



SF ESTUARY

Wetlands Regional Monitoring Program

WRMP Guidelines for Monitoring Fish and Fish Habitats (“FFH SOP”)

Cover Letter – August 2023

WRMP science framework context (Guiding and Management Questions):

At the request of the Technical Advisory Committee of the Wetland Regional Monitoring Program (WRMP), the Fish and Fish Habitat (FFH) Working Group was formed to develop standard operating procedures (SOPs) for monitoring aquatic communities, including fishes, macroinvertebrates, and dynamic habitat features (e.g, water quality), across the San Francisco Estuary (SFE). Data collected in alignment with this “FFH SOP” are intended to address the WRMP’s Guiding Question Number 4 (GQ4) and its associated Management Questions (MQs) as they pertain to aquatic species, particularly fishes and macroinvertebrates, and their associated habitats.

- *GQ4: How do projects to protect and restore tidal marshes affect the distribution, abundance, and health of plants and animals?*
 - *MQ4a: “How are habitats for assemblages of resident species of fish and wildlife in tidal marsh ecosystems changing over time?”*
 - Indicators of change in aquatic habitats include dissolved oxygen, temperature, salinity, and turbidity.
 - *MQ4b “How are the distribution and abundance of key native species of fish and wildlife of tidal marsh ecosystems changing over time?”*
 - Indicators of change in aquatic communities include abundance, biomass, species diversity, and species composition.

SOP development process context:

The Fish and Fish Habitat workgroup is comprised of a diverse group of representatives from Federal and State agencies, non-profit organizations, restoration practitioners, and academia. Over nearly 2 years, the Fish and Fish Habitat workgroup systematically reviewed different techniques for monitoring fish and fish habitats, developed a structured framework for evaluating different monitoring options, and built consensus around decision-making to develop a shared monitoring protocol that can help answer the WRMP management questions.

Scientific context:

The FFH SOP was developed to be...

- A scientifically robust suite of technical considerations and recommendations for monitoring fishes and macroinvertebrates in wetland habitats of the SFE.
- Inclusive of the mosaic of habitats and species that occur within the SFE’s tidal wetlands.
- Consistent with other long-term and short-term wetland monitoring efforts throughout the SFE.
- A resource for developing and implementing monitoring plans for the WRMP.
- A resource to help guide individual projects in developing monitoring plans that are consistent with the WRMP.



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Value of the SOP:

The FFH SOP provides guidelines for collecting data that can be used to assess baselines and changes to the ecological integrity of the estuary's aquatic wetland ecosystems. Such data are key for evaluating ecological responses to restoration, climate change, and other anthropogenic factors. Variation in aquatic communities and environmental conditions can serve as indicators of the integrated ecological responses of wetlands to multiple interacting drivers of change.

The FFH SOP is intended to facilitate...

- Collection of new data regarding how fishes and macroinvertebrates use tidal wetland habitats across the SFE.
- Broad integration of prior and existing data with new data from across the SFE.
- An improved understanding of how aquatic communities respond to wetland restoration.
- New information regarding the biological integrity of wetlands across the SFE.
- Generation of data for informing the conservation and management of wetland-associated species.
- Generation of robust baselines for assessing ecological impairment and change.
- Improved efficiency of take and incidental harassment authorizations.

Regulatory context:

The data collected at WRMP monitoring sites following the FFH SOP are intended to provide long-term, regional context to support greater efficiencies and enhance the value of permit-driven monitoring of wetland restoration projects in several ways.

- Baseline data from the WRMP site network could support projects that are required to conduct before, after, control, impact (BACI) studies to evaluate the effectiveness of restoration actions.
- SOPs provide a widely-accepted template for monitoring that can readily be adjusted to specific projects, thus reducing costs and complexity in developing project-specific monitoring plans.
- Data collected can be analyzed and synthesized at the regional scale to enhance the inferences gained from both long-term and project-specific monitoring efforts.
- Data collected will provide managers critical information on the use of wetland habitats by ESA/CESA listed species as well as other managed species.

WRMP Monitoring Plan Implementation context:

The FFH SOP provides a set of methods for the WRMP's long-term vision for monitoring fish and fish habitats. The resulting data will inform management questions identified in the WRMP Program Plan. This document can be used to help guide the development and implementation of the initial WRMP Monitoring Plan; however, the SOP itself was not intended to serve as a monitoring plan.

- As noted above, recommendations in the SOP are not intended to be written directly into permits. Rather, they are intended to provide guidance regarding suitable sampling methods that will maximize the integration and value of permit-associated monitoring data.

Read the full SOP [here](#).