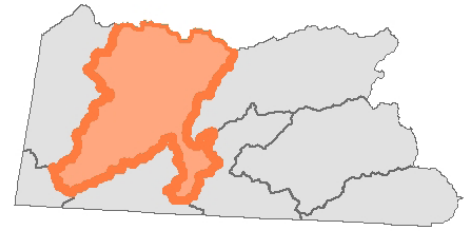


HIWASSEE LAKE WATERSHED

HUC 0602000207

















Includes: Major Streams- Martins Creek, Hanging Dog Creek, Grape Creek, Beaverdam Creek, Persimmon Creek & Bearpaw Creek

WATERSHED AT A GLANCE

<u>COUNTY:</u>	<u>AREA</u>	<u>2006 LAND COVER:</u>	<u>PERMITTED FACILITIES:</u>
Cherokee	157 sq mi.	Open Water.....4%	NPDES
<u>MUNICIPALITIES:</u>	<u>POPULATION:</u>	Developed.....4%	Wastewater Discharge.....2
Murphy	2000.....5,929	Forested.....85%	Wastewater Nondischarge....0
<u>EPA LEVEL IV ECOREGIONS:</u>	2010.....6,822	Shrub.....1%	Stormwater.....4
Broad Basins, Southern Metasedimentary Mtns.		Agriculture.....5%	Animal Operations.....0

