

DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
Quarterly Report

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SUBJECT: White River pH TMDL, Quarterly Report #2: December - April 2013
Project Code: 12-015

Introduction

Several areas of the White River are on Washington State's list of polluted waters (303(d) list) for pH and require a cleanup plan, or total maximum daily load (TMDL). Past studies have documented excursions of the upper pH criteria (8.5) and suggest these conditions are the result of nutrient inputs to the river.

To develop a TMDL for the river, the Washington State Department of Ecology (Ecology) conducted a series of water quality surveys between August and October of 2012. Ecology will use this data to develop and calibrate a numerical water quality model of the river to simulate continuous pH and other water quality parameters.

This quarterly report summarizes the data quality review, analysis, and preliminary model setup activities to date.

Progress to Date

Communications

During this quarter the project team:

- Requested, and received, quality control data files from USGS for their water quality stations in the watershed.
- Discussed timeline for obtaining quality reviewed data from the Muckleshoot Indian Tribe, for temperature and water quality data collected within the Muckleshoot reach of the river. Reviewed data will be received by the end of May 2013.
- Received contract laboratory results and case narrative for carbon and nitrogen in periphyton samples collected for the study. All sample results for the study have now been received.
- Met with Joel Massmann, the technical lead representing the Muckleshoot Indian Tribe, to discuss upcoming stages of model development and an appropriate format for collaboration during development.

Data Collection

During this quarter the project team:

- Did not collect additional data. Data collection as scheduled has been completed, however, Ecology would like to propose additional, supplemental data collection for early October 2013, including:
 - An additional dye study to measure time of travel at a lower flow range (preferably 300-500 cfs).
 - An additional seepage survey to collect flow measurements at a lower flow range. This would be useful for refining the estimated quantity of flow attributable to unmeasured non-point sources and groundwater.

Provisional Results

No provisional data is included in this report; however, specific provisional results may be available upon request.

Data Quality Review and Modeling Progress

During this quarter the project team:

- Completed data quality review of continuous water quality and temperature results. All data has been downloaded and entered into project databases. Preliminary adjustments and quality ratings have been completed.
- Processed periphyton foil area and calculated areal biomass results.
- Obtained daily self-monitoring results from the Buckley and Enumclaw DMR submittals during the study period.
- Completed the following tasks related to development of shade inputs to the model:
 - Created stream centerline using a combination of:
 - For RM 28 to 24 and RM 7.6 to 0.1, manually digitized using 2011 orthophotos.
 - For RM 24 to 7.6, used GPS coordinates collected during river float conducted in August 2012.
 - Digitized near stream disturbance zone (NSDZ) for right and left banks using 2011 orthophotos. Calculated channel width based on NSDZ using TTools.
 - Calculated stream elevations and topographical shading using TTools and the state Digital Elevation Model.
 - Began digitizing and coding vegetation polygons from 2011 orthophotos (task is approximately 50% complete). Polygons are being coded with tree heights and densities based on:
 - Limited measurements collected with a laser range finder and visual observations from Ecology's 2012 vegetation survey;
 - Canopy elevations compiled by Northwest Hydraulic Consultants from LIDAR data collected within the watershed.
 - Visual interpretation of 2011 orthophotos.
- Compiled, formatted, and entered into the model the following data:
 - Continuous flow data from USGS.
 - Air and dew point temperatures collected by Ecology.
 - Wind speed and solar radiation data from WSU-Puyallup.
 - Cloud cover data from SeaTac Airport.
 - Boundary condition (RM 28) temperature and continuous water quality data collected by Ecology.
- Completed a preliminary, 3-day, repeating diel QUAL2Kw simulation for August 8th, 2012 (dye study) using channel geometry and flow data. This simulation provides an un-calibrated estimate of travel time to compare to observed travel times collected during dye study.

Project Schedule and Upcoming Tasks

Based on the project timeline, the project is currently on schedule, with model setup and calibration scheduled to be completed by 12/15/2013. The primary tasks in the upcoming quarter will be:

- Calibrate the model geometry to match the predicted to the observed travel times using scaled multipliers on the depth and velocity coefficients.
- Complete coding of vegetation polygons and use TTools to extract vegetation height and density for the model segments.
- Use Ecology's shade model to calculate a continuous diel shade input for the QUAL2Kw model.
- Complete model setup including constructing, regressing, or interpolating continuous inputs from discrete datasets.
- Begin calibrating model to observed temperature data.

The next quarterly report will be available by 7/31/2013 and will cover progress during the period of 5/1/2013 to 7/31/2013.