



Regulatory Drivers of a San Francisco Bay Wetlands Regional Monitoring Program

A report submitted to the Wetlands Regional
Monitoring Program Steering Committee

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Ian Kelmartin
California Sea Grant Fellow
San Francisco Estuary Partnership

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Introduction

Objectives

The objectives of this document are to provide:

1. A brief overview of the current system for permitting non-mitigation tidal wetland restoration projects in the San Francisco Estuary.
2. A summary of major efforts to improve the wetland permitting system.
3. An overview of the regulatory engagement activities undertaken by the San Francisco Bay Wetlands Regional Monitoring Program (WRMP).
4. A discussion of how a Wetlands Regional Monitoring Program could address the needs of regulators and restoration practitioners with respect to wetland restoration project permitting.

Audience, terms, and geographic scope

This document is written for the San Francisco Estuary wetland restoration community. Though it is intended to be accessible by a broad range of professionals—regulators, restoration practitioners, natural resource managers, scientists, and others who are engaged in tidal wetland restoration—it assumes a fundamental understanding of the ecology of tidal wetlands, restoration methods, and the needs driving restoration.

We specifically address the restoration of tidal marsh habitat in the lower San Francisco Estuary including Suisun Bay, San Pablo Bay, Central San Francisco Bay, and South San Francisco Bay. For the sake of this report “San Francisco Bay” or “the Bay” refers to these areas collectively. Similarly,

“wetlands” refers specifically to tidal marsh and flats, and “wetlands restoration”, “restoration projects”, or simply “projects” refer to physical restoration work that aims to restore or enhance these habitats.

Definitions of acronyms

BCDC—San Francisco Bay Conservation and Development Commission

BRRIT—Bay Restoration Regulatory Integration Team

CDFW—California Department of Fish and Wildlife

EPA—United States Environmental Protection Agency

NMFS—National Marine Fisheries Service

RMP- Regional Monitoring Program for Water Quality in San Francisco Bay

SFBRA—San Francisco Bay Restoration Authority

SFBRWQCB—San Francisco Bay Regional Water Quality Control Board

USFWS—United States Fish and Wildlife Service

USACE—United States Army Corps of Engineers

WRMP- San Francisco Bay Wetland Regional Monitoring Program

The Wetlands Regional Monitoring Program

Plan development for the San Francisco Bay Wetlands Regional Monitoring Program (WRMP) is funded through an Environmental Protection Agency (EPA) Region 9 Wetlands Program Development Grant, managed by the San Francisco Estuary Partnership. The WRMP is being developed to monitor tidal marsh habitat in the lower San Francisco Estuary, with the goals of:

- Evaluating the condition of tidal marshes in a regional context
- Improving the efficiency and effectiveness of permit-driven monitoring of tidal wetland restoration projects
- Informing science-based adaptive management strategies for restoration

Program collaborators

Members of regulatory agencies, land management and restoration organizations, and science institutions are engaged in the development of the WRMP and serve on one or more of three bodies:

- The **Steering Committee** is a consensus-based decision-making body tasked with developing recommendations and guiding program plan development. All programmatic elements are reviewed and approved by the steering committee before inclusion in the WRMP plan. The steering committee is made up of regulators, restoration practitioners, and wetland scientists.
- The **Core Team** is responsible for administering the EPA grant and the WRMP development process, and drafts many aspects of the WRMP plan for review by the other bodies.
- The **Science Advisory Team** is composed of regional experts on subjects relevant to the WRMP. The members review and recommend the science content of the WRMP Plan.

Additional input on the scientific content has been gathered through technical workshops, and plan elements may be developed by ad hoc sub-committees. A list of members of these entities are included on the project website: WRMP.org.

Program plan components

The WRMP Plan will contain recommendations in the following areas:

- Administration and governance: The structure and membership of governing bodies, sustainable funding sources/models, communication, and, institutional relationships.
- Science framework: Indicators, metrics, and methods for assessing tidal marsh condition. Sentinel site locations and monitoring plan. Special studies.
- Data management plan: Data sources, quality control, storage, analysis, management, and access.
- Roadmap for implementation: The strategy for implementing a pilot program and scaling it up in the future, including a funding strategy, phased implementation of science framework, and formalizing relationships with collaborating organizations.

