INFORMATION ITEM

Lead Scientist Report

Summary

Part of the Delta Science Program's mission is to synthesize and communicate science to help support decision-making in the Delta. A key way to achieve this is via the State of Bay-Delta Science (SBDS)—periodically released collections of peer-reviewed articles for scientists and policy-makers that synthesize the "state of the science" on topics relevant to Bay-Delta management. The first set of articles from the 2025 edition of SBDS was published in *San Francisco Estuary & Watershed Science* (SFEWS) in March 2025. This edition of SBDS explores extreme events affecting the Bay-Delta—heatwaves, droughts, atmospheric rivers, and wildfires—and how science and governance systems can adapt to the increasingly complex management challenges posed by climate change. The introduction to the edition notes some ways in which climate change is manifesting as extreme climate and weather events; highlights the importance of long-term monitoring data for studying the frequency, magnitude, and duration of extreme events; flags the importance of decision-making frameworks that incorporate climate uncertainty; and summarizes key points from the other six articles in the edition.

2025 State of Bay-Delta Science Part 1 Now Available in *San Francisco Estuary & Watershed Science*

Thompson J, Dahm C, Christman M, Colombano D, Rowlands N, Windham-Myers L. 2025. The State of Bay-Delta Science: An Introduction to the 2025 Extreme Events Edition. San Francisco Estuary & Watershed Science, 23(1). https://doi.org/10.15447/sfews.2025v23iss1art1

The State of Bay-Delta Science (SBDS) is an ongoing Delta Science Program synthesis and communication effort intended to inform science and policy audiences about the "state of the science" for topics relevant to managing the Bay-

Delta system. Editions of SBDS consist of collections of scientific articles published in the peer-reviewed journal *San Francisco Estuary & Watershed Science (SFEWS)* (available here: https://escholarship.org/uc/jmie_sfews). An editorial board comprising Delta Science Program staff and external experts guides development and production of each edition. The first two editions of SBDS were published in 2008 and 2016 and covered a broad range of topics related to water and ecological management in the Bay-Delta; the third edition in 2023 focused base of the food chain (plants and algae) and their ecosystem services.

Published in SFEWS in March 2025 and authored by the SBDS editorial board, *The State of Bay-Delta Science: An Introduction to the 2025 Extreme Events Edition* sets up the fourth edition of SBDS. This edition explores extreme events affecting the Bay-Delta—heatwaves, droughts, atmospheric rivers, and wildfires—and how science and governance systems can adapt to the increasingly complex management challenges posed by climate change. The authors summarize some key findings on the status and trends of extreme events from the articles. For example:

- Average annual air and water temperatures in the Delta have increased over recent decades, and heatwaves have become more frequent and intense.
- The period 2000–2021 was the driest since 800 A.D., representing mega-drought conditions in the southwestern US.
- Climate change is likely to reduce the frequency but increase the intensity of atmospheric river storms in California.
- The period 2018–2024 included California's eight largest wildfires, each of which occurred within the greater Delta watershed.

The authors highlight the importance of long-term monitoring, which allows researchers to detect climate change signals in the Bay-Delta. The authors also note the importance of using region-specific climate models to help explore potential future scenarios in the Bay-Delta. Finally, they identify another key theme running throughout the edition, which is the growing need for flexible and adaptive frameworks that enable management decisions in the face of uncertainty.

In total seven articles are anticipated to be released in multiple editions of SFEWS throughout 2025. The first set of articles was released in March and comprised the

introduction to the edition (summarized here) plus three review articles covering climate governance, heatwaves, and droughts. Upcoming articles for release later this year explore atmospheric rivers and floods, wildfires and water quality impacts, and perspectives on how science and management can adapt to rapidly changing conditions in the Bay-Delta.

The introduction concludes with a summary of each article in the 2025 SBDS edition:

Part 1 (published in SFEWS in March)

- **Governance** (Led by Dr. Jessica Rudnick, formerly California Sea Grant): This paper characterizes the Delta's governance system and assesses the ways in which its structural and procedural features contribute toward the efficacy, efficiency, and equity of climate adaptation responses. (https://doi.org/10.15447/sfews.2025v23iss1art2)
- **Heatwaves** (Led by Brian Mahardja, US Bureau of Reclamation): Evaluating spatial patterns in temperature and heatwaves, this paper addresses the potential impacts of heatwaves on ecosystem and human health and briefly discusses key concepts and ideas for adaptation strategies. (https://doi.org/10.15447/sfews.2025v23iss1art4)
- **Drought** (Led by Dr. Rosemary Hartman, California Department of Water Resources): A discussion of current and proposed management actions for water availability as well as the need for multiple adaptation pathways to manage water equitably and effectively. The paper also explores tools and forecasting methods to mitigate how drought affects Delta plants and animals. (https://doi.org/10.15447/sfews.2025v23iss1art3)

Part 2 (anticipated to be published in SFEWS later this year)

- **Atmospheric Rivers** (Led by Dr. Alexander Gershunov, Scripps Institution of Oceanography): This paper discusses the role of atmospheric rivers in the projected increase in volatility of California's hydroclimate. The intensity of storms is expected to increase, resulting in increased flooding and associated risks to water infrastructure and communities.

- **Wildfires** (Led by Dr. Cliff Dahm, former Delta Lead Scientist and University of New Mexico, emeritus): Examining water quality degradation associated with burned landscapes and how that changes with the increased frequency of very large fires, this paper covers such topics as the mobilization and transport of contaminants, sediments, and heavy metals through the watershed.
- **Perspectives** (Led by Dr. Denise Colombano, Delta Stewardship Council): A higher-level synthesis of what we have learned so far, the key takeaway is that extreme events are adding new and challenging dimensions to an already "wicked" management setting. The paper outlines the SBDS editorial board's perspectives on promising paths forward for science-informed management.

