DRAFT
McKenzie Watershed Sampling and Analysis Plan

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Background

The McKenzie River is an important regional resource for providing over 250,000 people with high quality drinking water, producing hydroelectric energy, serving as a world-renown recreation and fishing area, and providing habitat to one of the last remaining native Bull Trout populations in the Pacific Northwest. Establishing a long-term watershed monitoring program to measure water quality trends and track potential impacts from global warming is critical to the protection of this regionally important watershed.

The McKenzie Watershed Council (MWC) has been involved in monitoring and tracking water quality in the McKenzie since 1996. This effort was centered on providing funding to the Oregon Department of Environmental Quality (DEQ) to collect water samples from seven monitoring sites six times a year (Figure 1). These samples were analyzed for 21 different water quality parameters. The Oregon DEQ used this data for evaluating trends as well as calculating an Oregon Water Quality Index score for each monitoring site for comparison with other rivers in Oregon.

In August 2005, the MWC Water Quality Subcommittee decided to redirect the funds that were supporting the DEQ's monitoring efforts to support a more proactive approach to watershed monitoring. The Oregon DEQ will continue to monitor three of the seven sites for statewide water quality trend analysis. This report describes the watershed monitoring approach recommended by the MWC Water Quality Subcommittee to better integrate existing monitoring efforts and provide a long-term mechanism to track water quality trends.

Overview of the Watershed Monitoring Concept

The potential of a collaborative long-term watershed monitoring program is significant in that it:

1) Establishes an interagency watershed monitoring system to collect data and information about the health of the river over the long term;
2) Acts as a clearinghouse for agency or organization specific monitoring data and information;
3) Establishes a GIS-based website to disseminate this information to the public, local schools, partner agencies and academia;
4) Produces an annual interagency state of the watershed report that pulls together all monitoring activities and data into a concise discussion that can be used to educate residents and other watershed stakeholders, and
5) Allows local, state and federal partners to identify watershed priority areas based on monitoring data and better collaborate on restoration and protection projects as well as establish pre- and post- project monitoring over time.

The purpose of this plan is to describe the sample numbers, locations, collection methods, analytical parameters, quality assurance, and other details associated with an interagency watershed water quality monitoring effort to collect useful data regarding the long-term health of the river. However, it is also important to articulate how this data will be managed and used to evaluate trends and support existing monitoring, restoration, and protection efforts.

A number of monitoring projects are currently underway in the McKenzie Watershed. In developing a watershed sampling program that replaces and enhances the previous DEQ effort, it is important to understand some of the basic information associated with these other monitoring efforts. A short-list of these projects includes:

- MWC macro invertebrate monitoring program;
- Mohawk water quality monitoring program;
- DEQ's scaled back water quality monitoring program associated with the Oregon Water Quality Index;
- DEQ TMDL study and implementation efforts;
- EWEB's Drinking Water Source Protection Monitoring Program that is currently focused on storm event monitoring to assess impacts from nonpoint sources of pollution;
- EWEB's water quality studies associated with Carmen-Smith FERC relicensing efforts;
- Army Corps of Engineers Metro Waterways study;
- Army COE Cougar Dam Temperature Control Tower operation study; and,
- Research data from OSU & USFS regarding McKenzie springs and impacts from global warming.

Ideally, the MWC watershed monitoring program would track these efforts and incorporate this information into an annual discussion of the water quality data being collected as part of this interagency sampling effort.

Sampling Approach

This section provides an overview of the proposed sampling approach for watershed water quality monitoring. Water quality monitoring will include both in situ collection of physical water quality parameters as well as grab samples collected for offsite laboratory analysis.

Physical Water Quality Parameters. A hand-held real-time multiprobe water quality meter will be used to monitor physical water quality parameters at each monitoring site prior to the collection of grab samples for offsite analysis. The probe end of the multiprobe instrument will be lowered from the bridge at the designated monitoring sites and allowed to come to equilibrium in the flowing water. Measurements of temperature, dissolved oxygen, pH and conductivity will be made using the multiprobe, with the results recorded on a field record for that monitoring day and site. Turbidity will be monitored in the field using a portable (field) turbidimeter (nephelometer). Water samples for turbidity measurements will be collected using the peristaltic pump and dedicated tubing arrangement identified below for grab sample collection.

Water Chemistry Samples. Grab water samples for offsite analysis will be collected off bridges by sampling teams using a peristaltic pump with dedicated tubing for each monitoring site. The pump will be run for approximately 5 minutes prior to collecting a water sample. Grab samples will be collected directly into prepared laboratory containers, properly labeled, and shipped to a commercial lab for analysis.

All samples will be analyzed by a commercial laboratory for the following:

- Total and dissolved metals (arsenic, cadmium, chromium, copper, manganese, nickel, lead, and zinc);
- Nutrients (nitrate-nitrogen, nitrite-nitrogen, ammonia, total kjeldahl nitrogen, ortho phosphates and total phosphorus);
- Bacteria (total coliform, e. coli)
- Chlorophyll-a;
- Total suspended solids;
- Total organic carbon; and,
- Chemical oxygen demand.

Field parameters that will be measured using a hand-held multi-probe and nephelometer at each monitoring location include:

- pH;
- Temperature;
- Dissolved oxygen;
- Conductivity; and
- Turbidity.

