scientist requested a small group of Bay-Delta experts led by Dr. Sam Luoma to prepare a proposal for developing a framework and strategic plan for CALFED Program monitoring.

The draft proposal has been reviewed by the CALFED Independent Science Board and is currently being discussed with various Bay-Delta groups involved in monitoring. The Science Program expects to fund a revised proposal in Year 9.

The proposed effort is expected to build a broad framework that will: define the monitoring needed to address major policy questions for Bay-Delta system; identify linkages to the framework among the existing monitoring activities; develop a strategy for improving those linkages; and identify critical gaps in existing monitoring with regard to evaluating environmental change.

- ***Other Coordination Actions***

The Science Program will provide contracting assistance for various science experts participating in both DRERIP and SMIP. In addition, Science Program staff members participate on the DRERIP executive committee and Adaptive Management Planning Team, and are providing web support for the DRERIP conceptual models.

The Science Program intends to become more involved with State Water Resources Control Board (SWRCB) efforts by assigning staff to work with them on pressing science issues and activities.

- ***Tracking database***

The Science Program will improve its project tracking database to help track deliverables and progress on research grants, and to support evaluations of progress toward program goals and objectives. Information will be shared with other programs through our communication and coordination efforts (see objectives Communicate Science and Coordinate Science).

# Objective: Facilitate Independent Peer Review

A fundamental objective of the Science Program is to facilitate independent peer review as a foundation for all aspects of the CALFED program of scientific and programmatic development and implementation. Independent peer review is a critical tool to help ensure that all decisions are transparent, unbiased, and sound.

- ***Review Panels and Individual Peer Reviewers***

The Science Program recommends, coordinates, and supports individual reviewers and review panels of nationally recognized independent experts to give unbiased reviews of processes, plans, programs and products. In Year 9 the Science Program will convene review panels for the DRMS revised Draft Phase I report and the NOAA Fisheries analytical framework for the OCAP Biological Assessment and salmonid Biological Opinion.

The timing for the biennial review of the Environmental Water Account (EWA) is anticipated to be fall 2008. Because of uncertainty about the future of the EWA, the Science Program will work with the implementing agencies to determine the value of a workshop reviewing the contribution of the various environmental water programs other than EWA to protecting and restoring native Delta fishes.

- ***Database of experts***

The Science Program will complete the development of a database of people with expertise relevant to CALFED issues to quickly find prospective panelists, individual reviewers and advisors when needed. This database will be available to Science Program staff and guest users upon request.

# Objective: Promote Research

The CALFED Science Program considers funding scientific research to be a critical component in establishing unbiased and authoritative knowledge directly relevant to CALFED actions. The goal of funding this research is to invest in knowledge that will fundamentally advance the understanding of the complex environments and systems within the CALFED jurisdiction to aid policy-makers and managers. The Science Program will help develop new knowledge that is timely and highly relevant to CALFED decision-making by:

1. identifying scientific unknowns of the highest priority to the CALFED community by holding a Priority Research Topic Selection Panel (see the above objective Coordinate Science),
2. soliciting for and supporting new scientific studies that closely investigate these scientific unknowns,
3. promoting peer-reviewed publication of the resulting information,
4. compiling, analyzing, and integrating scientific information across multiple disciplines, and
5. interpreting and communicating what is learned through Lead Scientist memos, publications, conferences, and websites.

- ***Research Grants: Proposal Solicitation Package***

If funding becomes available through proposition 84, the CALFED Science Program, in collaboration with agency managers, stakeholders, and independent scientists, will identify high-priority focused topics for scientific research and solicit the broad scientific community for proposals to address the topics. The Science Program hopes to fund up to \$8 million in new research projects through a competitive 2008 PSP to be announced in fall 2008, with proposal selections in early 2009.

The Science Program will continue to support ongoing research grants. Information on past and ongoing grants can be found at [http://www.science.calwater.ca.gov/psp/psp\\_package\\_2007.html](http://www.science.calwater.ca.gov/psp/psp_package_2007.html).

- **CALFED Science Fellows Program**

The Science Program will review applications from postdoctoral and graduate student researchers for 2008 CALFED science fellowships to work with CALFED Program agency scientists and senior research mentors on agency research priorities and data analysis gaps. The selected fellows and their research will focus on the greater California Delta and San Francisco Bay-Delta system and one or more of the following research topics:

1. Trends and Patterns of Habitats, Populations and System Response to a Changing Environment
2. Aquatic Invasive (Exotic) Species
3. Water Supply, Water Quality
4. Developing Indicators and Performance Measures

This year's class of 2008 will represent the fifth year of awarded fellowships by the CALFED Science Program. Proposals will be selected in summer '08 with funds awarded in the fall.

The Science Program will fund ongoing Fellows projects that resulted from previous solicitations. Information on the Fellows projects including the specific research questions being addressed, detailed guidelines, eligibility and application instructions, are posted on the California Sea Grant website at:

<http://www.csgc.ucsd.edu/EDUCATION/CALFEDIndx.html>.

## Budget Estimates FY 08/09

<b>CALFED Science Program</b>		Total (\$ in Millions)
CALFED Science Program		
Staff	1.9	
Research (Research Grants and Fellows)	5.8	
Advisors and Experts (Synthesize, communicate, Coordinate, Review)	0.5	
<b>Total Expenditures</b>	<b>8.2</b>	

<b>CALFED Science Program</b>		Total (\$ in Millions)
State	7.4	
Federal	.8	
<b>Total Expenditures</b>	<b>8.2</b>	

# Attachment 1: Science Program Support of Delta Vision

Lead Scientist Dr. Michael Healey and Independent Science Board (ISB) Chair Dr. Jeffrey Mount are the Science Advisors to the Delta Vision Blue Ribbon Task Force. Under their leadership, the Science Program and Independent Science Board have provided the following products and services to Delta Vision in Year 8:

- **Memos.**
  - *Sea Level Rise and Delta Planning* (ISB) recommending appropriate ranges in sea level rise for Delta planning
  - *Delta Levees and Ecosystem Function* (DV Science Advisors) debunking some commonly held beliefs about Delta levees; for example, they do not always help to sustain a healthy Delta ecosystem and, in fact, may be the cause of many current ecological problems
  - *Draft DRMS Phase 1 Report Independent Review* (Mike Healey) cautioning the Task Force on use of the DRMS Phase 1 report prior to its revision in response to the review
- **Informative products**
  - *Delta Vision Ecosystem Context Memo* on 12 key ecological principles to guide Delta Vision (Mike Healey)
  - *Design Principles for a Sustainable Ecosystem in the Bay-Delta* (Mike Healey)
  - *State of Bay-Delta Science 2008: Draft Summary for Policymakers and the Public*, a preview chapter from the full *State of Bay-Delta Science 2008* report (SBDS Editorial Board)
  - *Science Action – Tracking Organic Matter in Delta Drinking Water*, highlighting the latest research information on organic carbon and drinking water
  - *Delta Water Quality* (CALFED Water Quality staff) covering dissolved oxygen, pesticides, selenium, mercury, toxicity of unknown origin, and drinking water quality.
- **Delta Vision Assessment Team.**
  - Mike Healey convened a panel of experts to assess the draft Delta Visions. The panel is on call to review other draft Delta Vision products. Delta Vision Executive Director John Kirlin has found the Assessment Team's input valuable.
- **Informational Workshops**
  - *Defining a Variable Delta to Promote Estuarine Fish Habitat*
  - *Science Issues Relating to Delta Conveyance Infrastructure (through-Delta and isolated facility)*
  - *Governing the Delta: Principles for a New Vision*
  - *A Two-Part Discussion on Delta Conveyance Modeling in Support of the Delta Vision Blue Ribbon Task Force Workshop 1: Modeling Approaches, Workshop 2: Linking Physical and Biological Models for Ecosystem Prediction, Planning, and Performance*
  - *Organic Carbon: The Good, the Bad and the Muddy*
- **Participation in Delta Vision Strategic Planning activities**
  - Science Program staff participation on the *Delta Vision Ecosystem Workgroup* (Matt Nobriga)
  - *Guidance for development of ecosystem performance measures*. Mike Healey convened a group of experts who have put together initial guidance presented by Jeff Mount at the February 2008 Task Force meeting.

# Attachment 2: Interagency Ecological Program Program Plan

## Introduction

The Interagency Ecological Program (IEP) is an interdisciplinary, multi-agency effort that includes staff from DFG, DWR, USBR, USEPA, USGS, CALFED, USFWS, SWRCB, SFSU, and UCD. The mission of the IEP is to provide ecological information and scientific leadership for use in management of the San Francisco Estuary. The IEP program elements are categorized as either estuarine monitoring (21 elements) or special studies (85 elements).

The estuarine monitoring category focuses on status and trends of aquatic habitats and living resources in the San Francisco Estuary, and the Sacramento and San Joaquin Rivers. It is further subdivided into hydrodynamics monitoring (2), environmental monitoring (3), fish and macroinvertebrate monitoring (12), and water operations monitoring (4 elements).

The special studies category focuses on providing a mechanistic understanding of the physical, chemical, and ecological processes and also on evaluating current and new technologies, sampling methodologies, and overall study design. These studies can 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.

A large portion of the special studies activities are devoted to furthering the understanding and complexities of the Pelagic Organism Decline. The overall approach of the POD work in State Fiscal Year 2008-2009 is to evaluate and refine the POD conceptual models and begin to translate the conceptual models into quantitative models.

The special studies category is subdivided into salmon migration and survival (3), resident species (19), ecological processes (15), estuarine monitoring (13), fish facilities (27), Clifton Court Forebay investigations (1), contaminant effects (6) and other IEP function (2).

The following provides details on the IEP's major activities associated with the estuarine monitoring and special studies categories.

