Salmon River Trestle Pool Stage Discharge Report

We are conducting a stage/discharge study at the Trestle Pool to provide pre-, mid-, and post-project water levels over a wide range of flows. The project consisted of removing a center pier from the river channel, demolition of the south abutment wall to bankfull elevation, construction of a flood plain, and installation of a rock vane. A staff gage was installed at the site and simultaneous readings of the staff gage and the discharge at the USGS Pineville gage, which is located downstream of the project, were taken to evaluate the influences of the project on water levels at the site for each phase of the project (Figure 1).

Figure 1. Pre-project view of the center pier and south abutment at the Trestle Pool (left, photo taken from the top of the north abutment) and the staff gauge installed on the north abutment (right).

The pre-project phase represents the Trestle Pool with both abutments and the center pier in the middle of the channel intact. Our annual in-water work season was limited to late-June when we determined that the emergence of wild Chinook salmon (*Oncorhynchus tshawytscha*) fry was complete, through the end of August when large numbers of anglers began arriving at the river for the fall salmon fishery. The mid-project phase represents the period following the work accomplished in 2023 which included removal of the abutment on the south side of the river, construction of the flood plain, and the removal of the center pier (Figure 2). Chronic high-flow conditions prevented work in the summer of 2024. The post-project phase represents the period following the addition of a rock vane which was installed in 2025.

Linear regressions of natural log transformed discharge data from the Pineville gage and the staff gage at the Trestle Pool revealed that the discharge measured at Pineville was an excellent predictor of the water levels at the Trestle Pool during each phase of the project, and for all phases combined (all R^2s > 0.97). We also tested for pair-wise differences among the slopes of the trend lines for the 3 phases of the project using the R package “emmeans” (Lenth and Piaskowski, 2025).

Figure 2. Trestle Pool central pier removal and the south abutment following wall removal (left), and the completed vane and floodplain (right). Note that most of the vane is submerged at this flow and the flow is being directed back to the center of the channel. Both photos were taken from the top of the north abutment wall.

The subtle differences in the slopes for the three phases of the project are shown in Figure 3. Results of the significance tests are pictured in the inset graph. Water levels in the Trestle Pool rose quickest (i.e., had the steepest slope) during the pre-project phase because that was when there was maximum channel constriction. The slope was significantly steeper than those from both the later project phases ($p < 0.001$ and $p < 0.02$, for the pre-mid and pre-post comparisons, respectively). The mid-project phase represented the least constricted channel, lacking both the center pier and the vane which resulted in the slowest rise in water level per increase in discharge. Although less than the slope of the post-project phase which reflected the addition of the vane, the difference in slopes between the mid- and post-project phases was not significant at the 95% level ($p = 0.087$).

We can conclude that the project has resulted in a less constricted channel during less than bankfull flows, the vane has relieved erosion potential on the outside of the bend (south side as the river enters the pool) by directing flow back toward the center of the channel, and the increase in water level rise relative to discharge will be greatly diminished at flows above bankfull attributable to the reconnection with the floodplain, although we lack above bankfull data to demonstrate that aspect. All of this will contribute to improved sediment transport by removing the pinch-point and associated bedload deposition above the Trestle Pool that occurs at higher flows and reducing downstream erosion by reducing the depth and velocity of water exiting the pool. Removal of the center pier also eliminated a navigation hazard.

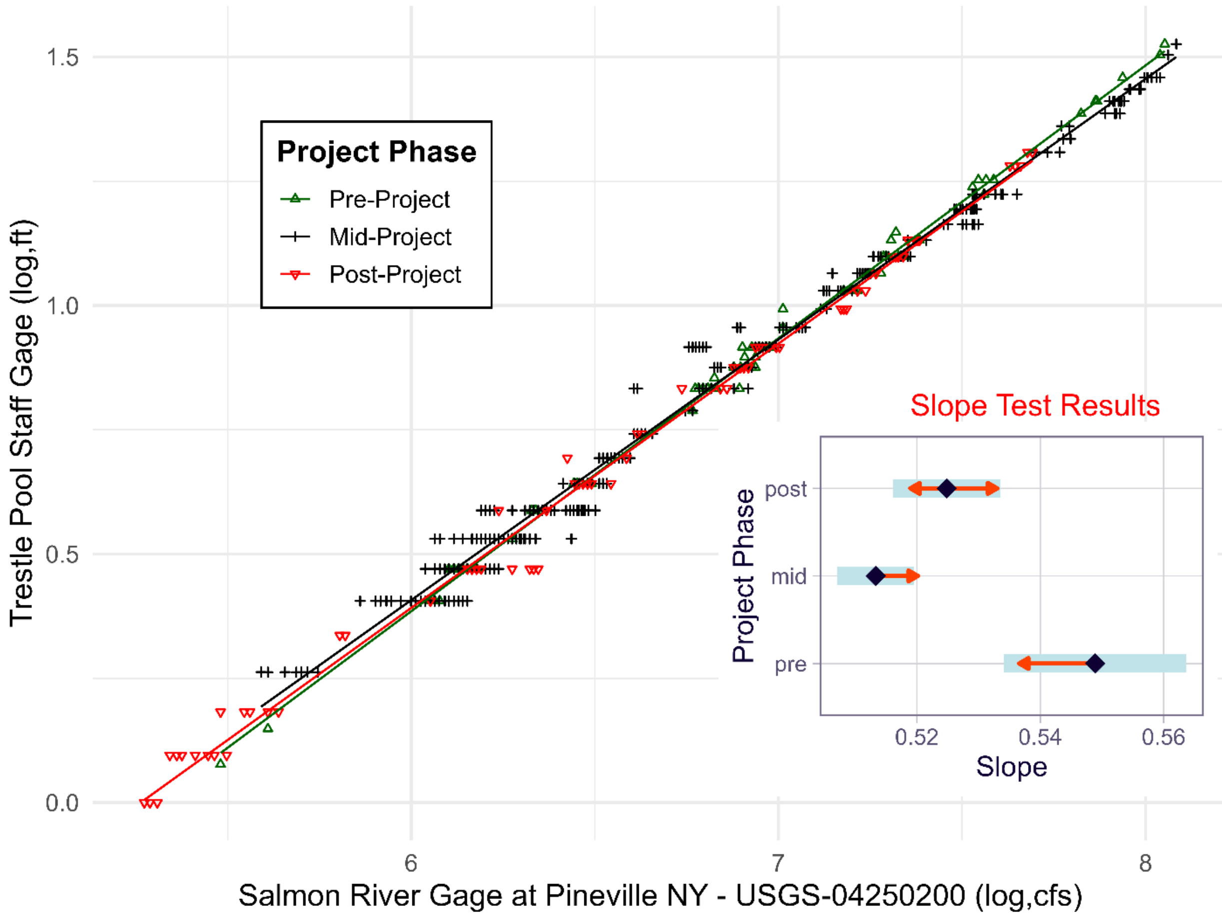

Figure 3. Regression plot of the Pineville gage discharge and Trestle Pool staff gage readings for the 3 phases of the project (all R^2s are >0.97). Note that both variables were natural-log transformed to make the relationship linear. The inset plot shows the results of the slope tests. Non-overlapping red arrows indicate significant difference at the 95% confidence level.

References

Lenth R, Piaskowski J (2025). _emmeans: Estimated Marginal Means, aka Least-Squares Means _. R package version 2.0.1, <https://CRAN.R-project.org/package=emmeans>.