



# Science News

News from the CALFED Science Program



**Blooming flowers along the Sacramento River's levees signal the return of spring to California's Delta**

## How the Delta Affects Out-Migrating Salmon

### Targeted Research Will Help Find Answers

Movements of juvenile salmon or smolts within Delta waterways are still a mystery. We know that some of the West Coast's adult chinook salmon use the Sacramento-San Joaquin Delta as adult for their annual migrations upstream to spawn and as smolts migrating westward to the sea. However, we still know little about the out-migrating trip juvenile salmon take to the sea, which channels they choose to travel, why, and how well they survive in the Delta.

Today, record-low numbers of endangered and threatened salmon along the Pacific Coast highlight the importance of gaining a better understanding of how salmon use the Delta, and whether water-management decisions are influencing the survivability of those salmon that use the Delta for their migrations.

In order to understand these effects, United States Geological Survey scientists undertook a pilot study on out-migrating salmon over the period 2004 to 2006 and have now prepared a full research proposal expanding on the successful pilot study. The

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## Moving the Interagency Ecological Program and Independent Science Board into the Future

The Delta Vision process and the Bay-Delta Conservation Plan are well under way, and Stage 2 of the CALFED Bay-Delta Program has begun. These major efforts are touchstones of the transition to a new era of Delta planning and decision making.

The CALFED Independent Science Board (ISB) is seizing this moment to develop recommendations for how science can guide decisions on the future direction of the Delta. The ISB is developing recommendations for enhancing its own effectiveness as well as the work of the Interagency Ecological Program (IEP).

The IEP consists of nine member agencies that have been working together for nearly 40 years to develop a better understanding of the estuary's ecology and the effects of the State Water Project and Federal Central Valley Project operations on the physical, chemical and biological conditions of the San Francisco Bay/Sacramento-San Joaquin Delta estuary. Monitoring by the IEP has created a

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## CALFED Science Program Establishing a Body of Knowledge

The CALFED Science Program's mission is to integrate peer-reviewed science into every aspect of the CALFED Bay-Delta Program. The Science Program is establishing the best scientific information possible to guide decisions and evaluate actions critical to the CALFED Program's success.

The long-term goal of the Science Program is to establish an unbiased, relevant and authoritative body of knowledge integrated across program objectives and communicated to the scientific community, agency managers, stakeholders and the public.

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## Out-Migration: *Continued from front page*

Department of Water Resources (DWR) funded the pilot study and is planning to fund the expanded research proposal

Researchers Jon Burau, Aaron Blake and current CALFED Science Fellow Russell Perry evaluated hydro-acoustical monitoring techniques to track salmon in their pilot study. They are proposing an expansion of the study to look at how salmon use the entire Delta, focusing on tracking how, and in what channels, smolts migrate on their way to sea. Detailing the three-dimensional flow environment near river forks and in river bends appears to be important when predicting how salmon migrate through the Delta environment. To date few studies have combined simultaneous measurements of water and smolt movements through the Delta

“Our region-wide study will give us much better data on what channels salmon smolts use for migrating and the survivability of smolts within each channel,” said Burau.

### Expert Review

The CALFED Science Program hosted an independent peer review of the *Regional Salmon Out-Migration Study Plan* on January 10, 2008. The workshop gave the study’s authors the opportunity to present information about their pilot-scale project and to receive appraisal of their new proposal.

## Schedule Update: Delta Risk Management Strategy

The California Department of Water Resources (DWR) and its consultants are well along in the process of developing a Delta Risk Management Strategy (DRMS), but release of the final reports has been delayed. At DWR’s request, the draft *DRMS Phase 1 Report: Risk Analysis*, released June 2007, was reviewed by an independent review panel provided by the CALFED Science Program. The report is currently undergoing extensive revisions based on the review panel’s comments. The revised draft *DRMS Phase 1 Report* should be ready for a second review by the panel in July 2008. It will likely take a few months to finalize the *Phase 1 Report* after the new review comments are received. The *DRMS Phase 2 Report: Evaluation of Delta Risk Management Strategies* is targeted for completion roughly two months after the revised draft *DRMS Phase 1 Report* is reviewed, around October 2008.

Ultimately, it is hoped that DRMS will help the state better understand risks to Delta levee stability, identify consequences if catastrophic failure occurs and provide long-term risk reduction alternatives. For more information on DRMS and the review effort, please visit [http://www.science.calwater.ca.gov/drms/drms\\_irp.html](http://www.science.calwater.ca.gov/drms/drms_irp.html).

CALFED Science Program supported reviewers for this study include experts on fisheries, hydrology and oceanography, mathematics and statistics, and ecosystem modeling. Members were: Stephen Monismith, Stanford University (Panel Chair); Si Simenstad, University of Washington; Richard Denton, consultant; Ken Newman, United States Fish and Wildlife Service; William Bennett, University of California, Davis; Dennis Rondorf, USGS; and Kenny Rose, Louisiana State University.