The differences between parameters that were analyzed by DEQ and the ones proposed as part of the MWC monitoring efforts include: 1) removal of alkalinity, biological oxygen demand, pheophytin-a, and total solids from the analysis list; and, 2) adding total and dissolved metals and total coliform.

Sample Number, Type, and Location

A total of ten monitoring stations will be sampled six times a year (i.e., once every other month). These monitoring stations include (Figure 2):

- McKenzie River @ Frissell Bridge
- McKenzie River @ Brutgers Bridge (road to Cougar Dam)
- South Fork McKenzie River @ bridge below Cougar Reservoir (road to top of Cougar Dam)
- South Fork McKenzie River @ bridge upstream of Cougar Reservoir near campground
- Blue River @ Hwy 126 bridge
- McKenzie River @ Goodpasture Bridge
- McKenzie River @ Hendricks Bridge
- McKenzie River @ Hayden Bridge

- Mohawk River @ Hill Road Bridge
- Mohawk River @ Wendling Road Bridge (Marcola)

A grab water sample will be collected at each monitoring station (10 water samples) for analysis by a commercial laboratory. Samples will be collected directly into laboratory prepared containers using a peristaltic pump with dedicated tubing and placed on ice.

Decontamination of sampling equipment is limited since all sample intake tubing and peristaltic pump internal tubing will be new material dedicated to each monitoring location and replaced for each sampling event. Samples will be collected directly into clean lab prepared and certified sample containers. The only decontamination between sampling events will be the stainless steel strainers used to provide weight to the intake tubing during sample collection. Decontamination procedures will be as follows:

- Alconox/water solution wash using appropriate brushes;
- Tap water rinse;
- DI water rinse

Quality Assurance/Quality Control Samples

The quality assurance (QA) objectives for this project are to develop and implement procedures that will ensure the collection of representative physical and chemical data of known and acceptable quality. Please refer to EWEB's *Lower McKenzie River Watershed, Stormwater and Urban Runoff Monitoring Plan (November 2001)* for additional detail on the quality assurance/quality control project plan (Section 7.0).

Comment [cwa1]: I looked at NAWQA protocols. They don't do a final OBW rinse. But be sure your methanol has evaporated before using equipment for another sample. Otherwise you might actually pull sorbed pesticides off sediment particles and increase dissolved concentrations. If you don't have time for drying, then use an OBW rinse.

A total of two quality control (QC) samples will be collected during each sampling event to assist in identifying potential problems resulting from sample collection or sample processing in the field. QC samples will include matrix spike/matrix spike duplicates (MS/MSD) and a field duplicate.

Matrix Spike/Matrix Spike Duplicate

Matrix spike samples will be collected from one location where collection of extra sample volume is not a problem. An extra set of lab bottles will be collected for metals and nutrients to provide the lab with additional volume to spike samples at the lab. It should be noted on the chain of custody form which sample is designated as a matrix spike and matrix spike duplicate. The samples will be shipped to the laboratory with instructions to spike. This information is important to allow evaluation of laboratory analyte recovery rates and precision.

Duplicate Samples

One duplicate sample will be collected for each sampling event by splitting a grab sample among lab containers and providing a unique sample number and time. Duplicate samples are used to access analytical variance as well as field collection methods.

Data Management and Reporting

The Eugene Water & Electric Board (EWEB) will take responsibility for managing the analytical and field data generated from the MWC watershed monitoring program. EWEB and Lane

Council of Governments (LOCG) have developed a robust SQL database that has managed the vast amount of monitoring data associated with EWEB's Drinking Water Source Protection Program over the past three years. Recently a web-based application was developed that allows outside access to the data for query, making maps, and downloading (see www.mckenziewaterquality.org). This application can serve as one way to make sure the data is disseminated to all the partners in this watershed. EWEB and LCOG will continue to support and enhance this web application over time as more users provide feedback and articulate additional needs.

EWEB will develop an annual watershed monitoring report that summarizes the results for the year, evaluates water quality trends, and ties this data to other water quality monitoring efforts in the watershed to provide a more comprehensive picture of the watershed. GIS analysis and watershed modeling will be used as needed to illustrate water quality trends, potential problem areas, and predict future trends based on land use trends in the watershed. It would be possible to include other information in this report such as location and type of restoration efforts and how these relate to water quality.

Schedule

The following is a tentative schedule for preparing for and implementing the watershed water quality monitoring effort:

Complete Sampling & Analysis Plan	November 9, 2005
Order Necessary Equipment for Sampling	November 14, 2005
Input Monitoring Sites into LCOG Database	December 1, 2005
Coordinate Sample Collection Event	December 19, 2005
First Sample Collection Event	January 9, 2006
Second Sample Collection Event	March 13, 2006
Third Sample Collection Event	May 8, 2006
Fourth Sample Collection Event	July 10, 2006
Fifth Sample Collection Event	September 11, 2006
Sixth Sample Collection Event	November 13, 2006
Draft Annual Report	January 15, 2007

Estimated Cost

Analytical cost = $315.00/sample x 11 samples x 6 events = $20,790.00

Equipment Costs = $3,996.00

- Peristaltic Pump = $725.00
- YSI Multi-Probe = $2,500
- Internal Pump Tubing (50 feet) = $221.00
- Sample Intake Tubing (500 feet) = $200.00
- Stainless Steel Strainers (10) = $350.00

TOTAL COST = $24,786.00