

## **INFORMATION ITEM**

### Lead Scientist's Report

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**Summary:** Delta Lead Scientist Dr. Laurel Larsen will discuss a study by *Sommer et al.* (2020), co-authored by Delta Stewardship Council (Council) Deputy Executive Officer for Science Louise Conrad. The study highlights the potential to use seasonally flooded rice fields to provide off-channel rearing habitat for juvenile Chinook Salmon. Dr. Larsen will also provide report outs from the Adaptive Management Forum and Steelhead Trout Workshop and highlight upcoming events such as the 11<sup>th</sup> Biennial Bay-Delta Science Conference and ongoing Delta Proposal Solicitation.

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#### **FARM TO FISH: LESSONS FROM A MULTI-YEAR STUDY ON AGRICULTURAL FLOODPLAIN HABITAT. SAN FRANCISCO ESTUARY AND WATERSHED SCIENCES. 2020.**

Expansive swaths of California's historic floodplains have been disconnected from adjacent rivers by the construction of levees for agricultural practices. In the Central Valley, these construction practices have supported the development of one of the most productive agricultural economies in the world. However, a large body of research provides evidence that loss of floodplain habitat has led to significant global reductions in the productivity and species' diversity of large river ecosystems, with corresponding declines in the distribution and abundance of many native fishes. There has been a growing interest in understanding whether the agricultural fields that occupy spaces, where formerly inundated floodplains were, could be modified to provide more value to the species who depend on this habitat. This question is especially relevant for the Central Valley's Yolo Bypass, which is the Sacramento River's primary remnant floodplain home to large areas of agricultural lands suitable for such investigation.

To examine whether seasonally flooded rice fields in the Yolo Bypass and other nearby agricultural areas could be modified to provide off-channel rearing habitat for juvenile Chinook Salmon, the team conducted a series of experiments using hatchery Chinook Salmon as surrogates for wild Chinook Salmon. This study summarizes key findings and lessons learned from six years of research on the feasibility of using various agricultural fields as rearing habitat for juvenile Chinook Salmon in the Yolo Bypass and other Central Valley locations.

First, seasonally flooded fields were found to be highly productive for Chinook Salmon. This productivity is attributed to higher abundances of zooplankton,

resulting in higher Chinook Salmon growth rates as compared to the adjacent Sacramento River. Similar results were found for other experimental locations in the Central Valley with different agricultural field types, including, but not limited to, non-rice crops and fallow areas. The team also found that field type (e.g., rice, fallow, disced) did not affect fish growth and survival and that hydrologic connectivity with the river was important for fish occupancy and persistence in these areas. Juvenile fish were attracted to fresh inflow from upstream and connectivity to downstream locations was needed to provide an escape pathway from predation. During periods of severe drought, the team learned that managed agricultural habitats produced low and variable salmon survival results likely from the stressors of extreme high temperatures and concentrated avian predation. However, the study authors acknowledged that these findings are based on few experiments. Periodic unmanaged floods in the Yolo Bypass made it especially challenging to schedule and complete investigatory experiments, further complicated by the substantial landowner's time and effort to install and maintain fields used during experiments. In particular, the authors acknowledged a need for understanding how floodplain use would affect juvenile Chinook Salmon at moderate flood levels, which were not tested. Planned modifications to the Fremont Weir would enable opportunities to resolve this knowledge gap.

This study exemplifies Action 1 of the Science Action Agenda, which is to invest in assessing the human dimensions of natural resource management decisions. It specifically relates to Action 1.A: Investigate the most cost-effective methods to improve species habitat on working lands. Using already established rice fields to support the rearing of juvenile Chinook Salmon promotes more efficient use of the area, allowing it to provide both economic benefits to humans and myriad ecological benefits to species of concern. The study asserts that recent and planned infrastructural improvements in the Yolo Bypass could substantially improve the potential for experimental work and broaden efforts to enhance salmonid habitat. Action 1.B—Develop tools to assist adaptive management in the Delta—is also represented well in this study. Chinook Salmon are endemic to the Sacramento River and Delta. They are also incredibly culturally, ecologically, and economically important to the area. However, their welfare has been threatened by widespread development, agriculture, and climate change. Finding ways in which developed lands can continue to be used for economically beneficial purposes while maintaining or improving the benefits provided by natural areas is paramount to adaptive management in the Central Valley. The research presented here also has implications for flow management, as connectivity greatly improved fish occupancy and persistence within these fields.

