SF ESTUARY
Wetlands
Regional
Monitoring
Program

WRMP Implementation Work Plan Amendment

March 2025 – March 2028
Version 12/4/25

Background

The Wetlands Regional Monitoring Program's (WRMP) mission is to deliver coordinated regional monitoring of the San Francisco Estuary's (Estuary) wetlands to:

1. Inform science-based decision-making for wetland restoration and adaptive management, and
2. Increase the cost-effectiveness of permit-driven monitoring associated with wetland restoration projects.

The WRMP is co-managed by the San Francisco Estuary Institute (SFEI) and San Francisco Estuary Partnership (Estuary Partnership), and funding awards go to one or both organizations.

This Implementation Work Plan Amendment (Amendment) document highlights the WRMP monitoring activities described in the 2025-2027 Implementation Plan that have received additional monitoring funds through the next increment of the EPA San Francisco Bay Program office award awarded to SFEI. These funds will extend monitoring activities through March 2028. This document identifies updated monitoring logistics, including timing, frequency, and locations of data collection.

Funding Summary for Monitoring Implementation, 2025 - 2028

US EPA San Francisco Bay Program Office

The U.S EPA San Francisco Bay Program Office has awarded $13.6M to the WRMP, with $8.6M awarded to SFEI and $5M to the Estuary Partnership. These funds are for implementation of the WRMP, including data collection and analysis, program governance and administration, regulatory alignment, and communication of information.

Restoration Authority

The RA has granted $3M to SFEI from October 2025 – September 2028 for WRMP program management; data collection, analysis, and visualization; website design and maintenance; engagement and communications; and SFBRA dashboard updates. No changes to RA funding have occurred.

Monitoring Conducted from March 2025 – March 2028

Based on the management questions developed by the WRMP Steering Committee that are detailed in the WRMP Program Plan, the WRMP Technical Advisory Committee (TAC) and staff developed the WRMP Monitoring Plan. The following monitoring activities are a subset of what is described in the Monitoring Plan and provide fundamental, baseline information from which the WRMP can build over time to answer the monitoring questions. Table 1 provides an overview of the monitoring activities and changes in funding since the 2025-2027 Implementation Work Plan was developed. There are no changes to WRMP workgroup recommendations or data storage in this amendment.

Table 1. Summary of monitoring activities, expected cost, and funding source updated to include the 2025 EPA Incremental Award.

Monitoring Activity/Subcategory	2025-27 Implementation Plan Funds	2025 EPA Incremental Award	Total	Funding Source
Establish and monitor horizontal/vertical control markers at Monitoring Network Sites; establish a record of locations	$75,000	$25,376	$100,376	EPA
Establish photo-point monitoring locations, collect data, and create a database for displaying and sharing information	$10,000	$10,000	$20,000	EPA
Baylands Habitat Map (BHM) 2025 – Mapping & Analysis	$655,000	$0	$655,000	RA
Obtain LiDAR data for the Lower Estuary	$300,000	$0	$300,000	RA
Establish vegetation monitoring transects and measure key vegetation parameters, marsh surface elevation, and marker horizons	$173,000	$60,500	$233,500	EPA
Conduct California Rapid Assessment Method (CRAM) surveys across Monitoring Network Sites and synthesize data	$525,000	$0	$525,000	RA
Establish water quality monitoring stations, including monitoring for suspended sediment	$195,998	$95,000	$290,998	EPA
Establish and monitor vegetation in the upland and mudflat transition zones				
Continue monitoring Surface Elevation Table-Marker Horizon (SET-MH) sites across the Estuary and install SET-MHs at six new sites	$80,000	$40,980	$120,980	EPA
Design and implement fish and fish habitat monitoring to include validation by deploying recommended sampling methods to encompass sites in the Monitoring Site Network	$1,500,000*	$375,000	$1,875,00	EPA
Establish water level monitoring stations	$0	$50,000	$50,000	EPA
Total	**$3,514,000**	$656,856*	EPA subtotal: $2,690,854 RA subtotal: $1,480,000	

* = $500,000 of the Incremental Award are allocated towards fulfilling initial contract with the Fish and Fish Habitat subawardee

Figure 1. Map of study area for WRMP tidal wetlands monitoring.

