Fact Sheet

Work in the Wet Versus Work in the Dry for Stream Restoration: A Comparison of Downstream Turbidity and Sediment Loads

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Research Question:

Stream bank erosion is a primary contributor to sediment loads during high flow events, with suspended sediments negatively impacting aquatic ecosystems, drinking water treatment, and overall stream health. While stream restoration is widely used to reduce erosion and improve water quality, the construction process itself can temporarily elevate turbidity and sediment levels—particularly when in-stream work occurs within the wetted channel. Maryland regulations typically require stream flow diversion during construction to minimize these impacts, though there is limited empirical evidence supporting this preference. This study evaluates whether working in the dry produces meaningfully lower turbidity and sediment loads than working in the wet. Three hypotheses guide the analysis: (H1) Turbidity will be higher during active Wet Construction than Dry Construction (H1A), but the total time turbidity exceeds Maryland's 150 NTU standard will be similar due to the accelerated pace of Wet Construction (H1B); (H2) The absolute difference in total suspended sediment load between the two construction methods will be less than 25% of their average; and (H3) Sediment loads from either construction method will be significantly lower than the load generated by a 1.25-year storm event. Site selection, monitoring design, and data analysis were informed by previous studies and tailored to account for watershed size, impervious cover, and baseflow conditions, with the goal of contributing site-specific evidence to a broader body of research on best practices in stream restoration construction.

Key Products and Results:

- **Turbidity Levels**: Construction in the Wet consistently resulted in higher turbidity levels compared to working in the Dry. The average turbidity levels during Wet construction were significantly higher at all study sites, with exceedances of Maryland's 150 NTU standard occurring more frequently.
- **Sediment Load**: Total suspended sediment loads were substantially higher for Wet construction compared to Dry construction, indicating a meaningful difference in sediment release.
- **Comparison to sediment load from Storm Events**: Despite increased turbidity and sediment load from Wet construction, the total sediment released during restoration activities at two of the sites was considerably less than what would be generated by a 1.25-year storm event. However, the third site produced more sediment load than a 1.25-year storm. This difference may be explained by key characteristics that set the third site apart: it had a smaller drainage area, lower baseflow, and a steeper stream gradient.

The results of this research are a useful contribution to a growing number of studies that in aggregate may allow for a more complete understanding of the impact of stream restoration construction with and without flow diversion measures. At the three sites studied, stream restoration construction in the wet showed an increase in both turbidity and sediment load when compared to construction in the dry. Further studies may consider evaluating the persistence of higher turbidity and sediment load downstream since this could have important effects on stream health and aquatic life. Additionally, studies may seek to evaluate more directly the differences in turbidity and sediment load with stream size, baseflow rates, and slope. Stream restoration construction in the Chesapeake Bay watershed will benefit from greater understanding of the impacts on water quality due to construction methods.