### **Estuarine monitoring (21 elements)**

Estuarine monitoring activities focus on status and trends of aquatic habitats and living resources in the San Francisco Estuary, Sacramento River, and San Joaquin River. Estuarine monitoring activities include:

- Hydrodynamics monitoring
  - Bay salinity monitoring (USGS)
  - Delta flows and database management (USGS)
- Environmental monitoring
  - Upper estuary zooplankton monitoring (DFG)
  - Environmental Monitoring Program (DWR)
  - Operation of thermograph stations (USGS)
- Fish and macroinvertebrates
  - Fall Midwater Trawl (DFG)

- Yolo Bypass monitoring (DWR)
- Adult striped bass population parameters (DFG)
- Water operations monitoring
  - Delta flow and water temperature monitoring (USGS)
  - Sacramento and Chippis Island fish trawl surveys (USFWS)
  - 20mm survey (DFG)

## **Special Studies (85 elements)**

- Salmonid migration and survival studies
  - Chinook race identification (DWR)
  - Coleman National Fish Hatchery late fall-run tagging (USFWS)
  - Support for the Ocean Salmon Project (DFG)
- Resident species studies
  - Bioenergetics of zooplankton (SFSU)
  - Delta smelt genetics (UCD)
  - Fish diet and condition (DFG)
- Ecological processes studies
  - Synthesis analysis of data (all agencies)
  - Sources and signals of turbidity (USGS)
  - Relationships between habitat and distribution (UCD)
- Estuarine Monitoring
  - Feasibility of using towed imaging systems (DWR)
  - Effects of Microcystis on threadfin shad (DWR)
  - Effects of wastewater treatment on primary productivity
- Fish Facilities
  - Predator impacts on salvage rates (USBR)
  - History of changes at the fish facilities (DFG and USBR)
  - Evaluation of DIDSON for underwater fish observation (USBR)
- Contaminant effects
  - Pyrethroid pesticide monitoring (UCB)
  - Fish tissue selenium analysis (DFG)
  - Impacts of wastewater on delta smelt (UCD)
- Clifton Court Forebay investigations
  - Steelhead predation study (DWR and DFG)
- Other IEP functions

- Data management and utilization (DWR)
- Support for the Science Advisory Group (SAG)

## **Program Management**

As with any large, multidisciplinary program, a portion of the effort goes to ongoing program management and planning. This category is devoted to tasks associated with contract management, development, approval, and implementation of the annual IEP work plan, as well as identifying future planning efforts and needs for the program.

## **Progress and accomplishments during State Fiscal Year 2007-2008**

- Successful implementation of the 2007 work plan
- Development of the 2008 work plan
- Completion of the Pelagic Organism Decline Progress Report: 2007 Synthesis of Results
- IEP annual workshop
- Report on the finding from a task force on biomarker applicability to discern population level effect stressors in the Delta:

[http://www.science.calwater.ca.gov/pdf/workshops/POD/POD\\_biomarker\\_report\\_022208.pdf](http://www.science.calwater.ca.gov/pdf/workshops/POD/POD_biomarker_report_022208.pdf)

- Publication of the following peer-reviewed journal articles:

Baerwald, M., F. Feyrer, B. **in press**. Distribution of genetically differentiated splittail populations during the non-spawning season. *Transactions of the American Fisheries Society*.

Benigno, G.M., and T. Sommer. 2007. Just add water: sources of chironomid drift in a large river floodplain. *Hydrobiologia*. **Preprint** available at: DOI 10.1007/s10750-007-9239-2.

Cloern, J.E., A.D. Jassby, J.K. Thompson, K.A. Hieb. 2007. A cold phase of the east Pacific triggers new phytoplankton blooms in the San Francisco Bay. *Proceedings of the National Academy of Sciences*. 104(47):18561-18565.

Feyrer, F., T. Sommer, and J. Hobbs. 2007. Living in a dynamic environment: variability in life history traits of age-0 splittail in tributaries of San Francisco Bay. *Transactions of the American Fisheries Society* 136:1393-1405.

Feyrer, F., M. Nobriga, and T. Sommer. 2007. Multi-decadal trends for three declining fish species: habitat patterns and mechanisms in the San Francisco Estuary, California, U.S.A. *Canadian Journal of Fisheries and Aquatic Sciences* 64:723-734.

Feyrer, F., J.A. Hobbs, M. Baerwald, T. Sommer, Q. Yin, K. Clark, B.P. May, and W.A. Bennett. 2007. Otolith microchemistry provides information complimentary to microsatellite DNA for a migratory fish. *Transactions of the American Fisheries Society* 136:469-476.

Geist, J., I. Werner, K.J. Eder, and C.M. Leutenegger. 2007. Comparisons of tissue-specific transcription of stress response genes with whole animal endpoints of adverse effect in striped bass (*Morone saxatilis*) following treatment with copper and esfenvalerate. *Aquatic Toxicology* 85(2007): 28-39.

Hobbs, J. A., W. A. Bennett, J. Burton, and M. Gras. 2007. Classification of larval and adult delta smelt to nursery areas by use of trace elemental fingerprinting. *Transactions of the American Fisheries Society* 136: 518-527.

Hobbs, J.A., J.E. Burton, and W.A. Bennett. 2007. Modification of the biological intercept model to account for ontogenetic effects in laboratory-reared delta smelt (*Hypomesus transpacificus*). *Fishery Bulletin* 105:28-37.

Jassby, A.D. 2008. Phytoplankton in the upper San Francisco Estuary: recent biomass trends, their causes and their trophic significance. *San Francisco Estuary and Watershed Science* 6(1).

Kimmerer, W.J. **in press**. Losses of Sacramento River Chinook salmon and delta smelt to entrainment in water diversions in the Sacramento-San Joaquin Delta. *San Francisco Estuary and Watershed Science*.

Kimmerer, W. and M. Nobriga. 2008. Investigating particle transport and fate in the Sacramento-San Joaquin Delta using a particle tracking model. *San Francisco Estuary and Watershed Science* 6(1).

Lehman, P. W., T. Sommer and L. Rivard. 2007. Phytoplankton primary productivity, respiration, chlorophyll a and species composition in the Yolo Bypass floodplain, California. *Aquatic Ecology*. Available online: DOI 10.1007/s10452-007-9102-6.

Lehman, P. W. 2007. The influence of phytoplankton community composition on primary productivity along the riverine to freshwater tidal continuum in the San Joaquin River, California. *Estuaries and Coasts* 30: 82-93.

Lehman, P.W., G. Boyer, M. Satchwell, and S. Waller. 2007. The influence of environmental conditions on the seasonal variation of *Microcystis* cell density and microcystins concentration in San Francisco Estuary. *Hydrobiologia*. **Preprint** available at: DOI 10.1007/s10750-007-9231-x.

Nobriga, M., and F. Feyrer. 2007. Shallow-water piscivore-prey dynamics in the Sacramento-San Joaquin Delta. *San Francisco Estuary and Watershed Science* 15(2).

Nobriga, M.L., T. Sommer, F. Feyrer, and K. Fleming. 2008. Long-term trends in summertime habitat suitability for delta smelt (*Hypomesus transpacificus*). *San Francisco Estuary and Watershed Science* 6(1).

Rosenfield, J. A., and R. D. Baxter. 2007. Population dynamics and distribution patterns of longfin smelt in the San Francisco Estuary. *Transactions American Fisheries Society* 136:1577-1592.

Sommer, T., C. Armor, R. Baxter, R. Breuer, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K. Souza. 2007. The Collapse of pelagic fishes in the upper San Francisco Estuary. *Fisheries* 32(6):270-277.

Sommer, T.R., W.C. Harrell and T.J. Swift. 2007. Extreme hydrologic banding in a large-river Floodplain, California, U.S.A. *Hydrobiologia*. **Preprint** available at: DOI 10.1007/s10750-007-9159-1.

Van Nieuwenhuyse, E.E. 2007. Response of summer chlorophyll concentration to reduced total phosphorus concentration in the Rhine River (Netherlands) and the Sacramento-San Joaquin Delta (California, USA). *Canadian Journal of Fisheries and Aquatic Sciences* 64:1529-1542.

## Priorities

Many elements of the estuarine monitoring category are given top priority because they are mandated by NOAA Fisheries, FWS biological opinions, and SWRCB Water Rights Decision D-1641. Elements with the operations monitoring category are also given priority as there is a commitment to continue providing the near “real-time” data needed to make water operation decisions. Additional funding above the IEP base program largely supported the Pelagic Organism Decline studies within the special studies category. Elements in this category were selected based on their ability to refine conceptual models, and their feasibility in terms of methods, staffing, costs, timing and data availability. Additionally, none of the special studies will affect the mandated monitoring currently performed by IEP.

## Progress Report

IEP investigators yield a range of products and deliverables including management briefs, publications (see above), technical reports, web-based reporting of monitoring data, distribution plots and annual indices, and posters and presentations at conferences, workshops, seminars, and meetings. All the elements have different timelines and due dates.

