

Preliminary Comments on Segmentation by Jack Harrison, HyQual

April 11, 2013

*****Use of Model**

A primary question that should be discussed before deciding how to set up the model is ... how will the model be used?

>>>One option is to setup the model to generate relationship between phosphorus and periphyton. A simple unlinked model could work fine for this.

>>> Another option is to setup the model to run scenarios. A linked model may work better for this.

The following are my preliminary comments on a discussion document (*excerpts are in italics*) prepared by HDR for discussion by the Aquatox Model Workgroup:

Date: April 10, 2013

Subject: Lower Boise River Aquatox Model Segmentation

RE: April 9, 2013 Model Work Session

- *Evaluate the pros/cons of a linked vs. un-linked model and identify what the logical segments for either scenario might be (as part of this evaluation, perhaps look at the 13 segment linked vs. the 4-segment unlinked to determine the differences in how boundary conditions, inputs, etc. are utilized in each).*

The two options for model linkage are linked and un-linked. Considerations for linkage of model segments include:

1. ***Boundary Condition Definition:*** *Linked model requires only the upstream boundary condition; whereas unlinked model requires boundary conditions for each segment*

For Linked model also will also need boundary conditions for: **Unknown inflows** (including groundwater and minor tributaries, which will vary by reach); **7 major tributaries** (shown as Mill, Mason, 15-Mile, Hartley, Indian, Conway, and Dixie); 5 WWTF inflows

Boundary conditions include time series of flows and **concentrations for state variables** to include: phosphorus (SRP), nitrogen (NO₃, NH₄), TSS, pH, DO, Temperature, algae (multiple types?), organic matter (??), other??

2. ***Model Setup Complexity and Calibration:*** *Unlinked model analysis is only of the processes occurring in the segment; whereas the linked model needs to represent fate processing in upper reaches*

For linked model would need set up: 1) physical channel “representation” that averages conditions over relatively long reach; 2) initial conditions, 3) time series for all diversions, 4) ??

3. ***Ease of Scenarios:*** *Linked model supports scenario simulations with modifications to tributary and discharger inputs; whereas unlinked model requires creating a methodology external to the model for redefining mainstem river boundary conditions*

For linked model, we would need to consider adjusting some or all boundary conditions: Mainstem upstream (1), tributaries (7), unknown (?), WWTF (5) and ??.

Also, understanding the model results and implications may be somewhat confusing because it may be difficult to know what is controlling periphyton growth.

For unlinked model, would “adjust” the boundary conditions of the 4-Segments to “represent potential changes” in water quality conditions. This would be a more straight forward assessment of how “individual” parameters or conditions control periphyton growth. This could then be “linked” back to the mass balance model for scenario analyses and setting of allocations.