



## **INFORMATION ITEM**

### Lead Scientist Report

## Summary

The Interagency Ecological Program (IEP) Drought Synthesis Team analyzed data from 1975-2021 to assess how drought affects ecosystems of the upper San Francisco estuary. Their findings highlighted the influence of reduced freshwater flow on water movement and exchange through the system, and associated alteration of habitats. Droughts had location-specific impacts such as increased water clarity and salinity in some regions and decreases in zooplankton and some fish species in other regions. These results emphasize the importance of considering regional differences in ecological responses to multi-year droughts when assessing ecosystem management strategies.

## Dry Me a River: Ecological Effects of Drought in the Upper San Francisco Estuary

*Rosemary Hartman, Elizabeth B. Stumpner, David H. Bosworth, Amanda Maguire, Christina E. Burdi, Interagency Ecological Program Drought Synthesis Team. 2024 San Francisco Estuary and Watershed Science 22(1). <https://www.doi.org/10.15447/sfews.2024v22iss1art5>*

The upper San Francisco (SF) estuary, which includes the Sacramento-San Joaquin Delta, Suisun Bay, and Suisun Marsh, is a diverse region that provides numerous ecosystem services and holds important cultural significance for many people. However, this region has become increasingly affected by droughts, which are predicted to become more frequent. The Interagency Ecological Program (IEP) Drought Synthesis Team published an article in the March 2024 San Francisco Estuary and Watershed Science journal entitled “Dry me a River” using a 46-year data set from 1975-2021 to assess impacts of droughts and mechanisms driving the changes. This multi-year analysis of multi-sector effects of drought on the Delta contributes to a key topic in the Delta’s 2022-2026 Science Action Agenda.

The IEP Drought Synthesis Team created a conceptual model (see Attachment 2) to describe how drought affects the upper SF estuary. The conceptual model suggests that freshwater flow is the key driver of the length of time water remains in a particular location (typically referred to as the water residence time) and other water transport dynamics. During drought, flows are reduced, less water is exchanged between locations and water residence times are longer. Reduced flows in turn affect habitat connectivity, which is crucial to numerous organisms and nutrient exchange between aquatic and terrestrial systems. Additionally, droughts are generally associated with increased water and air temperatures which can have varied impacts on ecosystem processes such as nutrient cycling and species interactions. The majority of food-web responses in the conceptual model could be attributed to the effects of drought on water movement patterns (through a decrease in water transport rates, an increase in water residence time, or both). Responses may have also been influenced by drought-associated increases in salinity, changes in water quality, or variations in the top-down effects of increased predation and increased grazing rates on phytoplankton and zooplankton.

Their models also demonstrated how region-specific responses to drought are important when considering impacts, as the upper SF estuary is a complex and dynamic ecosystem. For example, droughts were associated with increased water clarity, salinity, nutrients, chlorophyll concentrations, and zooplankton abundance in the South Delta. Comparatively, in Suisun Bay, drought conditions were linked to decreased Delta outflow, water exports, zooplankton, and some fish species.

These analyses contribute a better understanding of how prolonged decreases in freshwater flow during droughts affect the SF estuary's ecosystems. By focusing on the complex interactions between flow dynamics, water quality, and biological responses, the study provides valuable insights into the complex region-specific ecological responses that multi-year droughts can have. It will be imperative that Delta decision-making consider region-specific responses to drought when considering future management actions.

The upcoming edition of the State of Bay-Delta Science, a key component of the Delta Science Program's [Delta Science Strategy \(available here\)](#):

<https://deltacouncil.ca.gov/delta-science-program/delta-science-strategy>), focuses on the effects of extreme weather and climatic events in the Bay-Delta. The lead author of the featured article this month, Dr. Rosemary Hartman, is also contributing a chapter to that edition that explores the impacts of drought on the socio-ecological system of the Delta over time and summarizes current available tools for responding to drought. Other chapters in the edition will explore similar concepts with respect to heatwaves, atmospheric rivers, wildfires, and governance of the Bay-Delta system as it concerns extreme events. The suite of papers comprising this next edition are anticipated to be published in late 2024 or early 2025. For more information, visit [the State of Bay-Delta Science webpage \(available here: https://sbds.deltacouncil.ca.gov/\)](https://sbds.deltacouncil.ca.gov/).