## ON YOUR RADAR

### *Adaptive Management Forum*

Earlier this month the Delta Science Program hosted the second biennial Adaptive Management Forum, which was hosted virtually **February 3-5, 2021**. This forum provided an opportunity for the Delta community to share knowledge and promote collaboration around adaptive management of the Bay-Delta system. The goals of this year's forum were to synthesize lessons learned from prior ecosystem restoration and water management projects and research efforts, foster information sharing about adaptive management, strengthen science-management interactions, and stimulate dialogue around a shared vision of adaptive management. The 2021 forum featured morning sessions with presentations by invited speakers, followed by Q&A panels and breakout discussions. Afternoon workshops provided opportunities for participants to interact, network, and learn about specific adaptive management tools and practices. Over 250 people registered for the Forum, and each workshop had 35-70 participants. Videos of the presentations are posted on the Council's website, under the event's dropdown (<https://deltacouncil.ca.gov/events>), and a proceedings report will be forthcoming shortly.

The ideas shared at this Forum are already starting to influence the dialogue about adaptive management in the Bay-Delta and will continue to do so into the future. Critically, these ideas also help shape the way that the Delta Science Program will continue to work to fulfill the part of its mission related to promoting science-based adaptive management with Delta agencies.

### *Monitoring Steelhead Populations in the San Joaquin Basin Workshop*

The Delta Science Program hosted the Monitoring Steelhead Populations in the San Joaquin Basin Workshop on **February 17-19, 2021**. At the workshop participants will review the management challenges and monitoring framework for *Oncorhynchus mykiss*, and explore analytical approaches to measure the impact of management actions on San Joaquin Basin steelhead. The workshop supports the Biological Opinion on Long-Term Operation of the Central Valley Project and State Water Project – 3.6.2, which aims to develop a plan to monitor steelhead populations within the San Joaquin Basin and/or the San Joaquin River downstream of the confluence of the Stanislaus River, including steelhead and rainbow trout on non-project San Joaquin tributaries.

A report out from the workshop will be included in next month's Lead Scientist's Report.

*11<sup>th</sup> Biennial Bay-Delta Science Conference*

The 11th Biennial Bay-Delta Science Conference will be held virtually **April 6-9, 2021**, and is jointly sponsored by the Council and the U.S. Geological Survey. It represents a forum for sharing scientific information relevant to managing the connected San Francisco Bay and Sacramento-San Joaquin Delta systems. This year's conference theme is Building Resilience through Diversity in Science. Participants include, but are not limited to, natural scientists, engineers, resource managers, and stakeholders working on Bay-Delta issues. Details about the presenters, the topic they plan to cover, and how to access the conference will be released in the coming weeks.

To learn more about the conference, please visit: <https://deltacouncil.ca.gov/delta-science-program/11th-biennial-bay-delta-science-conference>.

Please direct questions to: [BDSC@deltacouncil.ca.gov](mailto:BDSC@deltacouncil.ca.gov).

*Proposal Solicitation Notice*

On November 9, 2020, the Council's Delta Science Program, in coordination with the U.S. Bureau of Reclamation (Reclamation) and California Sea Grant, announced a solicitation for scientific research proposals in the Delta. The solicitation will fund 12- to 31-month projects that directly inform management and advance the 2017-2021 Science Action Agenda. The total award amount is expected to be up to \$9 million, including up to \$5.5 million from the Council and up to \$3.5 million from Reclamation. Extensive outreach has been conducted by Council staff to raise awareness of this opportunity to researchers, within and beyond the Delta. Proposals were due by February 12, 2021. The 99 proposals received are currently being reviewed by external experts and a review panel. Awarded contracts will have a start date as early as July 1, 2021. For more details about the solicitation, please visit the website <https://deltacouncil.ca.gov/delta-science-program/delta-science-proposal-solicitations>.

**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 Report (available at the meeting)

Attachment 2: Visual Abstract of Article Summary 1

**CONTACT**

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