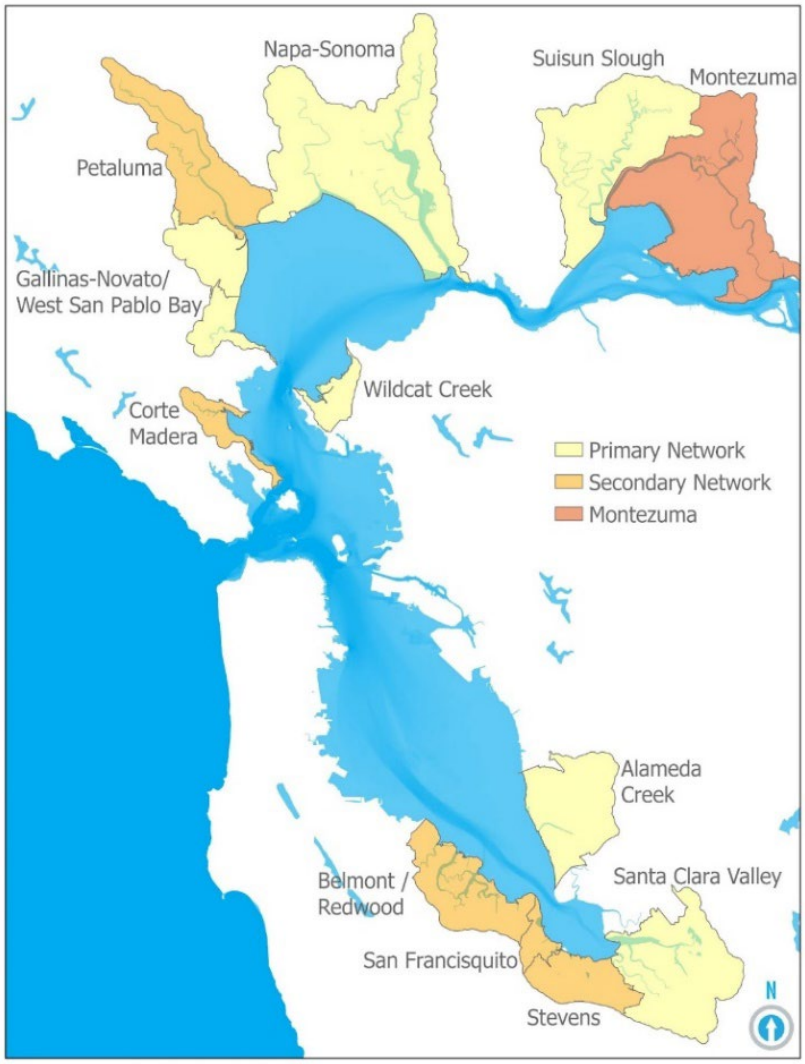
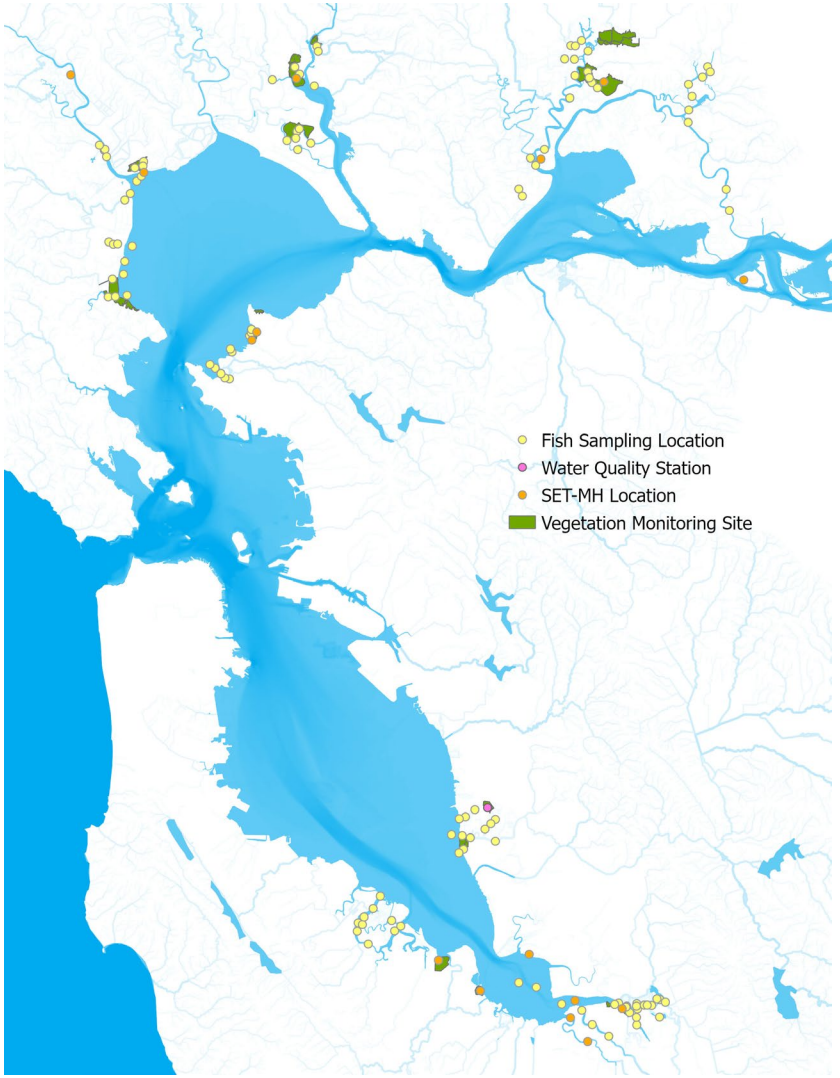


Figure 2. Map of known sampling locations.