## Activity

See IEP Activity Appendix

# Activity Appendix. Summary and Costs of the 2008 Interagency Ecological Program Monitoring, Special Study and Fish Facility Activities (Elements)

(Element costs are approximate and expressed in thousands of dollars)

5/5/08

Created from 2008 IEP Program Budget v13 November 29, 2007.xls

## I. Estuarine Monitoring Elements

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
<b>A. HYDRODYNAMICS</b>			IEP Core	IEP POD and Coordinated
1. Bay salinity monitoring a. (2008-029) b. Mandates – D1641	Salinity, water temperature, tide and meteorological measurements are collected in San Francisco Bay. Data is used to better understand the hydrodynamics of the estuary and calibration of multi-dimensional flow and transport models. <b>Deliverables:</b> a) Time series of salinity and water temperature for each monitoring site; b) time series of wind speed, wind direction, air temperature, atmospheric pressure and visible radiation from the meteorological station; c) IEP Newsletter article prepared June 2008. (Shellenbarger, USGS).	\$220	USBR-\$131 DWR-\$46 USGS-\$43	\$0
2. Delta flow measurement and database management a. (2008-030) b. Mandates - none c. POD	Channel flow and flow splits at key Delta sites are measured via UVMs and ADCPs. Data is used to evaluate fish transport and migration issues and to validate hydrodynamic models. This element will also maintain the time series database of Bay and Delta hydrographic data (tides, currents salinity, wind, and Delta flows information collected by USGS. <b>Deliverables:</b> Time series of measured tidal and daily net-flow for each station in the flow network; b) IEP Newsletter article, IEP Technical Report and peer-reviewed journal contributions will be made as appropriate. (Cathy Ruhl, USGS)	\$970	DWR-\$625 USGS-\$287	City of Stockton-\$38 CCWD-\$20

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
<b>B. ENVIRONMENTAL MONITORING</b>			IEP Core	IEP POD and Coordinated
1. Environmental monitoring program a. (2008-072) b. Mandates –D1641 c. POD	This element implements the D-1641 mandate to monitor water quality at 22 sites in San Pablo Bay, Suisun Bay, and the Delta. In addition to basic water quality parameters, chlorophyll, phytoplankton, benthic and zooplankton samples are collected. <b>Deliverables:</b> none identified. (Karen Gehrt, DWR).	\$2,600	DWR-\$1300 USBR-\$1300	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
<b>B. ENVIRONMENTAL MONITORING - Continued</b>			IEP Core	IEP POD and Coordinated
2. Upper estuary zooplankton sampling a. (2008-077) b. Mandates -D1641 c. POD	Neomysis shrimp and other zooplankton are sampled monthly in San Pablo Bay, Suisun Bay and the Delta. The monthly sampling is coordinated with the Environmental Monitoring Program (2008-072). <b>Deliverables:</b> a) Status and Trends IEP Newsletter article, Spring 2008; b) IEP Workshop presentation, March 2008. (April Hennessy, DFG).	\$205	DWR-\$103 USBR-\$102	\$0
3. Operation of thermograph stations a. (2008-104) b. Mandates -none	This element maintains the operation of the thermograph and sediment sampling stations at Vernalis on the San Joaquin River and the Sacramento River below Wilkins Slough. <b>Deliverables:</b> a) Data for water year 2007 will be published in the USGS annual report series "Water Resources Data for California," Spring 2008. (Clinton Nagel, USGS).	\$35	DWR-\$21 USGS-\$14	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
<b>C. FISH &amp; MACROINVERTEBRATES</b>			IEP Core	IEP POD and Coordinated
1. Adult striped bass population estimates a. (2008-002) b. Mandates -none c. POD	Annual tagging of adult striped bass for the purpose of making mark-recapture estimates of legal-size striped bass abundance, age distribution, mortality rates and evaluating factors affecting abundance. <b>Deliverables:</b> a) Sportfish Restoration Act report, September, 2007; b) updates to the adult striped bass population estimates are made as data becomes available. (M. Gingras, DFG)	\$809	DWR-\$352 DFG-\$457	\$0
2. Fall midwater trawl survey a. (2008-003) b. Mandates -OCAP c. POD	Fall midwater trawl sampling (since 1967) from San Pablo Bay through the Delta to monitor pelagic fish abundance and distribution. Data is used to calculate young-of-the-year indices of several important species including striped bass, delta smelt, longfin smelt, American and threadfin shad. An additional \$3,000 required for this element has already been obtained. <b>Deliverables:</b> a) IEP workshop presentation, March 2008; b) Status and Trends IEP Newsletter article, Spring 2008; c) Web-based updates of annual indices for six species; d) ACCESS database. (R. Baxter and D. Contreras, DFG)	\$294	DWR-\$73 USBR-\$60 DFG-\$131	USBR POD \$30
3. Adult sturgeon population estimates a. (2008-005) b. Mandates -none	Legal-sized green and white sturgeon are tagged to provide estimates of abundance, age distribution and mortality rates that are used to set angling regulations and evaluate factors affecting year-class strength. The frequency of the field work was periodic (every 2-4 years) but is now annual to provide better estimates. <b>Deliverables:</b> a) Sportfish Restoration Act report, September, 2007; b) IEP Newsletter articles as appropriate. (M. Gingras DFG)	\$347	DWR-\$225 DFG-\$122	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
<b>C. FISH &amp; MACROINVERTEBRATES- Continued</b>			IEP Core	IEP POD and Coordinated
4. Summer Trawl survey a. (2008-007) b. Mandates –OCAP c. POD	Spring-summer sampling with a towed, small mesh net from San Pablo Bay throughout the Delta to monitor the annual abundance and distribution of juvenile fish in the upper estuary and evaluate factors affecting abundance. <b>Deliverables:</b> a) Annual delta smelt and striped bass indices; b) IEP Newsletter article, Spring 2008; c) ACCESS database (R. Baxter and V. Afentoulis, DFG).	\$245	DWR-\$67 USBR-\$52 DFG-\$92	USBR POD \$34
5. Estuarine and marine fish abundance and distribution survey a. (2008-011) b. Mandates –D1641	Monthly mid-water and otter trawling survey (since 1980) at 52 channel and shoal stations from South San Francisco Bay to the lower Sacramento and San Joaquin rivers to track abundance and distribution trends of marine and estuarine fishes. <b>Deliverables:</b> a) IEP workshop presentation, March 2008; b) Status and Trends IEP Newsletter article, Spring 2008; c) ACCESS database. (Max Fish and Kathy Hieb, DFG).	\$639	DWR-\$339 USBR-\$300	\$0
6. Bay shrimp and crab abundance and distribution surveys a. (2008-012) b. Mandates -D1641	The trawling survey described for 2008-011 also include the collection and processing of Caridean shrimp and <i>Cancer</i> crab species to track abundance and distribution trends of Bay and estuarine shrimp. Data is used to assess the status of shrimp in the estuary. <b>Deliverables:</b> a) Status and Trends IEP Newsletter article, Spring 2008; b) ACCESS database. (Kathy Hieb, DFG).	\$226	DWR-\$108 USBR-\$118	\$0
7. Juvenile salmon and delta fishes abundance and distribution sampling a. (part of 2008-053) b. Mandates –OCAP	Sampling at key sites in the lower rivers, Delta and estuary targeting all races of juvenile salmon emigrating through and rearing in the Delta. The program provides information on the timing of emigration, extent of rearing in the Delta and annual production. <b>Deliverables:</b> a) The main deliverable is an extensive fisheries database updated daily and dating back to the mid 1970's; b) Real-time summaries are provided to the DAT, October – June annually; c) IEP Newsletter articles as appropriate. (P. Cadrett, USFWS)	\$1,345	DWR-\$675 USBR-\$670	\$0
8. Knight's Landing juvenile salmon monitoring a. (part of 2008-074) b. Mandates –OCAP	Continuous sampling by rotary screw traps of juvenile salmonids emigrating from the Sacramento River. Near real-time reporting of data provides early detection of salmon entering the Delta for management purposes. <b>Deliverables:</b> a) Daily catch of juvenile Chinook transmitted weekly to the DAT, October 2007; b) Technical reports as appropriate. (R. Vincik, DFG)	\$14	DFG-\$14	\$0
9. Spring Kodiak trawl a. (2008-088) b. Mandates –OCAP c. POD	Monthly Kodiak trawl sampling between February and April from San Pablo Bay through the Delta to monitor pre-spawning adult delta smelt during late winter and spring. Data collected determines the abundance, distribution and maturity status of adult delta smelt. <b>Deliverables:</b> a) Near real-time bubble plots of delta smelt distribution, sexual maturity stage and CPUE, Jan – April, annually; b) ACCESS database. (Julio Adib-Samii, DFG).	\$219	DWR-\$133 USBR-\$86	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
<b>C. FISH &amp; MACROINVERTEBRATES - Continued</b>			IEP Core	IEP POD and Coordinated
10. UCD Suisun Marsh fish monitoring a. (2008-093) b. Mandates –none	Monthly monitoring of fish abundance and distribution in Suisun Marsh channels using otter trawls or beach seines. Larval fish sampling using a towed fine-mesh plankton net is done at 5 sites on a monthly basis between February and June. All work is done by UCD personnel. <b>Deliverables:</b> a) Data summarized in annual reports, April annually; b) Suisun Marsh ACCESS database. (P. Moyle, UCD)	\$45	\$0	DWR <sup>b</sup> -\$45
11. Larval fish survey a. (2008-096) b. Mandates – OCAP c. POD	Sampling larval fish, particularly delta smelt, throughout the Delta. Sampling will begin in January instead of mid-March as recommended by the Pelagic Organism Decline workplan. Results could guide pumping operations and become a monitoring program for delta smelt as required by the USFWS OCAP BO. This element is in the process of transitioning. No <b>Deliverables</b> have been identified. (M. Gingras, DFG)	\$400	DWR-\$85 USBR-\$55	DWR POD \$145 USBR POD \$115
12. Yolo Bypass a. (2008-047) b. Mandates – none	The objectives of this interdisciplinary monitoring effort are to: (1) continue collection of baseline data on lower trophic levels (phytoplankton, zooplankton and aquatic insects), juvenile and adult fishes, hydrology and physical conditions; and (2) analyze Yolo Bypass data collected during 1997 – 2007 to elucidate potential influences on fish community trends. <b>Deliverables:</b> a) Peer reviewed journal article, June 2008; b) upload survey data to BDAT, October 2007; c) poster presentation at IEP workshop, March 2008. (T. Sommer, DWR)	\$200	DWR-\$100 USBR-\$100	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>D. OPERATIONS MONITORING</b>				
1. 20mm delta smelt survey a. (2008-033) b. Mandates –OCAP c. POD	A fine-mesh survey of the estuary and Delta to determine the distribution and abundance of post-larval delta smelt. Zooplankton sampling is conducted simultaneously; data collected is used to calculate density. <b>Deliverables:</b> a) ACCESS database, June 2008; b) IEP Newsletter article as appropriate. (Julio Adib-Samii, DFG)	\$401	DWR-\$240 USBR-\$161	\$0
2. Juvenile delta fishes abundance and distribution sampling a. (part of 2008-053) b. Mandates -OCAP	Sampling juvenile salmon and other delta fishes with midwater trawls, Kodiak trawls and beach seines in the delta to support or provide information useful to water project operations. <b>Deliverables:</b> a) The main deliverable is an extensive fisheries database updated daily and dating back to the mid 1970's; b) Real-time summaries are provided to the DAT, October – June annually; c) IEP Newsletter articles as appropriate. (P. Cadrett, USFWS)	\$897	DWR-\$450 USBR-\$447	\$0
3. Mossdale spring trawl a. (2008-071) b. Mandates – none	This money supports Region 4 field work. Overall effort is to provide "near-time" information on the relative vulnerability of key fish species to water project operations. <b>Deliverables:</b> a) Sampling results are made available within 48-hours via the Internet along with data to guide the decision making of the CALFED Ops Group, April – June 2008. (T. Heyne, DFG)	\$60	DWR-\$60	\$0
4. Water quality telemetred data collection a. (part of 2008-072) b. Mandates – D1641	Collection of water quality data, mainly electrical conductivity or salinity, from 7 telemetry sites used for day-to-day CVP and SWP operational decisions. Data is made available near a real-time basis. <b>Deliverables:</b> None identified. (D. Kaff, DWR)	\$650	DWR-\$325 USBR-\$325	\$0
5. San Joaquin River dissolved oxygen monitoring a. (2008-073) b. Mandates - none	Summer and fall monitoring of dissolved oxygen and temperature levels at several sites in the San Joaquin River near Stockton to evaluate the cause of seasonal dissolved oxygen levels and trigger placement at the Head-of-Old-River Barrier. Data is used to guide water project operations and barrier placement. <b>Deliverables:</b> None identified. (K. Gehrtz, DWR)	\$50	\$0	DWR <sup>a</sup> -\$50
6. Knights Landing juvenile salmon monitoring a. (part of 2008-074) b. Mandates – OCAP	Continuous sampling by rotary screw traps of juvenile salmonids emigrating from Knights Landing for to determine the distribution and abundance of juvenile salmonids. <b>Deliverables:</b> a) Daily catch of juvenile Chinook transmitted weekly to the DAT, October 2007; b) Technical reports as appropriate. (R. Vincik, DFG).	\$103	DFG-\$43	USBR <sup>f</sup> -\$30 DWR <sup>a</sup> -\$30
7. Mill and Deer creeks juvenile salmonid monitoring a. (2008-075) b. Mandates – OCAP	Continuous sampling by rotary screw traps of juvenile salmonids emigrating from Mill and Deer creeks. Near real-time reporting of data provides early detection of salmon entering the Delta for management purposes. <b>Deliverables:</b> a) Daily catches of Chinook and steelhead summarized twice weekly for DAT, October 2007; b) Fish length database, June 2008. (C. Harvey-Arrison, DFG)	\$74	DFG-\$24	USBR <sup>f</sup> -\$25 DWR <sup>a</sup> -\$25