## Delta Science Program Activities

Delta CHABs Monitoring Strategy - Delta Plan Interagency Implementation Committee (DPIIC)

Dr. Lisamarie Windham-Myers took part in a panel presentation to the Delta Plan Interagency Implementation Committee (DPIIC) on April 15<sup>th</sup> to present the Delta Cyanobacteria Harmful Algal Blooms (or CHABs) Monitoring Strategy for endorsement. Dr. Windham-Myers was joined by Dr. Laura Twardochleb from the State Water Board Division of Water Rights, Dr. Meredith Howard from the Central Valley Regional Water Board, and Dr. Ellen Preece from the Department of Water Resources and the lead author of the Delta CHABs Monitoring Strategy, and Tricia Lee from the Delta Science Program.

The Delta Science Program facilitated the development of the Delta CHABs Monitoring Strategy, which is a framework to increase monitoring coordination and improve data collection for CHABs in the Delta. The long-term goal is to move toward the ability to better mitigate CHABs and adequately forecast conditions that might lead to CHABs. There was a 30-day public comment period on a draft version of the document in March 2024, and a Delta Agency Science Workgroup meeting was hosted March 19<sup>th</sup> to highlight this effort and create an additional opportunity for comment and feedback. DPIIC members exhibited broad support for such a tool in managing CHABs in the Delta, and public comments received during the DPIIC

meeting were also in support of endorsement of the Strategy. DPIIC members endorsed the Strategy, pending receipt of the final document which is due summer 2024.

### [2025 Delta Research Awards now open for proposals](#)

Last month the Delta Science Program (DSP), in partnership with California Sea Grant, released its call for proposals for the 2025 Delta Research Awards. Funding research is a core element of the DSP mission, and these research awards are the primary mechanism through which DSP funds research. This year, there is approximately \$6 million available for research projects, which must directly address the priority science actions identified in the 2022-2026 Science Action Agenda and be integrated with natural resource managers, community groups, or Tribes.

Two key components of the 2025 Research Awards are: 1) the DSP encourages co-production and participatory research, in which information is co-produced by the researchers and the communities affected by the research. Through this approach, communities are engaged early and continuously in the research process. The DSP, Brandon Chapin, Council Tribal Liaison, and Morgan Chow, Environmental Program Manager in the Planning and Performance Division, have been facilitating connections between researchers and potential community and tribal partners using the results of an engagement survey (the survey is now closed); and 2) proposals with a substantial social science component will be eligible for additional points during the review process, in recognition of previous underfunding of Science Action Agenda actions related to the human dimensions of the Delta.

Letters of Intent were originally due May 14, 2024, but this has been extended to May 28, 2024. Full proposals are due August 26, 2024. Letters of Intent are required by the deadline for review to determine eligibility to submit a full proposal. Awards will be announced in January 2025 and projects are expected to begin in or after April 2025.

### [U.S. Bureau of Reclamation \(Reclamation\) Fish & Aquatic Effects Analysis Peer Review](#)

An update to the status of ongoing peer reviews was provided in the Council packet in February. Since then, this core function of the Delta Science Program has

completed one review, for the analytical and methods approaches of Reclamation's Long-Term Operations of the Central Valley Project (CVP) and State Water Project (SWP). Another independent peer review, for the Department of Water Resources Summer Fall Habitat Action analyses, will be highlighted at the June council meeting.

Background: Reclamation reinitiated Endangered Species Act (ESA) Section 7 consultation for the Long-Term Operations of the CVP and SWP. The Fish and Aquatic Effects Analysis is a portion of the Environmental Impact Statement, a report mandated by the National Environmental Policy Act, that is being developed by Reclamation for the long-term operations of the CVP and SWP. The analyses inform a Biological Assessment, a formal evaluation of the condition of waterbodies to understand impacts of stressors on aquatic communities. The U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) will use the Biological Assessment to determine whether the Long-Term Operations of the CVP and SWP will jeopardize listed species.

Scope: The intent of this review was for the Panel **to evaluate the analytical approach and use of methods and tools** by Reclamation to assess how the long-term operations of the CVP and SWP affect the aquatic environment and the exposure, response, and risk to ESA-listed species (individuals and populations). The Panel consisted of five members with expertise in aquatic habitat and food webs, fish biology and physiology, hydrologic alteration and modeling, and population dynamics.

