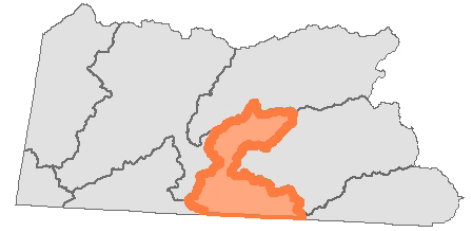


BRASSTOWN CREEK WATERSHED

















HUC 0602000203

*Includes: Major Streams- Brasstown Creek, Hiwassee River,
Little Brasstown Creek & Peachtree Creek*

WATERSHED AT A GLANCE

<u>COUNTY:</u>	<u>AREA</u>	<u>2006 LAND COVER:</u>	<u>PERMITTED FACILITIES:</u>
Cherokee, Clay	58 sq mi.	Agriculture.....15%	NPDES
<u>MUNICIPALITIES:</u>	<u>POPULATION:</u>	Developed.....6%	Wastewater Discharge.....0
none	2000.....4,456	Forested.....77%	Wastewater Nondischarge.....0
<u>EPA LEVEL IV ECOREGIONS:</u>	2010.....5,422	Shrub.....1%	Stormwater.....0
Broad Basins, Southern Metasedimentary Mtns			Animal Operations.....0

2006 Land Cover

-  Water
-  Developed, Open Space
-  Developed, Low Intensity
-  Developed, Medium Intensity
-  Developed, High Intensity
-  Deciduous Forest
-  Evergreen Forest
-  Mixed Forest
-  Shrub/Scrub
-  Grassland
-  Pasture/Hay
-  Cultivated Agriculture
-  Woody Wetlands
-  Barren Land

