Proposed Workplan for Development of A Nutrient Assessment Framework for SF Bay

October 11, 2012

Introduction and Project Goal

The California State Water Resources Control Board (SWRCB) is developing nutrient water quality objectives for the State's surface waters, using an approach known as the Nutrient Numeric Endpoint (NNE) framework. The NNE establishes a suite of numeric endpoints based on the ecological response of an aquatic waterbody to nutrient overenrichment (e.g. eutrophication and other nutrient-related adverse effects). The NNE framework is intended to serve as numeric guidance to translate narrative water quality objectives. The NNE framework is currently under development for all California estuaries (Sutula 2011). Because San Francisco Bay represents California's largest estuary (70% by area of estuarine habitat statewide), it merits development of an estuary-specific NNE framework. The San Francisco Bay Water Board is the lead on the regional effort to develop a Nutrient Assessment Framework.

A recent review reviewed by McKee et al. (2011) recommended specific NNE indicators for SF Bay, identified data gaps and recommended next steps. The review also recommended developing the NNE assessment framework for SF Bay, consisting of indicators of phytoplankton, nutrient concentrations, and dissolved oxygen in the subtidal habitat, which represents the majority of habitat in SF Bay. Work to review the science supporting dissolved oxygen objectives will be completed separately from this effort. The goal of this proposed project is to develop an assessment framework that will consider a combination of phytoplankton and nutrient indicators to assess the status of beneficial use support in SF Bay.

Over the past decade, much work has been done to establish standardized methodologies to assess eutrophication (Bricker et al. 2003, Zaldivar et al. 2008, Borja et al. 2011) and conduct surveys to evaluate the magnitude and extent of eutrophication (Bricker et al. 1999, Borja et al. 2009, Devlin et al. 2011, Garmendia et al. 2012). Under the European Union Water Framework Directive, assessment frameworks are under development to assess the ecological condition of estuaries with respect to eutrophication and other stressors, with the expressed intent of protecting those of high quality and identifying waterbodies that require management action (Zalivar et al 2008). In the US, a standardized approach for the assessment of estuarine eutrophication on a national scale has been developed by NOAA (Bricker et al. 2003) and applied in two separate NOAA-sponsored national assessments. However, collectively, European and US expertise in eutrophication assessment frameworks has not been transitioned to the development of estuarine nutrient water quality criteria. In this project we will develop a nutrient assessment framework for San Francisco Bay. The first step will involve utilizing existing data to test the applicability and precision of select assessment framework approaches that a working group of experts (from San Francisco Bay as well as outside experts) identifies as viable approaches for the Bay's unique situation. In so doing, we can ground truth the robustness of a process, and compare multiple approaches, prior to more fully investing in developing the full framework. The outcome and lessons learned from these analyses will be used to draft a nutrient assessment framework for SF Bay.

The purpose of this document is to describe the process by which a nutrient assessment framework will be developed. A particular approach to developing this framework is not presumed at the outset; rather the intent is to select the appropriate approach with advice of experts and stakeholders as a part of the process.

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An assessment framework is defined as a structured set of decision rules that specify how to use monitoring data to categorize specific segments of SF Bay with respect to impairment of Bay beneficial uses due to eutrophication and other nutrient-related adverse effects. The assessment framework should specify the magnitude, extent and duration of the effects that cause the segment to be classified differently. It should specify the temporal and spatial density of data required to make that assessment and provide guidance on how the data should be analyzed to make that determination.

Conceptually, the assessment framework project will build on work by McKee et al (2011), which identified candidate indicators that met, to varying degrees, four review criteria: 1) strong linkage to beneficial uses, 2) cost-effective and scientifically well-vetted means of measurement, 3) can develop predictive models to link to nutrients and other management controls and 4) natural variability in the indicator is sufficiently low that a trend can be detected. The assessment framework will also build on recent work, led by SFEI, to develop conceptual models of SF Bay ecological response to nutrient loads and linkage to Bay beneficial uses.

