

# Chapter 3 - Summary of Water Quality Information for the Hiwassee River Basin

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## 3.1 General Sources of Pollution

Human activities can negatively impact surface water quality, even when the activity is far removed from the waterbody. With proper management of wastes and land use activities, these impacts can be minimized. Pollutants that enter waters can be grouped into two general categories: *point sources* and *nonpoint sources*.

### **Point Sources**

Piped discharges from:

- Municipal wastewater treatment plants
- Industrial facilities
- Small package treatment plants
- Large urban and industrial stormwater systems

Point sources are typically piped discharges and are controlled through regulatory programs administered by the state. All regulated point source discharges in North Carolina must apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit from the state.

### **Nonpoint Sources**

- Construction activities
- Roads, parking lots and rooftops
- Agriculture
- Failing septic systems and straight pipes
- Timber harvesting
- Hydrologic modifications

Nonpoint sources are from a broad range of land use activities. Nonpoint source pollutants are typically carried to waters by rainfall, runoff or snowmelt. Sediment and nutrients are most often associated with nonpoint source pollution. Other pollutants associated with nonpoint source pollution include fecal coliform bacteria, oil and grease, pesticides and any other substance that may be washed off of the ground or deposited from the atmosphere into surface waters.

Unlike point sources of pollution, nonpoint pollution sources are diffuse in nature and occur intermittently, depending on rainfall events and land disturbance. Given these characteristics, it is difficult and resource intensive to quantify nonpoint contributions to water quality degradation in a given watershed. While nonpoint source pollution control often relies on voluntary actions, the state has many programs designed to reduce nonpoint source pollution.

Every person living in or visiting a watershed contributes to impacts on water quality. Therefore, each individual should be aware of these contributions and take actions to reduce them.

### **Cumulative Effects**

While any one activity may not have a dramatic effect on water quality, the cumulative effect of land use activities in a watershed can have a severe and long-lasting impact.

## 3.2 Description of Surface Water Classifications and Standards

North Carolina's Water Quality Standards Program adopted classifications and water quality standards for all the state's river basins by 1963. The program remains consistent with the Federal Clean Water Act and its amendments. Water quality classifications and standards have also been modified to promote protection of surface water supply watersheds, high quality waters, and the protection of unique and special pristine waters with outstanding resource values.

### Surface Water Classifications

All surface waters in the state are assigned a *primary* classification that is appropriate to the best uses of that water. In addition to primary classifications, surface waters may be assigned a *supplemental* classification. Most supplemental classifications have been developed to provide special protection to sensitive or highly valued resource waters. Table A-17 briefly describes the best uses of each classification. A full description is available in the document titled: *Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina*. Information on this subject is also available at DWQ's website: <http://h2o.enr.state.nc.us/wqhome.html>.

Table A-17 Primary and Supplemental Surface Water Classifications

PRIMARY FRESHWATER AND SALTWATER CLASSIFICATIONS	
<u>Class</u>	<u>Best Uses</u>
<b>C and SC</b>	Aquatic life propagation/protection and secondary recreation.
<b>B and SB</b>	Primary recreation and Class C uses.
<b>SA</b>	Waters classified for commercial shellfish harvesting.
<b>WS</b>	<i>Water Supply watershed</i> . There are five WS classes ranging from WS-I through WS-V. WS classifications are assigned to watersheds based on land use characteristics of the area. Each water supply classification has a set of management strategies to protect the surface water supply. WS-I provides the highest level of protection and WS-IV provides the least protection. A Critical Area (CA) designation is also listed for watershed areas within a half-mile and draining to the water supply intake or reservoir where an intake is located.
SUPPLEMENTAL CLASSIFICATIONS	
<u>Class</u>	<u>Best Uses</u>
<b>Sw</b>	<i>Swamp Waters</i> : Recognizes waters that will naturally be more acidic (have lower pH values) and have lower levels of dissolved oxygen.
<b>Tr</b>	<i>Trout Waters</i> : Provides protection to freshwaters for natural trout propagation and survival of stocked trout.
<b>HQW</b>	<i>High Quality Waters</i> : Waters possessing special qualities including excellent water quality, Native or Special Native Trout Waters, Critical Habitat areas, or WS-I and WS-II water supplies.
<b>ORW</b>	<i>Outstanding Resource Waters</i> : Unique and special surface waters which are unimpacted by pollution and have some outstanding resource values.
<b>NSW</b>	<i>Nutrient Sensitive Waters</i> : Areas with water quality problems associated with excessive plant growth resulting from nutrient enrichment.