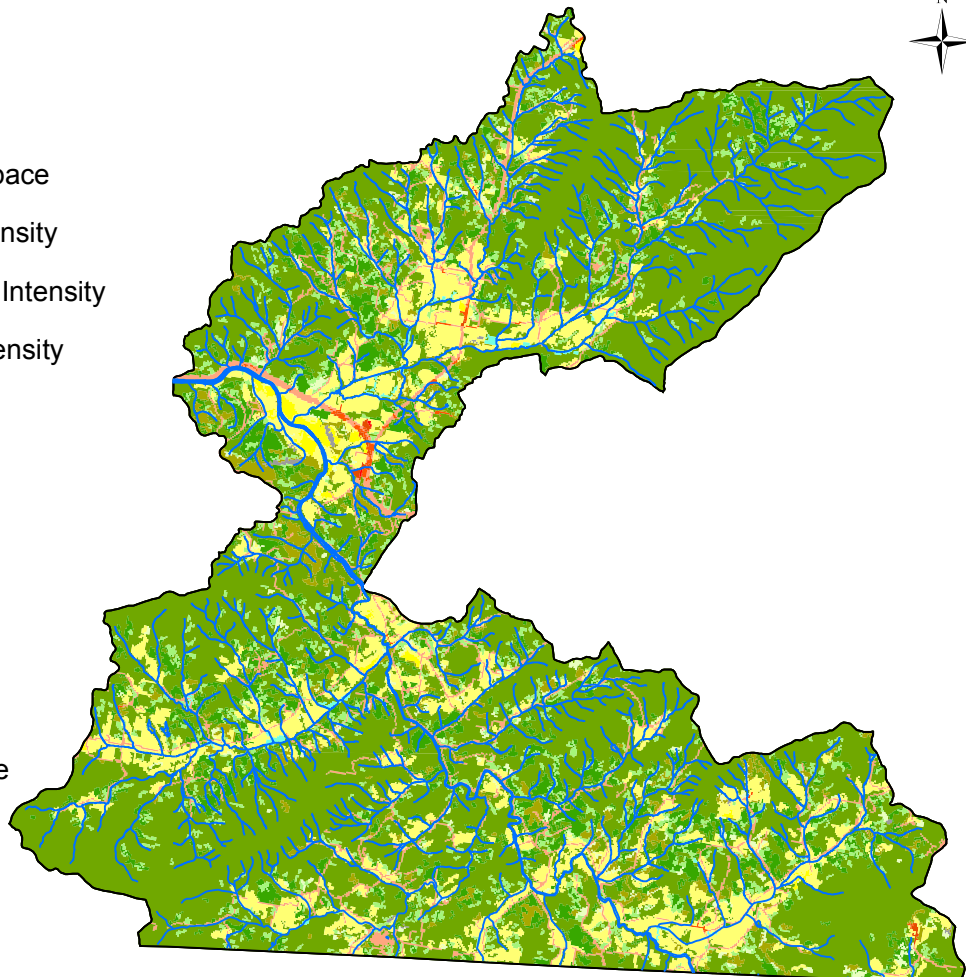
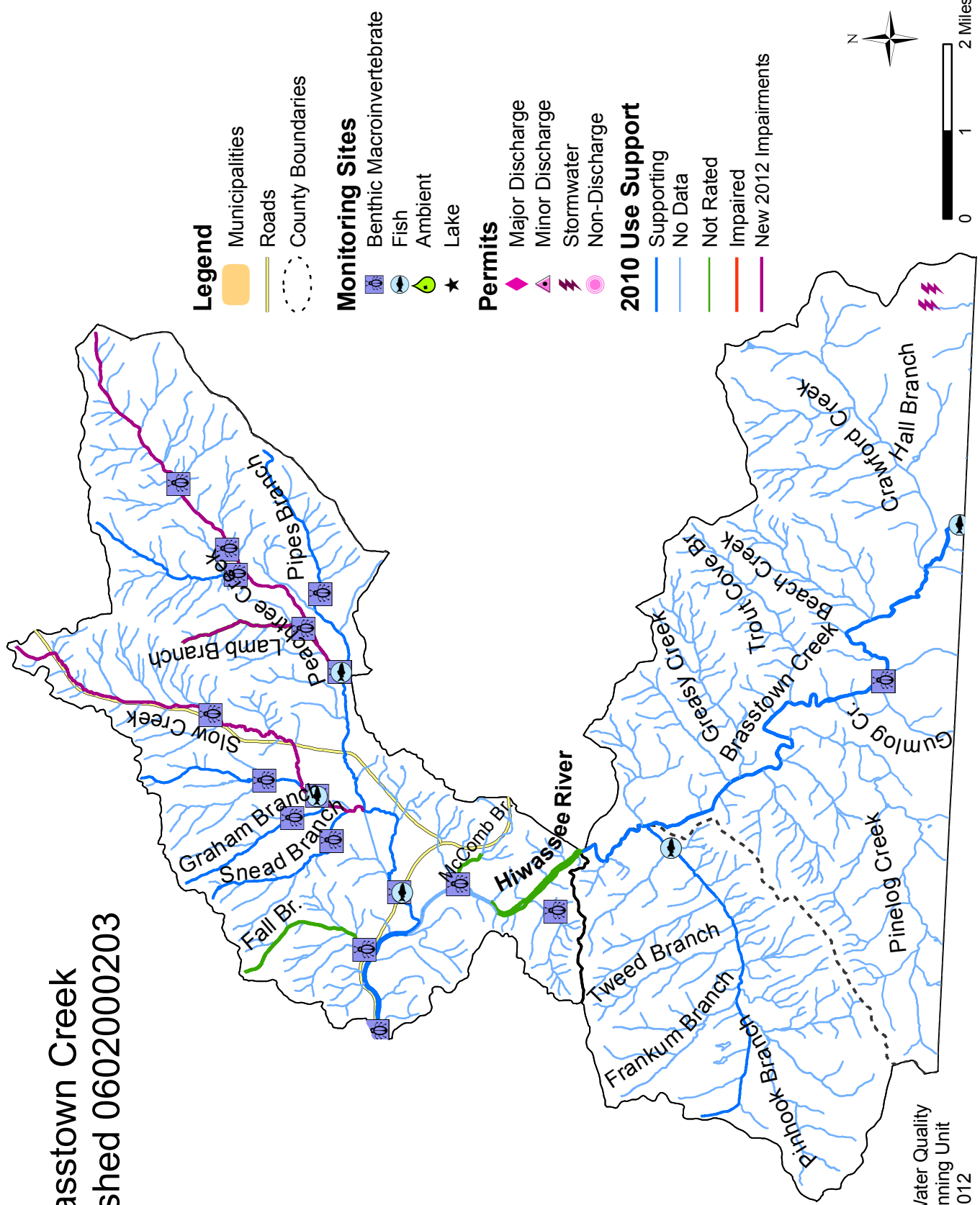