Regulatory Context for the WRMP

Wetland restoration in the San Francisco Bay is governed by a patchwork of regulations, agencies, and policies. Many of these date to the earliest days of environmental protection, when the chief threats to the Bay were fill and water pollution. Laws and policies have been slow to adapt to the evolving threats to the Bay through the late 20th and early 21st centuries. Chief among these threats is sea level rise, which combined with decreased natural sediment supply, threatens to drown existing marsh and may imperil the long-term success of restoration projects¹. Bay Area residents acknowledged these threats in June 2016, when voters in the nine Bay Area counties voted to approve Regional Measure AA by over 70%. Measure AA authorized a \$12/year parcel tax to be collected annually to be used for restoration and protection of the San Francisco Bay under the direction of the San Francisco Bay Restoration Authority (SFBRA)².

Permitting a new restoration project in the San Francisco Bay is a time consuming, expensive, complex process that requires significant expertise from the project sponsor. In discussions with restoration practitioners, permitting was cited as a significant challenge for wetland restoration projects. This is widely acknowledged throughout the field, and efforts to improve the permitting process are underway by several agencies and other entities, described below. These efforts are ongoing within the context of several state-wide efforts to improve habitat restoration and monitoring, includes the Habitat Restoration and Enhancement Act³ and the California Wetlands Program Plan⁴.

¹ <https://baylandsgoals.org/science-update-2016/>

² <http://sfbayrestore.org/>

³ <https://www.wildlife.ca.gov/conservation/environmental-review/hre-act>

⁴

https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/ca_wetland_program_plan_2017_2022_signed.pdf

Bay Restoration Regulatory Integration Team

The prospect of reliable funding for restoration has added urgency to agencies' efforts to improve the permitting environment for non-mitigation wetlands restoration. At present, permitting of these projects is addressed on a case-by-case basis. Under the current system permit applicants must coordinate with BCDC, SFBRWQCB, USACE, CDFW, USFWS, NMFS, and, depending on the project's location and specific circumstances, the California State Lands Commission, municipal governments and other state or federal agencies. These agencies typically process applications individually and sequentially, a system that relies on agencies considering other agencies' analysis, input, and leases and permits, that can lead to delays in project implementation and delivery of benefits to the Bay⁵. To address some of those issues, the SFBRA has elected to fund initial development of the Bay Restoration Regulatory Integration Team (BRRIT).

The BRRIT will include staff from BCDC, SFBRWQCB, USACE, CDFW, USFWS, and NMFS, who will work as a team with permit applicants with a goal of providing coordinated review of Restoration Authority-eligible projects. As part of this effort, a Policy and Management Team of upper management staff from those agencies has been convened to identify and implement policy changes necessary to support restoration. An analysis by the Policy and Management Team of common challenges in permitting for restoration identified project monitoring as an area of with great variability amongst the agencies, frequently resulting in projects bearing the main burden of contributing to regional restoration science in addition to demonstrating regulatory compliance. The Policy and Management Team analysis recommends that regional monitoring data be collected and shared through a regional monitoring program⁶.

⁵ http://sfbayrestore.org/packets-advisory/2018-05-04/Item%209_Permitting%20Proposal%20Presentation.pdf

⁶ <http://www.bcdc.ca.gov/BRRIT.pdf>

Use of fill in restoration

In some circumstances, restoration projects require the use of fill to raise subsided areas, or to creating additional high marsh or transition zone habitat. Policies regulating the use of fill in restoration projects, and the resulting conversion between wetland types, are inconsistent across agencies, complicating the permitting process for projects where fill or type conversion occurs⁷. Though a detailed discussion of the policies surrounding the placement of fill is beyond the scope of this document, it is important to note efforts by BCDC⁸ and the SFBRWQCB⁹ to better facilitate the use of fill in habitat restoration, and a multi-agency effort led by the EPA to develop a science-based framework for assessing habitat type conversion actions¹⁰. The BRRIT Policy and Management Team acknowledges that there is a need for additional data and technical criteria to guide the use of fill in tidal restoration¹¹. WRMP Core Team and Steering Committee members have been involved in both the BCDC and SFBRWQCB efforts, with the goal of coordinating and aligning the monitoring needs of the BRRIT and WRMP programs. Additionally, the WRMP is coordinating with the Regional Monitoring Program for Water Quality¹² in San Francisco Bay, SFBRWQCB, and BCDC to develop a suspended sediment monitoring strategy, which, if implemented, would provide regulators and restoration practitioners with information to guide the use of fill for habitat restoration projects.

