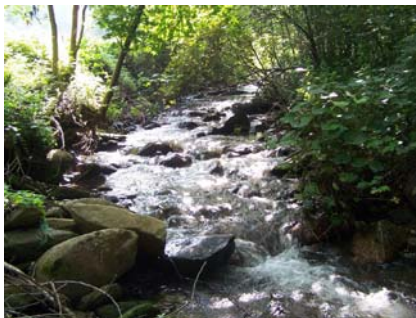


Peachtree-Martins Creek Local Watershed Plan Phase 2

**Hiwassee River Basin
Cherokee and Clay Counties, N.C.**

Watershed Assessment Report

May 2007



**A Project Of
The NC Ecosystem
Enhancement Program**



**With Assistance From
Equinox Environmental
Consultation and Design, Inc.
Asheville, NC**



Executive Summary

Background

This Watershed Assessment Report presents the results of the watershed assessment carried out for the NC Ecosystem Enhancement Program (NCEEP) during Phase 2 of the development of the Peachtree-Martins Creek Local Watershed Plan (LWP). Phase 1 produced a Preliminary Findings and Recommendations Report in early 2006. A third Phase will involve development of a management plan later in 2007. The assessment was conducted by Equinox Environmental Consultation and Design, Inc. (Equinox), in conjunction with the NC Division of Water Quality (NCDWQ), the NC Wildlife Resources Commission (NCWRC) and the Tennessee Valley Authority (TVA).

NCEEP is undertaking this planning effort in collaboration with the Hiwassee River Watershed Coalition (HRWC), a non-profit organization working to facilitate water quality improvements in the Georgia and North Carolina portion of the Hiwassee River basin. The objectives of this LWP are to assess watershed condition and to identify management strategies to restore and protect watershed integrity, which will provide the HRWC with additional technical information to support its watershed protection and improvement efforts.

The goal of Phase 2 is to conduct assessment activities in the Peachtree-Martins Creek area in order to support a more detailed appraisal of ecological conditions, identify causes and sources of degradation more clearly than was possible during the initial planning phase, and serve as the basis for development of a management strategy to address identified needs.

Planning Area Characteristics

Located in the Hiwassee River Basin, the 39 square mile planning area extends approximately from Mission Dam downstream to Murphy with the exclusion of Brasstown Creek. The three major drainages in the planning area (Peachtree Creek, Martins Creek and a group of several smaller Hiwassee River tributaries) were divided into 19 sub-watersheds for purposes of this assessment. Additionally, two topographic zones were delineated as an overlay on the sub-watersheds--a low gradient zone (slopes of 10% or less), which have historically been subject to extensive modification due to human activity and a high gradient zone (slopes exceeding 10%), which have generally been less intensively modified.

Over two-thirds of the planning area is forested, while 18% is in agricultural use, predominately pasture. Twelve percent of the area is developed, the vast majority of this being low density residential land (< 2 dwellings per acre). Total impervious cover in the study area is estimated to be approximately 4%, with 15 of the 19 sub-watersheds having less than 5% impervious cover and only the McComb Branch sub-watershed (11% impervious cover) exceeding 10%.

Data Sources

The analyses presented in this document draw upon three primary data sources:

- Water quality monitoring conducted by NCDWQ, including fish community monitoring (4 sites), benthic community monitoring (23 sites), chemical monitoring (33 sites) and toxicity monitoring (6 sites).
- An Integrated Pollutant Source Identification (IPSI) analysis conducted by TVA. The IPSI included the development of a geographic database (including land cover, assessment of riparian vegetation, identification of channelized streams and other features) and the development of a pollutant loading model for the planning area.
- A field assessment of stream habitat and physical condition at 62 sites, coordinated by Equinox and conducted jointly by Equinox and NCDWQ staff. Field activities included habitat assessment, substrate evaluation (pebble counts and embeddedness), bank erosion assessments and other data collection.

Findings – Aquatic Communities and Habitat

Streams in the planning area represented a wide range of conditions, from relatively pristine headwater creeks with diverse and pollution-intolerant benthic communities, to highly impacted streams with a limited capacity to support aquatic life. No sites were rated Fair or Poor by NCDWQ (ratings which would be indicative of impairment), though some streams that were too small to receive a formal rating were highly degraded. Taxonomic indicators of toxicity were not evident at any of the sites, though taxonomic indicators of nutrient enrichment were common.

While high quality aquatic habitat remains within the headwater areas of Peachtree Creek, varying degrees of degradation are evident in most other areas and the overall picture is indicative of a system that has been subjected to a variety of impacts. Among the habitat components evaluated, riparian areas exhibited the greatest degradation, especially in low gradient areas. Sediment impacts on pools and overall substrate condition were also evident. Habitat is likely a limiting factor for the benthic community at numerous sites.

The mountain creekshell (*Villosa vanuxemensis*), a state-threatened mussel, was found at four sites in Martins and Peachtree Creeks.

Findings – Major Stressors

Five major stressors are widespread in the Peachtree-Martins Creek area: the lack of riparian vegetation, channel modification, sediment impacts, and nutrient and fecal coliform contamination.