This Amendment to the 2025-2027 Implementation Plan period includes increases in EPA funding and changes in duration and/or inclusion of Monitoring Elements. This funding will enable continued monitoring for another year. No changes in RA funding have occurred.

- Horizontal/vertical control: Establish and monitor horizontal/vertical control markers and establish a permanent record of locations/positions.
- Photo-point monitoring: Establish long-term monitoring locations and a database structure for photo-point monitoring.
- Vegetation Monitoring: Establish vegetation monitoring transects and measure key vegetation parameters, marsh surface elevation, and marker horizons.
- Transition Zone Monitoring: Establish and monitor vegetation in the upland and mudflat transition zones at select Benchmark sites.
- Water Quality Monitoring: Establish a limited number of continuous water quality monitoring stations, including monitoring for suspended sediment.
- Surface Elevation Table-Marker Horizon (SET-MH) Monitoring: Continue monitoring of SET-MH sites and establish SET-MH stations at new sites.
- Fish and Fish Habitat (FFH): FFH monitoring by deploying recommended sampling methods to encompass sites in the Monitoring Site Networks.
- Water Level Monitoring: Establish a limited number of continuous water level monitoring stations.

Details for each monitoring element are highlighted below.

Establish and monitor horizontal/vertical control markers

Horizontal and vertical control are essential components of geodetic and surveying systems used to establish accurate and consistent reference frameworks for mapping and various geospatial applications. Existing local horizontal and vertical control points will be collated across the Estuary. Gaps in coverage will be identified and new control markers will be established in select areas following protocols to attain the required resolution and highest accuracy.

- **Scale of analyses/monitoring:** Estuary-wide collation of existing data; installation of new control markers at select sites
- **Frequency of analyses/monitoring:** Each Benchmark site in Primary and Secondary Networks will be assessed once
- **Duration of work:** Winter 2025 - Spring 2028
- **Cost:**
    - Initial Funds: $75,000
    - Incremental Award: $25,376
    - Total Funds: $100,367
- **Information products:** Database of benchmark locations and information; online map of locations
- **WRMP Staff contact**: Lisa Beers (lisab@sfei.org), Aviva Rossi (avivar@sfei.org)

Establish and monitor photo-point locations

Fixed photo point station locations will be distributed throughout a set of Project and Reference Sites at key areas of interest, which may include breach locations, areas expected to accrete rapidly, estuarine-terrestrial transition zones, edges of tidal creeks, and related locations of expected geomorphic and vegetation change.

- **Scale of analyses/monitoring:** All Reference and Project sites where vegetation monitoring is occurring
- **Frequency of analyses/monitoring:** Winter 2025 – Winter 2027
- **Duration of work:** Annually
- **Cost:**
    - Initial Funds: $10,000
    - Incremental Award Funds: $10,000
    - Total Funds: $20,000
- **Information products:** Database of locations and photographs; online map of locations
- **WRMP Staff contact**: Lisa Beers (lisab@sfei.org), Aviva Rossi (avivar@sfei.org)

Establish vegetation monitoring transects and measure key vegetation parameters, marsh surface elevation, and marker horizons

The WRMP will conduct long term site-level vegetation monitoring. Tracking changes in plant communities is critical to understanding the physical and biological characteristics of tidal wetlands at a regional scale and restoration site evolution over time. Site-level monitoring of vegetation cover allows additional tracking of species composition and abundance, tracking of invasive species, and validating and calibrating remotely sensed data. Furthermore, the vegetation within these habitats links crucial physical processes with dependent wildlife, playing a pivotal role in management.

- **Scale of analyses/monitoring:** Primary Monitoring Site Networks. Establish long-term vegetation transects at 18 sites. Establishment of additional feldspar marker horizon plots to monitor sediment deposition, and groundwater monitoring stations along a subset of transects.
- **Frequency of analyses/monitoring:** One round of monitoring during this Implementation Work Plan. Surveys will be repeated every 3-5 years at Benchmark and Reference sites and every 2-3 years at Project sites where restoration is ongoing.
- **Duration of work:** Transects established in 2025 and 2026; vegetation sampling Summer and Fall of 2025, 2026 and 2027.
- **Cost:**
    - Initial Funds: $172,500
    - Incremental Award Funds: $60,500
    - Total Funds: $233,500
- **Information products:** Archived and public records of data, as well direct communication with landowners.
- **WRMP Staff contact**: Lisa Beers (lisab@sfei.org), Aviva Rossi (avivar@sfei.org)

Establish a limited number of continuous water quality monitoring stations

Expanded monitoring of water quality within tidal wetland complexes off the main stem of the Estuary is essential for improving models of sediment dynamics that drive much of the WRMP's regional-level mapping products. These monitoring stations provide fine-scale data on key drivers of wetland condition, function, and resilience to sea level rise.

