

FACT SHEET

Extending the Arc: Understanding the importance of freshwater tidal habitat and changing environmental conditions to native fish populations of the Delta.

Deliverables: Hydrodynamic and water quality models of the local region; scientific paper(s) and reports describing the effects of hydrodynamics on water quality, food web production, and the potential for intertidal and sub-tidal habitat restoration in the region

Status: Initiated October 2014

Primary Investigator: Peter Moyle and Jon Durand

Recipient Organization: University of California, Davis

Project Cost: \$230,649

SFCWA Funding: \$230,649

Partners: California Department of Fish and Wildlife

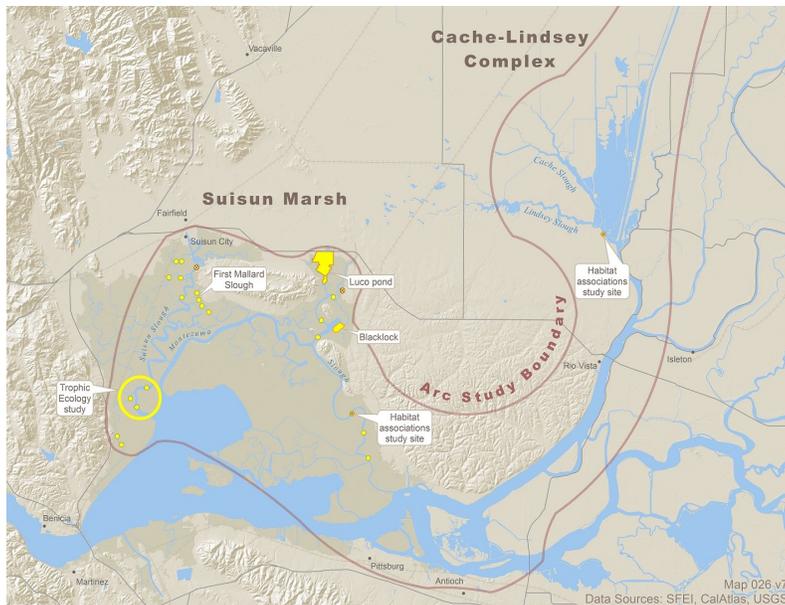


Figure 1. Map of the Arc Study Boundary

Introduction

The UC Davis team will study how physical habitat, hydrodynamics, water quality conditions and food webs support native fishes of the Cache-Lindsey Complex (CLC), including the lower Yolo Bypass. The region includes an extensive network of remnant and altered tidal wetlands, sloughs, and canals. Zooplankton densities in the region are often an order of magnitude higher than the central Delta and Suisun Marsh, attracting high densities of planktivorous fish.

It is likely that the spatial complexity and food web resources provide a seasonal and year-round refuge for both migratory and resident native fishes (e.g., delta smelt, juvenile Chinook salmon, tule perch).

Scientists and managers are thus interested in restoring large tracts of tidal habitat in the region.

The study will employ an interdisciplinary approach that couples hydrodynamics and food web models with empirical data on the distribution and abundance of phytoplankton, zooplankton, epibenthic invertebrates and juvenile and adult fishes across habitat type. The study design is broad and flexible enough to target a range of habitats, including those with known populations of fish, and those that are relatively depauperate. This approach will assist in answering questions such as:

- What are the effects of flow, climate and physical structure on water quality and pelagic food supply?
- What is the distribution of native and alien fishes throughout the CLC?
- How does the fish community change across the arc of habitat from Suisun Marsh through the CLC and up the Toe Drain and Shag Slough to the base of the Yolo Bypass?

Objective

The research goal is to understand how fish populations are influenced by climate, hydrology, temperature, turbidity, and food availability. To reach this goal we will study how habitats and food webs of the Cache-Liberty Complex (CLC, Figure 1), including the lower Yolo Bypass, support native fishes through the action of population drivers. This study extends the work we have done in 2012-2014 as part of our research comparing fish and food webs among Cache and Lindsey Sloughs, Sherman Lake and Suisun Marsh. This extension and the comparison to our present studies will give us the data needed to disentangle the complex processes driving population dynamics. This study is a unique examination of how local, regional and broad-scale environmental conditions influence fish recruitment, rearing, and reproduction in diverse habitats. It will produce essential information needed to develop successful tidal marsh restoration projects to support native fish populations in the CLC.

Results

To be determined

Conclusions

To be determined

Relevance

The study provides a number of benefits to SFCWA:

- The study is valuable for documenting status and trends in food and fish in the regions of the Cache-Liberty Slough (CLC) region that have been highlighted for management and restoration, including the Lower Yolo Ranch restoration site. The data collected will help influence successful tidal marsh restoration projects to support native fish populations in the region.
- Fish are the ultimate metric of restoration effectiveness for purposes of the Biological Opinions and BDCP; this study will assist in establishing baseline/existing conditions for restoration projects in the region.
- Continuation and expansion of the understanding of fish distribution and abundance across a wide geographic scope, collected with the same methods to allow comparability across sites.
- Contemporaneous sampling of available food resources and fish will aid in the understanding of that relationship.

Next Steps

To be determined