STREAMBANK STABILIZATION PROJECT ON WEST FORK OF THE CHATTOOGA RIVER, CHATTAHOOCHEE AND OCONEE NATIONAL FORESTS

Dale L. Rapin

AUTHOR: Forest Hydrologist for the Chattahochee and Oconee National Forests, 1755 Cleveland Highway, Gainesville, Georgia 30501.
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Abstract. An excessively eroding, 165 ft. section of streambank on the West Fork of the Chattooga River within the Chattooga National Wild and Scenic River corridor was treated using bio-technical engineering techniques and volunteer hand labor. Stream bank erosion and sediment delivery have been significantly reduced. Pine log revetments were installed with stone and soil backfill combined with brush layering. Slopes were shaped using an excavator, and live plant stakes and grass seed were applied. Fertilizer and landscaping fabric were also used. Native woody plants have been successfully re-established on the toe slope and near the top of the upper streambank. Attempts to establish vegetation in mid-slope positions have been less successful and additional re-vegetation measures are being considered. Forest Service and other federal, state and local agency personnel and community volunteers received practical training in applying bio-engineering technology to North Georgia conditions. The project site has been utilized to demonstrate the application of these techniques on several occasions. Project objectives to stabilize the streambank, demonstrate new technology and train people in its use were achieved.

INTRODUCTION

Site Description

The project is located on the West Fork of the Chattooga River, within the National Wild and Scenic River corridor of the Chattooga River (USFS, 1980) on the Chattahoochee and Oconee National Forests (C-ONF). The Chattooga Wild and Scenic River (WSR) includes 49.6 miles of the River and its tributaries and adjacent lands that make up the WSR corridor. WSR administration gives primary emphasis to protecting aesthetic, scenic historic, archaeological and scientific features of the river. Management goals are to provide a range of recreation opportunities characteristic of, and in harmony with, the nature of the individual river segments.

Section I, which includes the 3 mile reach containing the project area, is in the Recreation River Classification. It normally is a relatively slow moving, gentle stream suitable for the canoeing novice in an area of moderate development. Management direction in the C-ONF Land and Resource Management Plan (USFS, 1984) for those sections of the WSR in this Class is "to provide compatible outdoor recreation opportunities and water-oriented recreational facilities."

Streambank Erosion

Streambanks within the project site are subject to bank erosion during periods when flow exceeds ordinary high water levels. At that stage, bedrock outcrops in the channel deflect damaging flows into the bank at the project site. This was undercutting the bank resulting in sloughing of the upper bank material, which soon entered the river as sediment, and the loss of riparian vegetation (USFS, 2/6/95). The area of unstable streambanks was increasing with time, and bank erosion was threatening the vegetated buffer which had been established at the top of the bank on the edge of a wildlife habitat opening on the floodplain. The project area is not only used for wildlife management purposes but also by hunters, trout fishermen, canoeists and kayakers.

Project Coordination

Sediment from eroding streambanks at the site was degrading aquatic resources and the raw banks detracted from the scenic and recreation values of the WSR. The project area is located about 1/4 mile south of the intersection of Warwoman Road and U.S. Highway 28 on the west bank of the River. Approximately 165 linear feet of eroding stream bank are within the project area. The stream bank averaged about 12 feet in vertical height and 20 feet from the edge of the ordinary high water line to the top of the eroded streambank (Banker, 1995).

It was estimated, based on photographic evidence and conversations with local FS employees, that the top of the streambank was eroding laterally at a variable rate up to six inches or so a year. An annual average of 3 inches would amount to the loss of about 30 cubic yards of soil material per year which would be picked up and transported downstream by stormflow levels exceeding ordinary high water. In recent history the adjacent floodplain has been kept in permanent vegetative cover and managed as a wildlife opening and food plot. Prior to the establishment of a vegetative buffer zone sometime during the period 1982 through 1984, the area had been cultivated yearly right up to the sedge of the streambank (USFS, 1/6/95).

Most areas of severely eroding streambanks and channel instability in the West Fork watershed are products of the clearing of riparian vegetation and other valley bottom disturbances associated with agriculture and related development or with the establishment and maintenance of access roads. Removal of vegetation from the riparian zone, especially from streambanks, eventually results in loss of the mechanical binding of the soil by the plant root systems and also the protection that plant stems,

branches, leaves and litter provide against the erosive forces of flood flows. Streambanks along floodplains in the West Fork drainage typically have alluvial soils with sandy to loamy textures which are easily eroded by concentrated surface runoff and storm flow when left unprotected. Clearing of the protecting stands of riparian vegetation often results in unstable eroding streambanks and channel migrations (GA SWCC, 1994). Thus we infer that the actions and resource characteristics discussed above gradually led to the bank instability and resultant erosion at the project site.

