



## INFORMATION ITEM

### Lead Scientist's Report

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**Summary:** Delta Lead Scientist Dr. Laurel Larsen will discuss a recently published paper by Frantzich et al., which investigates if the use of managed flow pulses through the north Delta's Cache Slough Complex could improve habitat and generate food for fish such as the Delta smelt. Their results show that an experimental flow pulse in 2016 generated multiple benefits for downstream habitats, but more work is needed to better understand the underlying mechanisms or how generalizable the results are.

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USE OF A MANAGED FLOW PULSE AS FOOD WEB SUPPORT FOR ESTUARINE HABITAT. FRANTZICH ET AL., SAN FRANCISCO ESTUARY AND WATERSHED SCIENCES, 2021.

Regulation of freshwater inflow to the Delta is a key resource management tool used to maintain estuarine health, including appropriate salinity levels and cues for migratory salmon. Targeted flow actions that introduce temporary flow pulses to specific regions are rarer. Nevertheless, they have been used to provide floodplain habitat for fish rearing, decrease the salinity of Suisun Marsh to improve waterfowl habitat, and mobilize downstream transport of phytoplankton and zooplankton in the north Delta to provide food for species such as the Delta smelt, whose endangered status is thought to be related to severely depleted plankton communities. Despite their relative rarity, pulsed flow actions are commonly discussed in collaborative venues as a tool to enhance ecological resilience. Recently, the Delta science community recognized the importance of testing the effects of these flow actions in Action 1C in the draft 2022-2026 Science Action Agenda: "Identify and carry out large-scale experiments that can address uncertainties in the outcomes of management actions for... ecosystem function... in the Delta."

The Frantzich et al. study, led by the California Department of Water Resources, addressed this need by providing a test of the 2016 North Delta flow action, a one-of-a-kind flow pulse intended to transport water and fish food through the plankton-rich Cache Slough Complex (CSC) and stimulate downstream phytoplankton blooms that could potentially benefit Delta smelt. This idea was motivated by observations of previous summertime high-flow events through this region in the summers of 2011 and 2012, which stimulated phytoplankton blooms

downstream. (In contrast, in other, drier summers, flow patterns are typically reversed, and the high productivity of the region remains disconnected from the lower estuary.) The summer 2016 flow action, which used agricultural and flood protection infrastructure and required modification of reservoir operations upstream, was only possible through extensive coordination and cooperation of federal and state agencies, farmers, and landowners.

To analyze the impacts of the two-week flow pulse, the team collected water samples from five north-to-south stations before, during, and after the flow pulse to examine changes in plankton, chlorophyll, and certain water quality parameters like nutrients. Additionally, because they were unable to directly measure hydrologic changes, they used hydrologic models to compare the distribution of flow during the flow action versus historical and non-flow-pulse conditions.

Their study found that before the pulse, flow in the lower Yolo Bypass region followed the typical, reversed, early-summer pattern. However, after the flow pulse was introduced in July, the flow direction switched, so that water moved from the Yolo Bypass into the estuary, as intended. In addition to resulting changes in water quality parameters, the researchers also observed an increase in plankton densities and production downstream from the CSC and Yolo Bypass, as was hypothesized. However, the generalizability of this outcome was unclear. Namely, a Delta-wide phytoplankton bloom of a species that can persist in Delta sediments had occurred prior to the 2016 flow pulse. The researchers couldn't determine whether a similar flow pulse-induced bloom would have occurred downstream of the CSC if this "seed" material had not been present.

These results demonstrate the potential for managed flow pulses in targeted areas to effectively augment the food supply for fish such as the Delta Smelt, suggesting that they may constitute part of an effective strategy for bolstering the resilience of managed fish populations during dry summers. However, they also highlight the need for additional experimentation, to evaluate impacts in years with different pre-existing conditions and to establish direct impacts on fish populations.

#### DELTA SCIENCE PROGRAM ACTIVITIES

##### *Delta Lead Scientist "Ask-Me-Anything" (AMA) Series*

After a hiatus for the Thanksgiving holiday, the Delta Lead Scientist Ask-Me-Anything series will resume on December 20, from 12-12:30. The topic of the upcoming session, which the Science Program's Rachael Klopfenstein will co-host, will be the 2022-2026 update to the Science Action Agenda. To join the live session

and contribute to the discussion, visit the Council's Instagram page (@deltastewardshipcouncil) at the appropriate time.

