DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
Quarterly Report

October 31st, 2013

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FROM:	Greg Pelletier, Project Manager, Environmental Assessment Program Nuri Mathieu, Principal Investigator, Environmental Assessment Program
THROUGH:	George Onwumere, Unit Supervisor, Environmental Assessment Program
SUBJECT:	White River pH TMDL, Quarterly Report #4: August - October 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 criterion (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 reviewed continuous temperature data from the Muckleshoot Indian Tribe for one mainstem White River location and two tributaries.
- Received a request for provisional temperature data for the White River near Mud Mountain Dam from Nancy Brennan-Dubbs of US Fish and Wildlife, via the Muckleshoot Tribe. The provisional data was packaged and sent in October 2013.
- Coordinated with the Muckleshoot Tribe to conduct a second dye study in late October 2013. Coordination included conducting a lab experiment using Rhodamine dye and a piece of netting provided by the Tribe. The results of the experiment confirmed that fishing nets should not be discolored or damaged during the study.
- Learned of the departure of Cindy James from the project and from Ecology's Water Quality Program. Cindy has accepted a new position with Ecology's Air Quality Program. Congratulations Cindy, best wishes for your new endeavor.

Data Collection

During this quarter the project team:

- Conducted a second dye study on October 28-29th to make-up for a dye study that was cancelled in 2012. The 2012 dye study was cancelled due to high flows. The 2013 study was conducted at a relatively steady flow of 600 cfs, with all downstream dye peaks captured successfully.

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 the 9 separate shade models and entered shade outputs into QUAL2Kw model
- Used HEC-GeoRAS extension for ArcGIS 10.1 to import and georeference geometry from HEC-RAS models.
- Calibrated QUAL2Kw model for temperature. Adjustments included refining GW temperature estimates, switching to Brutsaert longwave emissivity model, and increasing hyporheic flow.
- Created excel macro to match predicted and observed temperature outputs and autocalculate RMSE and bias by parameter and reach, within QUAL2Kw.

- The calibrated temperature model is within 0.5 degrees RMSE at all observed sites.
- Upgraded model to newest version of QUAL2Kw beta.
- Simulated dye releases within the model using Greg Pelletier's new 'Instantaneous Sources' sheet, which allows the user to 'inject' a quantity of any state variable at an exact time (as opposed to over the course of an hour, as in the previous versions)
- Entered additional diel observed data in to the model.
- Began manually adjusting rates and constants to test sensitivities.
- Refined excel macro to include summary pivot tables of continuous data and match synoptic nutrient data. The new macro calculates error statistics and then updates an overall fitness statistic that is used by the auto-calibrate (genetic algorithm) function of the model.
- Performed initial, diagnostic auto-calibration with 1,000 total runs. The results will be used to set-up the next auto-calibration batch.

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:

- Finish calibration of model to nutrient, water quality, and periphyton data.
- Perform sensitivity analysis of the initial model calibration.
- Review initial calibration results with TMDL drafting committee.
- Begin set up of model scenarios.

The next quarterly report will be available by 1/31/2014 and will cover progress during the period of 11/1/2013 to 1/31/2014.