## II. Special Study Elements

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>A. SALMONID MIGRATION &amp; SURVIVAL</b>				
1. Chinook race identification (DNA) a. (2008-004) b. Mandates – OCAP	Conduct genetic studies to develop unambiguous identifiers of the various races of Central Valley Chinook salmon. Definitive, genetic identification of Chinook salmonid runs is required by NOAA Fisheries OCAP BO for winter-run and spring-run Chinook salmon. <b>Deliverables:</b> a) Report on winter and spring-run Chinook in SWP and CVP exports, Winter 2007 and Spring 2008; b) Report identifying genetic basis of early returning Chinook in the Feather River and other Sacramento Valley rivers and tributaries. (S. Greene, DWR)	\$291	DWR-\$291	\$0
2. IEP support for DFG Ocean Salmon Project a. (2008-009) b. Mandates - none	Assistance in port sampling for coded-wire tagged (CWT) fish and to collect and process CWTs from Central Valley hatcheries and spawning surveys. This information allows population estimates of salmonids. <b>Deliverables:</b> None identified. (C. Armor, DFG)	\$147	\$0	DWR <sup>h</sup> -\$147
3. Coleman Nat. Fish Hatchery late-fall run production tagging a. (2008-059) b. Mandates - none	Coded-wire tagging of all CNFH late-fall run production to ensure proper race identification during subsequent recovery of fish at Delta export facilities and in juvenile and adult sampling programs. Recovery of tagged late-fall run fish is also part of the spring-run recovery plan. <b>Deliverables:</b> a) This money supports the tagging action. (P. Brandes, USFWS)	\$150	\$0	DWR <sup>a</sup> -\$150

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
<b>B. RESIDENT SPECIES</b>			IEP Core	IEP POD and Coordinated
<b>A. SALMONID MIGRATION &amp; SURVIVAL</b>				
1. Otoliths analysis of pelagic fish a. (2008-060) b. Mandates – none c. POD	This study will analyze the otoliths of delta smelt to determine daily growth rate and area of origin. Analyses could provide detailed information on fish origin and growth that can be related to histopathology and potentially ambient water toxicity. <b>Deliverables:</b> a) Semi-annual reports to the POD MT; b) presentation at IEP Workshop, March 2008. (W. Bennett, UCD-BML)	\$350	\$0	CALFED ERP \$350
2. Liver histopathology for pelagic fish a. (2008-061) b. Mandates – none c. POD	This element will use histopathology analyses of the liver and glycogen to determine if larval and juvenile delta smelt, striped bass and inland silversides are exposed to toxins and/or food limitations. Samples will be obtained primarily from existing monitoring projects. <b>Deliverables:</b> a) Report on 2006 larvae and juveniles from directed sampling, submitted August 2007; b) semi-annual report to the POD MT, August 2008. (S. Teh, UCD)	\$350	\$0	CALFED ERP \$350

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
<b>B. RESIDENT SPECIES - Continued</b>			IEP Core	IEP POD and Coordinated
3. Fish Diet and Condition a. (2008-062) b. Mandates – none c. POD	This study will examine the stomach contents of many fish and zooplankton for changes in diet composition, feeding success and parasite load. Weights of fishes will be examined in relation to regions of the estuary, as well as environmental conditions such as conductivity, temperature, and water clarity. <b>Deliverables:</b> a) IEP workshop presentation, March 2008; b) draft delta smelt diet and condition manuscript, May 2008; c) ACCESS database; d) poster presentations where appropriate. (Steve Slater, DFG)	\$160	\$0	USBR POD \$160
4. Striped bass life cycle modeling a. (2008-038) b. Mandates – none c. POD	Models that integrate the effects of multiple stressors will be developed for striped bass and longfin smelt life cycle. Models will provide better understanding of what factors drive the population dynamics and what management strategies should be implemented. The money required to do this work (\$224,000) has already been obtained. <b>Deliverables:</b> a) 1 <sup>st</sup> progress report and IEP workshop presentation, March 2008; b) 2 <sup>nd</sup> progress report and CALFED Science presentation, October 2008; c) submission of 3 peer-reviewed manuscripts; d) computer codes for each model and supporting documentation explaining use, inputs and outputs. (Frank Loge, UCD)	\$0	\$0	\$0
5. Delta smelt otolith geochemistry and stock structure a. (2008-040) b. Mandates – none c. POD d. CBDA Science	Investigation into whether inter-annual variation in spawning and rearing conditions are associated with differences in inter-annual abundance and how growth rate vary over seasons and regions of estuary. <b>Deliverables:</b> a) Semi-annual reports to the POD MT; b) presentation at IEP Workshop, March 2008. (J. Hobbs, UCD-BML)	\$76	\$0	CBDA Science \$76
6. Modeling delta smelt populations a. (2008-041) b. Mandates – none c. POD d. CBDA Science	Models of delta smelt life cycle will be developed in this study. The models will integrate the effects of multiple stressors on delta smelt population so a better understanding of what factors drive the population dynamics and what management strategies could be implemented. <b>Deliverables:</b> a) Final project reports and papers submitted to journals by January 2009. (W. Kimmerer, SFSU-RTC; B. Bennett, UCD-BML; K. Rose, LSU))	\$332	\$0	CBDA Science \$332
7. Striped bass health investigations a. (2008-042) b. Mandates – none c. POD	Assessment of the health status of larval, juvenile and adult female striped bass collected from Bay-Delta using morphometric, histopathological, otoliths and biochemical metrics. Comparisons will be made with archived samples to determine if contaminants and diseases could be depressing striped bass populations. \$520,000 needed to conduct this work was obligated with 2007 funds. <b>Deliverables:</b> a) Reports on results of the adults and larvae are due by March 30, 2008 and September 14, 2008; b) poster presentation at IEP workshop, March 2008. (D. Ostrach, UCD)	\$0	\$0	\$0