Delta Science Program Activities

Peer review update

The mission of the Delta Science Program is carried out through several core functions, including the facilitation of independent scientific peer reviews. Within the Delta Science Program, the Collaborative Science and Peer Review (CSPR) unit leads these efforts. The CSPR unit is currently facilitating two independent peer reviews: (1) the Hydrologic Engineering Center Reservoir Simulation (HEC ResSim) Water Temperature Independent Peer Review requested by the U.S. Bureau of Reclamation, and (2) the design of the Healthy Rivers and Landscapes (HRL) Science Plan Peer Review requested by the Department of Water Resources.

The HEC ResSim peer review was officially kicked off on March 17 with four subject matter experts with expertise in hydrology, modeling, and water quality. The goal of the review is to respond to a set of charge questions that ask about the validity and clarity of the newly integrated HEC ResSim model (a reservoir simulation model) with the Water Temperature Model Platform. Review materials include the HEC ResSim user manual, technical reference, and two case studies. The final (group) report is expected to be completed in mid-May.

The HRL Science Plan Peer Review requested by the California Department of Water Resources will begin April 28, 2025. Three subject matter experts with expertise in structured decision-making, fisheries, and monitoring evaluation will write

individual review letters. Experts will address charge questions related to the HRL Science Plan's hypotheses, metrics and covariates, monitoring networks and modeling resources, information gaps, and adaptive management components. Final reports are expected to be completed by late June.

Webpages with all review materials, panel member bios, charge questions, and more are available on the Council's website (https://deltacouncil.ca.gov/delta-science-program/scientific-peer-review) and any additional questions can be directed to ReviewAdvice@deltacouncil.ca.gov.

2025 Delta Synthesis Working Group: Call for participants and topics

As part of the Delta Science Program's mission to lead and coordinate synthesis on key scientific issues of importance to Bay-Delta management, the Delta Science Program, in partnership with the National Center for Ecological Analysis and Synthesis (NCEAS), is organizing a Fall 2025 Synthesis Working Group. This will be the third time DSP and NCEAS are collaborating on this unique opportunity. Through a series of workshops, staff from NCEAS will provide high-quality training in synthesis, data science, and statistical techniques to approximately 18 Delta scientists. The workshops additionally provide opportunity to collaborate closely with scientists from a variety of agencies and institutions.

New this year, the Delta Science Program is seeking input on priority topics for which existing, publicly available data can be leveraged to inform Bay-Delta management needs. Ideas can be submitted by anyone regardless of their ability to participate in the training. Please note that this is not an opportunity to collect data. An open call has also been released for anyone interested in participating in the Synthesis Working Group activities.

Additional information about the 2025 Delta Synthesis Working Group including links to submission forms to share synthesis topics and express interest in participating in the workshops, can be found on the Delta Science Program's Synthesis Working Groups web page (https://deltacouncil.ca.gov/delta-science-program/science-synthesis-working-group).

On Your Radar

Delta Research Awards Seminar Series: May 7, 9:00 a.m.–12:00 p.m.

Mark your calendars! The final seminar in the 2020–2021 Delta Research Awards series is open to all who are interested in Delta science and management. These seminars give the broader community a chance to hear about the latest science and how it can shape decisions about important environmental and water issues in the Bay-Delta. The seminars create space for collaboration and open dialogue between researchers, managers, and the communities most affected by the research.

Join our researchers for these three exciting talks:

- *Reorienting to Recovery: Developing an inclusive, landscape-scale process for Central Valley salmonids.* Rene Henery (Trout Unlimited)
- *Juvenile Production Estimates: Tracking Spring-Run Chinook populations*. Russell Perry (USGS)
- *Predator Detection: Insights from salmonid telemetry data.* Rebecca Buchanan (University of Washington)

All previous seminars are available on YouTube (https://bit.ly/3Gd0K2F). Register for the seminar here: https://us06web.zoom.us/webinar/register/WN_kMK8j8k9RSmGGHlTszVzbA.

Microplastic Pollution: Impact on the SF Bay Delta and Remediation Strategies: May 9, 9:00 a.m.–4:00 p.m.

UC Davis Coastal and Marine Sciences Institute and the Delta Science Program are co-hosting a one-day symposium exploring the impacts of microplastics on aquatic ecosystems, with a focus on the heavily urbanized San Francisco Bay-Delta and its diverse habitats. We will learn how these tiny pollutants affect organisms and discuss the challenges in studying them as well as strategies for remediation and standardization. The symposium will run from 9:00 a.m.–4:00 p.m. (PST) on Friday, May 9th, 2025 on the UC Davis campus and will also be live-streamed and recorded. This is a ticketed event for in-person and remote attendees. Registration link is here (https://bit.ly/4jI2Nu5).

2025 State of the Estuary Conference: October 28–29

The next biennial State of the Estuary Conference will be held October 28–29, 2025 at the Henry J. Kaiser Center for the Arts in Oakland, CA. The San Francisco Estuary Partnership organizes this event every two years to highlight the current management and ecological

health of the San Francisco Bay-Delta Estuary. A call for abstracts for oral and poster presentations is anticipated to open in April. More information is available here: https://www.sfestuary.org/state-of-the-estuary-conference/.

By the Numbers

Science Program staff will summarize current numbers related to Delta water and environmental management. The summary (Attachment 2) will inform the Council of recent counts, measurements, and monitoring figures driving water and environmental management issues.

List of Attachments

Attachment 1: Visual Summary of Article

Attachment 2: By the Numbers

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