



INFORMATION ITEM

Lead Scientist Report

Summary

Access to food is a known challenge for native species in the Delta. This article, from Rowan Yelton, Anne Slaughter, and Wim Kimmerer, is about wetlands as a food source for fish and discusses a study regarding the degree to which food generated in a wetland makes it into the open water where it's accessible for fish to eat.

Diel Behaviors of Zooplankton Interact with Tidal Patterns to Drive Spatial Subsidies in the Northern San Francisco Estuary

Rowan Yelton, Anne M. Slaughter, and Wim J. Kimmerer. *Estuaries and Coasts* (2022) 45:1728-1748.

Aquatic food webs are often impacted by what scientists refer to as “resource subsidies”. Resources (nutrients, food, suspended particles, etc.) are often moved from one area of an aquatic ecosystem to another, often supplementing resource-poor areas by flows from resource-rich regions. For example, fish in food-scarce open water areas have long been thought to be sustained by zooplankton subsidies from marshes. Zooplankton (small, floating animals too weak to swim against currents) are the primary food source for young fishes, and adults of some species such as Delta Smelt.

However, quantifying the extent to which wetlands subsidize open-water areas is complicated. Doing so requires measuring flows and zooplankton abundance across the wetland-Estuary interface over extended periods, capturing the full variability of tidal cycles and their associated patterns of positive and negative (flood and ebb) flow. Further, though zooplankton cannot swim against tidal currents, they migrate vertically in the water column to escape predators and often seek refuge at the bottom—where they are sheltered from the movement of flow—during the day.

To help explain relationships between zooplankton migration and tidal flows on zooplankton subsidies, Yelton, Slaughter, and Kimmerer collected and analyzed high-frequency samples of zooplankton and water flows at Liberty Island Conservation Bank (within the Cache Slough Complex) in the summer of 2018. They found that *Pseudodiaptomus forbesi* was the most abundant copepod and that it was most abundant at night. They combined their measurements of zooplankton abundance with flows to calculate the zooplankton subsidy from the marsh. Their results showed that, over the summer of sampling, tidal flows were predominantly moving into the marsh at night, when zooplankton were abundant in the water column, so there was no net subsidy to the adjacent channel. Their results demonstrate that we cannot assume a zooplankton food subsidy from wetlands, but that we can estimate this subsidy using zooplankton and flow data, since subsidization patterns are determined by interactions between zooplankton behavior and long-term tidal patterns. This finding highlights the importance of both long-term monitoring (of tidal flows and zooplankton abundance) and targeted studies (of zooplankton vertical migratory behavior) that are needed to estimate subsidies and, ultimately, the food-web benefits of wetlands for fish.

This work, funded by the Delta Stewardship Council and State Water Contractors, directly addresses actions 3 and 5 of the 2022-2026 Science Action Agenda (*Expand multi-benefit approaches to managing the Delta as a social-ecological system* and *Acquire new knowledge and synthesize existing knowledge of interacting stressors to support species recovery and ecosystem health*, respectively).

Delta Science Program Activities

[California Sea Grant Fellows Recruitment for 2023 Cohort](#)

Continuing the legacy of working with the California Sea Grant Program, recruitment for the 2023 class of fellows has begun! This will be the 13th class of fellows; for 2023, the Council will add a fellow to the class cohort, bringing the total number of fellows to five for this year. Host agency presentations were from September 27-29, and 29 finalists were interviewed across the participating host agencies the week of October 10. Final matching announcements are scheduled for late October. More information to come in subsequent months.

[Delta Breeze Newsletter](#)

The October 2022 edition of the *Delta Breeze* was released via the Council listserv on October 4, 2022. The *Delta Breeze* is the Science Program's quarterly newsletter, with a target audience of scientists and science managers. This edition's contents include an introduction to the 2022 class of Delta Science Fellows, an overview of the Water Temperature Modeling Program independent review panel, a spotlight on Science Program-funded research on the emerging problem of thiamine deficiency threatening Chinook salmon populations, an overview of the Delta Science Tracker, and a list of 27 recent publications from Science Program staff and Science Program-funded researchers. To access the newsletter, visit <https://deltacouncil.ca.gov/pdf/science-program/newsletters/2022-10-03-delta-breeze-newsletter.pdf>.

[Science for Communities Workshop](#)

The [Science for Communities](https://bit.ly/3ESn4Mq) (<https://bit.ly/3ESn4Mq>) workshop was held at the Big Break Visitors Center in Oakley, CA, on Oct. 6th. Council Chair Virginia Madueño delivered the plenary address, and representatives in panel discussions included the California Indian Environmental Alliance, Sacramento Regional Coalition to End Homelessness, Sustain Our Abilities, Public Health Advocates, Restore the Delta, and Little Manila Rising. Stay tuned for an upcoming workshop report.

[Social Science Community of Practice: Advancing Interdisciplinary Research Symposium](#)

The Social Science Community of Practice's two-part Advancing Interdisciplinary Research Symposium took place on October 14th and 20th. Stay tuned for an upcoming workshop report.

On Your Radar

[Harmful Algal Bloom Workshop](#)

The two-day hybrid Harmful Algal Bloom Workshop is scheduled for November 8 and 9th, 2022 at 9 am PST. The in-person meeting will be hosted at the California Natural Resources Headquarters located at 715 P Street, Sacramento, CA 95818. Persons wishing to attend in-person can register at [Delta Harmful Algal Blooms Workshop Tickets, Sacramento | Eventbrite](#) (<https://bit.ly/3T0WtAj>), and those

interested in attending virtually via Zoom can register at [Meeting Registration - Zoom](https://bit.ly/3SleaVJ) (<https://bit.ly/3SleaVJ>). Additional information can be found on the Science Program flyer linked here: [Delta Harmful Algal Blooms Workshop Flyer](https://bit.ly/3e8tBYI) (<https://bit.ly/3e8tBYI>).

Salinity Management Workshop Focus Working Group Meetings

The Salinity Management Workshop series planning team will hold focused working group meetings later this fall to get feedback on the proposed demonstration modeling exercise and to hear more perspectives on major priorities, challenges, and potential benefits of salinity management in the Delta. The Science Program will host two focused working group meetings, one during the day and one in the evening, to make the meetings accessible to more people. Both meetings will run through the same agenda, so interested individuals need only attend one. An announcement of dates is pending and will be distributed via the Council's listserv and posted on the website.

Proposal to List Longfin Smelt as Endangered Species

On October 6, the U.S. Fish and Wildlife Service announced a proposal to list the San Francisco Bay-Delta distinct population segment of longfin smelt as an endangered species under the Endangered Species Act. Scientific studies have shown that this species is at risk of extinction, due to habitat loss and the reduction and alteration of freshwater inflows to the San Francisco estuary. Longfin smelt are currently listed as threatened under California's Endangered Species Act; a federal listing as endangered would upgrade protections to include protection of their habitat. Listing would also require federal agencies to consult with the U.S. Fish and Wildlife Service when proposing projects within longfin smelt's range. A 60-day comment period on the listing began on October 7, 2022.

By the Numbers

Delta Science Program staff will provide a summary of 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 Summary (provided at the Council Meeting)

Attachment 2: Article Visual of Yelton, Slaughter, and Kimmerer, 2022

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