Batten Kill Mass Failure Monitoring
Roaring Branch Confluence and Wastewater Treatment Plant

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INTRODUCTION

Fine sediment has been identified as a potential limiting factor in the Batten Kill. Fine sediment can impact trout populations by reducing spawning success and macroinvertebrate habitat.

To begin to understand the sources of the sediment impacting the Batten Kill, two mass failures were monitored to try to determine the rate of movement of the riverbanks and quantify the fine sediments delivered to the channel from these two sources.

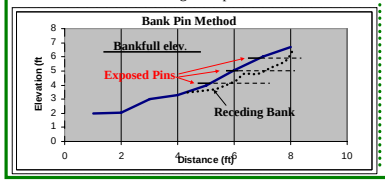
Because mass failures have the potential to deliver large amounts of sediment due to the long duration required to re-stabilize, large woody debris placements are being tested as a means of protecting the toe of a mass failure and collecting material moving down the slope.

OBJECTIVES

- Survey and monument mass failures for long-term monitoring
- Quantify estimates of fine sediment reaching the Batten Kill from two mass failures
- Assess changes in channel geometry.

METHODS

Monumented cross sections and horizontal bank pins were installed in two locations on the Batten Kill to evaluate rates of erosion and quantities of sediment delivered from two large mass failures. Cross sections were surveyed with a laser level and 300-foot plastic engineers tape. Bank pins (5 foot rebar) were driven horizontally into the toe of the bank at the mass failure at approximately 1/3-bankfull, 2/3-bankfull and bankfull elevations. A vertical pin was driven into the channel bed near the toe of the bank as a control for measuring bank profiles.



RESULTS

Cross Sections

The channel dimensions are essentially unchanged at the **Treatment Plant** after the first high flow in 2001. In 2002 however, the mass failure **deposited material at and below bankfull thereby reducing the channel width by 3.7 feet** and cross sectional area by 13 square feet.

At the **Roaring Branch** confluence **cross sectional area was reduced by 2%** due to minor aggradation causing a reduction of 0.1 feet in average depth.

Bank Profiles

At the **Treatment Plant**, between May and October of 2001, the bank profile shows the toe of the slope had 0.3 feet of deposition while the middle portion receded .05 feet and the upper portion 1.2 feet. With an average bank loss of 0.28 feet **an estimated 7.7 cubic yards of sediment could have entered the Batten Kill in one high flow event.**

In September of 2002 the **Treatment Plant** slide had covered the bank with 1.5 to 3.7 feet of material.

At the **Roaring Branch** slide, between May and October, 2001, 0.54 feet of bank was lost resulting in **an estimate of 13.9 cubic yards of sediment reaching the Batten Kill.**

In September, 2002, the bank profile is virtually unchanged from the previous year indicating either the slide is stabilizing or any eroded material has been replaced from higher up on the slide.

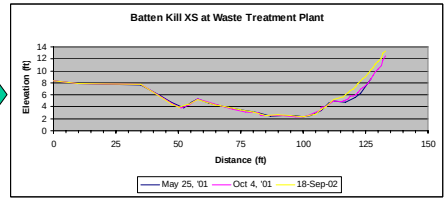
DISCUSSION

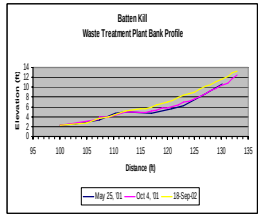
Two mass failure slides on the Batten Kill may have contributed as much as 21.6 cubic yards of sediment to the river during one high flow event in 2001 assuming the erosion rates at the cross sections represent the average bank loss over the length of the slides. Clearly, sediments eroded from within the active channel are being replaced from higher up on the slides. Sediments are expected to continue to enter the river until the toe of the slides stabilize.

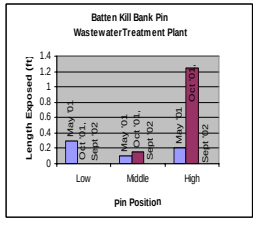
While cross sections showed little change, the use of bank pins was a very effective way to monitor erosion. In the case of a mass failure where eroded sediments are replaced from higher up, monitoring of bank pins after each high flow events can help quantify sediments reaching the river.

Qualitative assessment of recent toe stabilization efforts at the Waste Treatment Plant site indicate large woody debris may be an effective tool for reducing sediment delivery over the long-term until the slide reaches an stable angle of repose and revegetates naturally.

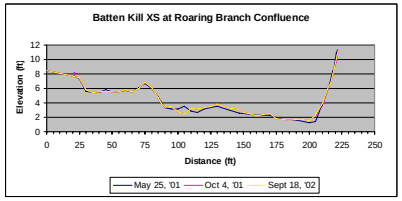
Waste Treatment Slide

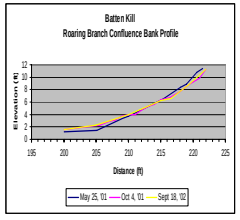


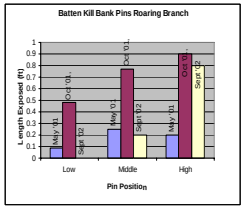




Roaring Branch Slide







Waste Treatment Plant LWD Placement for Toe Stabilization

Green Mountain National Forest