\* Primary classifications beginning with "S" are assigned to saltwaters.

## **Statewide Water Quality Standards**

Each primary and supplemental classification is assigned a set of water quality *standards* that establish the level of water quality that must be maintained in a waterbody to support the uses associated with each classification. Some of the standards, particularly for HQW and ORW waters, outline protective management strategies aimed at controlling point and nonpoint source pollution. These strategies are discussed briefly below. The standards for C and SC waters establish the basic protection level for all state surface waters. With the exception of Sw, all of the other primary and supplemental classifications have more stringent standards than for C and SC, and therefore, require higher levels of protection.

Some of North Carolina's surface waters are relatively unaffected by pollution sources and have water quality higher than the standards that are applied to the majority of the waters of the state. In addition, some waters provide habitat for sensitive biota such as trout, juvenile fish, or rare and endangered aquatic species.

### **Trout Waters**

Different water quality standards for some parameters, such as dissolved oxygen, temperature and turbidity, have been developed to protect freshwaters for natural trout propagation and survival of stocked trout. These water quality standards result in more restrictive limits for wastewater discharges to trout waters (Tr). There are no watershed development restrictions associated with the Tr classification. However, the NC Division of Land Resources does require a 25-foot vegetated buffer between Tr waters and graded construction sites.

A state fishery management classification, Designated Public Mountain Trout Waters, is administered by the NC Wildlife Resources Commission. It provides for public access to streams for fishing and regulates fishing activities (seasons, size limits, creel limits, and bait and lure restrictions). Although many of these waters are also classified Tr by DWQ, this is not the same classification.

### **High Quality Waters**

Special HQW protection management strategies are intended to prevent degradation of water quality below present levels from both point and nonpoint sources. HQW requirements for new wastewater discharge facilities and facilities which expand beyond their currently permitted loadings address oxygen-consuming wastes, total suspended solids, disinfection, emergency requirements, volume, nutrients (in nutrient sensitive waters) and toxic substances.

#### **Criteria for HQW Classification**

- Waters rated as Excellent based on DWQ's chemical and biological sampling.
- Streams designated as native and special native trout waters or primary nursery areas by the Wildlife Resources Commission.
- Waters designated as primary nursery areas by the Division of Marine Fisheries.
- Waters classified by DWQ as WS-I, WS-II and SA are HQW by definition, but these waters are not specifically assigned the HQW classification because the standards for WS-I, WS-II and SA waters are at least as stringent as those for waters classified HQW.

For nonpoint source pollution, development activities which require a Sedimentation and Erosion Control Plan in accordance with rules established by the NC Sedimentation Control Commission

or an approved local erosion and sedimentation control program, and which drain to and are within one mile of HQWs, are required to control runoff from the development using either a low density or high density option. The low density option requires a 30-foot vegetated buffer between development activities and the stream; whereas, the high density option requires structural stormwater controls. In addition, the Division of Land Resources requires more stringent erosion controls for land-disturbing projects within one mile and draining to HQWs.

### **Outstanding Resource Waters**

A small percentage of North Carolina's surface waters have excellent water quality (rated based on biological and chemical sampling as with HQWs) and an associated outstanding resource.

***The ORW rule defines outstanding resource values as including one or more of the following:***

- an outstanding fisheries resource;
- a high level of water-based recreation;
- a special designation such as National Wild and Scenic River or a National Wildlife Refuge;
- within a state or national park or forest; or
- a special ecological or scientific significance.

The requirements for ORW waters are more stringent than those for HQWs. Special protection measures that apply to North Carolina ORWs are set forth in 15A NCAC 2B .0225. At a minimum, no new discharges or expansions are permitted, and a 30-foot buffer or stormwater controls for most new developments are required. In some circumstances, the unique characteristics

of the waters and resources that are to be protected require that a specialized (or customized) ORW management strategy be developed.

### **Water Supply Watersheds**

The purpose of the Water Supply Watershed Protection Program is to provide an opportunity for communities to work with the state to strengthen protection of their water supplies. There are five water supply classifications (WS-I to WS-V) that are defined according to the amount and types of permitted point source discharges, as well as requirements to control nonpoint sources of pollution (Table A-17). Watersheds draining to waters classified WS carry some restrictions on point source discharges and on many land use activities including urban development, agriculture, forestry and highway sediment control. Minimum requirements for WS-I to WS-IV include a 30-foot undisturbed vegetated buffer. The WS-I and WS-II classifications are HQW by definition because requirements for these levels of water supply protection are at least as stringent as for HQWs.