*Draft 2022-2026 Science Action Agenda*

The Delta Science Program released the draft 2022-2026 Science Action Agenda (SAA) via listserv for public review on November 18, 2021. The draft was collaboratively developed with members of the Delta science community and provides a framework to address persistent, emerging, and forthcoming scientific uncertainties. The Delta Science Program is seeking feedback on the draft SAA during the review period, which is open through January 21, 2022. Input from the review period will be considered when revising the final SAA, anticipated by Spring 2022.

*DSP & NCEAS 2021 Synthesis Working Group*

Data analysis and synthesis are critical components of ecosystem-based management and informed decision-making, and facilitating scientific synthesis is a key role of the Delta Science Program. Accordingly, for three weeks this fall, the Delta Science Program, in partnership with the National Center for Ecological Analysis and Synthesis (NCEAS), provided high-quality training in synthetic data science and statistical techniques and an opportunity for collaboration between federal and state agencies and academic scientists to tackle a major uncertainty underlying the management of Delta ecosystems: What are the primary drivers of the estuarine food supply? NCEAS's mission emphasizes open science principles and techniques and promotes transparency and data sharing through reproducible data, software, and workflows.

Working group participants convened in September, October, and November for three weeks of training and synthesis facilitated by experts from NCEAS. The working group consists of 18 participants from nine agencies and universities. Its goal is to leverage the fall 2021 training and the collaborative setting to perform rigorous statistical analysis of drivers of the estuarine food supply. Outputs from the effort are anticipated to be released in mid-to-late 2022 and will include multiple publications, R functions, and a database. These products are expected to inform decision-making for restoration, protection of endangered species, and management of flow actions. The focus on food webs serves broad interagency goals, such as ecosystem function, resilience, and sustainability.

For more information: <https://deltacouncil.ca.gov/delta-science-program/science-synthesis-working-group>

*Environmental Justice Initiative Interviews*

The Council's 2019 Five-Year Review Report identified environmental justice (EJ) as a priority issue and recommended preparation of an issue paper to investigate the need for additional strategies or responses to address EJ within the Delta Plan, summarize the best available science, and identify future policy options for the Council to consider. The preparation of the issue paper was initiated in February 2021. The objectives for the EJ Issue paper are to (1) identify EJ issues within the Sacramento-San Joaquin Delta, the Delta Watershed, and areas that use Delta water; (2) identify options to address those issues that are within the Council's authority, and work to connect EJ groups with the appropriate governmental or non-governmental entities for issues outside the Council's authority; and (3) build a network of community leaders and EJ organizations with interest in the Delta to continue to work together on these issues.

To start working on this EJ initiative, the Council is integrating a social science research approach to collect interview data from EJ organizations and community-based organizations (CBOs) working on EJ issues to provide their perspectives, knowledge, and ideas for how to improve these issues. The interviews will inform the EJ issue paper as well as contribute to the body of peer-reviewed literature on EJ in the Delta. Outreach to EJ organizations and CBOs who can likely provide valuable interview perspectives has recently been initiated. If you or someone you work with would be interested and willing to interview, or you have any feedback or questions on this approach, please contact [environmentaljustice@deltacouncil.ca.gov](mailto:environmentaljustice@deltacouncil.ca.gov). Council staff intend to conduct approximately 30 interviews from a broad set of groups working across many different EJ issues and in different regions of the Delta.

For more information on this project, see  
<https://deltacouncil.ca.gov/environmental-justice>

ON YOUR RADAR

*Workshop on Salinity Management Actions*

As a reminder, the Delta Science Program will be hosting a two-part workshop on Salinity Management Actions with the first part happening in early 2022. The workshop aims to reach a better understanding of the range of management solutions that can be used to address saltwater intrusion during extreme drought conditions, and their outcomes. Participants in this workshop will identify and explore some of the impacts and tradeoffs associated with different salinity management scenarios and landscape planning alternatives. They will also work to

identify the knowledge gaps that must be filled to complete a robust evaluation of the socioeconomic and ecological costs and benefits of management scenarios. The workshop is designed to catalyze a subsequent process of comprehensive, collaborative scenario planning to develop an improved adaptive-management strategy for salinity during a long-term drought. The workshop will be held virtually, with registration that is free and open to the public. More information about the workshop dates and registration will follow in the coming months.

#### 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: Visual Abstract of Article Summary 1

#### CONTACT

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