

Addendum #3 to
Quality Assurance Project Plan:
South Puget Sound Water Quality Study
Phase 2: Dissolved Oxygen

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**SUBJECT: ADDENDUM #3 TO QUALITY ASSURANCE PROJECT PLAN
FOR SOUTH PUGET SOUND WATER QUALITY STUDY
PHASE 2: DISSOLVED OXYGEN**

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The Washington State Department of Ecology (Ecology) began a study of low dissolved oxygen levels in South Puget Sound in August 2006 (Albertson et al., 2007). The purpose of this study is to determine how nitrogen from a variety of sources affects dissolved oxygen levels. The project includes data collection, model development and application, and a final report documenting findings.

This addendum to the Quality Assurance Project Plan summarizes additional field collection necessary to quantify the deposition of organic matter in four inlets of South Puget Sound. Sediment deposition rates will be simulated in the water quality model of South Puget Sound, and this information will be used to verify the model output. This program will provide additional information with which to understand and quantify nutrient and oxygen fluxes for the water quality model under development for South Puget Sound.

Experimental Design

Four sediment traps will be deployed, one in each of four inlets in South Puget Sound. The locations of the sediment trap stations are shown in Table 1. These stations were selected to correspond to the deepest locations that will be occupied for determination of sediment fluxes as described in Addendum #2.

Table 1. Location of sediment trap stations.

Location	Estimated Depth (m) @ MLLW	Longitude (dec deg NAD83)	Latitude (dec deg NAD83)
Carr Inlet	24	-122.661704	47.359847
Case Inlet	24	-122.802291	47.332125
Budd Inlet	24	-122.919373	47.127149
Eld Inlet	27	-122.946517	47.135396

The stations listed in Table 1 are each at a depth of approximately 25 meters MLLW. The sediment traps will be deployed at mid-depth, approximately 10 meters from the bottom to avoid collection of re-suspended material.

The sediment traps will be deployed for four, two-month periods starting in mid-September 2007 and ending in mid-May 2008. At the time of deployment, each cylinder will have 0.5 gallon of high salinity water (4% NaCl) added to create a density gradient to trap the particulates collected.

The sediment trap design and deployment descriptions are described in detail in Norton (1996). After retrieving the traps, personnel will cap and label the collected bottles and store them on ice in coolers at 4 °C pending processing.

Processing will begin within 24 hours of retrieval and will consist of first decanting off a portion of the overlying water and then centrifuging the remaining slurry to isolate the particulate fraction. Percent solids will be determined on an aliquot of the centrifuged solids to allow for determination of the total dry mass of material collected.

Aliquots of the sediment will also be sent to a laboratory for determination of the concentration of total organic carbon (TOC), total nitrogen (TN), and total phosphorus (TP) per unit of dry weight of sediment.

The fluxes of dry weight, TOC, TN, and TP will be determined by dividing the total mass of material by the surface area of the trap and the duration of the deployment.

Analytical Laboratory

Samples for determination of TOC, TN, and TP will be sent to the Manchester Environmental Laboratory (MEL) for management of contract lab services. Percent solids will be determined by MEL.

Intended Use

The measured sedimentation rates will be used to aid in calibration of sediment flux subroutines in the water quality model for the South Puget Sound project.

Quality Objectives

Measurement Quality Objectives

Field measurement objectives for sediment traps are difficult to establish. No replicate measurements are planned given the advisory nature of the data.

Representativeness

The locations were selected to represent sediment depositional fluxes in the locations of the measurement of sediment/water fluxes that are described in Addendum #2.

Completeness

The completeness target for this field study is 100%. Reasons why all data may not be collected include:

- Malfunctioning equipment.
- Severe weather that precludes seagoing vessels from sailing.

Comparability

The field crews that will conduct the surveys have prior experience in the deployment of sediment traps.

Sampling and Measurement Procedures

The sampling and measurement procedures are described in Norton (1996).

Quality Control

Each sediment trap will have two collection cylinders. Samples from each collection cylinder will be analyzed independently to evaluate variability. In the event that insufficient material is obtained to conduct all planned analysis, all cylinders from a station will be pooled.

Data Management Procedures

Global Positioning System (GPS) coordinates and nominal depths of each trap deployment will be reported along with any supplemental field information from field notebooks.

Audits and Reports

The results will be included in the final data report for the overall project, described in the project Quality Assurance (QA) Project Plan.

Data Verification

Field and laboratory results will be verified in accordance with the project QA Project Plan.

Data Analysis and Use

The study will follow the procedures for data analysis and use as outlined in the project QA Project.

Organization

The following responsibilities are in addition to those outlined in the project QA Project Plan:

- Greg Pelletier—Develop sampling design; analyze data.
- Dale Norton—Lead for deploying sediment traps; providing field information.
- Mindy Roberts—Develop QA Project Plan addendum; review data.

Project Deliverables and Schedules

Ecology will conduct data analysis and will include the results in the overall project data report, described in the project QA Project Plan for delivery in 2008.

References

Albertson, S. L., J. Bos, K. Erickson, C. Maloy, G. Pelletier, and M. Roberts. 2007. South Puget Sound Water Quality Study Phase 2: Dissolved Oxygen, Quality Assurance Project Plan. Washington State Department of Ecology Publication No. 07-03-101. www.ecy.wa.gov/biblio/0703101.html.

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