<b>B. RESIDENT SPECIES - Continued</b>			<b>IEP Core</b>	<b>IEP POD and Coordinated</b>
8. Estimation of pelagic fish population sizes a. (2008-043) b. Mandates – none c. POD	Development of methods to calculate population estimates of many pelagic species will be investigated based on previous efforts. This effort will include particle tracking models to define boundaries of sampling regions and volumes represented by fixed stations in existing monitoring surveys and test the assumption of randomness in the data. <b>Deliverables:</b> A journal article estimating the sub-adult Delta smelt population size, Spring 2008; b) NCEAS involvement is expected to result in one to several publications. (Ken Newman, USFWS.)	\$171	\$0	DWR POD \$85 USBR POD \$86
9. Apparent growth rates of pelagic fishes a. (2008-051) b. Mandates – none c. POD	This analysis is a follow-up to 2005 efforts but will expand to calculate growth rates of all years of data. These growth rates will be evaluated with species abundance to determine whether or not growth rates declined in 2002-2004 compared to previous years. Analysis also includes whether environmental factors such as X2 position or zooplankton abundance affects growth rates or year-end mean size. <b>Deliverables:</b> Progress report/IEP Newsletter article, August 2008. (R. Baxter, DFG)	\$0	\$0	\$0
10. Longfin smelt habitat requirements a. (2008-098) b. Mandates – none c. POD	This analysis will investigate what the habitat requirements are for longfin smelt are and if suitable habitat has shifted spatially and/or temporally. Preexisting data from the FMWT and Townnet survey will be used to help answer this question. This work will be conducted with redirected staff effort. (R. Baxter, DFG)	\$0	\$0	\$0
11. Estimates of fish and zooplankton biomass a. (2008-106) b. Mandates – none c. POD	This analysis will utilize existing IEP long-term monitoring data from the Fall Midwater Trawl Survey, Townnet Survey, and Bay Study to estimate fish biomass and the 20mm and Townnet survey to estimate zooplankton biomass. Biomass trends will be investigated for spatial and temporal patterns. <b>Deliverables:</b> a) Poster presentation at State of the Estuary conference, October 2007; b) IEP Newsletter article, November 2008. (R. Baxter and S. Slater, DFG)	\$0	\$0	\$0
12. Striped bass bioenergetics a. (2008-115) b. Mandates – none c. POD	This element will couple bioenergetics analyses to data provided by the striped bass adult population dynamics (2008-116) to estimate the long- and short-term (i.e., POD years) trends in consumption demand of piscivorous striped bass. This analysis will investigate the trends in estimated population consumption demand of age 1 and older striped bass and determine if consumption demand has decreased more slowly than prey relative abundance/relative biomass. <b>Deliverables:</b> Draft manuscript for publication, December 2008. (G. Bengino DWR, M. Nobriga CALFED and M. Gingras, DFG)	\$72	\$0	DWR POD \$72
13. Delta fish biomass a. (2008-119) b. Mandates – none c. POD	This element will investigate the trends in fish biomass in the San Francisco Estuary and whether any changes in trends coincided with the POD years. Questions will mainly be addressed through summarization and integration of preexisting data and will largely be based on initial biomass estimates provided by Wim Kimmerer. <b>Deliverables:</b> A peer-reviewed manuscript as part of the NCEAS work group, 2008. (F. Feyrer, DWR)	\$0	\$0	\$0
14. Delta smelt culture facility a. (2008-108) b. Mandates – none c. POD	Funding for this element will help subsidize the baseline costs of producing larval, juvenile, and adult delta smelt for research projects conducted by various agencies and academia. <b>Deliverables:</b> 5,000 adult and 10,000 juvenile delta smelt for research conducted in 2008; b) 2007-2008 production report. (Joan Lindberg and Bradd Baskerville-Bridges, UCD)	\$330	\$0	DWR POD \$195 USBR <sup>c</sup> -\$195

<b>B. RESIDENT SPECIES - Continued</b>			<b>IEP Core</b>	<b>IEP POD and Coordinated</b>
15. Impacts of largemouth bass on the Delta ecosystem a. (2008-133) b. Mandates – none c. POD	“Top-down” effects are a key part of the POD conceptual model, however predation from inshore piscivores is a relatively poorly understood source of mortality. There is good evidence that centrarchid populations have thrived as a result of the expansion of Egeria beds but, it is unclear whether this may have contributed to the POD. Specifically, we need estimates of inshore predator abundance, and information about their effects on pelagic habitat. <b>Deliverables:</b> Still being negotiated. (Andy Sih, UCD)	\$325	\$0	DWR POD \$325
16. Delta smelt genetics a. (2008-135) b. Mandates – none c. POD	This study will examine (1) current genetic structure (microsatellite markers) of the Delta smelt population, (2) what extent hybridization between Delta smelt and Wakasagi smelt or longfin smelt occur, (3) spawning strategies using breeding experiments and microsatellite markers to understand Delta smelt population dynamics and (4) will develop a breeding plan to maintain natural genetic variation and population structure in closed populations. <b>Deliverables:</b> a) progress reports to USFWS; b) year-end final contract reports; c) refereed publications, April 2008; d) IEP workshop presentation, March 2008. (Bernie May, UCD)	\$134	USFWS - \$134	\$0
17. Bioenergetics of zooplankton species a. (2008-136) b. Mandates – none c. POD	Videographic techniques will be used to record observations of predator-prey interactions and specific patterns of prey selection to develop quantitative models of prey selection. Growth rates of larval delta smelt will be measured in laboratory experiments. Data on respiration, ingestion, growth and excretion will be used to create an energy budget for larval delta smelt, allowing for the possibility of more accurate models of population dynamic. <b>Deliverables:</b> a) Presentation at CALFED Science Conference, October 2008; b) progress report to CALFED, winter 2008; c) journal article submissions, winter 2008 and winter 2009; d) presentation at IEP workshop, March 2008. (Lindsay Sullivan, SFSU)	\$82	\$0	DWR POD \$82
18. Population genetics and otolith geochemistry of longfin a. (2008-137) b. Mandates – none c. POD	This study seeks to address some of the data gaps in longfin smelt life history by (1) identifying population structuring among tissue collections from the San Francisco Bay/Delta, Klamath River, coastal Oregon, and Columbia River, (2) comparing the life-history variability from pre-POD to POD era using strontium isotope 87Sr:86Sr ratios and (3) evaluate multiple annual collections of longfin smelt collected pre and post POD. <b>Deliverables:</b> a) 1 <sup>st</sup> progress report, spring 2009; b) IEP workshop presentation, March 2009; c) final report, spring 2010. (Josh Israel, Bernie May, and James Hobbs, UCD)	\$186	\$0	DWR POD \$186
19. Lower trophic levels of Suisun Bay food web a. (2008-142) b. Mandates – none c. POD	This project is designed to obtain a coarse “time-series” of food sources being utilized by the dominant zooplankton inhabiting the central portion of the upper SFB estuary (Suisun Bay) with biomarker-specific, multiple isotopes. <b>Deliverables:</b> a) submission of one peer reviewed article, August 2009 and August 2010. (Susan Lang, UC San Diego)	\$76	\$0	CALFED POD \$76

PROGRAM ELEMENT	ELEMENT DESCRIPTION	Cost	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>C. ECOLOGICAL PROCESSES</b>				
1. Hydrodynamic studies in the Delta a. (2008-027) b. Mandates – none	<b>Deliverables:</b> a) Analyze existing historical and current hydrodynamic and salinity data to document the spatial and temporal variations in hydrodynamics and salt transport processes b) Deploy hydrodynamic and water quality instrumentation to understand circulation and mixing in the Cache Slough/Liberty Island complex and fluxes of constituents (e.g. Chl-a, turbidity, etc.) in collaboration with DWR; c) Use hydrodynamic field investigations and numerical modeling in collaboration with DWR, Suisun Marsh Branch to understand how geometric complexity affects ecosystems. (J. Burau, USGS)	\$419	DWR-\$155 USGS-\$189	DWR <sup>b</sup> -\$75
2. South Delta study: fishes investigation a. (2008-017) b. Mandates – none	This element will develop methods and initiate a supporting field investigation for evaluating the behavior and use of channel cross-section and water column by fishes and life stages of concern, especially delta smelt. Collection of auxiliary data on juvenile Chinook salmon migratory movements and delta smelt growth and age will also be conducted. <b>Deliverables:</b> Peer-reviewed journal article: (L. Grimaldo, DWR)	\$566	\$0	DWR <sup>d</sup> -\$566
3. Field survey of <i>Microcystis aeruginosa</i> bloom biomass and toxicity a. (2008-079) b. Mandates – none c. POD d. CBDA Science	This survey will measure the bloom biomass and toxicity of <i>Microcystis aeruginosa</i> . Sampling will be closely connected to fish surveys to examine if there is a link between <i>Microcystis</i> biomass and toxicity and its direct effects on zooplankton and fish. This work was started with POD funding and is now funded by a two-year CBDA Science grant. <b>Deliverables:</b> Not identified. (P. Lehman, DWR) (D. Riordan, DWR)	\$250	\$0	CBDA Science \$250
4. Zooplankton fecundity and population structure a. (2008-044) b. Mandates – none c. POD	Effort will examine archived samples from the IEP zooplankton monitoring survey to determine some population dynamics parameters of both <i>Pseudodiaptomus forbesi</i> and <i>Eurytemora affinis</i> . This information is needed to examine what factors could be limiting zooplankton in Suisun Bay. <b>Deliverables:</b> a) 1 <sup>st</sup> progress report to IEP or Newsletter article, Oct. 2008; b) IEP workshop or CALFED Science workshop presentation. (Wim Kimmerer, SFSU-RTC)	\$80	\$0	DWR POD \$80
5. Changes in pelagic fish habitat quality a. (2008-066) b. Mandates – none c. POD	This element is a data analysis of striped bass and delta smelt catches and their associated habitat from FMWT, TNS, bay study, and 20-mm survey. GIS will be used to map suitable habitat and track changes in time trends, hydrologic trends, etc. <b>Deliverables:</b> Two peer-reviewed journal articles, June 2008. (T. Sommer and F. Feyrer, DWR)	\$120	\$0	DWR POD \$120
6. Phytoplankton primary production and biomass a. (2008-045) b. Mandates – none c. POD	This element will analyze long-term patterns and trends in phytoplankton production and biomass in different Delta subregions and make comparisons to Delta wide trends. Investigation will include factors that may be responsible for these trends, how the Delta food-web model will be affected by these trends and whether or not monitoring data can be used to evaluate benthic grazing rates. <b>Deliverables:</b> Presentations (CALFED 2006 and IEP 2007) and a peer reviewed journal article (Jassby 2008) have already been delivered. (A. Jassby, UCD)	\$25	\$0	DWR POD \$25

