Memo: WRMP Near-term Monitoring Priorities for Approval

Purpose: Approve near term monitoring priorities for the WRMP that identify new data collection and/or analyses that can be accomplished in 1-2 years with existing and matching program funds.

Audience: WRMP Technical Advisory Committee (TAC)

The WRMP has existing grant funds from the San Francisco Bay Restoration Authority (SFBRA) to support near-term science implementation, including a small budget to facilitate pilot monitoring of high priority indicators. This initial monitoring is an opportunity to launch data collection and analysis efforts and develop preliminary products that illustrate the power of the WRMP. It is also an opportunity to test the program's technical approach, from conception through data collection, analysis, synthesis, interpretation, management, and communication. This work will allow the WRMP to pilot its approach to program administration and governance, including soliciting Technical Advisory Committee (TAC) and Steering Committee (SC) feedback and contracting personnel to conduct the monitoring.

Near-term monitoring should address the program's science priorities and help answer the program's Guiding and Management questions, especially Guiding Question 1, which essentially asks "where are the wetlands and how are they doing?" Additional criteria for selecting near-term monitoring activities include:

- Low-cost (limited funds for new monitoring) with high return on investment
- Leverages historical and/or existing datasets
- Broad spatial coverage
- Addresses funder and regulator interest in evaluating restoration projects within a regional context
- Addresses near-term science priorities and/or restoration & management actions, particularly regarding the resilience of the region's wetlands to climate change

In April 2023, the science team solicited feedback from the TAC on a list of possible monitoring indicators or analyses to pursue in the near-term. Below, we present for TAC consideration and approval a ranked list of the top three monitoring priorities for pilot implementation. These three priorities were selected as they address all of the criteria outlined above, they span the range of monitoring approaches from remote sensed imagery analysis, rapid assessment of condition, and site-level monitoring (EPA's Levels 1,2,3) and in particular, all three approaches leverage historical monitoring investment.

1) **Standardized analysis of regional wetland characteristics from the Baylands Change Basemap**

In order to establish baseline characterization of tidal wetland habitats in the San Francisco Estuary (SFE), and critical contextualization of opportunities and investments, the WRMP will perform geospatial analyses using the Baylands Change Basemap (BCB). We will standardize the approach to quantifying tidal marsh acreage, particularly within existing restoration projects (SFBRA and previous investments), and compare these acreages to those in the 2009 Bay Area Aquatic Resources Inventory (BAARI) dataset. This analysis will enable us to track restoration progress, a fundamental product of WRMP regional mapping and of greatest importance to project funders. This information will be reported in a Memo on tidal marsh acreage and restoration progress and will be available to visualize online.

In addition, the WRMP will use BCB data to derive metrics of interest aligned with other efforts in the region including the [RDMMP/Shoreline Resilience Framework](), the State of the Estuary Report (SOTER), and the SFBRA Performance Metrics. These analyses will be approved by the WRMP TAC and incorporated in the Geospatial SOP so that they are applied consistently in future remapping efforts enabling calculations of change over time. The WRMP will invest in interpreting the metrics for the region and produce summary products that share findings. Particularly compelling potential analyses from the BCB are listed below, but are not exhaustive and subject to change upon further review.

- Marsh habitat change, calculated by comparing BCB habitat coverage with 2009 BAARI mapping, especially calculating gains due to restoration and losses in vegetated centennial marsh (strip/infill marsh) such as SR 37 Strip Marsh East
  - Tracking where wetlands are located and how they are changing over time is a primary goal (Guiding question 1) of the WRMP.
- Percent vegetated cover at Benchmark, Reference and Project Sites
  - Tracking decline in vegetated cover at Benchmark and Reference Sites has historically been an important indicator of marsh stability in the region. In contrast, tracking growth in vegetation is an important indicator at Project Sites of restoration success. Methods for mapping change in unvegetated and vegetated habitats are outlined in the Hydrogeomorphic and Vegetation SOPs.
- Subregion- and OLU-scale maps of complete marshes (Indicator 4, defined in the Baylands Ecosystem Habitat Goals Update) and where projects can make key improvements in connectivity (e.g. infrastructure re-alignment)
  - Complete marshes connect across mudflat and marsh habitats to upland transition zones, allowing vertical migration space as sea-levels rise. Identifying complete marshes and opportunities for complete marshes aid in prioritization of highest return upland protection and marsh restoration and protection efforts in the region.

These analyses leverage the previous investments in the BCB and the Shoreline Resilience Framework. They provide regional coverage and address science priorities and stakeholder needs. These analyses will result in mapping products that illustrate critical regional trends and opportunities in a digestible format that can demonstrate the utility of the WRMP.