FIGURE 1-1: BRASSTOWN CREEK WATERSHED MAP

Brasstown Creek Watershed 0602000203



NC Division of Water Quality
 Basinwide Planning Unit
 March 2012

WATER QUALITY MONITORING

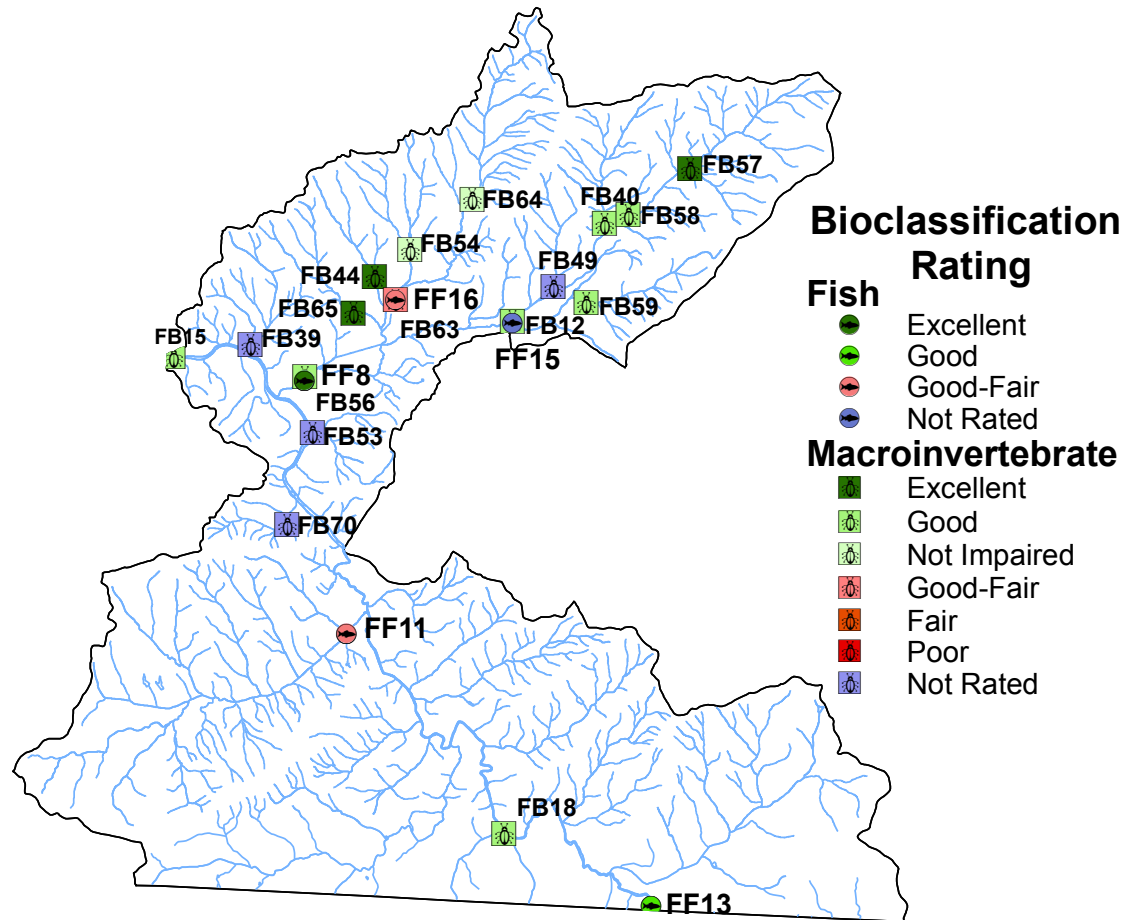
There are no ambient stations in this watershed. Although biological samples have been taken throughout the watershed since the 1980's. Basinwide sites were first sampled in 1994 and the three most recent basinwide benthic macroinvertebrate samples were

taken in 2009, all resulting in Good Bioclassifications. Site specific information is available in Appendix and the Biological Assessment Report is available here:

<http://portal.ncdenr.org/web/wq/ess/reports>.

Figure 1-2 shows the most recent benthic site rating in this watershed at sites sampled since 1994.

