

Future Aeration Demonstration Project and Upper Watershed Studies
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Outlined below is a preliminary description of what the Technical Advisory Committee envisions for a subsequent aeration demonstration project and upper watershed studies. These descriptions will provide the peer-reviewers with a basis upon which to provide comments about what needs to be studied further.

The total daily maximum load (TMDL) that these studies support will be taking a phased approach to solving the dissolved oxygen (DO) problem in the Stockton Deep Water Ship Channel (DWSC). The first phase of the TMDL will have two main objectives. The first objective is to continue to acquire the information necessary to understand the mechanisms that both create oxygen demanding substances in the upper watershed and cause excess oxygen demand in the DWSC. This information will be required to develop the permanent solutions in the final TMDL phase. The second objective is to insure that the Regional Board's interim dissolved oxygen performance goal is met in the DWSC while these studies continue. The projects making up this first phase of the TMDL will consist of an aeration demonstration project in the DWSC and a set of studies in the upper watershed upstream of the DWSC. The final TMDL phase will consist of the alternatives analysis required by the National Environmental Protection Act (NEPA) and/or the California Environmental Quality Act (CEQA), followed by design, implementation and long-term operation & maintenance of the selected permanent solutions designed to meet the final Basin Plan DO objectives.

DWSC Aeration Demonstration Project

The purpose for the aeration demonstration project is to study the feasibility and cost effectiveness of an aeration system designed to meet the Regional Board's proposed interim DO performance goal. It will also provide for data collection and analysis aimed at improving our understanding of the mechanisms causing the DO deficit within the channel. This information will provide the basis for cost/benefit and NEPA/CEQA alternatives analysis required to develop the permanent solutions in the final TMDL implementation phase.

1. *Aeration.* The aeration demonstration project is envisioned to be a multi-year effort that first performs an engineering feasibility study to determine the preferred location, size, and type of aerator(s) to be demonstrated. This will be followed by planning, design and construction of the selected demonstration aerators. The demonstration aerators will be operated with the following goals:
 - collect data on aeration system efficiency and cost-effectiveness in meeting DO water quality objectives
 - evaluate re-directed effects of aeration on beneficial uses in the DWSC and any other downstream water bodies that may be affected
 - use the aerators in an experimental mode to quantify the relative importance and interrelationship of the various oxygen consuming mechanisms in the DWSC, and
 - provide the aquatic resources in the DWSC with a minimal level of protection while we continue to collect and analyze the data.

2. *Monitoring.* Design, install and operate a series of continuous, water quality monitoring stations with remote telemetry in the DWSC. The goal is to provide the data necessary to plan and implement the aeration demonstration project. These stations should measure dissolved oxygen, chlorophyll (BOD concentration), temperature, pH, turbidity and EC at both Channel Point and Turner Cut (beginning and end of critical reach) and at one location upstream beyond the tidal influence of the DWSC. In addition, some number of locations between Channel Point and Turner Cut should be continuously monitored with multi-depth oxygen and temperature meters.
3. *Operational Modeling.* Develop a real time operational model to synthesize this data and help predict the magnitude and location of the oxygen deficit under varying environmental conditions in the channel. Employing the natural variation of incoming chlorophyll concentration and water temperature and experimentally manipulating controllable variables could provide a means of confirming our understanding of oxygen demanding mechanisms. For instance, flow in the DWSC might be manipulated or stabilized by employing the barriers at the head of Old River, or the Stockton Regional Sewage Plant may be taken on and off line, or oxygen delivery rates of the aerators could be adjusted. The goal is to better understand the importance of each variable singly and synergistically on channel oxygen levels and help in controlling the experiments and optimizing operation of the aerators.

San Joaquin River Upper Watershed Studies

Work conducted to date suggests that a large part of the organic load in the DWSC originate as algae in Salt and Mud Slough and in the San Joaquin River above Lander Avenue and grow during their transport downstream to the DWSC. The purpose of these studies should be to confirm these observations and determine the feasibility of an upper watershed algal control program benefiting the DWSC. This information is needed for the cost/benefit and NEPA/CEQA alternatives analysis required to develop the permanent solutions in the final TMDL implementation phase. This work should have the following goals:

- insure that all the data necessary for the HydroQual upper watershed water quality model is available to accurately understand and predict the growth, transport and fate of algae in the River between Lander Avenue and the DWSC.
- use empirical data and modeled understanding of growth dynamics to evaluate the relative effectiveness of upper watershed load reductions in improving oxygen conditions in the DWSC.
- collect data and study where and why algae grow so well in the upper watershed and how they might be cost-effectively controlled with minimal re-directed effects.

Administration

It is envisioned that both the demonstration and upper watershed projects will be administered by the same entity. This entity will insure that all the goals of the studies are achieved and that results are communicated to CALFED, the Steering Committee and the Regional Board. A series of final reports will be prepared that provide the information for the cost/ benefit analysis and NEPA/CEQA alternatives analysis required to develop the permanent solutions in the final TMDL implementation phase.