2006 Land Cover

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

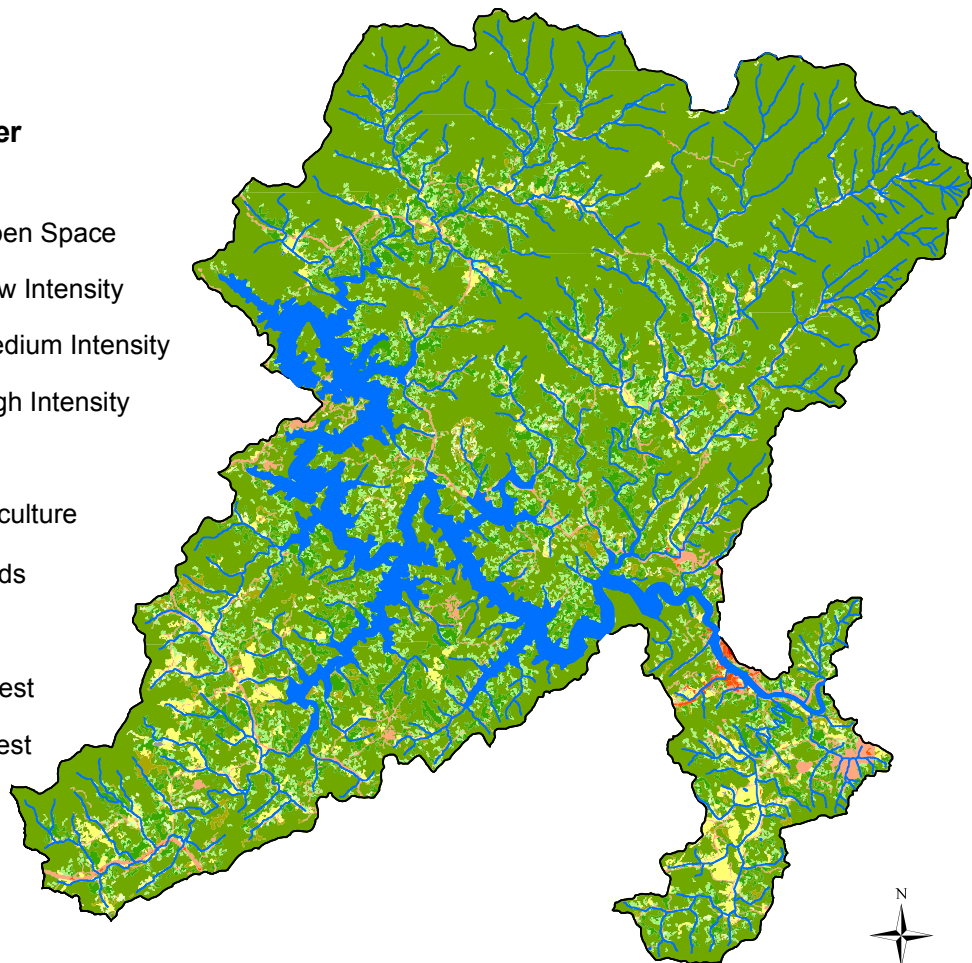
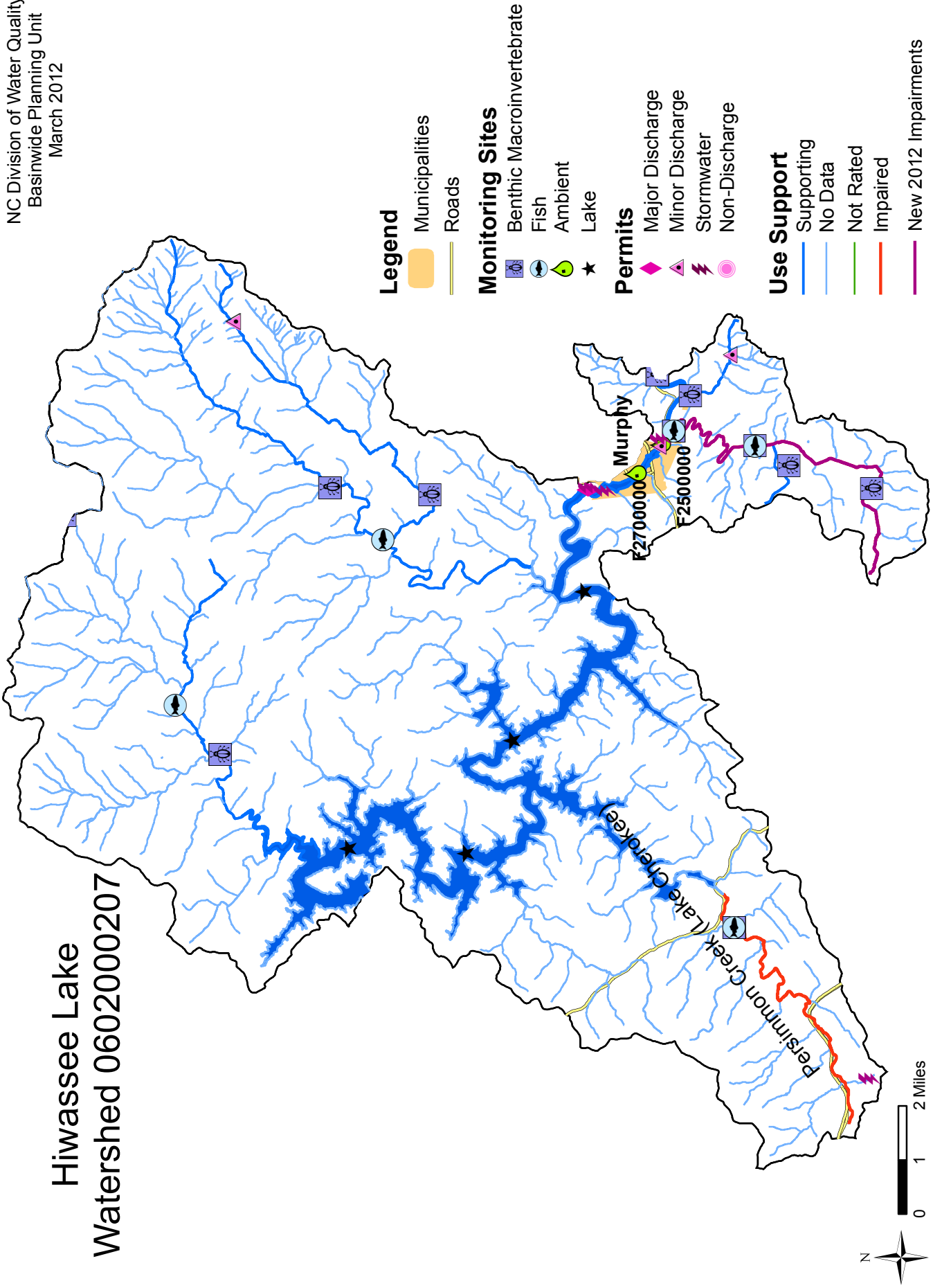


FIGURE 1-1: HIWASSEE LAKE WATERSHED MAP

NC Division of Water Quality
 Basinwide Planning Unit
 March 2012

Hiwassee Lake Watershed 0602000207



WATER QUALITY MONITORING

There is one ambient station in this watershed. Ambient station F2500000 at US 64 was discontinued and a new station F2700000 was established further downstream at Business 19 in 2007. Data from these stations indicate low pH levels.

