INFORMATION ITEM

Lead Scientist Report

Summary

Long-term environmental monitoring (more than10 years) is key to Delta science and has helped to elucidate many changes in the system, including native fish population declines and the effects of invasive species on food webs. Maintaining continuity in long-term datasets is vital to understanding such changes over time. However, updating data collection methodologies can introduce challenges and make data collected using newer techniques incompatible with older data. Jones et al. (2025) lay out tradeoffs to consider when switching from "established" to "emerging" methodologies. They also present best practices to ensure that adopting modern techniques does not come at the expense of long-term dataset quality for trend detection. Key considerations include data compatibility between the old and new approaches, whether other research teams will be able to replicate the new methods, and the need to provide detailed documentation that describes changes. Here in the Delta it will be important to evaluate how modern methods reframe past results derived from older data, and to determine whether the changes we observe in the system truly reflect a changing ecosystem or simply a change in methodology.

How to Preserve Long-Term Datasets When Switching from Established to Emerging Monitoring Methods

Jones, C. L. C., Solomon, K. J., Arsenault, E. R., Edwards, K. D., Hosseini, A., Miraly, H., Mott, A. W., Münzner, K., Ogashawara, I., Olson, C. R., Seeley, M. E., & Tracey, J. C. (2025). Tried and true vs. shiny and new: Method switching in

long-term aquatic datasets. Limnology and Oceanography Letters, 10(2), 151–157. https://doi.org/10.1002/lol2.10438

Long-term environmental monitoring programs are often referred to as the "backbone" of Delta science, generating datasets that can be used to track changes in the system over time and space. For example, long-term plankton monitoring has revealed the detrimental effects of the invasive overbite clam on Delta food webs. And in the early 2000s long-term fish surveys by the Interagency Ecological Program showed that populations of native fish such as Delta smelt and longfin smelt were rapidly falling. This event came to be known as the pelagic organism decline (POD) and was likely related in some part to the food web impacts of the 1990's overbite clam invasion into San Francisco Bay. Other monitoring programs have revealed different changes in the Delta system, such as increases in water temperature or run-off variability.

Given the importance of long-term datasets to understanding trends, there is an inherent tradeoff as science and technology advances: How do we maintain a "tried and true" dataset while allowing advanced monitoring approaches to improve the data quality? It is understandable that researchers want to incorporate the latest technology and sampling techniques. Newer methods can be faster, cheaper, more accurate, more comprehensive, or more detailed. Remote sensing, for example, can provide more real-time data and greater spatial coverage than manual monitoring methods, while reducing sampling time. Similarly, machine learning and other AI techniques increase scientists' ability to process and extract information from large amounts of data. Here in the Delta, manual water sampling has gradually given way to continuous monitoring via installed sensors; the gear and techniques used for fish and zooplankton sampling have evolved over time; and efforts are underway to explore emerging technologies such as environmental DNA for species identification.

In their 2025 article *Tried and true vs. shiny and new: Method switching in long-term aquatic datasets*, Jones et al. discuss the tradeoffs to consider when switching from established to emerging methodologies. The key is to ensure continuity between the old and new sampling methods so that the dataset continues to function as a continuous long-term whole, rather than being chopped into discrete "before" and "after" sections. Such discontinuities in the dataset can occur for many

reasons. For example, the variables measured using the new technique may not be quite the same as in the past, or the new method may generate so much information that there is a mismatch with older data that makes it challenging to run statistical analyses. Other considerations include the cost and complexity of the new methodology—and whether other research groups will be able to replicate it themselves.

Jones et al. (2025) show that successful method switching in long-term data collection requires ensuring dataset continuity while achieving the specific project goals of switching. They present six best practices to follow:

1. Consider the type of method switch, research potential pitfalls, and establish explicit goals.
2. Create a detailed plan for switching to the new method (e.g. run a pilot program or overlap the two methods for a while) and for managing the new data.
3. Compare data collected from both methods to see if and how they differ and whether they can be used as part of a single whole.
4. Explore possibilities to collaborate with other research groups who are considering the same method switch.
5. Have honest conversations with your collaborators about the advantages and disadvantages of method switching, and continually interrogate any decision to proceed.
6. Make method switches clear in publications and datafiles by describing both methodologies, explaining the rationale for switching, and identifying exactly when the switch occurred in any figures based on the dataset.

These are vital considerations to apply here in the Delta as we continue to use more advanced in-place water sensors, gradually expand our remote sensing work, and generally update our monitoring protocols. As well as ensuring appropriate data continuity, we must attempt to standardize data collection (to the extent possible) so that disparate datasets can be combined and analyzed together to deliver new insights. One of our most critical tasks will be to evaluate how modern data collection methods reframe and cast new light on past results derived from older data, and to determine whether any changes we observe truly reflect a

changing ecosystem or simply a change in methodology. The Delta Science Program is helping to address this important distinction through partnerships with the Interagency Ecological Program's Project Work Teams and through advanced data science training with the National Center for Ecological Analysis and Synthesis.