### **Classifications and Standards in the Hiwassee River Basin**

The waters of the Hiwassee River basin have a variety of surface water quality classifications applied to them. Many streams throughout the basin are classified Trout Waters (Tr). In subbasin 04-05-01, a large portion of the Tusquitee Creek watershed is currently designated High Quality Waters, and the entire Fires Creek watershed is Outstanding Resource Waters. In subbasin 04-05-02, the Gipp Creek watershed is classified ORW. Portions of the Hiwassee River basin that contain these special classifications are shown on Figure A-11.

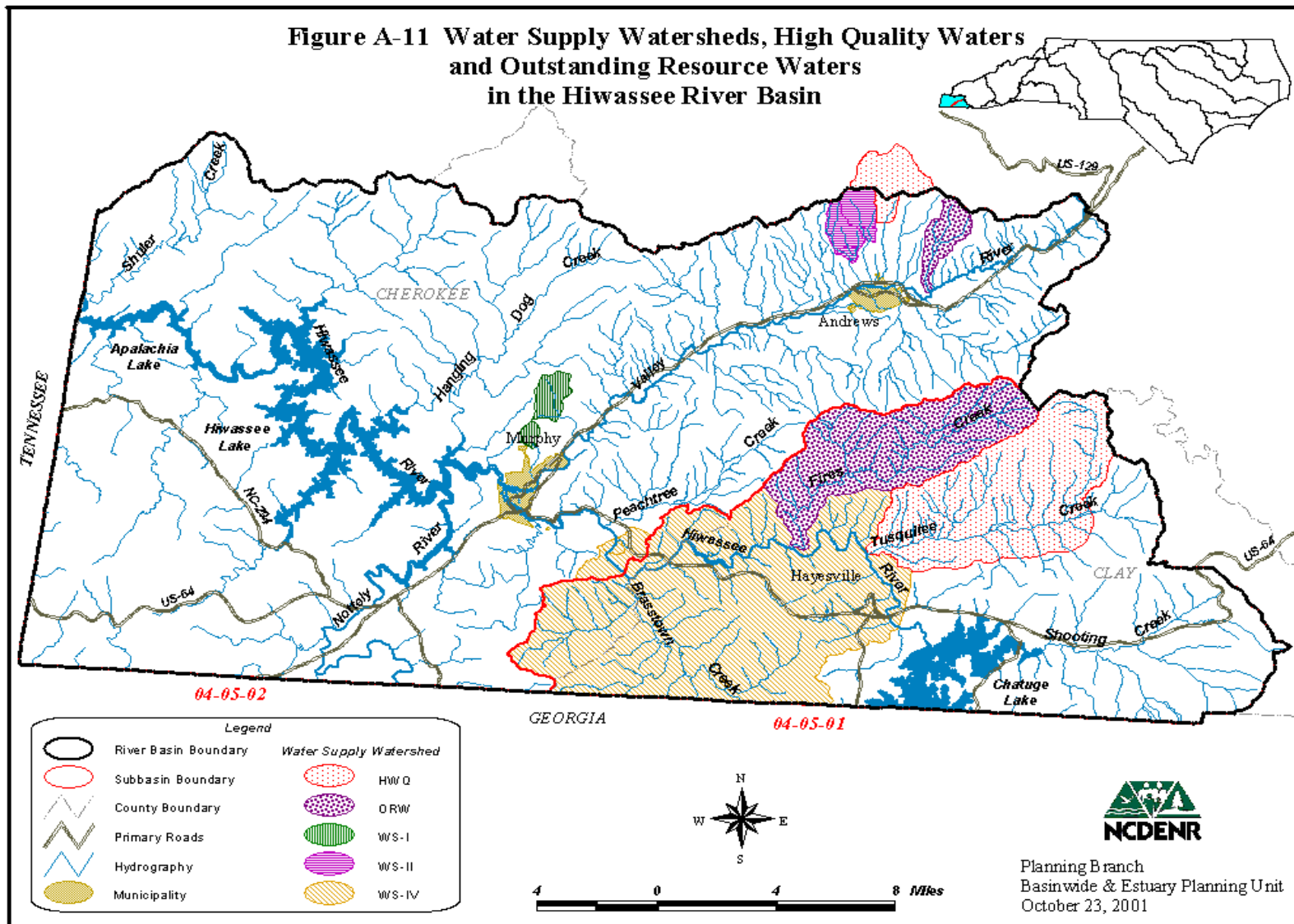


Figure A-11 Water Supply Watersheds, Trout Waters, High Quality Waters and Outstanding Resource Waters in the Hiwassee River Basin