FIGURE 1-2: BIOLOGICAL SAMPLE SITES & RATINGS



Biological Monitoring

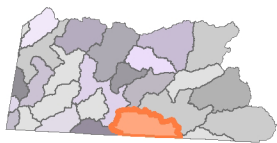
Biocriteria have been developed using the diversity, abundance, and pollution sensitivity of the organisms that inhabit flowing waterbodies in NC. One of five bioclassifications are typically assigned to each water body sampled: Excellent, Good, Good-Fair, Fair and Poor. Not Impaired and Not Rated designations are reserved for samples that were not eligible to be assigned one of the five typical bioclassification categories. Typically, a “Not Impaired” rating is equivalent to a Good-Fair or better bioclassification and a “Not Rated” designation is equivalent to a Fair or worse bioclassification. The reasons for not being able to assign one of these five typical bioclassifications may be a lack of appropriate bio-criteria or atypical sampling conditions (e.g., drought). These bioclassifications are used to assess the various impacts of both point source discharges and nonpoint source runoff. The resulting information is used to document both spatial and temporal changes in water quality, and to complement water chemistry analyses, ambient toxicity data, and habitat evaluations. In addition to assessing the effects of water pollution, biological information is also used to define High Quality or Outstanding Resource Waters, support enforcement of stream standards, and measure improvements associated with management actions. The results of biological investigations have been an integral part in North Carolina’s basinwide monitoring program.

PROTECTION AND RESTORATION OPPORTUNITIES

The following section provides more detail about specific streams where special studies have occurred or stressor sources information is available. Within this document, biological sample site IDs ending in an “F” denote fish community and a “B” denote macroinvertebrate community. Specific stream information regarding basinwide biological samples sites are available in Appendix 1B. Use support information on all monitored streams can be found in Appendix 1A. Detailed maps of each of the watersheds are found in Appendix 1C or by clicking on the following small maps.

To assist in identifying potential water quality issues citizens, watershed groups and resource agencies can gather and report information through our Impaired and Impacted Stream/ Watershed survey found here: <http://portal.ncdenr.org/web/wq/ps/bpu/about/impactedstreamssurvey>.

LOWER BRASSTOWN CREEK (HUC 060200020302)



Brasstown Creek [AU# 1-42] originates in northern Georgia where it drains a portion of Towns County and the Town of Young Harris before flowing through southwestern Clay County, NC to join the Hiwassee River. Brasstown Bald is the highest point in GA and is in the headwaters of Brasstown Creek. DWQ took a fish sample (FF13) near the state line which improved from the Good-Fair sample in 2004 to Good in 2009. Although the water quality shows a slight improvement specific

conductivity readings suggest agricultural and municipal wastewater inputs from GA. Further downstream, macroinvertebrate sample site (FB18) rated Good. This site rated Excellent in 2004 and the decline is likely associated with drought conditions. This reach drains small portions of the Chattahoochee National Forest in Georgia but its watershed also contains areas of low density housing, pasture and row crops in North Carolina that lie outside of the national forest boundary.

Little Brasstown Creek [AU# 1-42-11] is a large tributary to Brasstown Creek, draining a small portion of southeastern Cherokee County. The watershed contains low density, rural residential development, pasture, hay, and row crops in addition to substantial forest cover. Some of the headwaters are in a permanent conservation easement through the [Land Trust for the Little Tennessee](#) and significant restoration and monitoring efforts were conducted by the [Hiwassee River Watershed Coalition](#) and its partners. The fish sample (FF11) taken in 2009 resulted in the same rating as the 2004 sample, Good-Fair. The lower reach of this creek has sandy runs with boulder/cobble pools and very few riffles. The riparian vegetation consists of overgrown exotic species bordered by agricultural fields.

