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Work Element 4. Establish Guidelines

The purpose of this work element is to develop the technical foundation for policy decisions to establish nutrient-related water quality objectives. This strategy assumes that the development of nutrient related water quality objectives would be accomplished using an approach consistent with the “nutrient numeric endpoint framework”—the numeric guidance that would serve as a means to translate narrative nutrient water quality objectives. This numeric guidance will be centered on an "assessment framework," a structured set of indicators and associated thresholds that can be used to categorize potential ecological states of the Bay from supporting to impairment of beneficial uses. These assessment frameworks also specify the spatial and temporal density and types of data needed to make an assessment of beneficial uses support.

The Bay NNE literature review and data gaps analysis proposed a suite of indicators appropriate to assess the effects of eutrophication and other adverse effects of nutrients on Bay beneficial uses (McKee et al. 2011). Indicators were proposed for three principal habitat types: 1) subtidal unvegetated habitat, 2) vegetated subtidal (seagrass and other SAV), and 3) intertidal flats. The review proposes specific tasks to develop the NNE assessment framework for each habitat types. These tasks are given in Table 3. An initial rank of high, medium, and low priority was assigned to each by the Water Board. Prioritization of work elements reflects: 1) percentage of habitat type represented in the Bay and 2) best professional judgment as to whether an indicator represents the most sensitive assessment of potential impacts to beneficial uses. Based on these two criteria, phytoplankton (biomass and community composition), dissolved oxygen, HABs and HAB toxins were the primary NNE indicators of interest in unvegetated subtidal habitat. Ammonium, N:P ratio and other nutrient forms are also indicators of interest, pending the outcome of studies being conducted in Suisun Bay (see Work Element 3) and assessment by a working group of scientists.

Indicators representative of other habitat types such as intertidal flats and seagrass are of high interest in the Bay as well as other estuaries around the state. Several studies are ongoing to support decisions on NNE thresholds in California estuaries outside of the Bay. Thus, these work elements are designated as moderate priority, with the intention of evaluating the applicability of these studies to assessment of these habitats in San Francisco Bay sometime in the future.,

Five tasks were designated as high priority and as such they are components of planned activities during the first four years.

Activities Update

Click right and left arrows to scroll through activities. *Note:* Timeline dates are approximate

[Task 4 Timeline](#) [1]

Task 4.1 Nutrient Assessment Framework

The purpose of this task is to develop an assessment framework that considers the use of phytoplankton and nutrient forms (e.g. ammonium and other nutrient species or ratios) to assess the condition of the Bay. This will be done by choosing the precise indicators and metrics; specifying how and when they will be measured; and creating decision rules for how the indicators will be combined in order to classify Bay segments into categories of degree of beneficial use support (from supporting to impairing beneficial uses). Existing data on phytoplankton, nutrients and other co-factors will be used to graphically illustrate options with respect to how to use data to make an assessment. Where feasible, results from model simulations will be used to inform assessment framework development (e.g. linkages between phytoplankton biomass and low dissolved oxygen).

The influence of ammonium on the magnitude of primary productivity as well as the composition of phytoplankton community in different regions in the Bay is a topic of intense interest and research in the Bay. This ongoing research must be synthesized to develop a fuller perspective on the need for concentration-based objectives for ammonium. As such, work under Task 4.1 will be carried out in close coordination with Work Element 3, and may also be informed by the use of biogeochemical models in Task 6.2.a to assess the relative importance of ammonium's inhibitory role in primary production. In addition, this Task 4.1 will coordinate with efforts in Task 3.3 to identify data gaps or studies that may still need to be conducted to determine the need for and approach to next steps with respect to incorporating ammonium into the NNE assessment framework for the Bay.

Subtasks include:

- 4.1a Conduct preliminary analysis of existing data to demonstrate existing approaches
[Proposed Workplan for Assessment Framework Development](#) [2]  [Proposed Workplan for Assessment Framework Development](#) [3]
- 4.1b Convene a series of workshops to develop assessment framework
[SF Bay AF Meeting Summary Feb 2014](#) [4]  [SF Bay AF Meeting Summary Feb 2014](#) [5]
- 4.1c Draft the assessment framework document
- 4.1d Conduct outreach and vet assessment framework approach and technical products with stakeholders

[Task 4.1 - Subtasks Completion](#) [6]

Chart omitted.