Biological samples have been taken throughout the watershed since the 1980's. Basinwide sites were first sampled in 1994 and the two most recent basinwide benthic macroinvertebrate samples were taken in 2009 resulting in an Excellent and Good-Fair Bioclassifications. An additional six samples were taken in 2006 as part of a [special study](#). 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.

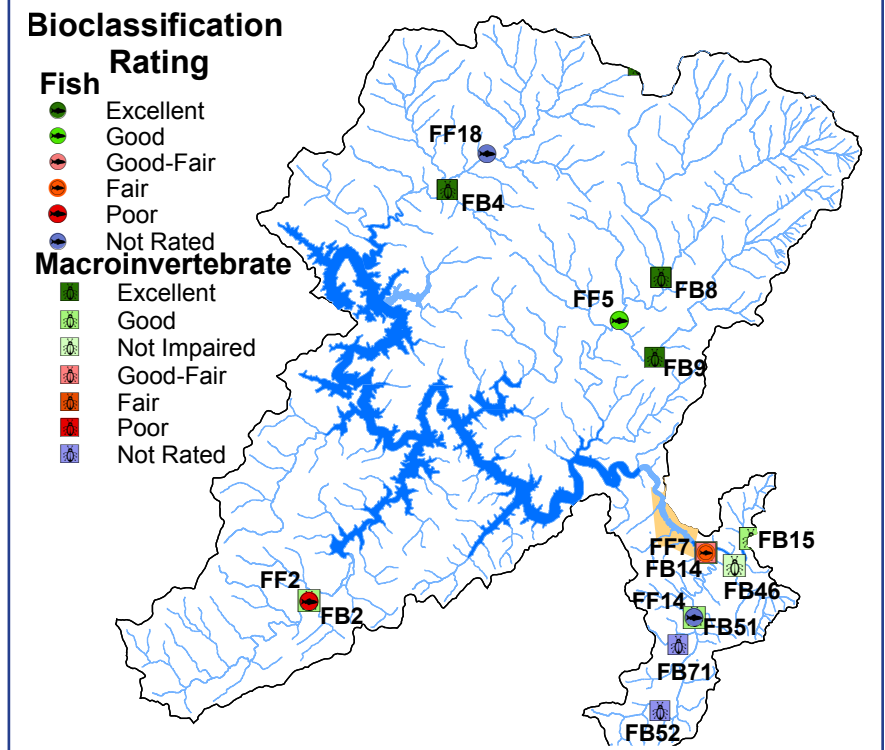
Biological Monitoring

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

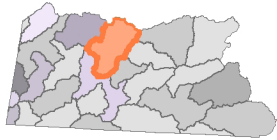
The following section provides more detail about specific streams where special studies have occurred or stressor sources information is available. Within this document biological sample site IDs ending in an "F" denote fish community and a "B" denote macroinvertebrate community. Specific stream information 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.

FIGURE 1-2: BIOLOGICAL SAMPLE SITES & RATINGS



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>.

HANGING DOG CREEK (HUC 060200020701)

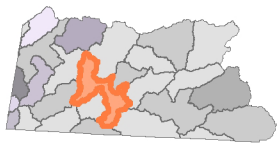


Hanging Dog Creek drains ~41 square miles to Hiwassee Lake, some of which is in Nantahala National Forest. Davis Creek and all its tributaries, and Dockery Creek are tributaries to Hanging Dog Creek that carry the supplemental Trout classification (Tr).

Hanging Dog Creek [AU# 1-57] was sampled in 2009 resulting in Excellent macroinvertebrate (FB8) and Good fish (FF5) community rating; although there was a noted increase in sedimentation and riparian vegetation loss. Downstream, the riparian zone was narrow and provided insufficient shading. Reestablishing the riparian zone will provide more shading to keep water temperature low and protect against bank erosion.

Owl Creek [AU# 1-57-6] was last sampled for macroinvertebrates in 2004 resulting in an Excellent rating. There is one discharge permit (NCG530068) in Owl Creek for a trout farm. Dinkin Branch and Little Owl Creek are tributaries to Owl Creek and are classified for the protection of trout.

GRAPE CREEK-HIWASSEE LAKE (HUC 060200020702)



This subwatershed drains ~36 square miles, including: Hampton Creek, Martin Creek, Grape Creek, and Beech Creek drainages. Hiwassee Lake is surrounded by Nantahala National Forest and there are two significant natural heritage areas within the subbasin: Hiwassee Church Bluffs and Will Scott Mountain. There is also a significant amount of Tribal land in this subwatershed, held by the Eastern Band of

Cherokee Indians.