The Hiwassee River Watershed Coalition (HRWC) hired a professional consultant to conduct benthic monitoring along Little Brasstown Creek in association with a watershed restoration project. Three sites on Little Brasstown Creek, along with one reference site on Winchester Creek, were evaluated before and one year after stream restoration work was conducted. These sites were rated using methods established by NC DWQ. Winchester Creek and the sites upstream and downstream of the restoration project on Little Brasstown Creek showed no between-year differences. Winchester Creek received a Good bioclassification in both 2004 & 2005; the upstream and downstream sites rated Good-Fair. Although the site on Little Brasstown Creek within the project reach still received a Good-Fair bioclassification, there was a large improvement in habitat quality. The habitat score improved from 37 in 2004 to 70 in 2005 following restoration work. Improvements in the benthic macroinvertebrate community typically require more than one year following restoration. The study also noted that the benthic macroinvertebrate community structure at all sites, including the reference reach, are warmer than expected for mountain streams, probably due to a lack of shading from the limited riparian cover. Habitat scores in unrestored sections of Little Brasstown Creek that were monitored immediately upstream and downstream of the Carringer/Mitchell restoration project were poor, averaging 35/100 in both years. (Lenat Consulting Services, March 2005).

The HRWC also used a grant from the CWMTF to hire NCSU's Water Quality group to do an extensive 3-year monitoring effort at 10 of their Brasstown Creek restoration sites. All samples were collected using protocols developed by DWQ. Qualitative 4 surveys were used at all collection locations, in 2005, 2006, and 2007. In addition, an epifaunal sample was collected from all three of the Brasstown Creek locations. All

specimens were preserved in the field using standard protocols and identified to the lowest practical level in the laboratory. The results are listed below.

Project	No. EPT Taxa			EPT Abundance			Bioclassification		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Greasy Creek	24	26	25	115	96	90	--	--	--
Long Branch	4	16	16	24	62	42	--	--	--
Little Brasstown Cr (Mason/Stalcup)	29	28	25	85	170	81	Good	Good	G/F
Little Brasstown Cr (Sheppard)	30	30	28	120	137	93	Good	Good	Good
Little Brasstown Cr (Carringer/Mitchell)	28	27	19	136	97	76	Good	G/F	G/F
Little Brasstown Cr (Campbell)	19	13	5	73	34	7	G/F	Fair	Poor
Brasstown Creek (Warne)	26	28	28	106	118	114	G/F	Good	Good
Brasstown Creek (Bell)	25	32	27	109	143	96	G/F	Good	G/F
Brasstown Creek (Hyatt & Oland)	43	37	31	140	178	88	Excel.	Good	Good

Water Quality Initiatives

Between 1999 and 2005, the Hiwassee River Watershed Coalition (HRWC) was awarded more than \$2.5 million by the NC Clean Water Management Trust Fund for restoration work in the Brasstown Creek watershed. Using these funds, HRWC, in partnership with the Natural Resources Conservation Service, the Clay and Cherokee County Soil & Water Conservation Districts, and 46 local landowners, conducted restoration activities along 30,000 linear feet (approximately 5.7 miles) of stream. In addition, more than 50 acres of wooded riparian buffer were created and placed under a protective easement; 160 acres of critically eroding bare areas were re-vegetated; and 2,000 acres of pastureland were improved. Additional accomplishments of the Brasstown Creek Watershed Restoration Project include \$1.8 million dollars spent locally (materials and grading/clearing contractors); the purchase of a no-till grain drill that continues to be available to local farmers at low cost rental rates; and a community educated about the value of riparian buffers for controlling erosion. Specific information, including before and after pictures, about the projects can be found at the HRWC website: <http://www.hrwc.net/brasstown.htm>

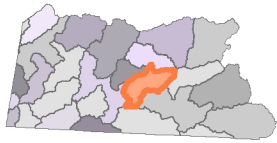
In 2004 HRWC was granted additional funds to monitor channel stability, vegetation survival, temperature, benthic communities, and suspended sediment at 10 restoration sites in the Brasstown Creek watershed over a 3-year period (2005-2007). Staff and students of NCSU's Department of Biological and Agricultural Engineering conducted the monitoring work. The study found that restoration efforts at nine of the monitored locations have been highly successful in terms of improving habitat, re-vegetating riparian areas, and improving the physical condition of the stream channel. Most banks are now stabilized and erosion has been greatly reduced. The January 2008 summary, Monitoring Report, Evaluation, & Action Plan is available on the HRWC website: http://www.hrwc.net/bc_evaluation.htm

The US Fish & Wildlife Service awarded HRWC \$20,000 in 2010 to help implement the Brasstown Creek Action Plan. Specifically, eradication of nonnative invasive plants and supplemental plantings of native trees and shrubs within the riparian buffers at six of the individual projects sites is being conducted. At one project site, new landowners have allowed HRWC to extend the 50-foot buffer for an additional 500 linear feet and have signed a new contract that can be recorded, replacing the old 2-page "handshake" agreement HRWC previously held.