The expert review panel has examined the proposed plan and made recommendations to the study team for improving it. This type of independent review is conducted routinely for important CALFED Science related research to help ensure that studies provide relevant, robust and defensible science. The study team has revised their proposal based on the review panel’s input and have submitted it to DWR for funding consideration. The proposal, review and revised proposal will be available soon on the CALFED Science Program website, <http://science.calwater.ca.gov>.

### Expanding Our Understanding

During the workshop, the research team pointed out that our understanding of how human and natural processes affect out-migrating salmon is incomplete. Past studies have concentrated on how out-migrating salmon enter and exit the Delta and have not detailed what happens to smolts within the Delta.

The purpose of the expanded study will be to understand where salmon go in the Delta, why they choose particular routes, how well they survive in particular reaches, and how water-management decisions possibly harm or benefit their survival. The authors point out that by expanding their pilot study to a regional scope they can provide information for future management plans like Delta Vision and the Bay-Delta Conservation Plan.

## Proposals Solicited for Supplemental Funds for Existing Science Program Research Grants

In late 2007, the CALFED Science Program requested proposals from the more than 20 current Science Program grantees for a small amount of supplemental funding to enhance their ongoing research.

Seventeen proposals for supplemental funding – totaling over \$4 million – were submitted to the Science Program. These supplemental proposals are currently undergoing independent scientific review with awards expected to be announced in late spring.

A list of the submitted proposals may be viewed on the CALFED Science Program website at [http://www.science.calwater.ca.gov/psp/psp\\_package\\_2007.html](http://www.science.calwater.ca.gov/psp/psp_package_2007.html).

**ISB:** *Continued from front page*

solid foundation of data that supports the current scientific understanding of ecological conditions in the Bay-Delta ecosystem.

“It’s been a real achievement to keep this program running through changing policies, budgets and management priorities,” said Jeff Mount, chair of the CALFED Independent Science Board. “The managers in the contributing agencies need to be commended for this foresight; however, we are seeing major new policy directions for the Bay-Delta and contributing watersheds.”

The ISB’s recommendations are:

- The Bay-Delta system needs (and currently lacks) a comprehensive and integrated monitoring program. The IEP should form the foundation of this program.
- The IEP should become more anticipatory, hypothesis-driven and comprehensive, focusing on promoting understanding of the entire Bay-Delta system.
- Recent progress in encouraging data analysis and publication of results should be supported and expanded.
- IEP should seek greater integration and collaboration with monitoring and research programs both within and outside of the Delta in order to promote greater understanding and innovation.
- The IEP needs a strategic analysis of its current sampling protocols and locations, with the goal of evaluating their effectiveness and design.
- There is high value in periodic, independent review of the program and assessment of the response of the program to those reviews.

- It is worthwhile, as part of on-going planning efforts, to evaluate the efficacy of current funding and governance structures for IEP and whether different approaches might improve performance and stability of resources.

“The ISB fully endorses IEP’s role as an active participant as we move forward with proposals related to the future of the Delta,” said Mount. “In fact, we recommend that the IEP consider expanding its monitoring, analysis and research functions to better support management of the entire Bay-Delta system.”

More details can be found in the ISB’s memo to IEP Directors, “*Moving the Interagency Ecological Program into the Future*,” available at [http://science.calwater.ca.gov/isb/isb\\_index.html](http://science.calwater.ca.gov/isb/isb_index.html).

The ISB is considering alternative models for a science board that serves all Delta planning initiatives. They are evaluating whether the current ISB structure is appropriately configured, organized and funded, and if its mission and goals are appropriate to meet the challenges of the future. Preliminary ideas for the ISB are:

- Independent scientific oversight, guidance and advice through science boards and panels are integral to meeting future needs for Delta changes.
- A broad charge and overlap of authority of agencies within the state and federal governments warrants an ISB and Science Program with reporting responsibly to a high-level state office.
- Expand the scientific perspective through greater involvement with Cal/EPA.

Final recommendations will be made during the next ISB meeting, May 19-20, 2008.



## Pick Our Brain

**Question:** *If there has been no earthquake in the Delta for 100 years why is the current prediction of earthquake risk so high?*

**Answer:** Scientists have identified at least five major faults near the Delta that are capable of producing large earthquakes. When seismologists and geologists study faults, they estimate how large an earthquake a fault is capable of generating. This is called an earthquake’s “magnitude.” They also estimate how frequently both large and small earthquakes might occur on that fault. This is called an earthquake’s “frequency.”

When scientists predict the frequency of a given earthquake magnitude, say, “100 years,” they do not mean that this earthquake will occur exactly every 100 years. Earthquakes are random. Sometimes it will be more than 100 years between two similar earthquakes, and sometimes it will be less.

Consider a fault that is seismically active and has yielded large earthquakes in the past, but has not produced a large earthquake in the past 100 years. Seismologists believe that the chance of such a large earthquake occurring will increase with time. In other words, the more time that passes, the greater the chance of an earthquake occurring because the stresses are building without relief.