⁷ http://sfbayrestore.org/packets/2019-02-22/Item%2011_At%202%20Permit%20and%20Policy%20Improvement%20List.pdf

⁸ <http://www.bcdc.ca.gov/BPAFHR/FillHabitat.html>

⁹ https://www.waterboards.ca.gov/water_issues/programs/cwa401/wrapp.html

¹⁰ http://sfbayrestore.org/packets/2019-02-22/Item%2011_At%202%20Permit%20and%20Policy%20Improvement%20List.pdf

¹¹ <http://www.bcdc.ca.gov/BRRIT.pdf>

¹² <https://www.sfei.org/programs/sf-bay-regional-monitoring-program>

WRMP Regulatory Engagement and Analysis

Though the mechanisms that will lead to the implementation of the WRMP are still under development, the regulatory communities' acceptance of WRMP metrics and indicators to monitor restoration projects will be crucial to the success of the program. To achieve this acceptance, representatives of many of the agencies regulating wetlands restoration in the Bay are included on the WRMP Core Team (SFBRWQCB, US EPA) Steering Committee (USFWS, USACE, BCDC, CDFW, SFBRWQCB), and Science Advisory Team (USFWS). NMFS is not formally represented, but NMFS staff have been engaged in program development.

In addition to attending meetings and commenting on draft documents, regulators are consulted via one-on-one meetings with members of the WRMP Core Team and have played a significant role in the science content development process. Between January 2018 and April 2019, Core Team members have held over 20 coordinating meetings with regulators. Many of these conversations centered on better understanding how monitoring requirements were set for non-mitigation wetlands restoration work, typical monitoring requirements for these projects, and the flexibility agencies would have to accept monitoring plans that are consistent with the WRMP.

A review of guiding documents was undertaken to gain an understanding of the regulatory context and the state of wetlands restoration in the San Francisco Estuary. This included the statutes granting authority to regulatory agencies, regulatory policy documents (Water Quality Control Plan for the San Francisco Bay Basin¹³, San Francisco Bay Plan¹⁴), reports and planning documents (State of the

¹³ https://www.waterboards.ca.gov/sanfranciscobay/basin_planning.html

¹⁴ http://www.bcdc.ca.gov/plans/sfbay_plan.html

Estuary Report¹⁵, the San Francisco Estuary Blueprint¹⁶, Tidal Marsh Recovery Plan¹⁷, Baylands Ecosystems Habitat Goals Update¹⁸), restoration permits/biological opinions, restoration project monitoring plans/reports, and additional analysis of wetlands project permitting (BCDC internal analysis of monitoring reports, BRRIT Policy and Management team “Sand in the Gears” document¹⁹ and Permit and Policy Improvement List²⁰).

¹⁵ <https://www.sfestuary.org/our-estuary/soter/>

¹⁶ <https://www.sfestuary.org/ccmp/>

¹⁷ https://www.fws.gov/sfbaydelta/documents/tidal_marsh_recovery_plan_v1.pdf

¹⁸ <https://www.sfei.org/projects/baylandsgoals>

¹⁹ <http://www.bcdc.ca.gov/BRRIT.pdf>

²⁰ http://sfbayrestore.org/packets/2019-02-22/Item%2011_At%20Permit%20and%20Policy%20Improvement%20List.pdf

Regulatory drivers survey

To further explore typical monitoring requirements and how they are selected, a qualitative survey was distributed to permitting staff at regulatory agencies in March 2019 (Appendix A). The survey was distributed through WRMP Steering Committee members, and responses were solicited from staff directly involved in the permitting of wetland restoration projects in the San Francisco Estuary.

Twelve responses were received representing BCDC (4 responses), SFBRWQCB (3), USFWS (2), CDFW (1), USACE (1), NMFS (emailed comments only). On May 1, 2019 the WRMP Steering Committee discussed the results of this survey and agreed this response rate captured much of the relatively small group of staff that work in permitting these projects region-wide.

Table 1. Responses to: In your experience, what components (informally or formally) drive decisions on what monitoring requirements are included within permits for non-mitigation tidal marsh restoration projects in San Francisco Bay? Total possible responses: 11.

Influence	Responses
Monitoring plan provided by permittee	9
Project objectives	9
Professional knowledge/experience	8
Best available science	8
Past permit conditions	7
Past project issues	7
Enforceable policies	6
Legislative mandate	5
Perceived resources of applicant	4
Data gaps	3
Written internal agency guidelines	0

The survey found inter- and intra-agency variations in the drivers of decisions on the monitoring requirements for restoration projects (Table 1) and the requirements themselves (Table 2). Notable among the responses to drivers of decisions is the influence of monitoring plans provided by the permittee, and no respondents cited written internal agency guidelines.