Status: The peer review panel has **completed** its review of the relevant technical appendices (from the draft EIS) that describe the literature, models, and tools used. The panel also reviewed several aquatic ESA-listed species chapters from the draft Biological Assessment. The final co-authored report includes the Panel's responses to their charge questions and provides guidance for improving the analytical approach used by Reclamation in order to better interpret results of their ecological models. It was announced via the Council's listserv on Monday, April 29<sup>th</sup>, and can be found on our peer review webpage (<https://deltacouncil.ca.gov/delta-science-program/scientific-peer-review>). .

## On Your Radar2025

### Delta Science Fellowship Program

The Delta Science Program and California Sea Grant are excited to announce the 13<sup>th</sup> round of Delta Science Fellowships, with support for the 2024-2026 academic years. This fellowship funds research projects of up to two years in duration that will advance the state of knowledge underlying high-priority science issues that affect the Sacramento-San Joaquin Delta and its management as an integrated socio-ecological system. Eligible applicants include postdoctoral researchers, Ph.D. students, and master's students. Information about how to apply for this funding opportunity can be found at <https://caseagrant.ucsd.edu/funding/2025-delta-science-fellowship>. Letters of intent are due June 24, 2024. and full applications are due August 26, 2024. An informational webinar is scheduled for May 22.

#### *Key dates:*

Solicitation announced: April 30, 2024

Informational webinar: May 22, 2024

Letters of Intent due: June 24, 2024

Proposals due: August 26, 2024

Project start date: January or February 2025

### 2024 State of the Estuary Conference

The 2024 biennial State of the Estuary Conference has been rescheduled for May 28-29, 2024 in Oakland, CA at the Scottish Rite Center. The San Francisco Estuary Partnership (SFEP) organizes this event every two years to highlight the current management and ecological health of the San Francisco Bay-Delta Estuary. Several Council staff are participating in the conference as planning team members, session organizers and facilitators, and oral and poster presenters. A full agenda is available here: <https://www.sfestuary.org/state-of-the-estuary-conference/>.

### May 31, 2024 Understanding Food Web Dynamics from the San Francisco Estuary to the Pacific Ocean Symposium

The UC Davis Coastal and Marine Sciences Institute (CMSI) and the Delta Science Program are hosting a one-day symposium exploring food web research from the San Francisco Estuary to the Pacific Ocean on May 31, 2024. This symposium aims to convene food web experts to discuss ongoing research, find synergies in approaches and findings, and identify information gaps, with the goal of improving

ecosystem-based fisheries management. The event can be attended in person at the International Center Multipurpose Room at UC Davis or virtually via Zoom.

Registration is now open at

[https://airtable.com/appEOgQ4D9g6QsZqP/pagpUzcyBYZCyK9ak/form?mc\\_cid=95b4b67d11&mc\\_eid=UNIQID](https://airtable.com/appEOgQ4D9g6QsZqP/pagpUzcyBYZCyK9ak/form?mc_cid=95b4b67d11&mc_eid=UNIQID).

### 2024 Bay-Delta Science Conference: Call for Abstracts

The Delta Science Program is excited to announce that the call for abstracts is now open for the 2024 Bay-Delta Science Conference! This year's theme - "Cultivating Connections in a Dynamically Changing Environment" - recognizes the need for diverse perspectives to confront the multiple challenges in a dynamically changing environment such as the Sacramento-San Joaquin Delta. To cultivate this more holistic approach to conservation, the conference will include talks and sessions that encompass a wide variety of disciplines such as the use of traditional knowledge, identifying contaminants within and around the watershed, identifying the needs of a variety of species, and exploring ways to mitigate climate change impacts, among other topics. The conference will be held in person at the Safe Credit Union Convention Center in Sacramento, CA from September 30-October 2, 2024. Abstract submissions are due June 3, 2024. Stay tuned to the Council's listserv for updates, and visit the conference website for details on registration and abstract submission (<https://www.baydeltascienceconference.com/>).

### By the Numbers

Science Program staff will summarize current numbers related to Delta water and environmental management. The summary (Attachment 1) will inform the Council of recent counts, measurements, and monitoring figures driving water and environmental management issues.

### List of Attachments

*Attachment 1: By the Numbers*

*Attachment 2: Visual Summary of Article*

## Contact

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