



Interagency Ecological Program 2020 Work Plan Element: North Delta Flow Action: Role of improved Yolo Bypass Flows on Delta Food Web Dynamics

Project Manager and Affiliation

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Costs (thousands) and Funding Sources

\$750 DWR

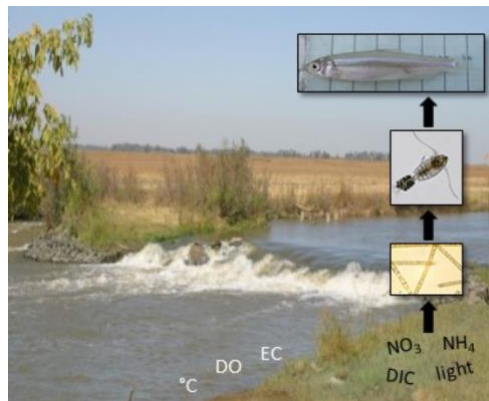


Figure: Yolo Bypass Lisbon Weir and Delta food web interactions

Description

In a collaborative effort between CA Department of Water Resources, US Bureau of Reclamation, CA Department of Fish and Wildlife, United States Geological Survey, San Francisco State University, and UC Davis, this study will investigate the role of augmented summer and fall flows in the Yolo Bypass and North Delta areas on lower trophic food web dynamics and the benefits to listed fish species. Using both continuous and discrete sampling approaches, this study will relate hydrologic patterns to chlorophyll-a, nutrients and primary productivity, plankton densities and composition (phytoplankton and zooplankton), contaminant concentrations, as well as water quality parameters such as electrical conductivity, turbidity, temperature, and dissolved oxygen. In addition, caged hatchery Delta Smelt will be monitored to determine the effects of the managed flow action and increased food web productivity on fish survival, growth, and behavior.

Need

Due to the food-limited nature of the San Francisco Estuary, it is critical to understand mechanisms that result in successful food web productivity including phytoplankton blooms. Food limitation is one of the primary hypothesized causes of the Pelagic Organism Decline. In 2011 and 2012 there was evidence that a moderate Yolo Bypass flow pulse during fall agricultural drainage periods was followed by phytoplankton

blooms in the lower Sacramento River. Managed flow actions in the following years showed an increase in food web productivity could be repeated; however, results varied across years and flow actions indicating more research is warranted to understand correlations between flow and abiotic conditions, and the biological response of the food web. The increases of summer/fall flows in North Delta, has been considered a management strategy as part of complying with USFWS Delta Smelt Biological Opinion Action 4. The augmentation of flows through the Yolo Bypass/North Delta is also included as one of several Delta Smelt Resiliency Strategies by Natural Resources Agency.

Objectives

- Determine if managed flow actions through the Yolo Bypass stimulate increased primary productivity locally and downstream, and if it is repeatable.
- Characterize how nutrients, chlorophyll and plankton (composition and density) in the Toe Drain, Cache Slough Complex, and lower Sacramento River change in response to flow pulses.
- Determine if nutrient subsidies of the source water and downstream are limited by abiotic and biotic factors.
- Characterize spatial differences and transport of pesticide contaminants in the Yolo Bypass in response to the flow actions.
- Determine survival, growth and behavior of caged hatchery Delta Smelt before and after the flow action in the Yolo Bypass.

Schedule of Milestones

August-Oct. 2019: Conduct and monitor fall agricultural flow action through Yolo Bypass.

March 2020: Presentation of 2019 preliminary results at 2019 Annual IEP conference.

June 2020: Summary report of 2019 flow action, productivity, and Delta Smelt results.

June 2020: Operations, monitoring and analysis plan for 2020 North Delta Flow Action study.

June 2021: Manuscript submission of 2019 results.