Survey respondents indicated vegetation cover, relative area of habitat types, and other physical and vegetative indicators of habitat health were commonly regarded as a typical monitoring requirements for restoration projects. All of the indicators provided on the survey were selected at least once, and a few were added by respondents (sedimentation, methylmercury in fish).

Table 2. Responses to: For permits that your agency issues for voluntary salt marsh restoration projects, what aspects of the marsh are typically (in most permits) required to be monitored?. Total possible responses: 11.

Indicator	Responses
Vegetation cover	9
Relative area of habitat types (high marsh, low marsh, mudflat, etc.)	8
Vegetation community measures (richness, diversity, etc.)	8
Invasive vegetation	8
Marsh elevation	6
Tidal exchange	5
Other water quality metrics	5
Channel width/length	4
Other physical metrics	4
Other vegetation metrics	4
Dissolved oxygen	4
Turbidity/sediment load	4
Terrestrial wildlife: presence/absence	4
Public use/access	4
Channel complexity	3
Nutrients	3
Water temperature	3
Terrestrial wildlife: abundance	3
Fish: presence/absence only	3
Aerial imagery/LiDAR	2
Other fish and wildlife metrics	2
Sedimentation	2
Fish: abundance	1
Invertebrates	1
Mosquito populations	1
Other human factors	1
Methylmercury in Fish	1

The survey asked how long monitoring was typically required after project completion. Responses were 0-5 years (2), 6-10 years (4), 11+ years (1), and project dependent (4). When asked whether there were agency guidelines that speak to consistency around monitoring periods, 3 answered yes, 4 answered no, and 4 answered that they don't know or spoke to efforts to establish guidelines or less formal attempts to set consistent requirements for monitoring periods.

All respondents indicated an ability to incorporate adaptive management and change monitoring requirements over time based on the findings of project monitoring.

Key Findings and Recommendations

This section synthesizes the findings of WRMP regulatory engagement efforts to describe how the WRMP, if implemented, could provide benefits to regulatory agencies and the broader wetland restoration stakeholder community. These are rooted in a vision of the WRMP that, while influenced by the ongoing WRMP development process, may be incorrect or incomplete. The eventual attributes and implementation of the WRMP will be guided by the Steering Committee and available funding.

1. Standardized, regional, indicators could benefit regulators and restoration practitioners

A fully implemented WRMP could provide a standardized suite of indicators measured consistently across the bay. Depending on how the WRMP is implemented, monitoring plan requirements for individual projects could be reduced, simplifying the permitting process for both applicants and permit review staff. Better regional understanding of tidal marsh habitat condition reduces the burden for any one site to provide information, and could allow the performance of restoration projects to be evaluated in the context of regional and local conditions. This information, in turn, can inform future management decisions, such as the best use of fill in restoration projects.

The WRMP could support the efforts of the BRRIT to better coordinate restoration project permit conditions, and has the potential to inform the best use of Restoration Authority funds and other monies used for wetlands restoration.

All elements of the WRMP regulatory engagement work found variation in how monitoring requirements are set for restoration projects. This points to the potential benefits of standardization and the broad latitude agencies in setting monitoring requirements. Staff indicated a flexibility to accept the indicators set by the WRMP, provided they are based in the best available science and satisfy the

legal mandates of the agency. In general, regulatory staff expressed optimism that a WRMP could meet their agencies' needs for measuring the performance of non-mitigation tidal marsh restoration projects, with the acknowledgment that site-specific circumstances like the presence of threatened/endangered species or a unique water quality threat could lead to additional monitoring requirements.

2. Centralized data management and analysis could support adaptive management, and add value to existing monitoring data

An important aspect of the WRMP could be the establishment of infrastructure to manage, analyze, and share monitoring data. Though large amounts of data are being collected around the Bay, the lack of data management infrastructure and standardized indicators prevents the data from being accessible, cohesive, and useful in evaluating resources in a regional context. Staff reported a desire to use monitoring data for adaptive management of restoration, but agencies often lack the resources, established processes, and programs for doing so; in practice monitoring reports more often are reviewed individually for permit compliance purposes only. Adaptive management, where it occurs in the Bay, is generally driven by restoration project managers. High quality regional monitoring data, analyzed and reported to regulatory agencies by the WRMP, could provide important information about the condition of tidal marshes to allow contextually analyzed permit actions and inform adaptive management while also potentially reducing the workload of regulatory staff.