Planning and implementing the streambank stabilization measures required close coordination with various user and interest groups, along with other federal and state agencies because of its location within the WSR and its designation as a primary trout stream by the Georgia Department of Natural Resources (DNR), Environmental Protection Division (EPD) (USFS, 2/23/95). Working with Forest Service (FS) Southern Region specialists, the C-ONF selected the project to serve as a hands on demonstration and training session for the transfer of bio-engineering technology to employees of the FS and other agencies and volunteers (USFS, 2/21/95). Scott Banker and Associates, Inc. worked closely with C-ONF personnel to develop conceptual and detailed site plans, coordinate construction details, design and conduct the training program and to provide on-site construction supervision. The installation of bio-engineering measures was completed by volunteers and FS employees in early March, 1995 (Banker, 1995).

METHODS

Project measures were designed to create a situation that would reduce and counteract the erosive forces of flood flows above ordinary high water and establish a living layer of vegetation to protect the streambank and riparian zone. As described in Banker's Post Construction Report (Banker, 1995), the project used a combination of mechanical and biological measures including bank shaping, log revetments backed by stone riprap, soil backfill with brush layering, seeding with erosion control matting, live staking, and live facines. Pine revetment logs were secured in place with log deadmen, soil anchors and steel cable. Plant material needed for bio-engineering was harvested nearby at the time of construction and trucked to the site. The primary plant materials used were species of Salix, but some Cornus, Elagnus, and Alnus materials were included in the brush mattresses and fascines. Most of the manual labor was performed by FS employees and volunteers over three working days using hand tools. An excavator was utilized to shape the slope and to place the logs, stone, and the backfill material.

As directed by the FS Watershed Improvement Prescription Plan (USFS, 2/6/95), the project was conducted in accordance with applicable provisions of the National Environmental Policy Act (NEPA). The appropriate coordination and site surveys were accomplished during the project planning and implementation period to insure compliance with appropriate federal, state and local regulations, guidelines, and policies. Clean Water Act (CWA) requirements were addressed during the planning process. Site specific consultations were made with the U.S. Army Corps of Engineers concerning wetland provisions of the CWA and with the GA DNR concerning the state Erosion and Sediment Control Act requirement for a trout stream variance and with Rabun County for a land disturbance permit. Photo monitoring has been conducted periodically at the site.

RESULTS

As reported by Banker (1995) mid-bank flows occurred with two weeks following construction resulting in minor scouring and was followed by several weeks of very dry weather. No significant damage was encountered during the first growing season. The project exhibited structural stability. New vegetative growth was vigorous from the live stakes and brush layer. Stream bank erosion was reduced to barely visible levels, riparian plants were invading, and restoration was well underway.

A summary report of an evaluation conducted by the FS Southern Regional Office personnel, about 18 months following construction during September of 1996 (USFS, 10/22/96), stated that most of the woody vegetation had survived and was sprouting actively. Some of the grass cover was lost from the mid-slope position, but good survival of the live stakes had held the soil in place and stabilized the site. The author accompanied Ranger District personnel on a brief site visit in mid-December 1996, following a storm event of 7 inches or so over much of the watershed. We observed bank scouring and sediment deposition behind the brush layer at the edge of the maximum sustained stormflow which was an estimated 7.5 feet above the ordinary high water level.

CONCLUSIONS

Bio-technical engineering methods applied to a 165 foot section of excessively eroding stream banks of the West Fork of the Chattooga River appear to have been successful in reducing bank undercutting, sloughing in, and the consequent delivery of sediment to the stream system. Revetments installed at the ordinary high water level are performing as designed, protecting against undercutting. Native shrubs have become well established behind the revetment and along both the base and the top of the stream bank. However, those plants established in the mid-slope positions from seeded grasses and live stake sprouts have thinned out to the extent that adequate protection is no longer being provided against the forces of erosion. Reinforcement planting and/or live staking and other appropriate measures are being planned for the site as part of the scheduled annual maintenance of watershed improvement projects on the C-ONF.

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