**Do you have a science question about the Delta you would like answered?**

To have your question considered for *Science News*, email the editor, Robert Ullrey at [rullrey@calwater.ca.gov](mailto:rullrey@calwater.ca.gov).

# SAN FRANCISCO Estuary & Watershed SCIENCE

## New Issue Available

The latest issue of *San Francisco Estuary and Watershed Science* (SFEWS) can be downloaded at <http://repositories.cdlib.org/jmie/sfews/vol6/iss1/>. The SFEWS is a peer-reviewed quarterly journal that publishes research about the science and resource management of the San Francisco Bay, the Sacramento-San Joaquin River Delta, and upstream watersheds.

Volume 6, Issue 1 (February 2008) contains four informative papers about:

- *Summertime water quality variables in the Delta and how they affect delta smelt survival,*
- *Phytoplankton food sources for pelagic fish species living in the Delta,*
- *The changes in snowmelt patterns in the Sierra Nevada and the significant impacts on California's water resources, and*
- *Hydrologic modeling of the Delta to evaluate how movement of fish through the Delta may be influenced by flow and water pumping.*

Matt Nobriga, a CALFED Staff Environmental Scientist, is the lead author of *Long-term Trends in Summertime Habitat Suitability for Delta Smelt*. Co-authored by Ted Sommer, Fred Feyrer and Kevin Fleming, the article looks at why the delta smelt's productivity does not seem to be as related to variations in river inflows as are other Delta species. The authors argue that the seasonal changes within the Delta and long-term changes in the physical conditions occurring within some areas of the Delta affect delta smelt abundance regionally. However, these effects do not explain delta smelt abundance trends. Alan Jassby, a University of California, Davis professor, authored *Phytoplankton in the Upper San Francisco Estuary: Recent Trends, Their Causes, and Their Trophic Significance*. It has been speculated that long-term decreases in phytoplankton (a food source for fish) have caused a decline in fish populations. Jassby discusses the trends in biomass variability, including the effects of macronutrient supply, water flow variations and other factors.

David Peterson, Iris Stewart and Fred Murphy, all researchers from the United States Geologic Survey, present compelling evidence in *Principle Hydrological Responses to Climatic and Geologic Variability in the Sierra Nevada, California*, about how climatologic changes are influencing the timing and quantity of mountain snowmelt flow.

Co-authors Matt Nobriga and Wim Kimmerer, a CALFED Science Advisor, investigated the principal causes of fish entrainment within the Delta. *Investigating Particle Transport and Fate in the Sacramento-San Joaquin Delta Using a Particle Tracking Model*, uses computer simulation modeling to investigate the effects that export pumps, tides, river inflows, removable barriers and agricultural diversions are having on water and fish movement throughout the Delta. The next issue of SFEWS is expected in early summer 2008.

## New Editor in Chief Named

The CALFED Science Program, sponsor of the SFEWS, is pleased to announce that Dr. Samuel N. Luoma, first CALFED Lead Scientist, will be the Editor in Chief for the online journal starting with Volume 6, Issue 3. "We are grateful to Dr. Fred Nichols for taking over as sole Editor in Chief upon the untimely death of his Co-Editor in Chief Dr. Randy Brown," said Science Program Deputy Director Dr. Lauren Hastings. "We look forward to the capable leadership of Dr. Luoma, who had the original vision for the journal in 2001 as Lead Scientist and is now returning to continue and expand upon the journal's success."

## Upcoming Science Program Events

### Independent Science Board Public Meeting

May 19-20, 2008

CALFED, 650 Capitol Mall, 5th floor, Sacramento, CA.

For more information, visit: <http://www.science.calwater.ca.gov/>.

## Upcoming Events of Interest

### Delta Vision Blue Ribbon Task Force

April 24-25, 2008

West Sacramento City Galleria, 1100 West Capitol Avenue, West Sacramento, CA.

For more information, visit: [www.deltavision.ca.gov](http://www.deltavision.ca.gov)

### Brown Bag Seminar: Restoration Activities on the Northern End of Liberty Island with Erik Vink

May 13, 2008

CALFED, 650 Capitol Mall, 5th floor, Sacramento, CA.

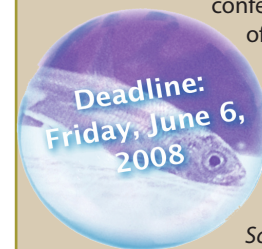
For more information, visit: <http://www.calwater.ca.gov/>.

## Call for Abstracts: 5th Biennial CALFED Science Conference

October 22-24, 2008

Abstract Deadline June 6, 2008

Conference organizers are seeking presentations for the October 22-24 conference in all four of CALFED's program objectives, and the conference's overall theme, "Global Perspectives and Regional Results: Science and Management in the Bay-Delta System." Abstracts are due June 6, 2008. Forms available April 15th.



For more information, visit: <http://science.calwater.ca.gov/events/conferences/index.html>.