NCDA&CS - North Carolina Forest Service

Stream Restoration Post-Implementation Annual Monitoring, Final Report:

Year 5 - 2013

For the N.C. Clean Water Management Trust Fund (CWMTF)
Project #2004A-411:
"Rendezvous Mountain Purlear Creek Stream Restoration"

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Project Background

Approximately 2,600 linear feet of Purlear Creek were restored in two phases on Rendezvous Mountain Educational State Forest (ESF) in Wilkes County with funding provided by the N.C. CWMTF. The project was implemented in two phases:

Phase 1: 700 linear feet, UT-Purlear, perennial, Priority 1 restoration.
Phase 2: 1,900 linear feet, mainstem Purlear Creek, perennial, Priority 1 and Priority 2 restoration.

Much of the property was acquired by a separate CWMTF grant, before stream restoration. The site was a hay pasture prior to ownership by the N.C. Forest Service (NCFS). The growing and harvesting of fescue for hay production was taking place across the entire pasture and immediately along Purlear Creek. This intensive land use along the creek resulted in incised and undercut stream banks. There was no functioning riparian buffer along most of the length of stream within the pasture, except for an occasional large tree.

The outcomes of this restoration project include:

- Align the stream into the natural valley of the site;
- Connect the stream to a functional floodplain;
- Create in-stream structures suitable to manage bankflow events and enhance aquatic habitat;
- Establish a permanent forested riparian buffer;

The long-term goal is to create conditions within the restored reach of Purlear Creek that are suitable for the introduction of trout, in partnership with the N.C. Wildlife Resources Commission. At this stage of the project, we believe that this long-term is well on its way to being accomplished.

More detailed background information about the project's full scope of work, the site characteristics and restoration implementation is available in the project's Final Report to the CWMTF dated October 31, 2008. In addition, this project, and summaries of other restoration projects undertaken by the NCFS, are available on the "Stream Restoration" page of the NCFS website, under the Water Quality header at http://ncforestservice.gov.

In addition, a "Phase 3" of this project was accomplished in 2009 with the realignment and restoration of approximately 1,500 feet of Purlear Creek beginning at the downstream ending point of "Phase 2", and extending to the bridge of Mozelles Road over Purlear Creek where the creek leaves State Forest property. This Phase 3 was funded via a grant from the N.C. Division of Water Resources. While our annual monitoring reports focus primarily on Phases 1 & 2 (as these were funded by the CWMTF), occasional discussions regarding Phase 3 may be included in these reports as a means to discuss and depict overall watershed conditions.

Annual Monitoring Narrative

Two individual site visits were conducted by NCFS Nonpoint Source Branch personnel during 2013, both during the summer. One site visit consisted of a full walk of the restored stream reach, with photo documentation. The other visit included a team of biologists from the N.C. Division of Water Resources who examined aquatic life in the restored stream.

Total precipitation at the project site during 2013 was estimated to be approximately 70 inches, as recorded by a remote automated weather station located on the State Forest. This substantial amount of precipitation is corroborated by a similar rainfall collection estimate taken from another remote weather station at Raven Knob, located in adjoining Surry County.

Precipitation totals from the remote weather station at the State Forest for previous years are included for comparison: 2012: 46 inches*; 2011: 57.55 inches; 2010: 46.75 inches; 2009: 52.25 inches; 2008: 39 inches; 2007: 33 inches. In April 2012, a bankfull event was captured on video which can be viewed at the following link on the YouTube website: http://youtu.be/gQXXSOT4FOg.

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* The 2012 estimate is believed to be lower than actual for that year. The rain gage apparatus located on the State Forest which is typically referenced to obtain the precipitation data for this annual report was not fully operational throughout 2012. The total precipitation estimate of 46" reported here for 2012 was obtained by averaging the incomplete State Forest's precipitation data (42") with those from other nearby gages, including: from a remote weather station at Raven Knob in Surry County (50"); and from data provided by the USACE at its W.Kerr Scott Reservoir located in Wilkes County (47.48").

Stream Morphology

Visual assessments reveal that the overall stream is retaining its structure, with some minor bank erosion observed in places. No problems have been noted with any of the in-stream structures. Incursion of old legacy sediments from upstream, beyond the restoration reach, continue to mobilize in the restored system. This sediment source remains unclear and will continue to be investigated.

Photo above shows a step-series of two rock vanes, immediately downstream from the confluence of the UT-Purlear, with the mainstem of Purlear Creek. Photo at right shows some minor bank erosion of the right bank, along the UT-Purlear.
Both photos were taken June 27, 2013.

With the relatively firm rooting of permanent vegetation along both sides of the creek now well established, we do not expect major bank loss going forward. The floodplain remains connected to the stream, allowing high water flows to spill out of the channel.

Upstream from the confluence of UT-Purlear and mainstem Purlear Creek, there was a large woody debris jam observed in mid-Summer (seen in the photos below) that occurred when a legacy tree either blew-down, or broke off and fell into the stream. This debris jam had been in place long enough for a sizeable sandbar to form behind it, and the stream's flow had split into two pathways through the debris. Most likely, we will leave the debris jam in place, unless major bank structural loss begins to occur.


Large debris jam in the mainstem Purlear Creek. Photos taken June 27, 2013.

Vegetation

Tree growth remains abundant and there continues to be a diversity of tree species within the riparian corridor.

Growing-season shade from trees and woody shrubs appears to be increasing both in area and length along the stream corridor.

The photo at right was taken June 27, 2013, and shows the degree of shade being cast upon a segment of Phase 2 that was restored.

Invasive Plant (Kudzu) Control

In 2010 we identified an infestation of kudzu within portions of the riparian zone. In late August/early September of 2011, NCFS personnel conducted the first herbicide treatment application on the kudzu in an attempt to eradicate the plant from along Purlear Creek. No treatments were made in 2013. Observations indicated that some kudzu re-growth has occurred, and it appears to have expanded its area of coverage upstream into the UT. Additional treatments will be made in 2014.

Aquatic Insects

We participated in a special study conducted by the N.C. Division of Water Resources (Quality) in the summer of 2013. The study investigated the re-colonization of restored streams by benthic macroinvertebrates. The findings of the sampling and overall project are still being prepared by NCDWR.

Photo at left from July 2013 shows biologists identifying and collecting samples from Purlear Creek.

Water Temperature

The N.C. Wildlife Resources Commission sampled in-stream water temperatures and summarized multiple years of sampling. The findings are included in the Appendix (attachment). Generally, it appears there is a trend of lowered water temperatures, including during the growing season (Spring and Summer). Continued tree canopy closure over top of the stream should continue to create conditions that could be favorable to support the introduction of trout into the restored reach of Purlear Creek, perhaps as early as 2015.

Goals for Continuing Management

In addition to routine monitoring, other project goals for 2014 and beyond include:

- Continue herbicide treatment to control kudzu infestation
- Conduct periodic (ideally annual) prescribed burning on the uplands areas and restored wetlands to foster growth of native warm season grasses, control invasive plants, and improve small game habitat
- Explore options for re-introducing trout, in coordination with the N.C. Wildlife Resources Commission
- Freshen the property line markings to discourage un-intended trespass into the riparian corridor
- Develop, produce, and install self-guided interpretive educational sign exhibits along the creek

This is the final annual monitoring report as part of the conditions of the 401-Certification and NWP that were issued to support this stream restoration. Staff of the N.C. Forest Service, and affiliated partners and cooperators, will continue to monitor the conditions of the stream and its riparian corridor, and work towards the goals outlined above.

Appendix

1. Water temperature graphs.
2. Time series of photographs.