3. The WRMP could serve as an important forum and trusted source of data for regulators and restoration practitioners

Response to the goals and process of the WRMP has been positive. Even after challenging discussions, regulatory staff voiced their appreciation for the collaborative and transparent way the program is being developed. These discussions underscored the importance of using the best available

science and transparent decision making used in the WRMP development process to maintain support among regulators and the larger stakeholder community.

The mechanisms agencies use to implement the WRMP are as yet undefined and will require continued coordination with regulators and the buy-in of agency upper management. Regulatory participation in the WRMP is also dependent on the indicators chosen for inclusion in the program, and whether they meet the policy needs of the agencies. Continued engagement by regulatory agencies, both through the WRMP steering committee and direct meetings between regulatory staff and WRMP leads, is critical to ensuring the WRMP has the best chance of adoption by regulatory agencies, in whatever form is deemed most appropriate.

The WRMP could, like the Bay RMP for Water Quality, become the premier source for technical data on the condition of tidal marsh within the Bay. It would probably be guided by both regulators and restoration practitioners, providing an opportunity for the two groups to problem solve collaboratively. With a trusted source of data, decision making for all who have a stake in management and restoration of tidal marsh habitats could be supported, reducing disagreements between parties and potentially facilitating more rapid and effective restoration efforts.

Appendix A: Regulatory Drivers Survey

The following survey was distributed through Steering Committee Members to line-level permitting staff in March 2019.

WRMP Permit-Driven Monitoring Questionnaire

The Wetlands Regional Monitoring Program (WRMP) is an effort develop a pilot program plan to improve efficiency of monitoring of tidal wetland restoration projects and evaluate the condition of the tidal marsh in the San Francisco Bay at a regional scale. As a part of the WRMP, project staff are evaluating regulatory drivers of monitoring in the San Francisco Bay. WRMP staff have completed document analysis, informational interviews and had in-depth discussions with staff from various regulatory agencies. We are now seeking to add additional information from permit analysts and regulatory staff. Our goals are to better understand:

- How decisions are made about project monitoring requirements
- Typical permit-driven monitoring requirements
- How data from monitoring is used by regulatory agencies

This survey should take less than 10 minutes to complete. The results of this survey will be aggregated and shared, but names and other identifying information will not be shared.

Please email Ian Kelmartin (ian.kelmartin@sfestuary.org) with any questions.

***Required**

1. Name

2. Agency *

3. Job Title *

4. Email

5. Are you directly involved with the permitting of wetland restoration projects? * *Mark only one oval.*

Yes

No (If you answer no, you do not need to complete this survey)

6. In your experience, what components (informally or formally) drive decisions on what monitoring requirements are included within permits for non-mitigation tidal marsh restoration projects in San Francisco Bay? Check all that apply.

Check all that apply.

Legislative mandate

Past permit conditions

Enforceable policies

Written internal agency guidelines

Monitoring plan provided by permittee

Professional knowledge/experience

Best available science

Past project issues
 Perceived resources of applicant
 Project objectives
 Data gaps
 Other:

7. For permits that your agency issues for voluntary salt marsh restoration projects, what aspects of the marsh are typically (in most permits) required to be monitored? Please check all that apply.

Check all that apply.

Marsh elevation
 Channel width/length
 Tidal exchange
 Channel complexity
 Other physical metrics
 Aerial imagery/LiDAR
 Relative area of habitat types (high marsh, low marsh, mudflat, etc.)
 Vegetation cover
 Vegetation community measures (richness, diversity, etc.)
 Invasive vegetation
 Other vegetation metrics
 Dissolved oxygen
 Nutrients
 Water temperature
 Turbidity/sediment load
 Other water quality metrics
 Terrestrial wildlife: abundance
 Terrestrial wildlife: presence/absence only
 Fish: abundance
 Fish: presence/absence only
 Invertebrates
 Mosquito populations
 Other fish and wildlife metrics
 Public use/access
 Other human factors
 Other:

8. How long after project completion is monitoring typically required? *Mark only one oval.*

0-5 years

6-10 years

11+ years

Don't know

Other:

9. Is there agency guidance that speaks to setting consistency around monitoring periods? *Mark only one oval.*

Yes

No

Don't know

Other:

10. Do permitting requirements allow for "adaptive management" over time and flexibility to change monitoring requirements based on findings?

Mark only one oval.

Yes

No

Don't know

Other:

11. May we follow up with you to gather more information about how your agency sets monitoring requirements for voluntary marsh restoration permits?

Mark only one oval.

Yes (if yes, please double-check your email address above)

No