Evaluation of the Hydrologic Effects of the Trestle Pool Project

We are conducting a stage/discharge study to provide pre- and post-project water levels at the Trestle Pool over a wide range of flows. The old trestle abutments and center pier currently act as a pinch point in the river. At higher flows, the water piles up above the pinch point which slows it down. This reduced velocity results in bed load deposition in this area. This deposition results in a "filling in" of the river channel. With the channel filled in, high flow events tend to cut into the riverbanks rather than scouring the existing channel causing more erosion and the formation new channels. Note that the river is heavily braided above the project site. The project is designed to facilitate proper bedload transport by eliminating the pinch point. We will remove the center pier and the south abutment and re-establish a flood plain on the south side of the river by excavating a portion of the old railroad grade. There are also additional aspects of the project that will improve habitat for fish and other aquatic organisms.

We anticipate that the water levels exceeding bankfull at the project site will increase slower relative to increases in discharge when the project is complete since the existing impediment to velocity will be gone and water will have the freedom to spread out horizontally at these higher flows. This is designed to eliminate the piling up of water and the associated bedload deposition above the pinch point that is occurring prior to its removal.

We installed a staff gauge on the north abutment of the trestle to monitor water levels at the project site (Figure 1). There is also a USGS gage located a short distance downstream of the project site. We developed a simple linear regression model using natural log-transformed discharge measurements at the gage to predict the natural log transformed gage readings (i.e., water levels) at the project site. The log transformations were useful for the regression because the relationship using the original units was slightly curvilinear, but the transformations made the relationship linear.

Figure 1. Staff gage installed on the north abutment at the Trestle Pool.

To date, we have collected pre-project data from 10/28/22 through 4/2/23 that ranged from 425 to 3140 ft^3s^{-1}. Note that the range of flows occurring during the monitoring period never exceeded bankfull. The summer minimum baseflow of 185 cfs at the Lighthouse Hill Reservoir was scheduled to begin 1 May but flows have remained higher than that with the amount of water in the system.

The discharges at Pineville did an excellent job of predicting water levels at the Trestle Pool over the range of flows that occurred during the pre-project monitoring period (R^2=0.997, p<0.001, 92 df, Figure 2).

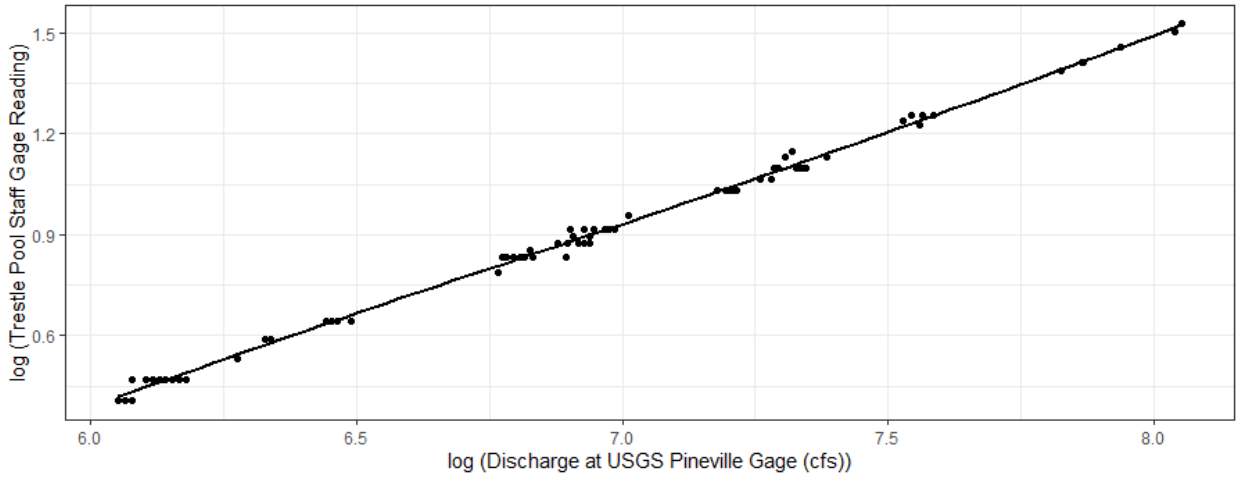

Figure 2. Regression plot for the pre-project predictions of water levels at the Trestle Pool at various levels of discharge at the USGS gage at Pineville (R^2=0.997, p<0.001, 92 df).

As expected from the results of the regression model, the discharge measurements do an excellent job of predicting the water levels at the Trestle Pool over the range of flows that occurred during the pre-project monitoring period (Figure 3). Also note the curvilinear nature of the relationship of the results back transformed to the original units.

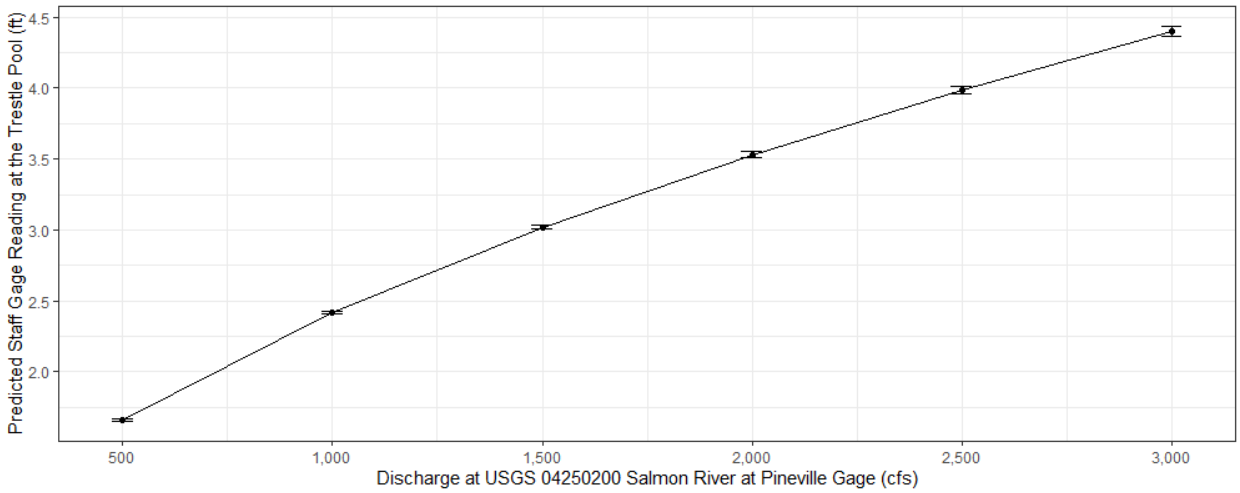

Figure 3. Pre-project regression predictions of water levels at the Trestle Pool based on the discharge at Pineville. The error bars represent 95% confidence intervals, and the axis labels are back transformed to the original units.