Delta Science Program Activities

Delta Research Awards Seminar Series Now Complete

On May 7, 2025, the Council's Delta Science Program hosted the final seminar in the 2020–2021 Delta Research Awards series: a series of talks and engagement opportunities meant to strengthen the connection between research findings and the managers and decision-makers who may use the information. The 2020–2021 Delta Research Awards included 16 high-priority projects that address critical knowledge gaps identified in the 2017–2021 Science Action Agenda and total over $10 million in combined funds from the Delta Science Program, Bureau of Reclamation, and State Water Contractors. The final seminar on May 7 featured presentations by Rebecca Buchanan, Russell Perry, and Rene Henery that focused on salmon recovery by improving monitoring, understanding migration patterns, and guiding inclusive, strategic conservation planning. All seminars were recorded and are available on the Council's YouTube channel: https://youtube.com/@DeltaCouncil.

Delta Collaboratory Kick-Off Meeting

On June 12, 2025, the Council's Delta Science Program hosted the kick-off meeting for the first phase of the Delta Collaboratory. The term "collaboratory" is a fusion of "collaboration" and "laboratory," and the Delta Collaboratory will be a virtual hub for open science, synthesis, and modeling to help the Delta science community coordinate and collaborate on socio-environmental management challenges in the Delta. The underlying vision of the Collaboratory is a networked community of modelers and modeling resources to support complex projects that combine and leverage multiple different models. For now, the Delta Science Program's view of the Collaboratory is not of a physical place, but rather a support structure centered on collaboration and resource sharing.

To establish the foundation of the Collaboratory, the Delta Science Program is convening and supporting a suite of projects that will use modeling approaches to

address three key Delta management issues: salinity intrusion, harmful algal blooms, and tidal wetland food webs. As well as pursuing these tangible, management-relevant science goals, the project work teams are also tasked with identifying the core resources and approaches needed for project success. This will help to reveal resource needs that are shared across projects (for example, all three projects might require hydrodynamic models to estimate how long water remains in parts of the estuary) and will provide opportunities to develop and refine processes and tools for cross-team collaboration. These efforts will help to lay the foundation for longer-term functions and organizational aspects of the Collaboratory.

The kick-off meeting was attended by subject-matter experts and project leads from the United States Geological Survey, the California Department of Water Resources, the San Francisco Estuary Institute, and UC Merced, along with support staff from the Delta Science Program. The purpose was to make introductions, learn more about each project, set expectations, and discuss logistics. The Delta Science Program will provide more updates as the projects progress.

On Your Radar

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 Healthy Rivers and Landscapes (HRL) Peer Review requested by the Department of Water Resources.

The HEC ResSim (Hydrologic Engineering Center Reservoir Simulation) model peer review ended in early June. The goal of the review was to respond to a set of charge questions that asked about the validity and clarity of the new integration between the HEC ResSim model (a reservoir simulation model) and the Water Temperature Model Platform (an integrated model platform for managing supply and cold water in Central Valley Project reservoirs). Integrating these models will allow resource

managers to have short- and long-term water temperature predictions of reservoir systems in the Delta watershed. The four-member panel of subject matter experts was impressed by the model integration. Some key recommendations from the panel include making documentation focus on higher-level content (rather than user functionality) and clarifying uses of the model, such as its low suitability for multi-year temperature simulations. We will continue to capture key takeaways of the review from the panel and any lessons learned from the requesting party in the coming weeks. The final report will soon be available on the Council's website (see below).

The HRL Science Plan peer review requested by the California Department of Water Resources began with kick-off meetings on April 28 and May 5. Currently, the three subject matter experts with expertise in structured decision-making, fisheries, and monitoring evaluation are in the process of reviewing the HRL Science Plan. Final individual reports are expected 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.

Inaugural Delta Carbon Team Meeting

On May 27, 2025, multiple Council Delta Science Program and Planning and Performance staff joined the inaugural Delta Carbon Team meeting hosted by the Delta Conservancy and The Nature Conservancy. The Delta Carbon Team is intended to bring together agency staff, researchers, nonprofits, and other interested parties to collaborate on Delta carbon issues, particularly those resulting from reduced water exchange with land surfaces due human land use decisions. In particular, the drying and oxidation of the Delta's highly organic peat soils release large amounts of carbon dioxide to the atmosphere and cause land subsidence—which itself increases the risks of levee failure and flooding, threatens water supplies, and reduces viability of agricultural lands. Research shows that rewetting peat soils can slow and even reverse subsidence while also mitigating greenhouse gas emissions. Several landscape-scale plans call for wetland restoration in the Delta to meet state climate goals, and there are multiple projects investigating best management practices for marsh restoration and the conversion of row crops to rice cultivation. Key issues of "rewetting peat soils" include minimizing methane

emissions, mosquito control, generating income through carbon crediting, and incentives for farmers to alter their crops or practices.

The Delta Carbon Team kick-off meeting was an opportunity for participants to introduce their work and their priorities and to discuss ideas for the group's purpose and organization. The group will likely form sub-teams to focus on specific issues (e.g. greenhouse gases, levees, agriculture, mapping and data analysis). These sub-teams will meet more frequently than the whole group. More details on the group's structure and purpose will be discussed at the next meeting. Given the significant impact that subsidence has on achieving the coequal goals, the Delta Carbon Team is a good opportunity for Council staff to network with other experts and to understand how their work intersects with the bigger management and legislative picture.

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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