

## EXECUTIVE SUMMARY

The Ecosystem Enhancement Program (EEP) has selected the Cathey's Creek Watershed (CCW) (Hydrologic Unit 03050105070020), within the Broad River Basin of North Carolina, for a detailed technical watershed assessment. The purpose of this Cathey's Creek Technical Watershed Assessment includes characterizing the watershed, identifying any general problem areas related to ecological functions, determining how to address these problems, and developing a plan that includes specific solutions to the problems. The overall approach includes new methods of watershed assessment that focus on ecological functions of the watershed.

This report covers the initial hydrologic unit characterization and preliminary findings. A plan for detailed field data collection and water quality monitoring is also included. The characterization is a compilation of existing published GIS data and other databases regarding land use, water quality, ecosystem functions, current management measures, and existing restoration and protection needs. The current conditions and functional status of the watershed were evaluated and stressors were identified. The watershed evaluation includes interviews with local stakeholders and resource agencies, visual observation of the watershed, and analysis of existing data. Sub-watersheds (SWs) were identified and classified for future field studies and monitoring. Watershed management goals and potential functional improvement projects were also identified. Extensive field studies were not included in this phase of reporting.

Addressing ecological impacts in terms of functional losses and replacements on a watershed level is a new approach to mitigation planning and implementation in North Carolina. The approach used in this report is based on preliminary guidance provided to EEP by technical committees charged with developing the functional analysis methodology. This report addresses three main watershed functions and to the extent possible with the available data, a number of sub-functions. The three main functions are Water Quality, Hydrology, and Habitat. The actual analysis was limited to data currently available in GIS or other databases. The analysis relied on a simple ranking system rather than calculated models indexed to a reference watershed.

The analysis involved examining the watershed functions and sub-functions in terms of indicators developed for each of the functions and sub-functions. Some of the indicators are simple values that are obtained from attribute tables in the GIS, whereas others are derived from overlays and calculations using the data in the GIS. Percentages are based on total surface water length in a SW or total SW area.

The SWs were then ranked for each indicator with a value of 1 to 14, with lower values indicating higher functional status. Once the SW rankings for each of the indicators were determined, an average rank for each major function was calculated.

Water quality functions were assessed by evaluating relative amounts of forested area and cleared or impervious area, length of stream protected by a forested buffer, and length of stream classified as impaired. It was assumed that the highest level of water quality function would be achieved with 100% forested cover, 100% buffer protection, less than 12% impervious cover, and no streams classified as Impaired. These assumptions do not take into account the range of

variation within which full function may be achieved, nor do they account for the possibility that sustainability may be achieved at lower levels of function.

Hydrology functions were assessed by evaluating relative areas of forested area and cleared or impervious area, length of stream protected by a forested buffer, area of ponds, and area of wetlands. The assumptions for forested and impervious area and buffered stream length are the same as noted above.

Habitat functions were assessed by evaluating relative areas of forested and cleared land, area of wetlands, buffered stream length, size of forest interior patches, and presence of suitable corridors between the large patches. The presence of forest patches with greater than 74 acres of interior area with at least one connection to another large patch implies the ability of the watershed to support a variety of species, including habitat specialists and wide-ranging species.

Stream reaches and hydric soils in cleared areas were targeted as degraded areas of interest for further analysis and potential watershed improvements. These degraded areas were identified using GIS procedures.

The functional analysis calculations resulted in an average rank for each of the 14 SWs for each of the three main ecological functions. These three average ranks were summed to obtain an overall functional score for each of the SWs. The functional scores clustered into four groups distinguished by shared characteristics. Group A sub-watersheds have the greatest ability to carry out their natural watershed functions whereas Group D is the most impaired. The differences in land use and land cover are the most apparent reason for impairment. Functional ability declines as both forested cover decreases and impervious area increases.

Based upon the findings of this study, the CCW appears to be in a transitional state. Urban runoff and sediment are suspected to be the leading causes of water quality impairment within the watershed. The urban runoff volumes, peak flows, and pollutant loads will continue to increase as development continues in the three municipalities. Water quality monitoring results in the urban areas of the CCW have been consistently indicative of stressed stream biota. Other areas of concern include the effects on water quality of the Spindale Wastewater Treatment Plant discharge and potential mercury contamination from old mining operations.

The altering of the streams as a result of mining and farming practices along with the changes to the floodplain and upland areas (increased impervious surface, loss of forest cover, and changes in soil permeability) are believed to be the main causes of impairment in the hydrologic functions of the watershed. The watershed is not efficient at absorbing overbank flows through short- or long-term storage and the channels do not handle peak flows in a stable manner. The flood control ponds also have affected the hydrologic functions by changing the timing and sediment balance of the stream flows.

The same causes of impairments to water quality and hydrology most likely have also impaired the habitat functions. The increased velocity and volume of urban runoff and the resulting scour, increased sediment load, and sandy substrates create a hostile environment for aquatic species.

Straightened and entrenched streams lack the riffle-pool sequence that provides a variety of habitat types.

The major stressor on terrestrial habitat functions is the removal and fragmentation of native vegetation. The decline in timber and farming has resulted in reforestation in many areas, but from observations made during windshield surveys, the species richness appears to be low and exotic invasive species have become established. It is not known whether the presence of exotic species on the stream banks affects aquatic communities.

A detailed field assessment is planned to address the watershed functional deficiencies and concerns identified through the GIS analysis. We hope to achieve a more complete understanding of the functional status of the watershed and how the stressors and indicators are linked to the aquatic community ratings. The objectives of the detailed field assessment are as follows:

- Assess the sources, severity, and causes of sedimentation and erosion;
- Identify the most critical areas for stream stabilization and restoration;
- Assess urban runoff;
- Assess habitat degradation;
- Evaluate the Spindale WWTP discharge to determine its contribution to water quality degradation; and
- Assess the potential mercury contamination from old mining operations.

The data collected from this detailed assessment will be used to re-define the preliminary ranking based on the GIS analysis and to evaluate the links between the suspect indicators and water quality ratings. Critical areas will be identified where functional deficiencies are the greatest and where implementation of watershed improvements such as stream or wetland restoration and best management practices will have the greatest impact on water quality and watershed functions. These findings will be documented in a Critical Areas Analysis Report.