Water supply watersheds are also presented on Figure A-11. Marble Creek and its tributary Brittan Creek, as well as a portion of Brittan Branch in the Valley River watershed, are classified WS-I (most protective). Also in the Valley River drainage, a large portion of the Beaver Creek watershed, including Dan Holland Creek, is classified WS-II.

### **Pending and Recent Reclassifications in the Hiwassee River Basin**

Figure A-11 shows a large area including parts of the Hiwassee River and the Brasstown Creek watershed classified as WS-IV. This is the primary water supply for the Town of Murphy. The NC Department of Transportation (DOT) intends to start construction of a bridge within the existing Critical Area (CA) of the Town of Murphy's water intake in June 2003. [The Critical Area designation is for watershed areas within a half-mile and draining to the water supply intake.] In order to alleviate Division of Environmental Health (DEH) Public Water Supply (PWS) Section and town concerns that construction of the bridge might contaminate the water supply, a new water intake must be constructed. Before the DEH PWS Section will allow water to be withdrawn at the new location, the CA for the new intake must be established. Therefore, some waters within the water supply watershed currently classified WS-IV are proposed for reclassification to WS-IV CA.

## **3.3 DWQ Water Quality Monitoring Programs in the Hiwassee River Basin**

Staff in the Environmental Sciences Branch and Regional Offices of DWQ collect a variety of biological, chemical and physical data. The following discussion contains a brief introduction to each program, followed by a summary of water quality data in the Hiwassee River basin for that program. For more detailed information on sampling and assessment of streams in this basin, refer to the *Basinwide Assessment Report* for the Hiwassee River basin, available from the Environmental Sciences Branch website at <http://www.esb.enr.state.nc.us/bar.html> or by calling (919) 733-9960.

### ***DWQ monitoring programs for the Hiwassee River Basin include:***

- Benthic Macroinvertebrates (Section 3.3.1)
- Fish Assessments (Section 3.3.2)
- Aquatic Toxicity Monitoring (Section 3.3.3)
- Lakes Assessment (Section 3.3.4)
- Ambient Monitoring System (Section 3.3.5)

### **3.3.1 Benthic Macroinvertebrates**

Benthic macroinvertebrates, or benthos, are organisms that live in and on the bottom substrates of rivers and streams. These organisms are primarily aquatic insect larvae. The use of benthos data has proven to be a reliable monitoring tool, as benthic macroinvertebrates are sensitive to subtle changes in water quality. Since macroinvertebrates have life cycles of six months to over one year, the effects of short-term pollution (such as a spill) will generally not be overcome until the following generation appears. The benthic community also integrates the effects of a wide array of potential pollutant mixtures.

Criteria have been developed to assign a bioclassification rating to each benthic sample based on the number of different species present in the pollution intolerant groups of Ephemeroptera (Mayflies), Plecoptera (Stoneflies) and Trichoptera (Caddisflies), commonly referred to as EPTs; and a Biotic Index value, which gives an indication of overall community pollution tolerance. Different benthic macroinvertebrate criteria have been developed for different ecoregions (mountains, piedmont and coastal plain) within North Carolina. Bioclassifications fall into five categories ranging from Poor to Excellent.

### **Overview of Benthic Macroinvertebrate Data**

Appendix II lists all of the benthic macroinvertebrate collections in the Hiwassee River basin between 1983 and 1999, giving site location, collection date, taxa richness, biotic index values and bioclassifications. Ninety-one benthic macroinvertebrate samples have been collected from 39 sites since 1983 in the Hiwassee River basin. Approximately 80 percent of these received Excellent or Good bioclassifications. Table A-18 lists the most recent bioclassifications since 1983 (by subbasin) for all benthos sites in the Hiwassee River basin.