Task 4.2. Review of Dissolved Oxygen Objectives

McKee et al. (2011) found that dissolved oxygen monitoring data taken along the longitudinal "spine" of the SF Bay typically meets established DO objectives. However, SF Bay dissolved oxygen objectives were established in the first Basin Plan in 1975 and the science of supporting derivation of dissolved

oxygen objectives has evolved considerably since that time. The main focus of this review is on the application of the DO objectives to shallow water habitats, tidal marshes, managed ponds and tidal sloughs, although it can be argued that a comprehensive review should be conducted. Near-term tasks consist of: 1) synthesizing existing dissolved oxygen data; and 2) evaluating the adequacy of existing dissolved oxygen objectives.

4.2.a Synthesize existing dissolved oxygen data

This task will synthesize existing dissolved oxygen data Bay-wide and for specific habitats, such as tidal sloughs, and shallow subtidal areas. This topic was not covered in the Bay NNE literature review and data gaps analysis (McKee et al. 2011). The synthesis effort will include analysis of data currently being collected (since 2011) at 6 USGS moored stations (DO, chlorophyll, and fluorescence), as well as other data sources, including historical studies conducted in the Lower South Bay. This synthesis will assess status and trends of dissolved oxygen relative to Basin plan standards, and will assess whether objectives are being met and whether there is evidence of impairment.

4.2.b Evaluate the adequacy of the dissolved oxygen objectives and the need for site specific objectives

The purpose of this task is to synthesize data on dissolved oxygen requirements of species representing the variety of beneficial uses in SF Bay and to inform whether there is a need to revise dissolved oxygen objectives for SF Bay. The product would be a report that synthesizes methodology, summarizes availability of DO tolerance data for key indicator species, and, assuming data are available, calculates DO criteria protective under acute and chronic conditions for the range of beneficial uses represented in SF Bay. To the extent feasible, this analysis will also qualitatively consider naturally occurring low oxygen (e.g., in tidal wetlands or in waters exiting naturally low-oxygen habitats) versus low oxygen due to anthropogenic perturbations. Depending on available resources, this work may be phased so that shallow subtidal areas and tidal sloughs are initially the focus of the review. Based on the synthesis in subtask 4.2b, data gaps will be identified and, if necessary, recommendations for additional data collection to support the derivation of DO criteria will be made.

Subtasks include:

- 4.2a Synthesize existing dissolved oxygen data
- 4.2b Evaluate the adequacy of existing dissolved oxygen objectives

Task 4.2 - Subtasks Completion

[7]

Chart omitted.

Task 4.3. Macroalgal NNE Assessment Framework.

The objectives of this task are: 1) to document baseline abundance of macroalgae in a variety of habitat types and regions of the Bay and 2) participate in statewide effort to develop an assessment framework for eutrophication in intertidal flats and shallow subtidal habitat, based on macroalgae. The intent is that progress on this work element would be monitored for applicability to the Bay and that SF Bay stakeholders have the opportunity to comment on studies supporting these work elements, while progress is made on other tasks.

Subtasks include:

- 4.3a Document baseline macroalgal abundance in SFB
- 4.3b Participate in statewide macroalgal objective development
- 4.3c Evaluate the applicability of a macroalgal objective to SFB

Task 4.3 - Subtasks Completion **[8]**

Chart omitted.



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Links

[1] <http://sfbaynutrients.sfei.org/content/task-4-timeline>

[2] <http://sfbaynutrients.sfei.org/files/proposed-workplan-assessment-framework-development>

[3] http://sfbaynutrients.sfei.org/sites/default/files/Proposed%20Workplan%20for%20Development%20of%200A%20Nutrient%20Assessment%20Framework%20for%20SF%20Bay%201122012_DS.pdf

[4] <http://sfbaynutrients.sfei.org/files/sf-bay-af-meeting-summary-feb-2014>

[5] <http://sfbaynutrients.sfei.org/sites/default/files/SF%20Bay%20AF%20Meeting%20Summary%20%20and%20Appendices%2002062014%20V2.pdf>

[6] <http://sfbaynutrients.sfei.org/content/task-41-subtasks-completion>

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