Special Study Summary

In July 2005, the Ecosystem Enhancement Program (EEP), Hiwassee River Watershed Coalition (HRWC), and Equinox Environmental Consultation and Design started a local watershed planning process in the Peachtree-Martin 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. Hampton Creek and Martin Creek in this subwatershed were sampled as part of this assessment.

Hampton Creek [AU# 1-48] was sampled (FB46) in 2006 as part of the EEP watershed assessment special study resulting in a Not Impaired status. However, when compared to other similarly rated small streams, Hampton Creek ranks the worst biologically. The creeks drainage area at the sample site is 1.9 square miles where there was minimal canopy cover noted. Average stream width was 4 meters; average depth was 0.3 meter. The upper section of the reach had been channelized. To the right of the stream was a horticultural nursery. Habitat at the site suffered primarily from a very narrow riparian zone that provided minimal shade to the stream. (BAU Memorandum B-20060731).



Hampton Creek, Site FB46

Martin Creek [AU# 1-49] drains north ~9 to the Hiwassee River and is a broad, flat, agricultural valley, but is also one of the most developed subwatersheds in the Hiwassee River basin, with many new single-family homes under construction in addition to older, established residential neighborhoods associated with the Town of Murphy. The mountain creekshell (*Villosa vanuxemensis*), a

state-threatened mussel is found in Martin Creek. This creek was sampled by DWQ biologists in 2006 as part of an EEP study (BAU Memorandum B-20060731); the details of this study are available on the EEP website: http://www.nceep.net/services/lwps/pull_down/by_basin/Hiwassee_RB.html.

The basinwide benthic sample in Martin Creek at SR 1558, (FB14) near the confluence with the Hiwassee River received a Good-Fair bioclassification in 2009, which is a decrease from the Good rating it received in 2004. The basinwide site FB14 was sampled in 2006 as part of the special study and resulted in a Good-Fair rating, with noted sedimentation as being an issue, but also noting a healthy and diverse riparian vegetation. The fish community sample (FF7) taken at the same location resulted in a Fair rating with a noted shift in trophic community, which is a decline from the special study sample taken in 2006, which received a Good-Fair rating. Benthic site FB51 at SR 1576 is about halfway upstream from the mouth resulted in a Good rating, while the fish sample (FF14) at the same location was Not Rated because of the stream is a low elevation trout-type stream and criteria have not been developed for those streams. Biologists noted areas of habitat degradation, sedimentation and abundant periphyton growth. Most of the stream reach has been channelized with limited riparian vegetation and evidence of cattle access. Two additional sites were sampled as part of the special study in the winter of 2006, one site is near the headwaters (FB52) and another (FB71) on a unnamed tributary to Martin Creek; both were Not Rated because of their small stream status. The unnamed tributary was noted as having nutrients and habitat degradation as stressors. The declining stream conditions are likely a result of steep slope and ridgetop residential development that occurred in this area between 2005-2008.



Martin Creek at SR 1576, Sites FB51 & FF14

In 2004, Martin Creek at SR 1558 (sites FF7 & FB14) was considered a regional reference site because of its instream, riparian, and watershed characteristics. At that time, based upon an examination of topographic maps, it was estimated that approximately 60 percent of the watershed upstream from the site was forested. GIS analyses, based upon 1993-1995 landuse coverage, showed that approximately 75 percent of the watershed was forested and approximately 20 percent in pasture. Thus, despite the prevalence of pasture alongside the creek throughout the middle of the watershed and that which was observed in 2006 at sites FB51 and FB14 technically continued to qualify as a regional reference site. However, the fish community has not been rated Good or Excellent even though this site has moderately high quality instream and riparian habitats. There are no known upstream dischargers and nonpoint source runoff should not be affecting this moderate gradient stream. But clearly, some factor(s) is impacting the fish community. Effects from historical land use practices within the watershed and illegal discharges (e.g., "straight pipes") may be impacting the stream. The uniform depth, the relatively homogenous flat cobble substrate covered with fine silts, the lack of productive riffles, and the lack of deep pools with submerged structures undoubtedly all contribute to the low total abundance of fish, the low diversities and abundance of cyprinids, darters, and Rock Bass, Smallmouth Bass, and Trout, and ultimately the continued lower than expected NCIBI ratings. Although the watershed is predominantly forested, land use practices closest to the stream throughout the watershed and upstream from the SR 1558 monitoring site may be having a negative impact on the downstream fish community that far exceeds the moderately high quality habitat benefits at the monitoring site. (BAU Memorandum B-20060731).



