SF ESTUARY
Wetlands Regional Monitoring Program

# Hydrogeomorphic Monitoring SOP Cover Letter

**WRMP science framework context (Guiding and Management Questions):**
At the request of the Technical Advisory Committee of the Wetland Regional Monitoring Program (WRMP), the Hydrogeomorphic (HGM) Workgroup was formed to identify standard operating procedures (SOPs) for monitoring dominant physical processes driving wetland form and function across the San Francisco Estuary (SFE), referred to herein as HGM monitoring.

**The SOPs are methods documents to inform WRMP monitoring, and while they can be used to inform and design project monitoring, they are not designed to be used wholesale as permit requirements.**

Data collected in alignment with this SOP are intended to address the following WRMP Guiding and Management Questions:

- Guiding Question 1: Where are the region's tidal wetland ecosystems, including tidal marsh restoration projects, and what net landscape changes in area and condition are occurring?
    - Management Question 1A: What is the distribution, abundance, diversity, and condition of tidal marsh ecosystems, and how are they changing over time?
    - Management Question 1B: Are changes in tidal marsh ecosystems impacting water quality?
- Guiding Question 2: How are external drivers, such as accelerated sea level rise, development pressure, and changes in runoff and sediment supply, impacting tidal wetlands?
    - Management Question 2A: How are tidal marshes and tidal flats, including restoration projects, changing in elevation and extent relative to local tidal datums?
    - Management Question 2B: What are the regional differences in the sources and amounts of sediment available to support accretion in tidal marsh ecosystems?
- Guiding Question 3: What new information do we need to better understand regional lessons from tidal marsh restoration projects, advance tidal marsh science, and ensure the continued success of restoration projects?
    - Management Question 3A: Where and when can interventions, such as placement of dredged sediment, reconnection of restoration projects to watersheds, and construction of living shorelines, help to sustain or increase the quantity and quality of tidal marsh ecosystems?

**SOP development process context:**
A workgroup of regional experts in various aspects of tidal marsh hydrogeomorphology were invited to participate and contribute to the development of this SOP. Because standard monitoring protocols are already in use by many regional programs and agencies for many of the identified variables, this workgroup decided to collate and adopt these existing protocols as much as possible. The workgroup grouped the important physical variables into topic categories and section leaders with expertise in

different elements were invited to lead subgroups. These subgroups convened to share experience, identify existing SOPs, consider best methods for the regional program, and discuss challenges and considerations. Section leaders then identified and organized key SOPs and proposed best monitoring methods to address WRMP questions. The whole HGM workgroup met several times between February and November 2023 to coordinate and exchange information on methods, and to work towards agreement on recommendations for monitoring variables across a regional scale and within the monitoring site networks.

**Scientific context:**
As illustrated in the conceptual models compiled in the WRMP Program Plan, hydrogeomorphic variables are fundamental drivers of tidal marsh ecosystems and their resulting habitat, biology, and functions. Hydrogeomorphic monitoring, including topography, accretion, tidal inundation, salinity, suspended sediment, channels/ponds/pannes expansion, and dissolved oxygen, is crucial for understanding and tracking changes in tidal marshes. Not only do these physical parameters determine where tidal marshes occur, but these hydrogeomorphic variables significantly shape the form and function of these habitats and determine which species can live within these ecosystems. For example, tidal marsh vegetation is highly influenced by a range of hydrogeomorphic factors, including elevation, sedimentation, inundation, and salinity regimes. Therefore, monitoring hydrogeomorphic variables at a regional scale is indispensable for comprehending the physical and biological characteristics of the SFE. Additionally, establishing a close connection between hydrogeomorphic and biological variables is crucial because they often exert a mutual influence.

**Value of the SOP:**
While monitoring elements of the WRMP are outlined individually in separate SOPs, their true value lies in explaining the interrelated complex biogeomorphic relationships in estuarine systems. For instance, monitoring for indicators such as elevation, salinity, and tidal inundation should be co-located with field surveys for vegetation to answer questions about how vegetation species or alliances are distributed in regard to the tidal frame and how this changes over time. The Hydrogeomorphic SOP is intended to facilitate:

- Collection of new data from remote-sensing of regional imagery to assess the distribution and track change of inundation regimes and elevation capital throughout the entire SFE.
- Standardized and comparable methods for tracking accretion and erosion at numerous sites.
- An improved understanding of how marshes respond to long-term trends in water surface elevation and sediment supply as well as episodic events.
- Generation of robust baselines for assessing ecological change.

**Regulatory context:**
The data the WRMP collects with this SOP at WRMP monitoring sites 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. Recommendations in the SOP are intended to serve as a guide for best practices to maximize the value of data produced by individual projects.

**WRMP Monitoring Plan Implementation context:**
This SOP is a long-term vision for data collection that can help answer 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.

- This SOP is intended to guide the development and implementation of WRMP monitoring plans
- Recommendations in the SOP are not intended to be written directly into permits, but 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