2) **Conduct California Rapid Assessment Methods (CRAM) assessments of WRMP Priority Monitoring Sites**

Assessing the condition of regional wetlands is a high priority for program funders and is consistent with the WRMP near-term science priorities. CRAM is a well-established rapid assessment approach for assessing wetland condition. This method is in use throughout the state, which helps to provide context for and confidence in additional data acquisition. Previous CRAM assessments in SFE will enable an analysis of change in wetland condition over time.

CRAM is a rapid assessment approach that enables us to broadly characterize the wetlands selected in the WRMP Priority Site Network and thus launch the WRMP program. It enables sites where CRAM is conducted outside of the WRMP Network (such as restoration projects) to be evaluated relative to the WRMP Network Sites. CRAM will enable us to see trends in wetland condition across subregions of the Estuary and based on management history, and additionally can link between the region-wide mapping efforts and site-level data collection. Initial efforts will focus on using historical CRAM assessments and a regional Cumulative Distribution Function (CDF) to characterize wetlands selected in the WRMP Priority Monitoring Site Network. This analysis will be used to select a subset of WRMP Monitoring Sites to assess using CRAM. This approach will:

- Establish a baseline understanding of marsh condition at WRMP Network Sites
- Facilitate change detection in scores over time (for sites that have been previously assessed using CRAM)
- Evaluate WRMP Network Site CRAM scores relative to regional trends (CDFs)
- Compare WRMP Project Sites to established Habitat Development Curves (HDCs) and see how they compare to Benchmark and Reference Sites

Existing Data Sources: CRAM Data is available for multiple SF Estuary wetlands on EcoAtlas. About a third of the sites within the WRMP priority monitoring site networks have been surveyed for CRAM in the past, mainly between 2005-2012. Re-surveying at these sites would allow an assessment of how condition at these wetlands has changed over time, and would contribute to regional Habitat Development Curves (HDCs) and Cumulative Distribution Functions.

3) **Deploy Sediment Elevation Tables-Marker Horizons (SET-MHs) in Underrepresented Sub-regions and Conduct Region-wide SET-MH Data Collection**

Detecting if marshes are beginning to drown is a near-term priority for WRMP monitoring. Deep rod Sediment Elevation Table-Marker Horizons (SET-MHs) assess total elevation change and accretion locally, which are processes critical to understanding wetland vulnerability to sea level rise (SLR). SET-MHs have been deployed at sites throughout the region and historic data can be leveraged at these locations. However, many SET-MHs already in place are not always monitored and by re-sampling these locations, long term monitoring can be leveraged. In addition, new SET-MHs can be deployed in Central Bay locations to augment the network of SET-MHs that are relatively well-distributed throughout most of the rest of SFE. We propose

funding and supporting WRMP partners at USGS to a) install new SET-MHs in central Bay locations that fill regional gaps and b) monitor existing SETS.

In order to fill out a region-wide network of SET-MHs and physical process monitoring, new SET-MH sites will be established at critical data gaps within the priority monitoring site networks, such as Older Raccoon Island (Napa-Sonoma Network), San Pablo Creek Marsh (Wildcat Network), and Whale's Tail South (Alameda Creek Network).
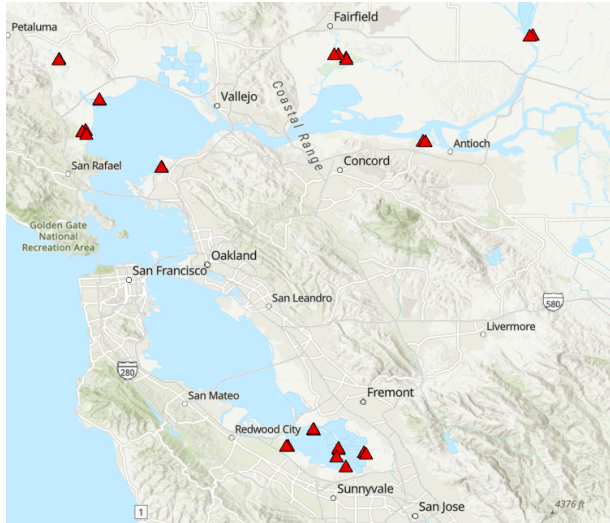

Figure 1. Current distribution of SET-MHs throughout lower SFE.

Additionally, field crews can revisit existing SET-MHs to obtain new data about accretion and elevation change. This acquisition of field (Level 3) data would fill critical regional data gaps and allow the WRMP to test monitoring protocols established in the Hydrogeomorphic Standard Operating Procedures (SOP), including data collection, QA/QC, and data sharing. This work can be accomplished through partnering with local stakeholders such as USGS and NERR. Monitoring these physical processes addresses numerous program guiding, management, and monitoring questions as well as key science priorities regarding sediment and accretion. Building out and monitoring this network of SET-MHs begins to answer the question of whether and where marsh accretion is keeping pace with SLR and where marshes are at risk of drowning.