Martin Creek at SR 1558, Sites FF7 & FB14

Water chemistry data was also collected in Martin Creek capturing baseflow and stormwater conditions, detecting moderate nitrite-nitrate concentrations in the baseflow and elevated fecal coliform counts. Five fecal coliform bacteria samples between May 24- June 12, 2007 detected bacteria levels that exceed state standards with a maximum coliform count of 1400 and a geometric mean of 550.

Water chemistry data was also collected in Martin Creek capturing baseflow and stormwater conditions, detecting moderate nitrite-nitrate concentrations in the baseflow and elevated fecal coliform counts. Five fecal coliform bacteria samples between May 24- June 12, 2007 detected bacteria levels that exceed state standards with a maximum coliform count of 1400 and a geometric mean of 550.

The Hiwassee River, [AU# 1-(50)], below Martin Creek had low pH and was Impaired on the 2010 303(d) list, however no low pH conditions were detected in 2009 or 2010 and therefore the stream will no longer be impaired on the 2012 303(d) list. Ambient station F2500000 at US 64 was discontinued and a new station F2700000 was established further downstream at Bus 19 in 2007. This reach of the river flows through the Town of Murphy. Fecal coliform bacteria samples were collected in September 2011 at this site and the data indicates bacteria levels that do not exceed our current water quality standards assessment criteria. The Town of Murphy's WWTP (NC0020940) discharges into this reach of the river. The facility has had several permit violations(TSS, fecal coliform bacteria and monitoring frequency) in recent years, however the instream low pH does not appear to be a result of the WWTP violations. The plant has issues with solids management because of slug loading and weather conditions. The facility is to consider entering into SOC in order to allow the facility time to get solids management and process control strategy in place.

Hiwassee Lake [AU# 1-(53)] was built by the Tennessee Valley Authority (TVA) between 1936 and 1940 to provide hydroelectric power and is the second largest TVA-owned lake in North Carolina. Hiwassee Reservoir's classifications include C and B, for the protection of primary recreation and aquatic life. DWQ took water quality samples in the lake from May through September 2009 and did not detect any water quality parameters of concern. For more details regarding the data collected see the [ESS Lake & Reservoir Assessment report](#).

Recommendation

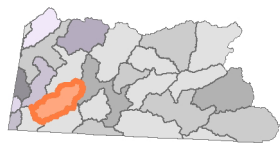
The final Peachtree-Martin Creek Watershed Management Plan is the best available strategy for restoration needs in this subwatershed. DWQ supports these identified restoration needs and will work with federal, state, and local parties to implement its recommendations.

Ecosystem Enhancement Program Projects

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.

LAKE CHEROKEE-PERSIMMON CREEK (HUC 060200020703)



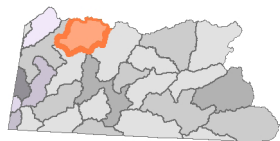
This subwatershed drains 25 square miles northeast into Hiwassee Lake. Persimmon Creek is impounded to form Lake Cherokee, a 30 acre reservoir, before entering Hiwassee Lake. The monitoring sites at SR 1127 are approximately one mile upstream from the backwaters of Lake Cherokee. Persimmon Creek [AU# 1-63a] received a Poor bioclassification in 2006 at fish sampling site FF2 and therefore the

Creek is Impaired and listed on the 2010 303(d) list. However, the benthic site FB2 which is downstream from the fish site, has rated Excellent from 1994-2006, when it declined to a Good bioclassification. These extreme differences in ratings prompted a special study done in 2006, (BAU Memorandum -20060720). The upstream site is noted as having poor habitat characteristics, while downstream habitat conditions improve. The main differences in the two reaches were in bottom substrate, pool variety, riffles, bank stabilities, and canopy cover. Such a difference in ratings suggested that habitat alone may have been the influencing factor for the fish rating, because the water quality would not have changed within this short stretch of stream.

Recommendations

Habitat improvements are anticipated in future sites assessments of the creek but stream restoration and bank stabilization are still needed in Persimmon Creek. DWQ supports the restoration efforts led by the Cherokee County Soil and Water Conservation District who completed a restoration project on 1,700 ft. of the upstream reach. Creating sloped banks re-vegetated with dogwood, willow, and river birch; rock veins and root wad structures were also placed within the stream to deflect the current. Additionally, DWQ encourages the District to develop a watershed plan for moving forward in order to insure that both water quality and watershed function are restored. DWQ will sample this stream again to evaluate the improvements to water quality as a result of these efforts.