Recommendations

Additional efforts to prevent sedimentation and to re-establish instream habitats and riparian vegetation are needed in the Brasstown Creek watershed. HRWC has demonstrated its ability to coordinate such projects. HRWC's restoration effort in the Brasstown Creek watershed is a model program. It uses sound scientific methods and has created effective partnerships at the federal, state, and local level. DWQ strongly supports their ongoing restoration goals.

PEACHTREE CREEK-HIWASSEE RIVER (HUC 060200020303)



Peachtree subwatershed drains 24 mi² including headwaters within Nantahala National Forest and a small portion of the subwatershed along the Hiwassee River is a Water Supply IV watershed area. Peachtree Creek flows through a broad flat valley called Ammon Bottom. Land use in the subwatershed consists of rural residences, residential lawns, and active pasture (hay fields) with forested hillsides. There are no

DWQ ambient stations; however, water chemistry data was also collected for a special study that captured baseflow and stormwater conditions. Samples detected elevated nutrient levels and elevated fecal coliform counts. Five fecal coliform bacteria samples between May 24- June 12, 2007 at Mission Road detected bacteria levels that exceed state standards with a maximum coliform count of 1200 and a geometric mean of 520, leading to a portion of Peachtree Creek [AU# 1-44a] listed as Impaired on the 2012 303(d) list. In September 2011, fecal coliform bacteria samples collected from another site further downstream (US 64 alt.) did not exceed our current water quality standards assessment criteria. There are two macroinvertebrate sample sites and one fish sample site that are resampled every five years in this subwatershed. Site FB12 on Peachtree Creek [AU# 1-44a] rated Good. Previous samples at this location were Excellent bioclassifications; the decline is likely associated with drought conditions. Downstream from the benthic site is the fish site (FF8) which rated Excellent, with noted improvements in bank stabilization on Peachtree Creek (AU# 1-44b). The creek is noted as having a naturalized, wild reproducing population of rainbow trout and a moderately diverse and very abundant fish community.

The Peachtree-Martins Creek Watershed Management Plan (described below) is the best available strategy for restoration needs in the subwatershed. DWQ supports these identified restoration needs and will work with federal, state, and local parties to implement its recommendations. The Hiwassee River Watershed Coalition continues to take the lead role in facilitating restoration activities.

Flow conditions on the Hiwassee River [AU# 1-(43.7)] are influenced by a hydroelectric power station at Mission Dam. The macroinvertebrate sample (FB15) site on this reach of the river has consistently rated Good, but the benthic community is becoming slightly more pollution tolerant.

SPECIAL STUDY SUMMARY

In July 2005, the Ecosystem Enhancement Program (EEP), Hiwassee River Watershed Coalition (HRWC), Equinox Environmental Consultation & Design and DWQ started a local watershed planning process in the Peachtree-Martins Creek watershed: <http://www.hrwc.net/peachtreemartinslwp.htm>. The goals were to: (1) assess stream quality in the watershed, identifying key sources of degradation and pollution, and (2) develop a comprehensive strategy to address watershed needs. The resulting Local Watershed Plan addressed both ecological and community priorities for the 39 mi² Peachtree-Martins Creek watershed.

Intensive field assessments and landowner outreach activities were performed, carrying out recommendations named by a local advisory committee. The Tennessee Valley Authority developed new land use and riparian buffer datasets from low altitude aerial photography and produced an Integrated Pollutant Source Identification database in March 2006.

Stressors identified that limit stream integrity throughout the watershed are lack of riparian vegetation, channel modification, excess nutrients and sediments, and fecal bacterial contamination. Localized stressors include stormwater impacts in the Peachtree area, groundwater contamination in the vicinity of Tri-County Community College and the Clifton Precision Products/Moog Components facility, and impacts from Mission Quarry. Ongoing commercial and residential development is expected to continue in the area and is the biggest future threat to water quality and other elements of ecological function.