Table A-18 Summary of Most Recent Benthic Macroinvertebrate Bioclassifications for All Freshwater Benthos Sites in the Hiwassee River Basin

<b>Subbasin</b>	<b>Excellent</b>	<b>Good</b>	<b>Good-Fair</b>	<b>Fair</b>	<b>Poor</b>	<b>Total</b>
04-05-01	13	7	0	0	0	20
04-05-02	5	6	6	2	0	19
<b>Total (#)</b>	<b>18</b>	<b>13</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>39</b>
<b>Total (%)</b>	<b>46%</b>	<b>33%</b>	<b>16%</b>	<b>5%</b>	<b>0%</b>	<b>100%</b>

Fifteen sites were sampled during routine 1999 basinwide surveys. For the 1999 collection, Figure A-12 presents the following bioclassifications: Excellent – 8 (53%), Good – 6 (40%), Good-Fair – 1 (7%). Water quality has improved slightly in the Hiwassee River basin since 1994, when only 80 percent of sites received Excellent or Good bioclassifications and one site received a Fair.

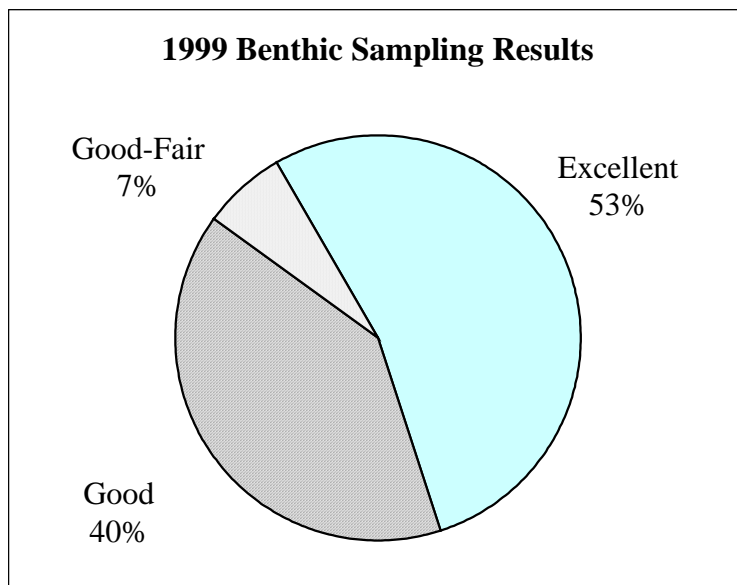


Figure A-12 Bioclassifications for 15 Hiwassee River Basin Benthic Macroinvertebrate Sites Sampled by DWQ in 1999

### 3.3.2 Fish Assessments

Sixty-eight fish species have been collected from the Hiwassee River basin in North Carolina. Special status has been granted to four of these species by the US Department of the Interior, the NC Wildlife Resources Commission, or the NC Natural Heritage Program under the North Carolina State Endangered Species Act (G.S. 113-311 to 113-337) (NCWRC, May 1998).

The North Carolina Index of Biotic Integrity is one of the tools DWQ uses to summarize all classes of factors such as water and habitat quality, flow regime and energy sources which influence the freshwater fish communities of wadeable streams throughout the state. No stream fish community basinwide monitoring was conducted during 1999 in the Hiwassee River basin because of recent revisions and a reexamination of the criteria and metrics.

DWQ has only systematically tracked reported fish kill events across the state since 1996. The only fish kills reported in the Hiwassee River basin occurred during the summer of 1998 when several small kills (less than 25 fish per kill) were observed in Chatuge Lake. During this dry and hot period, dissolved oxygen levels were low in the reservoir. A larger kill of approximately 200 fish (of which most were yellow perch, 10-25 cm in length) was observed during this period in the Hiwassee River below the dam. The kill was attributed to low dissolved oxygen levels in the water passing through the turbines.

No fish tissue contaminant monitoring was conducted between 1994 and 1999 by DWQ because of the lack of any significant contaminant concerns in the Hiwassee River basin. Currently, there are no fish consumption advisories specific to the North Carolina portion of the basin.



### 3.3.3 Aquatic Toxicity Monitoring

Acute and/or chronic toxicity tests are used to determine toxicity of discharges to sensitive aquatic species (usually fathead minnows or the water flea, *Ceriodaphnia dubia*). Results of these tests have been shown by several researchers to be predictive of discharge effects on receiving stream populations. Many facilities are required to monitor whole effluent toxicity by their NPDES permit or by administrative letter. Other facilities may be tested by DWQ's Aquatic Toxicology Laboratory.

