US EPA

REGION 4

Nonpoint Source Program Success Story

North Carolina

Restoration of Two Mountain Wetlands in Western North Carolina

Wetlands Restored The Valle Crucis and Newland Wetlands are significant ecological communities that provide habitat for threatened plants and animals. These wetlands had been degraded by both agricultural activities and urban development. Water quality, hydrologic and biological monitoring of the degraded wetland sites provided data for the restoration of these systems, including enhanced habitat and improved water quality. The restored wetlands also serve as educational sites to demonstrate the importance of natural ecosystems.

OVERVIEW

Wetlands of the Southern Appalachians are important ecological areas that provide habitat for uncommon and threatened wetland plants and animals. Due to small size, degradation and alteration, mountain wetland ecosystems are often overlooked. Under current state and federal laws, many of these wetlands do not meet minimum size requirements for regulation and may be drained and/or altered without a permit and without mitigation. Recent studies have shown, however, that these small wetlands can support viable populations of rare plant and animal species. Although the importance of these systems can be documented from an ecological standpoint, restoration is often difficult since very little is known about the hydrology and water quality of mountain wetlands.

Valle Crucis Wetland: Growing Season After Planting

In this project, two sites were chosen for restoration: 1) floodplain/riparian wetlands adjacent to Dutch Creek in Valle Crucis, NC; and 2) a degraded mountain wetland in an urban setting in Newland, NC. In the Valle Crucis Wetland, one parcel was noted for its numerous "wet pockets" and wetland vegetation. Local residents stated that most of the area, located within the floodplain of Dutch Creek, stayed wet year round. Further studies revealed that the area had been altered by years of agricultural practices.

In the Newland Wetland area, a site visit was made by personnel from the US Army Corps of Engineers and NC Division of Water Quality in the summer of 2004. The wetland was determined to be under jurisdiction and appropriate permits were obtained. It was agreed among North Carolina State University (NCSU) staff and the regulatory personnel that the best course of action would be to enhance the southwestern portion of the wetland by filling ditches, removing refuse, and planting native vegetation. The remaining portions of the wetland were to remain unaltered.

HIGHLIGHTS

The mountain wetland restoration project was designed to: 1) document the hydrologic functions and water quality of mountain wetlands; 2) develop methods to restore hydrologic, ecological, and water quality functions to degraded mountain wetlands; 3) develop methods to create riparian wetlands that compensate for the loss of some wetland habitats; and 4) educate landowners about the importance of small mountain wetlands.

Monitoring of both potential restoration sites as well as reference sites was an important component of this project. The Valle Crucis wetland site, prior to construction, had a long history of agricultural production, with the most recent being hay production. Soil probing indicated hydric soils varying in depth throughout the entire project site. It was necessary to monitor ground water hydrology for a period of a year to determine if the site could feasibly be restored to a functioning wetland.

Reference sites were chosen based on location, accessibility, and permission to monitor in the Basin Creek, Wilkes County area, located in Blue Ridge Parkway National Park. A small groundwater and seep-fed wetland approximately ½ acres in size was selected as a reference wetland. Two automatic groundwater monitoring devices were installed within the wetland and data were downloaded quarterly. Soil profiles were recorded and a plant survey was performed. Two wetlands located within the floodplain of the East Prong Roaring River in Wilkes County were selected for monitoring. As with the Basin Creek wetlands, automatic groundwater monitoring devices were also installed. Soil profiles and plant communities were recorded for reference purposes.

The Newland Wetland, approximately 1½ acres in size, is bordered by Kentucky Creek to the west, a service road to the north, a small recreational field to the south, and a paved parking lot to the east. This wetland had been degraded by ditching in some areas and adding refuse to other areas. The entire wetland was predominately an alder shrub thicket and served as flood storage for Kentucky Creek. Soil probing confirmed the existence of hydric soils as well as appropriate hydrology to make this a jurisdictional wetland.