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>C. ECOLOGICAL PROCESSES - Continued</b>				
7. CASCaDE computational assessment of scenarios a. (2008-081) b. Mandates – none c. POD d. CBDA Science	CASCaDE -simulations with linked models, this element will project changes under a range of plausible scenarios such as global warming, hydrologic responses, land-use change, reconfigurations of within-Delta habitats, and sea level rise. <b>Deliverables:</b> A final report is required and shall be submitted by 2/28/2009. The final report must include copies of any publications or reports produced. A draft manuscript(s) will suffice for a final report. Final manuscript(s) must be submitted after publication. The CASCaDE project agrees to present project findings at the biennial CALFED Science Conference and/or other CALFED Science Program workshops and symposia. (J. Cloern, USGS).	\$554	\$0	CBDA Science \$554
8. Foodweb support for delta smelt and estuarine fishes a. (2008-082) b. Mandates – none c. POD d. CBDA Science	This research will determine the productivity base of the foodweb of the Low-Salinity Zone (LSZ) of the northern San Francisco Estuary. The proposed research would address two critical issues for CALFED: foodweb support for the threatened delta smelt, and the basis for the relationships between abundance of estuarine fish species and freshwater flow. <b>Deliverables:</b> Several peer reviewed journal articles for the various tasks have been identified, target milestone date is December 2008. (W. Kimmerer, SFSU-RTC)	\$390	\$0	CBDA Science \$390
9. Synthetic analysis a. (2008-046) b. Mandates – none c. POD	This is a collaborative effort between the POD and UCSB National Center for Ecological Analyses and Synthesis (NCEAS), which provides the setting, tools and staff support for individual scientist and working groups to conduct analysis and synthesis of complex ecological data. <b>Deliverables:</b> a) 2007 synthesis report, Sept. 2007; b) 2008 synthesis report, Dec. 2008. (G. Castillo, USFWS; L. Brown, USGS; S. Slater, DFG)	\$696	\$0	USBR POD \$600 DWR POD \$96
10. Hydrologic changes and Suisun Bay increased salinity a. (2008-097) b. Mandates – none c. POD	This work will investigate what hydrologic or climatic changes have resulted in increased fall salinity in the western Delta. Watershed events such as reservoir operations, rice field flooding, and sea level rise will be used to help answer this question. <b>Deliverables:</b> a) a summary report has already been provided; b) final report, 2 <sup>nd</sup> quarter, 2008. (G. Gartrell, CCWD)	\$55	\$0	CALFED POD-\$55
11. Relationship between habitat and distribution a. (2008-134) b. Mandates – none c. POD	This work will investigate whether spatial shifts in the habitats required by pelagic fish reduced their likelihood of finding adequate amounts of different habitats. This work will build upon previous analyses conducted by Feyrer and Nobriga. Habitat will be combined with physical data to allow GIS projections of suitable summer and fall habitat for delta smelt, threadfin shad, and age-0 striped bass. <b>Deliverables:</b> Final reports including manuscripts for peer review, late 2009. (Susan Ustin and Jonathon Greenberg, UCD)	\$90	\$0	DWR POD \$90
12. Long-term sources and early warning turbidity signals a. (2008-126) b. Mandates – none c. POD	This study will determine the origin, movement, and extent of turbidity pulses that affect delta smelt behavior and salvage at the pumps by answering the questions: Do smelt move towards the water diversions because they are following specific turbidity pulses, or because their habitat has shifted towards the pumps? Where are the sources of turbidity for water exported at the SWP and CVP? <b>Deliverables:</b> Journal articles. D. Schoellhamer , S. Wright (USGS); L. Grimaldo (DWR)	\$92	\$0	USBR POD \$92

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>C. ECOLOGICAL PROCESSES - Continued</b>				
13. Effects of Cache Sl. On N. Delta pelagic habitat a. (2008-132) b. Mandates – none c. POD	The proposed study will examine the hydrodynamic “footprint” of Liberty Island, the major body of water in the Cache Slough Complex. Flux of phytoplankton out of Liberty Island will be studied as part of the Breach III study, providing a good opportunity to examine the fate of the exported material. The study approach will include both continuous monitoring and 24-hour flux studies. <b>Deliverables</b> not yet identified. (P. Lehman, DWR and J. Bureau, USGS)	\$322	\$0	USBR POD \$322
14. Clifton Court residence time and circulation patterns a. (2008-125) b. Mandates – none c. POD	In order to understand the sources and causes for loss, CCF circulation patterns and hydraulic residence time still need to be quantified. This issue was important in 2007, when operations were restricted during a period in which it was unclear whether salvaged delta smelt originated from Delta channels or from fish that had entered CCF earlier. This study will describe CCF patterns and residence time using releases of rotamine dye. <b>Deliverables:</b> a) Progress report, Sept 2008; b) IEP Newsletter article, Dec 2008. (C. Ruhl, USGS)	\$50	\$0	USBR POD \$50
15. 3-D modeling of the Delta a. (2008-141) b. Mandates – none c. POD	This study will address the entrainment of delta smelt in the export facilities and the exposure of delta smelt to toxins and available food items given that location controls the exposure of delta smelt to these items. The UnTRIM Bay-Delta model will be extended throughout portions of the Delta not included in the present UnTRIM model. The resulting tool wil predict a large range of processes including hydrodynamics, salt intrusion, movement of organisms and sediment transport. <b>Deliverables:</b> a) IEP Workshop presentation, Feb 2008; b) calibration report, March 2008; c) particle tracking report, June 2008; d) participation in POD meetings as requested. (Ed Gross)	\$290	\$0	DWR POD \$290

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>D. ESTUARINE MONITORING</b>				
1. Mitten crab monitoring and reporting a. (2008-026) b. Mandates – none	Element will operate the online reporting system for mitten crab collections and observations and would implement summer surveys of mitten crab distribution and abundance. The main part of this element will be funded and staffed by USFWS exotic species personnel with some sharing of resources from IEP. Deliverable: (K. Webb, USFWS)	\$53	USFWS \$53	\$0
2. Evaluation of South Delta temporary barriers a. (2008-103) b. Mandates-D 1601	Program monitors the potential impacts of South Delta temporary barriers installation and operation to water quality and resident and migratory fishes. One specific activity is monitoring the movement of juvenile salmon through the culverts of the Head of Old River barrier. This work is a condition of DWR's 1601 agreement for these barriers. <b>Deliverables:</b> results published in the 2007 and 2008 VAMP reports. (A. Rockriver, DFG)	\$150	\$0	DWR e \$150
3. Benthic macrofauna biomass trends a. (2008-065) b. Mandates – none c. POD	This study will measure and examine the biomass of benthic organisms collected quarterly from 1975-2004. The information will improve our understanding of benthos roles in the estuary, including feeding potential of various functional groups, availability and transmission of contaminants bioaccumulated in benthos, and trends in production. <b>Deliverables:</b> a) CALFED final report, 10/2010; b) CALFED Science Conference presentation, 10/2010. (K. Gehrtz, DWR)	\$0	\$0	\$0
4. Analysis of historical population dynamics a. (2008-084) b. Mandates – none c. POD	Analyses for long-term patterns in fishes and invertebrates, including trends, step changes, regime shift and changes in distribution among sampling stations. The analyses will look if there are joint patterns in catch of pelagic species and factors that affect abundance of fishes and invertebrate. <b>Deliverables:</b> a) methods paper already published; b) second journal article not yet published. (M. Chotkowski, USBR and B. Manley)	\$0	\$0	\$0
5. Investigation of power plant impacts a. (2008-087) b. Mandates – none c. POD	Analyses will be conducted for trends in fish entrainment and impingement at power plants. This effort will analyze whether or not pelagic fishes are vulnerable to entrainment and thermal effects and the scale of impact these power plants have on pelagic fish populations. Costs required for this work will be absorbed by existing program costs. <b>Deliverables:</b> survey results will be available for analyses after one full year of monitoring but no one has been identified to conduct the analyses at this time.	\$0	\$0	\$0
6. Field support of all POD activities a. (2008-089) b. Mandates – none c. POD	This element provides the funding for the supplemental collections and sampling of water, fish and zooplankton needed for various POD activities. <b>Deliverables:</b> Field samples for various analyses such as liver histopathology, water toxicity, and striped bass health. (F. Feyrer, DWR and various Mates, DFG).	\$194	\$0	DWR POD \$26 USBR POD \$168

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>D. ESTUARINE MONITORING - Continued</b>				
7. Retrospective analysis of long-term benthic community data a. (2007-078) b. Mandates – none c. POD	Investigations into the long-term trends and ecological processes involving benthic organisms from historical data collected by the EMP (2007-072) at its 4 benthos monitoring stations. Specifically, historical trends of community composition in relation to environmental variability, hydrology and exotic species invasions will be evaluated. Funding is covered under the EMP. <b>Deliverables:</b> a) peer-reviewed journal article, Dec 2008; b) report to POD MT of major finding, Dec 2008. (H. Peterson and J. Thompson, USGS)	\$0	\$0	\$0
8. Corbula salinity tolerance, distribution and grazing rates a. (2008-076) b. Mandates – none c. POD	Salinity tolerance of Corbula clam will be measured in a controlled laboratory setting to evaluate if increases in salinity level in Suisun Bay influenced the change in distribution of Corbula. Two surveys will also be conducted to assess distribution, abundance and size (and therefore grazing rates) of benthic bivalves. <b>Deliverables:</b> 1 <sup>st</sup> progress report, Oct 2008; b) presentation at CALFED Conference, Oct 2008. (K. Gehrtz, DWR, Jonathon Stillman, SFSU-RTC)	\$65	\$0	DWR POD \$65
9. Food match-mismatch a. (2008-122) b. Mandates – none c. POD	Paired fish and zooplankton sample data collected by the 20mm and Townet Surveys will be analyzed for distribution overlap of each POD fish species and its zooplankton prey. Competitor density will also be examined for potential effect. <b>Deliverables:</b> a) tri-annual progress reports, April, August and December, 2007; b) Peer-reviewed journal article, summer 2007; c) IEP workshop presentation, March 2008. (R. Baxter, DFG)	\$0	\$0	\$0
10. Feasibility of using towed imaging systems a. (2008-130) b. Mandates – none c. POD	This is a pilot scale project to test the feasibility of using towed imaging systems. The first part of the study will involve identifying gear types, video speed, camera lenses, and lighting that is best suited for this application. The second part will examine limitations of the gear including turbidity, velocity, and variation in fish size. If technical issues can be overcome, a more detailed study in 2009 will address questions such as 1) Are towed video imaging systems a feasible technique for measuring the abundance and distribution of pelagic fishes in the Delta and Estuary? 2) If so, what species, life stages, and regions would be most suitable for this technique? <b>Deliverables:</b> a) progress report, Sept 2007; b) IEP Newsletter article, Dec 2008. (G. Beningo, DWR and D. Portz, USBR)	\$70	\$0	DWR POD \$41 USBR POD \$29
11. Use of acoustics to estimate trawl dimensions a. (2008-131) b. Mandates – none c. POD	This study will employ the use of a commercially-available transmitter, transponder, computer system to calculate dimensions of a net while the net is being towed during routine monitoring surveys and special deployments. The information should improve the accuracy of abundance indices and abundance estimates for Delta smelt and other fishes susceptible to the trawl and may suggest appropriate alternative configurations and/or deployment of trawls. <b>Deliverables:</b> memos following deployment and a final report with tables of pertinent trawl dimensions and recommendations. (M. Gingras, J. Messino, DFG)	\$30	\$0	USBR POD \$30