- **Scale of analyses/monitoring:** Primary Monitoring Site Networks
- **Frequency of analyses/monitoring:** Monthly, continuous
- **Duration of work:** Following establishment, for the duration of this Implementation Plan
- **Cost:** (split with transition zone monitoring, below, under same subcontractor)
    - Initial Funds: $195,998
    - Incremental Award Funds: $95,000
    - Total Funds: $290,998
- **Information products:** Archived and public records of data, WRMP website
- **WRMP Staff contact**: Lisa Beers (lisab@sfei.org), Aviva Rossi (avivar@sfei.org)

Establish vegetation monitoring transects along upland and channel transition zones

A series of short transects will be established along the boundaries of distinct tidal wetland plant assemblages called transition zones. This transition zone monitoring will encompass both upland/marsh edge and marsh/channel edge. These transects will be used in addition to the vegetation plot monitoring described above to better account for rare and uncommon species that are mainly found along these transition zones.

- **Scale of analyses/monitoring:** Benchmark sites with upland transition zones
- **Frequency of analyses/monitoring:** Every 3-5 years, two times during this Implementation Work Plan
- **Duration of work:** Upland transition zone established and monitored in Winter 2024/Spring 2025; channel transition zone established and monitored in Summer 2025; monitoring in 2027
- **Cost:** (split with water quality monitoring, above, under same subcontractor)
    - Initial Funds: $195,998
    - Incremental Award Funds: $95,000
    - Total Funds: $290,998
- **Information products:** Archived and public records of data.
- **WRMP Staff contact**: Lisa Beers (lisab@sfei.org), Aviva Rossi (avivar@sfei.org)

Logistics to continue monitoring Surface Elevation Table-Marker Horizon (SET-MH) sites established in 2023-2024

Sediment Elevation Tables - Marker Horizons (SET-MH) are a method to measure total elevation change and accretion; when multiple sites are monitored across a region, they provide information on accretion, elevation change, and shallow subsidence (compaction or expansion). This information will allow the WRMP to investigate questions on how elevations of marsh planes are changing and where tidal wetlands are able to keep up with sea level rise.

- **Scale of analyses/monitoring:** Measure all stations currently installed (80 across 18 sites) and install stations at two new sites per year (Figure 3)
- **Frequency of analyses/monitoring:** Monitoring occurs twice annually; installation of new SET-MHs will occur in the Fall of each year
- **Duration of work:** Twice per year through Spring 2028
- **Cost:**
    - Initial Funds: $80,000
    - Incremental Award Funds: $40,980
    - Total Funds: $120,980
- **Information products:** Archived and public records of data, WRMP website
- **WRMP Staff contact**: Lisa Beers (lisab@sfei.org), Aviva Rossi (avivar@sfei.org)

Fish and Fish Habitat Monitoring

FFH monitoring provides information on how habitats for assemblages of fish using tidal marsh ecosystems are changing over time, and how the distribution and abundance of key native species of fish are changing over time.

- **Scale of analyses/monitoring:** Priority Monitoring Site Networks, and Secondary Monitoring Site Networks (where feasible). Up to 20 otter trawl samples per season per year within each of the 7 Priority Monitoring Site Networks. See Figure 2 for survey regions.
- **Frequency of analyses/monitoring:** Seasonal sample sessions (Spring, Summer, Fall, and Winter 2025 and 2026).
- **Duration of work:** Spring 2025 – Spring 2027
- **Cost:**
    - Initial Funds: $1,000,000
    - Incremental Award Funds: $500,000 to complete year 1-2 funds; $375,000 new
    - Total Funds: $1,875,000
- **Information products:** Archived and public records of data
- **WRMP Staff contact**: Lisa Beers (lisab@sfei.org), Aviva Rossi (avivar@sfei.org)

References

WRMP. 2024a. San Francisco Estuary Wetlands Regional Monitoring Program: 2024 Monitoring Plan. Prepared by the WRMP Science Team, WRMP Technical Advisory Committee, and the San Francisco Estuary Institute. https://www.wrmp.org/resources/

WRMP. 2024b. Wetland Regional Monitoring Program Guidelines for Monitoring Fish and Fish Habitats. https://www.wrmp.org/resources