The Aquatic Toxicology Unit maintains a compliance summary (Figure A-13) for all facilities required to perform tests and provides a monthly update of this information to regional offices and DWQ administration. Ambient toxicity tests can be used to evaluate stream water quality relative to other stream sites and/or a point source discharge.

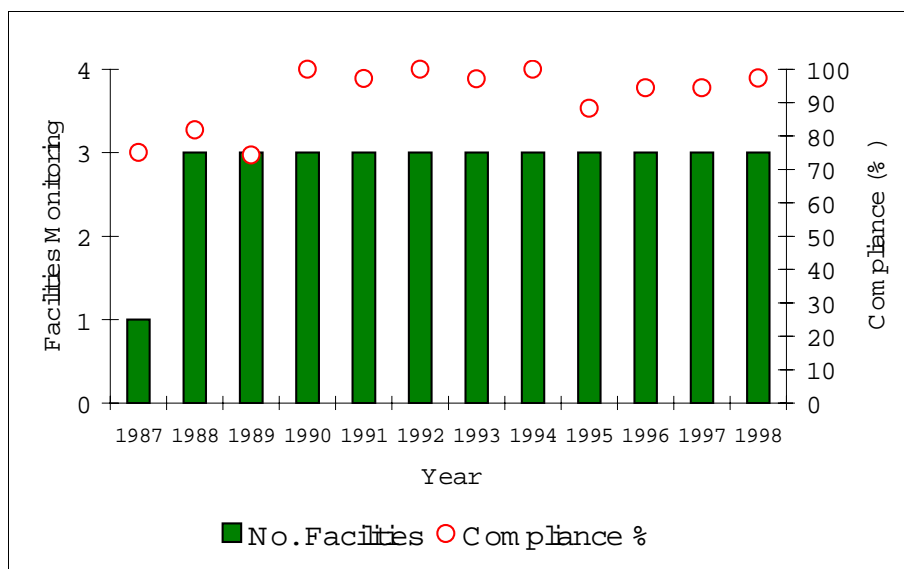


Figure A-13 Summary of Compliance with Aquatic Toxicity Tests in the Hiwassee River Basin (1999)

Three facilities in the Hiwassee River basin have NPDES permits which require whole effluent toxicity (WET) testing. Since 1993, all facilities operated within a compliance rate of 90-95 percent. Facilities with toxicity problems during the most recent two-year review period are discussed in the subbasin chapters in Section B.

### 3.3.4 Lake Assessment

Three lakes in the Hiwassee River basin were sampled as part of the Lakes Assessment Program in the summer of 1999. These data are used to determine the trophic state of each lake, a relative measure of nutrient enrichment and biological productivity. All three lakes (Chatuge, Hiwassee and Apalachia) exhibited low biological productivity, as is expected in the mountain region. NC Trophic State Index scores are presented in Figure A-14. All three lakes are oligotrophic.

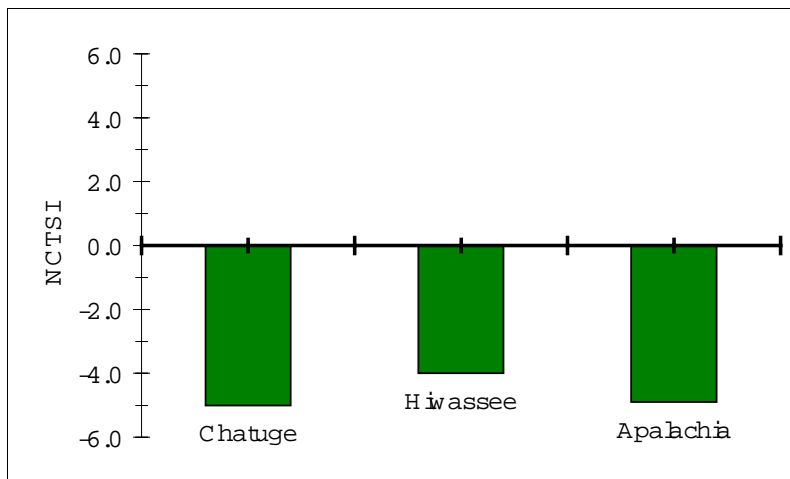


Figure A-14 North Carolina Trophic State Index Scores for Lakes in the Hiwassee River Basin

### 3.3.5 Ambient Monitoring System Program

The Ambient Monitoring System (AMS) is a network of stream, lake and estuarine stations strategically located for the collection of physical and chemical water quality data. North Carolina has 450 monitoring stations statewide, including two stations in the Hiwassee River basin presented in Table A-19 and shown on individual subbasin maps in Section B. These stations are sampled monthly for 27 parameters.