Lack of Riparian Vegetation. The lack of riparian vegetation is probably the most widespread stressor in the planning area. In areas with slopes under 10%, only 10% of stream length has adequate vegetation on both banks, defined as a zone of woody vegetation at least 30 feet wide. Both banks have inadequate riparian vegetation about 65% of the time. The situation is not nearly as severe in higher gradient areas, where two thirds of stream banks have adequate riparian zones on both banks.

Riparian land in low gradient areas has commonly been cleared for crop land and pasture, residential buildings and yards, and public and private roads. Streamside areas are often intensively managed and kept free of woody vegetation. Continued human activities in riparian areas serve both to perpetuate degraded vegetative conditions and contribute to potential sources of pollution.

Channel Modification. Channel modification in the form of stream relocation, straightening, dredging and similar activities is also widespread. There are approximately 26 miles of channelized stream in the planning area (13% of total stream length). About 36% of streams in the low gradient zone have been modified. Channelization commonly occurs in conjunction with other disturbances, especially the removal of riparian vegetation. Watershed observation suggests that channelization occurring in high gradient areas is often associated with roads or residential areas. While much of the channelization is historic, and some streams are recovering, channel disturbance in other areas is ongoing.

Channel modification is associated with a variety of impacts on habitat and stream quality, including incision, habitat degradation, sedimentation and bank erosion. For example, riffle embeddedness is more than twice as high in channelized reaches (65%) than in unchannelized reaches (30%) and overall aquatic habitat is much more degraded.

Sediment Impacts. Sedimentation is widespread in area streams, though severity varies. Both riffles and pools are impacted by sediment deposition. Nine sub-watersheds had median embeddedness levels of 60% or greater. At 40% of sites assessed, pool quality rated 4 or less on a 10-point scale. Bank erosion is also common in the planning area, though severity is generally moderate and severe bank failure is relatively unusual.

IPSI estimates of total suspended solids loads indicate that notable sediment source areas are related to a variety of land uses and are widely dispersed. Mission Quarry is the largest single source of sediment, but developed areas, agricultural activities, road and stream erosion and new construction are all important sources and contribute to the problem. Potential impacts from future development are also a concern, since development is likely to result in an increase in many factors related to sediment impacts - including land clearing and road construction, ongoing post-construction sediment inputs and stream erosion due to increased imperviousness.

Nutrients. Biological community data indicate that nutrients are a fairly common stressor in the planning area, though impacts are not currently severe in most places. Moderate baseflow nitrite-nitrate concentrations were found in Martins Creek, Slow Creek, Moore Branch and lower Peachtree Creek, while elevated storm concentrations were observed in McComb Branch. Chemical monitoring was limited, however, and may not be adequate to reliably characterize nutrient levels, especially during storms when the highest nutrient levels would be expected. IPSI data on nitrogen and phosphorus loads indicate that both developed and agricultural areas are major nutrient sources, though these estimates are generic in nature and are not useful for identifying specific nutrient-generating activities, especially in developed areas.

Fecal Coliform. Fecal coliform sampling was not frequent enough to document whether state water quality standards were violated. However available data indicate that there are a number of streams where concentrations appear to exceed the standard, especially Martins Creek and Slow Creek. These are both streams to which livestock have extensive access, though other sources may be a factor as well. Straight-piping and septic system malfunction no doubt occur in the study area, but data on their extent are currently unavailable. Data from a Wastewater

Discharge Elimination (WaDE) investigation to be conducted later in 2007 by the NC Division of Environmental Health should help to establish how important sources of domestic waste are in the planning area.

Localized Stressors. In addition to these widespread stressors, a number of localized concerns were investigated. *Groundwater contamination* by trichloroethylene (TCE) exists at two sites in the Peachtree area- the Clifton Precision Products/Moog Components facility and Tri-County Community College. Remediation is ongoing at these locations. The potential for human health impacts via drinking water may be limited, as few residences in the area of contamination are believed to be using well water. Based on existing information, impacts on aquatic life in adjacent streams also appear unlikely. However, recent data on surface water and drinking well chemistry is not extensive. The Superfund Section of the NC Division of Waste Management intends to conduct follow-up monitoring in private wells in the Peachtree area during 2007.

Widespread *stormwater impacts* appear unlikely at the present time, given the generally dispersed nature of development in the planning area and relatively low levels of impervious cover. However potential impacts from the relatively dense development in the Peachtree area were investigated, including at the Murphy Medical Center and Tri-County Community College. Existing information indicates that both nutrient and toxic impacts are a concern in McComb Branch and its tributaries, which drain much of this area. It is not apparent that major hydrologic impacts exist at present, though some impacts on stream channels were identified. Impacts are likely to increase in the future as additional development occurs in the US 64-NC141 vicinity and elsewhere in the planning area.

An investigation of the source of degraded conditions in a small tributary entering the Hiwassee River just below Mission Dam indicated that *Mission Quarry* is the primary source of the problem. NCDWQ identified the quarry, which operates under a state stormwater permit, as the major source of sediment to this creek. Enforcement actions by NCDWQ are underway. The reason for elevated conductivity in the stream remains unclear, but both process water and untreated storm runoff from the quarry are likely possibilities.