Proposed Scope of Effort

This workplan consists of 4 technical tasks:

1. Scoping of approaches to nutrient assessment framework development
2. Analyses of existing data
3. Draft assessment framework
4. Draft and final project report

Task 1. Scoping of Approaches to Nutrient Assessment Framework Development

The purpose of this task is to prepare a white paper summarizing potential approaches to developing a nutrient assessment framework for SF Bay. The white paper will identify candidate indicators and metrics, summarize existing literature for how those indicators have been used to assess ecological condition and recommend a suite of options to consider for further exploration.

This white paper will be used to initiate discussions via a kick-off meeting with a working group of experts in estuarine eutrophication to: 1) discuss possible approaches and 2) identify the types of analyses of existing data that would support their evaluation. The white paper would also be discussed with SF Bay stakeholders for feedback and comments on approaches as well as identification of additional data sources that could support the evaluation.

Task 1 deliverables include: 1.1) white paper summarizing approaches, 1.2) working group kick off meeting agenda, meeting materials, and meeting summary, and 1.3) stakeholder meeting agenda, meeting materials and meeting summary.

Task 2. Analyses of Existing Data

The purpose of this task is to analyze existing data from SF Bay estuary that would support the evaluation of possible approaches to nutrient assessment framework development. This task

consists of: 1) compiling existing SF Bay monitoring data and literature related to assessment framework approaches, 2) conducting analysis and 3) oral presentation of results to the expert working group and stakeholders for discussion and comment. Compilation of existing data will focus on candidate indicators identified through McKee et al. (2011). Analyses will focus on identifying how data on indicators or combinations of indicators can be used to identify alternative states and how decisions on data aggregation across temporal and spatial scales affects the results of the assessment.

Task 2 deliverables include: 2.1) list and excel database of existing data and 2.2) figures and tables representing key findings of analysis of existing data.

Task 3. Draft Assessment Framework

This task builds on Tasks 1 and 2 to draft an nutrient assessment framework for SF Bay. To initiate this effort, two 2-day meeting of the experts workgroup will be convened in the Bay Area. Results of the analyses of existing data will be presented. Meeting participants will work together to develop the scientific foundation for the assessment framework, specifying to the degree possible: 1) indicators and specific metrics, 2) a number of categories representing "alternative states" from high to low ecological condition and/or beneficial use support and 3) decision rules for how data should be used to categorize the Bay or Bay segment being to the applicable "alternative state." A follow up workshop will be scheduled, if needed, to complete this effort.

The workshop will be followed by working group conference calls to revise the draft assessment framework. A complete draft assessment framework will be presented to stakeholders for discussion and feedback.

Task 3 deliverables include: 3.1) workshop agenda, meeting materials and summary,3.2) technical report summarizing the analysis of existing data and the proposed draft assessment framework.

Task 4. Draft and Final Project Reports

The purpose of this task is to produce a draft and final project report, summarizing the work achieved under this study and recommending next steps. The draft report will be presented to the SF RWQCB project managers and stakeholders for comment and feedback. A final project report will be submitted which addresses these comments.

Task	**Element**	**FY12 Q1**	**FY12 Q2**	**FY12 Q3**	**FY12 Q4**	**FY13 Q1**	**FY13 Q2**	**FY13 Q3**	**FY13 Q4**	**FY14 Q1**
1. Scope framework	1.1 white paper									
	1.2 working group meeting #1									
2. Analysis of existing data	2.1 Compile data									
	2.2 analysis of data									

3. Draft assessment framework	3.1 working group meeting #2, #3									
	3.2 conference call									
	3.3 Draft assessment framework									
4. Draft/ final report	4.1 Draft project report									
	4.2 Final project report									

Proposed Schedule of Deliverables

Task	**Element**	**Approximate Schedule**
1 Framework Scoping	1.1 white paper summarizing approaches	February 15, 2013
	1.2 working group meeting agenda, meeting materials, and meeting summary.	60 days after meeting
2. Analysis of existing data	2.1 Excel database of existing data	June 30, 2013
	2.2 Figures and tables representing key findings of analysis of existing data	June 30, 2013
3. Draft assessment framework	3.1 workshop agenda, meeting materials, and summary	September 30, 2013 January 30, 2014
	3.2 working group conference call agenda, meeting materials, and meeting summary.	60 days after conference call
	3.3 Draft assessment framework	June 30, 2014
4. Project report	4.1 Draft project report	September 30, 2014
	4.2 Final project report	November 30, 2014