Newland Wetland Construction

Newland Wetland Planting

The southwestern portion of the Newland site was graded to fill ditches and create small swales. All shrubs that were in the construction zone were carefully excavated and later reinstalled within the newly graded areas. A shrub border was also planted along the southern boundary to prevent encroachment into the wetland by a nearby recreational area. Because a portion of the wetland was bordered by a road and a parking lot, slight grading was made alongside these areas. This allowed uniform flow of surface water from the impervious areas into the wetland, and served to treat stormwater runoff. An additional small strip along the eastern portion of the wetland had been maintained by the town of Newland by mowing; this area was planted and a shrub hedge of alders was installed along the perimeter to prevent encroachment. Planting consisted of approximately 400 wetland plants and shrubs which were installed immediately following construction.

RESULTS

Groundwater monitoring wells were installed throughout the Valle Crucis site to a depth of approximately five feet. Students from Appalachian State University collected ground water data on a weekly basis for a period of approximately one year. Rainfall data were also collected during this time period. Figure 1 shows the monitoring results for this site.

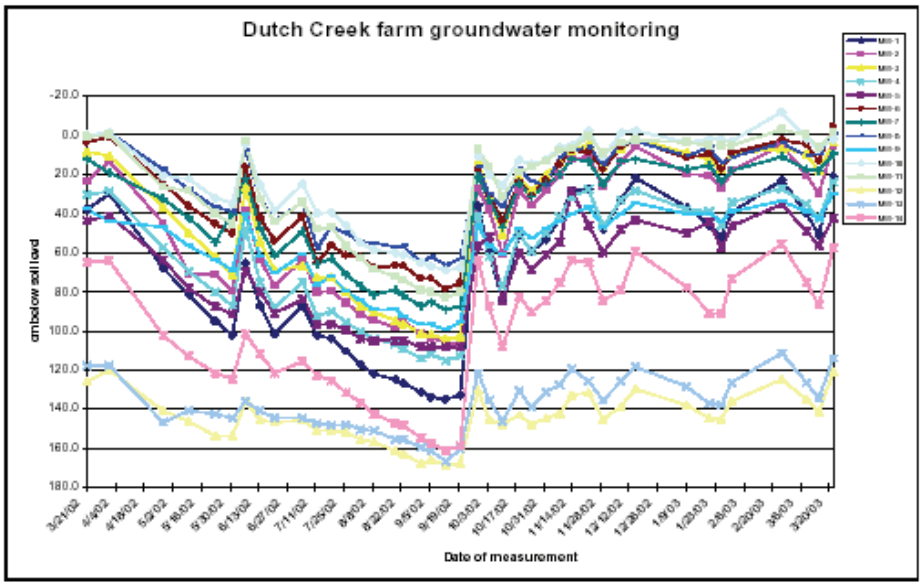

Figure1. Groundwater Monitoring Results at Valle Crucis Wetland

After monitoring the site for approximately one year, the data collected from the site, as well as the reference sites, were used to reconstruct the wetland. A topographic survey of the entire area was completed and used for restoration. The Valle Crucis wetland was graded and reshaped; following grading, approximately 5,000 wetland plants and shrubs were installed. A kiosk was installed on the site to provide information about the project and the importance of small mountain wetland systems.

Valle Crucis Wetland Planting

In the Newland Wetland, construction was done to allow groundwater infiltration into the wetland and prevent overland flow. In a nearby recreational area, a large concrete slab was created within approximately 15 feet of the wetland boundary. NCSU assisted the town of Newland with the purchase and installation of impervious concrete for this pad. An informational kiosk was installed at the wetland site describing the importance of wetland ecosystems, as well as the management practices installed to improve water quality.

Restoration data for the Valle Crucis and Newland Wetlands are summarized in the following table:

VALLE CRUCIS AND NEWLAND WETLANDS Best Management Practices and Acres Restored	
Riparian Buffers - Vegetative	2 acres
Wetland Creation	1 acre
Wetland Restoration	1 acre

PARTNERS AND FUNDING

The project was funded by $200,000 in US Environmental Protection Agency Section 319 funding and a nonfederal match of $133,335 from the NC Clean Water Management Trust Fund.

The project was administered by North Carolina Division of Water Quality. Project Partners included: North Carolina State University; Blue Ridge Resource Conservation and Development Council; Clean Water Management Trust Fund; NC Wildlife Resources Commission; NC Cooperative Extension Service-Surry and Yadkin County Centers; Natural Resource Conservation Service; Surry Soil and Water Conservation District; and US Fish and Wildlife Service.

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