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>D. ESTUARINE MONITORING - Continued</b>				
12. Effects pf wastewater treatment a. (2008-138) b. Mandates – none c. POD	Field studies will include transect surveys of nutrients and phytoplankton as well as phytoplankton "grow-out" enclosures experiments at or near the Sacramento and San Joaquin WWTPs. More controlled laboratory experiments with added effluent, ammonium, and nitrate will complement the field study. <b>Deliverables:</b> Annual reports to the SWRCB, CALFED, POD MT, IEP Newsletter articles, presentations as appropriate, and a journal article. (R. Dugdale, A. Parker, F. Wilkerson, SFSU,RTC)	\$167	\$0	DWR POD \$77 SWRCB POD \$90
13. Effects of Microcystis on threadfin shad a. (2008-139) b. Mandates – none c. POD	The elements of this task will evaluate: 1) Acute toxicity of microcystins on larval and juvenile fish; 2) Water exposure of larval and juvenile threadfin to environmentally-relevant concentrations of microcystins and dietary exposure of larval and juvenile threadfin to single-celled and colonial forms of microcystis; 3) examine sublethal <i>Microcystis</i> studies on TFS including growth, histopathological, and reproductive effects, and 4) determine bioaccumulation and fate of microcystins in threadfin. <b>Deliverables</b> to be determined. (Swee Teh, UCD and P. Lehman, DWR)	\$293	\$0	DWR POD \$293

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>E. FISH FACILITIES</b>				
1. Evaluation of DIDSON for underwater fish observations a. (2008-TF18) b. Mandates – CVPIA	This study element utilizes the dual DIDSON (dual frequencies identification sonar) for underwater detection work at the TFCF. Included are observations of fish behavior near the primary channel bypass intakes and within the secondary channel of the TFCF. The information will be helpful for assessing fish behavior and ability to navigate through the TFCF salvage process. (S. Hiebert, USBR)	\$46	\$0	USBR <sup>c</sup> \$46
2. Evaluation of an above ground holding tank and pumped bypass system a. (2008-TF19) b. Mandates – CVPIA, OCAP	This study element evaluates and assesses an above ground holding tank as an alternative to the presently used recessed collection tanks at the south delta fish facilities. An above ground holding tank could allow for better separation of fish and debris while awaiting transport to the release sites by reducing stress and predation. (B. Mefford, USBR)	\$50	\$0	USBR <sup>c</sup> \$50
3. Evaluation of alternative TFCF bypass operations a. (2008-TF21) b. Mandates – CVPIA, D-1485, OCAP	This study will evaluate alternative operation of the TFCF primary bypass system to determine if this will improve the facilities ability to meet hydraulic criteria as per D-1485. Presently the TFCF does not meet D-1485 bypass criteria, which is a significant amount of the time due to losses in stage height in the south delta over the past 50+ years. (C. Demoyer, USBR)	\$55	\$0	USBR <sup>c</sup> \$55
4. Evaluation of holding tank influences on Chinook and delta smelt a. (2008-TF3) b. Mandates – CVPIA, OCAP	This study element will complete recessed holding tank swirl tests to assess stress associated with the existing recessed holding tanks located at the south delta fish facilities. This information is useful in conjunction with CHTR study efforts. (C. Karp, USBR)	\$60	\$0	USBR <sup>c</sup> \$60
5. TFCF efficiency for spittail and Chinook salmon a. (2008-TF17) b. Mandates – CVPIA, OCAP	This study element will allow for continued assessment of the existing TFCF for Chinook salmon salvage efficiency. No assessment for salmon has been conducted since the facility was first built in the 1950s. This information will be helpful towards establishing baseline conditions for present TFCF operation. (C. Karp, USBR)	\$53	\$0	USBR <sup>c</sup> \$53

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>E. FISH FACILITIES - Continued</b>				
6. TFCF efficiency for delta smelt a. (2008-TF5) b. Mandates – CVPIA, OCAP	This element will continue assessment of the existing TFCF for delta smelt salvage efficiency. No assessment for delta smelt has ever been conducted at the TFCF. This information will be helpful towards establishing baseline conditions for present TFCF operation. (M. Bowen, USBR)	\$87	\$0	USBR <sup>c</sup> \$87
7. Fish taxonomic refinement & external assessment of test fish for FFIP/TFFT/TFCF a. (2008-TF6) b. Mandates – CVPIA	This activity funds the fish taxonomy program element of the Tracy Research Program. Information generated from this program provides useful keys and identification photos of early life stages of fish for use by researchers and managers dealing with fish studies and monitoring in the delta. Tracy Volume Series Report No. 30 "Delta smelt /Wakasagi Early Life Stages, released last year, was one product of this effort. This element also provides for injury analysis consistent with on-site research efforts. (S. Hiebert, USBR)	\$50	\$0	USBR <sup>c</sup> \$50
8. Predator impacts on salvage rates a. (2008-TF8) b. Mandates – CVPIA	This study will help determine whether the existing predator load in the primary channel of the TFCF is significantly reducing the number of fish reaching the recessed holding tanks. Paired whole facility efficiency trials will be performed with high and low predator loads. (B. Bridges, USBR)	\$72	\$0	USBR <sup>c</sup> \$72
9. Biotelemetry of striped bass movement a. (2008-TF12) b. Mandates – CVPIA, OCAP	This experiment will provide further understanding of the movements and holding patterns of fish predators in the fish salvage systems and the factors contributing to these patterns. Results will ultimately assist in finding methods to minimize predator fish residency and holding times. (R. Bark, USBR)	\$40	\$0	USBR <sup>c</sup> \$40
10. Fish holding associated stress in WR Chinook salmon a. (2008-TF15) b. Mandates – CVPIA, OCAP	This project determines whether holding tank design and conveyance methods significantly add to acute physiological stresses, specifically to the winter-run Chinook. Tests will compare recess holding tank design with above ground holding tank design. This work will link up with the CHTR research efforts underway. (D. Portz, USBR)	\$30	\$0	USBR <sup>c</sup> \$30
11. Fish behavior at the mitten crab traveling screen a. (2008-TF22) b. Mandates – OCAP	This study element will allow for completion of fish passage assessment associated with operation of the mitten crab traveling screen located at the TFCF. This is a requirement placed on Reclamation for continued use of the traveling screen as part of the TFCF operations. The screen is also being assessed for debris removal in addition to mitten crab removal. (C. Karp, USBR)	\$48	\$0	USBR <sup>c</sup> \$48

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>E. FISH FACILITIES - Continued</b>				
12. TFFIP website a. (2008-TF23) b. Mandates – CVPIA	This activity allows for continued maintenance of Reclamation's Tracy Research Program web site. The website contains all previously released Tracy Volume Series Reports as well as water chemistry data and current year program information. It also provides links to other relevant sites. (D. Craft, USBR)	\$53	0	USBR <sup>c</sup> \$53
13. Tracy Series Reporting a. (2008-TF24) b. Mandates – CVPIA	This activity provides for publishing of Reclamation's Tracy Research Volume Series Reports. To date, over 27 volumes have been published. Volumes 23, 29, 32, and 33 are expected to be published in 2007. (D. Craft, USBR)	\$134	0	USBR <sup>c</sup> \$134
14. TFCF cleaning loss evaluation a. (2008-TF10) b. Mandates – CVPIA, OCAP	This study allows for field testing of the fish loss associated with present louver cleaning operations at the TFCF. This is a requirement by the NMFS CVP OCAP B.O. The information will be used to adjust fish loss at the federal TFCF. (B. Bridges, USBR)	\$78	0	USBR <sup>c</sup> \$78
15. Improved debris removal at the TFCF a. (2008-TF13) b. Mandates – CVPIA, OCAP	This study allows for continued assessment of the mitten crab traveling screen as a debris removal device located within the secondary screening system at the TFCF. Effective use of this screen for debris removal will allow for less debris to enter the recessed holding tanks and fish haul trucks, thus reducing stress and mortality. (J. Boutwell, USBR)	\$5	0	USBR <sup>c</sup> \$5
16. Evaluation of holding tank screen entrainment at TFCF a. (2008-TF9) b. Mandates – CVPIA	The primary purpose of this study is to determine the TFCF holding tank screen entrainment efficiency for four size classes of juvenile delta smelt. The results will help determine how many delta smelt are being lost through the screens and how this effects fish salvage numbers and fish loading densities. (B. Wu, USBR)	\$55	0	USBR <sup>c</sup> \$55
17. Evaluation of striped bass predators at TFCF a. (2008-TF14) b. Mandates – CVPIA	This study will help attempt to quantify the number of predator fish that are located between the trashrack structure and the primary louvers. This information will be helpful in determining their impact to salvage of fish at the TFCF. Predators will be released into the primary channel and captured using the Peterson mark-recapture technique. (B. Bridges, USBR)	\$50	0	USBR <sup>c</sup> \$50
18. Bates Table Evaluation a. (2008-TF2) b. Mandates – CVPIA, OCAP	Evaluation of the current Bates Table used for guidance when holding and transporting fish to release sites. The Bates Table was originally produced in the 1960s and is in need of reassessment due to changing conditions. The information can be used by both south delta fish facilities for improved guidance and is linked to CHTR studies. (Z. Sutphin, USBR)	\$161	0	USBR <sup>c</sup> \$161

