

Project No: WRI-82:
Project Title: In-Stream Turbidity and Suspended Sediment Changes Following Improvements to a Forest Road and Harvesting

Recipient: West Virginia University

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Funding
USGS 29,496
Cost-share 60,278
Total Project Value 89,774

Project Status: Active

Abstract

Most research examining the effects of forest road construction on water quality in the East, particularly the central Appalachians, has involved the careful use of best management practices on soils that are not highly susceptible to erosion. Little work has been done to determine how water quality is affected by road construction and harvest that use lower levels of care that are commonly observed, especially on private land. Because privately owned forest lands make up more than 80 percent of forests in West Virginia, demands for wood extraction are increasing, and the most productive sites in West Virginia are on highly erodible soils, it is important to understand how typical road construction practices used in forestry operations will affect suspended sediment and turbidity levels.

A forest road was pioneered through a watershed in summer 2002. It was left in poor condition from fall 2002 through mid-summer 2003. In mid-summer its condition was improved through the installation of more and better water control features and sediment traps, seeding of the fill slopes and cut banks, and graveling of the driving surface after water quality problems were found and reported. In the spring summer 2005, approximately 58 percent of the roaded watershed area was harvested by a combination of conventional harvesting and cable yarding. Approximately 53 percent had a heavy two-age harvest that approximated clearcutting and 5 percent was thinned relatively lightly. Water samples were collected with automatic samplers near the mouths of the roaded watershed and a nearby undisturbed watershed during most storm events for three years prior to road construction and continuing through the present. Samples have been analyzed for turbidity using a Hach Ratio Turbidimeter and for total suspended sediment and mineral suspended sediment using standard vacuum filtration and filter drying/burning procedures. Turbidity and suspended sediment levels in both the control and treatment watersheds were in expected ranges during the 3 pretreatment years prior to road construction. By contrast, both parameters increased to very high levels during the spring and early summer 2003 before the road condition was improved and finalized.

After road improvements were finalized, reductions in turbidity and suspended sediment occurred but maximum turbidity levels continue to be elevated substantially above pre-road conditions as a result of the sediment stored in the channel from road construction.

This proposed study requests funding to continue sampling turbidity and suspended sediment in an established study following improvements to a forest road and harvesting. The ultimate goal of the study is to document the results of five years and prepare a long-term, big project for USDA National Research Initiative, US Environment Protection Agency, or National Science Foundation. Specifically, we propose to continue the stream water sampling phase of water sampling phase of this study, to evaluate: 1) the length of time required for turbidity and suspended sediment to decline to conditions more like those before road construction, 2) if storms with certain characteristics or antecedent flow conditions are most associated with elevated turbidity and suspended sediment conditions, even if more average storms/flows no longer have elevated sediment, 3) if recovery is linear, exponential, or it levels off at some point in time, and 4) if turbidity and suspended sediment show additional increases following the 2005 harvesting due to the combination of increased streamflow (from reduced evapotranspiration) and sediment additions from streamside disturbance from felled and uprooted trees.