Specific management strategies to address both present and future stressors were identified. Strategies to address current problems include stream restoration, riparian buffer restoration, agricultural, road, residential, and forestry best management practices (BMPs). Strategies to address future threats and protect current resources include preservation of existing large forested tracts, sustainable forest management, public education, and a number of planning programs to soften development impacts.

Biological Data

DWQ sampled macroinvertebrate communities at seven locations in this subwatershed as part of the development of EEP Local Watershed Plan. The location and sample results are listed below. Pictures and descriptions of these sites, including taxa collected are available in BAU Memorandum 20060731, “Results of Biological Sampling for the Ecosystem Enhancement Program in Hiwassee Subbasin 02, March 2006” by request. Additional details are available from EEP’s website: <http://portal.ncdenr.org/web/eep/rbrps/hiwassee>.

Waterbody	AU #	Site ID #	Biological Sample	Specific Conductance	Additional Notes
Pipes Branch	1-44-7	FB59	Good	10 µmhos/cm	Least impacted benthos community of all small stream sites. High fecal coliform bacteria levels, low pH and phosphorus are parameters of interest.
Peachtree Creek	1-44a	FB12 FF15	Excellent Not Rated	18 µmhos/cm 16 µmhos/cm	Sparse bank vegetation, a narrow riparian zone on the left side of the stream, and a reduced canopy
Peachtree Creek	1-44b	FB56	Good	37 µmhos/cm	Areas of erosion were present on both banks; bank vegetation was a diverse mix of trees, shrubs and grasses; incised channel
Slow Creek	1-44-9	FB64 FF16	Not Impaired Good-Fair	36 µmhos/cm 44 µmhos/cm	Upper reach is within a horse pasture with sparse habitat. Slightly turbid water and incised channel. The macroinvertebrate community is probably more reflective of broad watershed conditions than local habitat conditions. Elevated nutrients levels are also of concern.
Messer Branch	1-44-9-2	FB54	Not Impaired	34 µmhos/cm	Upper reach had no riparian vegetation; lower reach had moderate riparian zones with grass banks vegetation.
Snead Branch	1-44-9-4	FB65	Excellent	30 µmhos/cm	Riparian zones were wide and intact on both sides of the stream and no serious habitat or water quality problems were noted.
McComb Branch	1-43-(2)	FB5	Not Rated	61 µmhos/cm	Channel was incised and areas of severe bank erosion were evident with limited riparian vegetation. Turbid water with abundant periphyton. Nutrients, toxicity, fecal coliform bacteria, aluminum, manganese, zinc are additional potential water quality problems.

Additional water quality data, including biological, chemical and toxicity was also collected by DWQ’s Watershed Assessment Team (WAT) for the EEP Local Watershed Plan. The results of the biological samples are listed in Table X along with identified stressors. The full reports is available online at: http://www.nceep.net/services/lwps/Hiwassee/PMC_DWQwaterquality_study.pdf.

Waterbody	AU #	Site ID #	Biological Sample	Additional parameters of interest
Fall Branch	1-45	FB39	Not Rated	aluminum, phosphorus, turbidity, fecal coliform bacteria
UT Hiwassee	1-(16.5)c	FB70	Not Rated	
Graham Branch	1-44-9-3	FB44	Excellent	no water quality concerns
Fate Puet Cove Cr.	1-44-4	FB40	Good	nutrients, turbidity, aluminum & zinc
Lamb Branch	1-44-5	FB49	Not Rated	fecal coliform bacteria
Peachtree Creek	1-44a	FB58 FB57	Good Excellent	fecal coliform bacteria, nutrients

Bacteria Data

The NC Division of Water Quality (DWQ) conducted fecal coliform bacteria sampling in the Peachtree-Martins Creek watersheds near Murphy between May 24, 2007 to June 19, 2007 to support the development of a Local Watershed Plan (LWP) by the NC Ecosystem Enhancement Program. The sampling during this period was conducted during baseflow conditions. Streams sampled and results are listed below.