Watershed Functional Condition

An analysis of ecological condition at the sub-watershed scale was conducted using a suite of 14 indicators in three broad functional areas. Subwatersheds were rated as Excellent, Good, Moderately Impacted or Poor on each of the following:

- Hydrology Indicators - forest area extent, impervious cover, extent of stream channelization and streambank stability;
- Habitat/Biological Community Indicators - overall aquatic habitat quality, benthic macroinvertebrate community integrity, microhabitat diversity and abundance, riffle embeddedness and pool frequency/variety;
- Water Quality Indicators - specific conductance, riparian area condition, total suspended solids load, benthic macroinvertebrate pollution tolerance and nitrogen concentration.

Based on the overall patterns of function, sub-watersheds were arranged into five tiers (Table A). Overall ecological condition is best (*very high function and high function tiers*) in the portion of the Peachtree drainage upstream of the Slow Creek confluence. Seven subwatersheds (38% of the area) exhibit a *moderate level of ecological function*. These areas exhibit many

characteristics of good ecological function but have sufficient impacts to be considered at risk of becoming functionally compromised if additional deterioration occurs. Seven other sub-watersheds (about 45% of the planning area) are considered to exhibit a *low level of ecological function*. These sub-watersheds are significantly degraded, although they retain some indication of adequate ecological function and are not considered to be in the poorest condition. Severe degradation on the sub-watershed scale (*very low function*) is limited to the Mission Quarry area. While many individual sites in the planning area are severely impacted, at the sub-watershed level these impacts are mitigated to varying degrees by the areas that remain undisturbed or well-managed.

Functional condition is notably more degraded in the low gradient topographic zone than in steeper terrain. Land in this zone is less likely to be forested, with much more intensive residential and agricultural activity. Riparian zones were in poorer condition and channel modification more widespread. The high gradient zone received ratings of Good on virtually all indicators, while ratings as high as Good were unusual for the low gradient zone.

Table A Sub-Watershed Functional Condition in the Peachtree-Martins Creek Planning Area

Functional Condition Tier		Sub-Watersheds	% of Planning Area
1	Very High	Peachtree Creek Headwaters Upper Peachtree Creek Pipes Branch	13%
2	High	Upper Martins Creek	4%
3	Moderate	Fall Branch Middle Peachtree Creek Slow Creek Headwaters Mid Slow Creek Moore Branch Southern Un-named Hiwassee Tributaries Lower Martins Creek	38%
4	Low	Calhoun -Mission Branch Lower Slow Creek Lower Peachtree Bottomlands Middle Martins Creek Hampton Creek Messer Branch McComb Branch	45%
5	Very Low	Mission Quarry Tributary	< 1%

Next Steps

A Watershed Management Plan is scheduled for completion in the fall of 2007. That document will identify focus areas for management activity and include recommended management strategies to address the major concerns summarized in this Watershed Assessment Report. Recommendations will be developed in consultation with the HRWC and a Local Advisory Committee constituted to provide guidance to this project.

The Plan will also include an analysis of alternative development scenarios, evaluating the extent to which increased development is likely within the project area over the next ten years. The IPSI Nonpoint Source Model will be used to quantify potential impacts of this development, as well as the ability of potential management actions to mitigate those impacts.

List of Acronyms and Abbreviations

ATU	Aquatic Toxicology Unit
ATV	All Terrain Vehicle
BAU	Biological Assessment Unit
BEHI	Bank Erosion Hazard Index
BI	Biotic Index
BOD ₅	Five-Day Biochemical Oxygen Demand
BMPs	Best Management Practices
CWP	Center for Watershed Protection
EPT	mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera)
EPT BI	EPT Biotic Index
GIS	Geographical Information System
HRWC	Hiwassee River Watershed Coalition
IPSI	Integrated Pollutant Source Identification
LAC	Local Advisory Committee
NAWQC	National Ambient Water Quality Criteria
NCDLR	NC Division of Land Resources
NCDOT	NC Department of Transportation
NCDWQ	NC Division of Water Quality
NCEEP	NC Ecosystem Enhancement Program
NCGAP	NC Gap Analysis Project
NI	Not Impaired
NCIBI	NC Index of Biotic Integrity
NCNHP	North Carolina Natural Heritage Program
NCWRC	NC Wildlife Resources Commission
NOV	Notice of Violation
NPS	Nonpoint Source
NR	Not Rated
NRCS	Natural Resources Conservation Service
PFRR	Preliminary Findings and Recommendations Report
RCRA	Resource Conservation and Recovery Act
RSAT	Rapid Stream Assessment Technique
TCCC	Tri-County Community College
TCE	Trichloroethene
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
TVA	Tennessee Valley Authority
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
WaDE	Wastewater Discharge Elimination Program
WAT	Watershed Assessment Team
WMP	Watershed Management Plan
WNAT	Watershed Needs Assessment Team

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