

To: Weiss Bypass Group
From: Henry Mealing

RE: Proposed method for evaluating Weiss Bypass flow scenarios

The HEC-RAS model has been calibrated and the Weiss Bypass Group (WBG) has submitted various flow scenarios to run through the model. If the WBG is amenable to accept the use of just the HEC-RAS visual model outputs and we can reach agreement on flows, then no additional analysis will be needed. If the WBG can't reach agreement then the group will need some way to evaluate the "biological value" of each flow scenario investigated. The results of this analysis will be essential for balancing between various flows and for writing the EA. This memo presents a proposed method for evaluating each of the various flow scenarios.

Habitat Parameters to Analyze

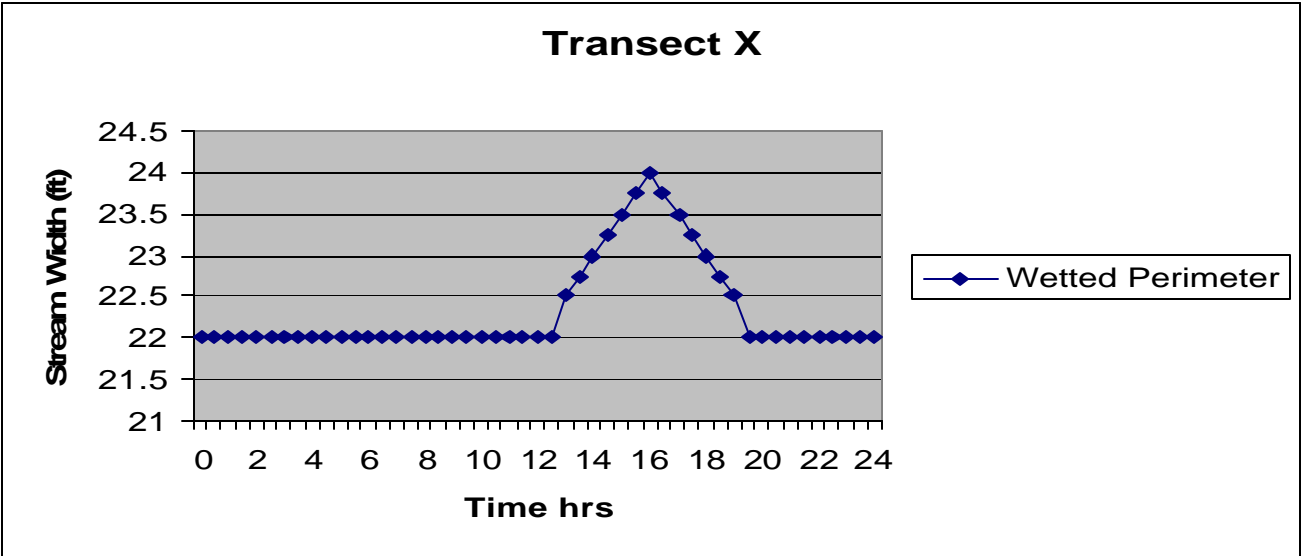
Typically, four habitat parameters are deemed important in establishing minimum flows: substrate type, wetted perimeter, depth of water, and velocity of water. Since substrate type is fairly consistent throughout the Weiss Bypass (gravel and sand), we can essentially drop this parameter and focus on wetted perimeter, depth, and velocity. The model output for each of the flow scenarios should include transect data for each of these three parameters. The HEC-RAS model can give us discreet wetted perimeter changes but will only yield average depth (and water surface elevation) and velocity at this time. However, this information should be sufficient to evaluate changes in habitat with changing flows.

Selecting Transects to Analyze

Rather than analyze every transect for each flow scenario, we should select specific transects that the WBG believe are representative of various habitats. The original 15 bypass transects could serve as a basis for this discussion, since all members of the WBG observed these transects and agreed that they were representative of all habitat types in the bypass. To further narrow the number of transects to analyze, the information (pictures, observations, notes, and judgment) that were collected during the Weiss Bypass trips would be used. Several of the transects represent the same type of habitat and shouldn't be needed for the analysis – especially adjacent transects in similar habitats. The WBG will also need to select transects that represent various habitat types and weight them accordingly. For example, most of the upper bypass habitat consists of pools with a few riffle areas, so the "pool" transects may represent 70% of the overall bypass habitat and "riffle-run" transects may only represent 30%.

Wetted Perimeter

This analysis will show how changes in spill and backflow yield a corresponding measurable change in the amount of wetted habitat (width of stream). This analysis will demonstrate how some transects respond very quickly and some respond very little to flow changes at the spillway or with a backflow.



Analysis of Depths and Velocities

Analysis of depth and velocity of water will be related back to a range of “preferred” depths and velocities based on information from the Weiss Bypass Fish and Mussel spreadsheets. For this analysis, the WBG will select a range of depths and velocities that will be beneficial for improving aquatic habitat. The WBG will establish large overall ranges or create narrower subsets of ranges for Pool species and Riffle/Run species separately. Plotting model run data over a generation cycle will depict shifts in various habitats with changes in the generation wave. The attached chart depicts an “expected” data set generated from HEC-RAS. Spillway releases should result in some average depth and velocity baseline for a certain time period of the day (14 hrs in this example). These depths and velocities will either be within or outside of the “preferred” range. As the generation wave moves up the bypass, depths will increase and velocities will slow down or actually reverse. By plotting the generation wave data, the influence of backflows on “preferred” ranges can also be observed. The example presented here shows depths are always acceptable but velocities are unacceptable for about 1.5 hours during the generation cycle.