Table A-19 Ambient Monitoring System Stations within the Hiwassee River Basin

Station Code	Station Name	Subbasin	County	Classification
F2500000	Hiwassee River above Murphy NC	04-05-02	Cherokee	WS-V
F4000000	Valley River at SR 1373 at Tomotla NC	04-05-02	Cherokee	C Tr

Water quality, based on ambient monitoring station data, at both locations is good. Fecal coliform bacteria (a pathogen indicator) concentrations at both stations have decreased significantly over time (Table A-20).

Table A-20 Summary of Fecal Coliform Bacteria Collections from the Hiwassee River Basin Ambient Monitoring Stations (1973-1999)

Site	Collection Range (Date)	No. of Samples	Geometric Mean	No. of Samples >200 col/100ml	% of Samples >200 col/100 ml
Hiwassee River	6/27/73 - 6/15/89	77	160.4	29	37.7%
	9/6/89 - 8/29/94	15	5.9	1	6.7%
	<b>9/28/94-8/26/99</b>	<b>49</b>	<b>3.4</b>	<b>3</b>	<b>6.1%</b>
Valley River	11/19/73 - 8/24/89	133	367.0	93	69.9%
	9/6/89 - 8/29/94	18	24.0	3	16.7%
	<b>9/28/94 - 8/26/99</b>	<b>49</b>	<b>19.2</b>	<b>6</b>	<b>12.2%</b>

Note: Rows in bold represent the current basinwide assessment period.

### 3.4 Other Water Quality Research

North Carolina actively solicits "existing and readily available" data and information for each basin as part of the basinwide planning process. Data meeting DWQ quality assurance objectives are used in making use support determinations. Data and information indicating possible water quality problems are investigated further. Both quantitative and qualitative information are accepted during the solicitation period. High levels of confidence must be present in order for outside quantitative information to carry the same weight as information collected within DWQ. This is particularly the case when considering waters for the 303(d) list. Methodology for soliciting and evaluating outside data is presented in *North Carolina's 2000 § 303(d) List* (NCDENR-DWQ, May 2001).

**DWQ data solicitation includes the following:**

- Information, letters and photographs regarding the uses of surface waters for boating, drinking water, swimming, aesthetics and fishing.
- Raw data submitted electronically and accompanied by documentation of quality assurance methods used to collect and analyze the samples. Maps showing sampling locations must also be included.
- Summary reports and memos, including distribution statistics and accompanied by documentation of quality assurance methods used to collect and analyze the data.

*Contact information must accompany all data and information submitted.*

During March 1999, Tennessee Valley Authority (TVA) biologists collected information on fish, benthic macroinvertebrates and habitat characteristics at fifteen sites on streams in the North Carolina portion of the Hiwassee River basin. This currently unpublished data are presented in Table A-21.

The benthic data are limited to the number of EPT families with a maximum of about 25 families/site. TVA's EPT rating is not equivalent to DWQ's benthic bioclassification. TVA's IBI score is not equivalent to DWQ's fish community IBI score. TVA uses IBI information as a

ecological watershed screening tool, whereas the focus of DWQ work is on use assessment. The TVA habitat assessment score has a maximum value of 52. These data are not currently used by North Carolina to assign use support ratings.

Table A-21 Biological and Habitat Data Collected by the Tennessee Valley Authority from the Hiwassee River Basin, March 1999

