Evaluating Model Accuracy for Fish Habitat in the Weber Watershed

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Objectives

- Compare measured stream habitat data with modeled fish habitat predictions in the Weber watershed.
- Average monthly streamflow, stream temperature, gradient, and geomorphic condition were intersected in a GIS database to model aquatic habitat (Kraft and Null, In prep).
- Quantify error in the model by comparing modeled values to collected data.
- Represent data spatially to determine possible causes for high error values.
- Identify sites and set protocols for continuing data collection.

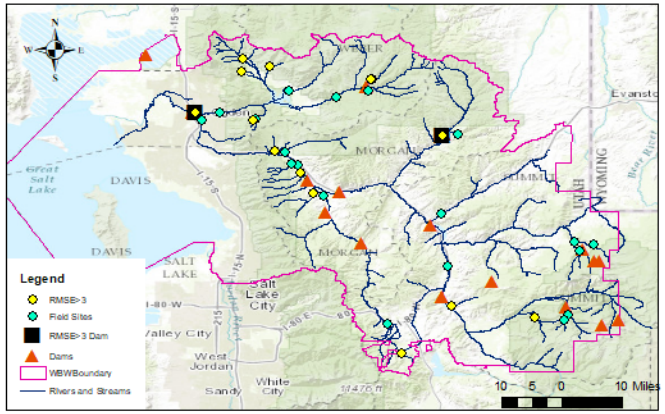

Figure 1. Field sites in the Weber watershed.

Methods

- Identified areas with river access using GIS and land ownership records.
- Measured discharge, temperature, specific conductance, and dissolved oxygen at each site.
- Matched measured site locations to areas in the GIS model.
- Calculated root mean square error (RMSE), percent error, mean bias, Nash Sutcliffe efficiency (NSE), and correlation coefficients to compare modeled to measured values.
- Evaluated sites with high error values spatially in GIS .

Figure 2. YSI probe used to measure temp, DO, and TDS (left) in use (right)

Results

- Modeled versus measured stream temperature RMSE was approximately **3.17°C** for June and **2.45°C** for May, with **24** and **8** percent error respectively.
- Discharge values when compared resulted in an RMSE of **71.64 cfs** for June and **221.6 cfs** for May, with **52** and **49** percent error respectively.
- NSE was **-44.02** for June and **-90.52** for May discharge.
- Correlation coefficients were determined for each parameter and are shown on figures 3 and 4.

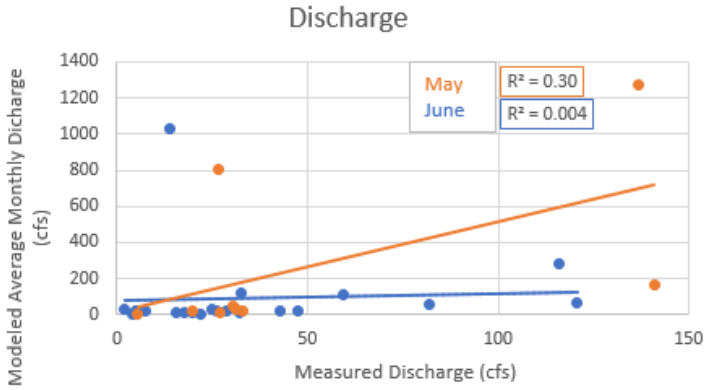

Figure 3. June modeled average monthly vs measured streamflows.

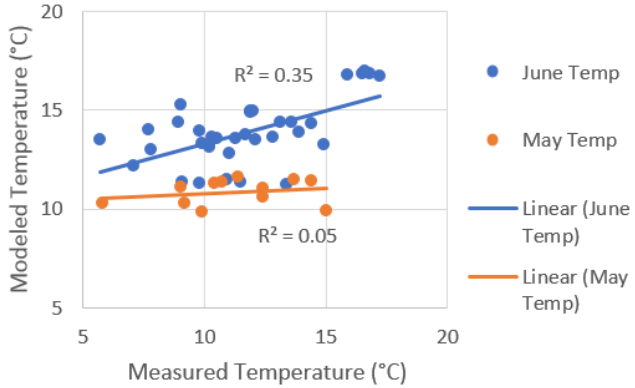

Figure 4. Modeled average monthly vs measured stream temperature.

Discussion

The modeled and measured temperatures differed by more than 3°C at 12 sites, where at others they were reasonably close. The data were plotted in ArcMap along with a shapefile showing dam locations. Only 2 of 12 sites with a RMSE greater than 3°C were within 1 mile of a dam (figure1). Potential causes for the temperature discrepancy will be an area of future study.

Discharge measurements to modeled estimates produced a negative NSE suggesting that it would be preferable to take an average of the measured values rather than use the model to predict discharge.

The model predicts average monthly conditions, whereas we compared point data for just one year with higher than average snowpack. We anticipate that model fit will improve with ongoing data collection.