Waterbody	Total number samples	Results >400	Min Value	Max Value	Geometric Mean	Proportion (% > 400)
Lamb Branch	5	5	800	2200	1540	100
Peachtree Creek (at Mission Rd)	5	3	180	1200	520	60
Slow Creek	5	5	460	2400	1043	100
McComb Branch	4	2	170	2200	518	50
George Creek (Hiwasee Lake HUC)	5	0	88	230	140	0
Martins Creek (Hiwasee Lake HUC)	5	2	220	1400	550	40
Mission Branch (Tusquitee Creek HUC)	5	3	390	2400	631	60
Sudderth Branch (Tusquitee Creek HUC)	4	0	96	190	122	0

EEP projects in the Brasstown Creek Watershed

EEP has two restoration and/or preservation projects in the Peachtree-Martins Creek watershed which will be constructed in 2012 and one project that has already been constructed on Trout Cove Branch, a tributary to Brasstown Creek.

The Martins Creek project is on a large tract of largely wooded property that drains to Martins Creek that was identified as the top priority for preservation in EEP's project atlas. This project will protect almost four miles of highly functioning stream and riparian area and restore another mile of degraded stream along Martins Creek itself and tributaries that flow to it that have been impacted by livestock grazing. In addition, almost seven acres of riparian wetland will be restored in the Martins Creek floodplain.

Another project is on an unnamed tributary to Martins Creek near its headwaters. This project is on a stream that has been highly impacted by cattle. It will restore the stream and riparian area of more than a mile of stream, installing fencing and other livestock BMPs.

The Trout Cove Branch project restored the stream and riparian area of almost 4,000 linear feet of the creek. Procedures included reestablishing channel sinuosity, installation of rock vanes and root wads for erosion control and improved aquatic habitat, and enhancement of existing wetland areas. The project is now in long-term stewardship.

NOTABLE WATERS

Table 1-1 lists waterbodies identified as needing additional protection and potential restoration actions. The fourth and fifth columns of this table list potential stressors and sources that may be impacting a stream based on in-field observations, monitoring data, historical evidence, permit or other violations, and other staff and public input. In many cases, additional study is needed to determine exact source(s) of the impact. The last column includes a list of recommended actions.

TABLE 1-1: NOTABLE WATERBODIES

STREAM NAME	AU#	CLASS.	STRESSOR	SOURCE	STATUS	ACTIONS NEEDED
Crawford Creek	1-42-1	WS-IV	habitat degradation, sedimentation	agriculture	Not Rated	R,M, BMPs
Lamb Branch	1-44-5	C	fecal coliform bacteria	agriculture, failing septic systems	Impaired	BMPs
Little Brasstown Creek	1-42-11	WS-IV	habitat degradation, sedimentation	agriculture, forestry, residential development	Supporting	R, BMPs, F
McComb Branch	1-43-(2)	WS-IV	sedimentation, nutrients, toxicity, fecal coliform bacteria, metals	stormwater, agriculture, historical groundwater contamination	Impacted	SC, R
Peachtree Creek	1-44a	C	fecal coliform bacteria	agriculture, failing septic systems	Impaired	BMPs,R
Pinelog Creek	1-42-6	WS-IV	habitat degradation, sedimentation	agriculture	Not Rated	R, M, BMPs
Slow Creek	1-44-9	C	nutrients, fecal coliform bacteria	historical groundwater contamination, agriculture, failing septic systems	Impaired	R, M, NMC, BMPs

AU # = Assessment Unit # or stream segment/reach

Class. = Classification (e.g., C, S, B, WS-I, WS-II, WS-III, WS-IV, WS-V, Tr, HQW, ORW, SW, UWL)

Stressor = chemical parameters or physical conditions that at certain levels prevent waterbodies from meeting the standards for their designated use.(e.g., low/high DO, nutrients, toxicity, habitat degradation, etc.)

Source = development, agriculture, WWTP, NPS,

Status = Impaired, Impacted, Supporting, Improving

Actions Needed = R= restoration, P= protection, SC= stormwater controls, SS= stressor study, E= education, LO= local ordinance, BMPs, SSP= species protection plan, F= forestry BMPs, Ag= Agriculture BMPs, NMC= nutrient mgmt controls, S&E soil and erosion control, M= monitoring

WATERBODY CLASSIFICATIONS

All surface waters in the state are assigned at least one primary classification and they may also be assigned one or more supplemental classifications, Figure 1-3 . A list of classifications with a description of their requirements can be found in Chapter 2 of the [Supplemental Guide to Basinwide Planning](#).

FIGURE 1-3: STREAM CLASSIFICATIONS