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>E. FISH FACILITIES - Continued</b>				
19. Diet analysis and food preference of predatory species a. (2008-TF4) b. Mandates – CVPIA, OCAP	This study will provide valuable information towards dietary habits of predator fish located within the bypass system at the TFCF. Information obtained related to predator behavior will enable better management of their presence within the salvage facilities. (R. Reyes, USBR)	\$116	0	USBR <sup>c</sup> \$116
20. Basic water quality monitoring and assessment of incoming flows a. (2008-TF7) b. Mandates – CVPIA	This element provides accurate baseline water quality data from sample collection efforts underway at the TFCF. The information is useful to researchers, operation personnel, and other agencies that have an interest in water quality of the south delta at the Tracy Pumping Plant. (D. Craft, USBR)	\$108	0	USBR <sup>c</sup> \$108
21. Vertical sorting of fish by size using a laboratory "V" shaped leaky louver a. (2008-TF1) b. Mandates – CVPIA	This element is the completion of leaky louver design work originally envisioned for fish screens and test facilities. The design is to pass smaller fish to one holding area and divert larger fish to another. The concept can be employed at the existing TFCF also if a new secondary system is constructed. (C. Karp, USBR)	\$5	0	USBR <sup>c</sup> \$5
22. Laboratory studies of horizontal separator physical model for TFCF a. (2008-TF11) b. Mandates – CVPIA	This study will allow for completion of model work in the Denver lab used to test effectiveness of fish sorting and holding designs to meet modern fish protection objectives originally envisioned for fish screens and test facilities. The concept can be employed at the existing TFCF also if a new secondary system is constructed. (L. Hanna, USBR)	\$98	0	USBR <sup>c</sup> \$98
23. Program management, regional support, & consultants a. (2008-TF25) b. Mandates – CVPIA	This element provides for costs associated with Tracy Research Program management and provides for regional support from other Reclamation Offices/Divisions within the MP Region and any local consultants/contractors. (R. Silva, USBR)	\$289	0	USBR <sup>c</sup> \$289
24. Evaluation/Design of circular rotating screen in the recessed collect tanks a. (2008-TF16) b. Mandates – CVPIA	This study allows evaluation of a circular rotating screen to be installed within the recessed holding tanks at the TFCF. Removing additional debris from the recessed tanks will reduce stress and mortality of fish holding in the recessed tanks awaiting transport and release. (B. Mefford, USBR)	\$103	0	USBR <sup>c</sup> \$103

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>E. FISH FACILITIES - Continued</b>				
25. Evaluation/Design of electric pulse fish crowders with TFTF development a. (2008-TF20) b. Mandates – CVPIA	This study will provide valuable information related to use of electric fish crowders (pulsed electric fields) as a means of moving fish along or preventing fish residency. (B. Mefford, USBR)	\$42	0	USBR <sup>c</sup> \$42
26. New Technologies and Release Site studies a. (2008-055) b. Mandates - none	Investigation into the use of new technologies and release site alteration that can improve survival of fish released as part of the CHTR process. (R. Padilla, DWR)	\$910	0	DWR <sup>d</sup> \$910
27. Fish Facility history a. (2008-107) b. Mandates – none c. POD	This project will identify changes that have occurred at the state and federal fish facilities from 1956 to 2006 that may have impacted the reported number of salvaged fish. Changes will be documented in the form of metadata. <b>Deliverables:</b> IEP Technical report, December 2008. (Brent Baskerville-Bridges, USBR; Jerry Morinaka, DFG)	\$0	0	\$0

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>G. CLIFTON COURT FOREBAY INVESTIGATIONS</b>				
1. Clifton Court Forebay steelhead predation a. (2008-048) b. Mandates –OCAP	This study will obtain information on steelhead and their major predators' behavior and will be used to measure loss of steelhead due to predation in Clifton Court Forebay. Avian predation on steelhead will also be obtained. Methods and technologies from 2005 pilot study will be implemented on a wider basis in 2007. <b>Deliverables:</b> a) draft report, May 2008; b) final reports, December 2008. (K. Clark, DWR and R. Fujimura, DFG)	\$1367	0	DWR <sup>d</sup> -\$1367

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>H. CONTAMINANT EFFECTS</b>				
1. In-situ biomarker study-endocrine disruptors a. (2008-121) b. Mandates – none c. POD	EPA-ORD and the DWR EMP program will conduct two- one month studies in November 2007 and February 2007. Batches of fat head minnows will be exposed in a flow through system to Sacramento and San Joaquin River water. The minnows will be processed and sent to ORD where they will be analyzed for endocrine disruptors. The tissue will be preserved and for future biomarker work with organo-phosphates and pyrethroids. <b>Deliverables:</b> CALFED Science Conference presentation, Oct 2008. (R. Breuer, DWR)	\$0	\$0	\$0
2. Contaminants synthesis a. (2008-124) b. Mandates – none c. POD	This work will synthesize available data on contaminants and toxicity into a single report to answer the above questions. The available data is tentatively scheduled to be assembled by a team of graduate students from UC Davis and then a panel of experts will be assembled to develop conclusions and recommendations. <b>Deliverables:</b> Final report and stakeholder workshop, Fall 2008. (Diane Riddle, SWRCB)	\$150	\$0	SWRCB POD \$150
3. Contaminants and biomarkers work a. (2008-127) b. Mandates – none c. POD	The overall goal is to assess the potential for contaminated water to contribute to the observed declines of pelagic species in the Delta. The study will build from the results of the 2006 and 2007 Delta-wide monitoring project which investigated toxicity of Delta water samples to invertebrates and early life stages of fish species of concern. Like the 2006 and 2007 study years, if toxicity is detected, toxicity identification evaluations (TIEs) and chemical analysis will be used to identify toxicant(s). <b>Deliverables:</b> a) semi-annual progress reports; b) oral progress reports to POD MT, Sept 2008 and 2009; c) IEP workshop presentation, March 2008 and 2009; d) results to be published in peer-reviewed journal, and/or summer 2009 IEP Newsletter. (I. Werner, UCD and others)	\$1,298	\$0	CUWA- \$25 USBR POD \$1273
4. Impacts of wastewater on delta smelt a. (2008-143) b. Mandates – none c. POD	Screening study to determine impacts of wastewater sources of ammonia on diatom production. Two delta smelt dilution series bioassays will be simultaneously conducted using 40 – 45 day old specimens. The hypothesis being tested are 1) delta smelt survival is negatively impacted by ambient ammonia concentrations and 2) smelt survival is negatively impacted by one or more contaminant(s) that are positively correlated with ammonia from sewage treatment plants. <b>Deliverables:</b> Final report and stakeholder meetings, fall 2008. (UCD)	\$20	\$0	SWRCB POD \$20
5. Pyrethroid pesticide monitoring a. (2008-144) b. Mandates – none c. POD	The goal of this study is to assess the potential for aquatic life beneficial use impairment in the Sacramento-San Joaquin River Delta due to the occurrence and toxicity of pyrethroids pesticides in the water column. Do pyrethroid pesticides occur in toxic concentrations in ambient source, near-failed, and Delta channel surface waters of the Delta? <b>Deliverables:</b> a) draft report, Feb 2009; b) final report, March 2009. (Don Weston, UC Berkeley)	\$300	\$0	SWRCB POD \$300
6. Selenium analysis a. (2008-145) b. Mandates – none c. POD	The primary objective is to establish background selenium levels in the freshwater delta. Previously collected fish will be analyzed and contaminants levels will be compared with concentrations believed to harm wildlife and people. The data may also be helpful should the hydrology of the estuary change as a result of Delta Vision and the amount and residence time of San Joaquin River water increased in the Delta. <b>Deliverables:</b> Analysis results due in 2008. (DFG, Moss Landing)	\$20	\$0	SWRCB POD \$20

PROGRAM ELEMENT	ELEMENT DESCRIPTION	COST	FUNDING SOURCE	
			IEP Core	IEP POD and Coordinated
<b>J. IEP FUNCTIONS</b>				
1. Data Management and Utilization a. (2008-019) b. Mandates - none	Management and dissemination of data and information generated by IEP monitoring and special study activities. <b>Deliverables:</b> maintenance and operation of the IEP web page and BDAT web site and data vaults. (Sherrie Bruebaker, DWR)	\$791	DWR-\$172 USBR-\$369	DWR <sup>a</sup> \$250
3. Science Advisory Group (SAG) a. (2008-020) b. Mandates – none	Funding to support travel and meeting costs for the Science Advisory Group. <b>Deliverables:</b> An annual meeting with the Science Advisory Group.	\$20	USBR- \$20	\$0

### III. Program Management Activities

<b>PROGRAM MANAGEMENT</b> – For all agencies, Program Management refers primarily to management and oversight activities, such as performance of Coordinator and Management Team responsibilities. All funding from IEP Core.	
Dept. of Fish and Game	\$571
Dept. of Water Resources	\$332
Water Resources Control Board	\$167
U.S. Bureau of Reclamation	\$220
U.S. Fish and Wildlife Service	\$122
U.S. Geological Survey	\$100
U.S. Environmental Agency	\$40
National Marine Fisheries Service	\$5
U.S. Army Corps of Engineers	\$16
	\$ 1,573

<b>TOTAL MONITORING</b>	<b>\$ 11,048</b>
<b>TOTAL SPECIAL STUDIES</b>	<b>\$ 15,077</b>
<b>TOTAL PROGRAM MANAGEMENT</b>	<b>\$1,573</b>
<b>2008 OVERALL PROGRAM TOTAL</b>	<b>\$27,698</b>

Notes:

<sup>a</sup> = funding from DWR Operations

<sup>b</sup> = funding from Suisun Marsh group (60% DWR and 40% USBR)

<sup>c</sup> = funding from USBR Tracy Operations

<sup>d</sup> = funding from DWR Prop 13 funds

<sup>e</sup> = funding from DWR Planning

<sup>f</sup> = funding from USBR Operations

<sup>g</sup> = funding from DWR FERC

<sup>i</sup> = funding from DWR Fish facilities

<sup>j</sup> = funding from USBR CALFED