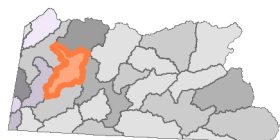
BEAVERDAM CREEK (HUC 060200020704)



Beaverdam Creek [AU# 1-72] drains ~30 square miles and the majority of streams, including the creek itself, carry the supplemental Trout waters classification (Tr). The last macroinvertebrate sample was collected (FB4) in 2004 resulting in a Excellent rating, however the 2009 fish sample (FF18) was Not Rated and noted some water quality concerns. Despite being a trout stream no top predator species were found,

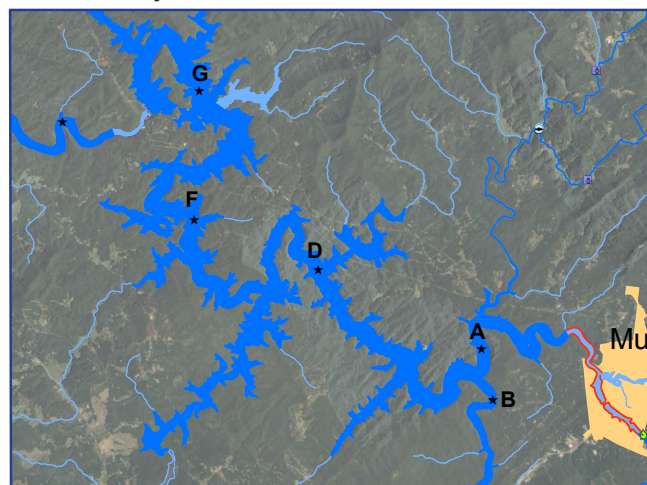
there were also noted breaks in riparian vegetation from cattle access.

HIWASSEE LAKE-HIWASSEE RIVER (HUC 060200020705)



This subwatershed includes the downstream portion of Hiwassee Lake. Bearpaw Creek [AU# 1-66] flows north to Hiwassee Lake is the one major drainage solely within this subwatershed and is not monitored by DWQ.

Hiwassee Lake [AU# 1-(53)] was built by the Tennessee Valley Authority (TVA) between 1936 and 1940 to provide hydroelectric power and is the second largest TVA-owned lake in North Carolina. Hiwassee Reservoir's classifications include C and B, for the protection of primary recreation and aquatic life. DWQ took water quality samples in the lake from May through September 2009 and did not detect any water quality parameters of concern. The locations of samples sites are located on the figure to the right. For more details regarding the data collected see the [ESS Lake & Reservoir Assessment report](#).



Hiwassee Lake Station Locations

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
Beaverdam Creek	1-72	C;Tr	habitat degradation	agriculture	Supporting	Ag BMPs
Hampton Creek	1-48	C	habitat degradation, sedimentation	urban stormwater	Supporting	R,SC
Martin Creek	1-49	C	sedimentation, nutrients, fecal coliform bacteria	agriculture, failing septic systems, residential development	Impaired	SC, LO, SSP, Ag, NMC
Persimmon Creek	1-63a	C	habitat degradation, sedimentation	agricultural, loss of riparian vegetation	Impaired	R, Ag

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=conservation 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 mgnt 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](#).

Trout (Tr) Waters

Beaverdam Creek and several of its tributaries are classified as Trout (Tr) waters. Tr are protected for natural trout propagation and maintenance of stocked trout. There are no watershed development restrictions associated with the trout classification; however, the NC Division of Land Resources (DLR), under the NC Sedimentation and Pollution Control Act (SPCA), has requirements to protect trout streams from land disturbing activities. Under G.S. 113A-57(1), "waters that have been classified as trout waters by the Environmental Management Commission (EMC) shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the twenty-five percent of the buffer zone nearest the land-disturbing activity, whichever is greater." The Sedimentation Control Commission, however, can approve land-disturbing activities along trout waters when the duration of the disturbance is temporary and the extent of the disturbance is minimal. This rule applies to unnamed tributaries flowing to the affected trout water stream. Further clarification on classifications of unnamed tributaries can be found under Administration Code 15A NCAC 02B .0301(i)(1) or the following link: http://portal.ncdenr.org/c/document_library/get_file?uuid=f4f0b765-7892-4681-885b-95f4ef26f806&groupId=38364.

FIGURE 1-3: WATERBODY CLASSIFICATIONS