Stream	Location	Subbasin	County	# EPT Families	TVA EPT Rating*	# Fish Species	Total # Fish	TVA IBI	Habitat Score
Hyatt Mill Cr	SR 1140	04-05-01	Clay	22	Good	8	501	42	26
Blair Cr	SR 1140	04-05-01	Clay	19	Good	10	114	32	25
Town Cr	SR 1140	04-05-01	Clay	4	Poor	3	79	24	21
Qually Cr	SR 1306	04-05-01	Clay	20	Good	7	307	46	36
Tusquitee Cr	SR 1300	04-05-01	Clay	19	Good	10	737	36	42
Fires Cr	SR 1300	04-05-01	Clay	21	Good	9	287	34	49
Brasstown Cr	SR 1564	04-05-01	Cherokee	21	Excellent	18	713	52	37
L Brasstown	SR 1565	04-05-01	Cherokee	16	Good	17	239	50	21
Valley River	SR 1515 & US 19/129	04-05-02	Cherokee	15	Good	24	1282	52	34
Valley River	SR 1370 & US 19/129	04-05-02	Cherokee	15	Good	31	1019	58	28
Rapier Mill Cr	Off 1124	04-05-02	Cherokee	20	Excellent	10	449	40	41
Nottely River	Off 1124	04-05-02	Cherokee	18	Good	11	---	34	--
Hanging Dog	SR 1349	04-05-02	Cherokee	16	Good	13	194	42	48
Beaverdam Cr	SR 1326	04-05-02	Cherokee	21	Excellent	13	631	42	42
South Shoal Cr	Near mouth	04-05-02	Cherokee	21	Excellent	3	116	28	42

\* TVA EPT ratings are not equivalent to DWQ bioclassifications.

TVA also monitors the ecological health of its reservoirs annually. The TVA reservoir rating system is based on the assignment of a numerical score which is then used to define each of five reservoir indicators (algae, dissolved oxygen, fish, benthic macroinvertebrates and sediment) as Poor, Fair or Good.

The overall ecological condition of Chatuge Reservoir rated poor based on 1999 TVA monitoring results. Dissolved oxygen and benthic macroinvertebrates received low scores at both the forebay and Shooting Creek sites within the lake. No insects were collected at three of the ten samples in the forebay (30 percent) and five of ten in the Shooting Creek arm (50 percent) of Lake Chatuge. Sediment quality also received a low score at the Shooting Creek site due to high levels of copper, chromium and nickel. Chatuge also received a poor rating in 1998 (TVA-Chatuge, March 2000).

The poor ratings in 1998 and 1999 for Lake Chatuge are in stark contrast to previously good ratings in 1996, 1994 and 1993. TVA speculates that the very hot, dry weather which occurred in late summer was likely a contributing factor in both years (TVA-Chatuge, March 2000).

Hiwassee Reservoir rated good and Apalachia Reservoir rated fair in 1999. These ratings are consistent with ratings in previous years. The fair rating for Apalachia Lake is primarily related to the fish assemblage (TVA-Apalachia, March 2000).

Nottely Reservoir, located on the Nottely River just upstream of the NC/GA state line, rated Poor in 1999. The only indicator that received a high score was sediment. Data indicate increasing nutrient enrichment. Dissolved oxygen was low in as much as 50 percent of the water column from mid-August to mid-September. Benthic macroinvertebrate scores were also low. Problems with low dissolved oxygen have been observed in Nottely Reservoir every year since monitoring began in 1991 (TVA-Nottely, March 2000)

### 3.5 Use Support Summary

#### 3.5.1 Introduction to Use Support

Surface waters are classified according to their best intended uses. Determining how well a waterbody supports its uses (*use support* status) is an important method of interpreting water quality data and assessing water quality. Surface waters are rated *fully supporting* (FS), *partially supporting* (PS) or *not supporting* (NS). The ratings refer to whether the classified uses of the water (i.e., aquatic life protection, primary recreation and water supply) are being met.

For example, waters classified for fish consumption, aquatic life protection and secondary recreation (Class C for freshwater or SC for saltwater) are rated FS if data used to determine use support meet certain criteria. However, if these criteria were not met, then the waters would be rated as PS or NS, depending on the degree of degradation. Waters rated PS or NS are considered to be impaired. Waters lacking data, having inconclusive data, or for which criteria have not yet been developed are listed as not rated (NR). More specific methods are presented in Appendix III.

#### ***Use support ratings for surface waters:***

- *fully supporting (FS)*
- *partially supporting (PS)*
- *not supporting (NS)*
- *not rated (NR)*

#### ***Impaired waters categories:***

- Partially Supporting
- Not Supporting

Historically, the non-impaired category was subdivided into fully supporting and fully supporting but threatened (ST). ST was used to identify waters that were fully supporting but had some notable water quality concerns and could represent constant, degrading or improving conditions. North Carolina's past use of ST was very different from that of the US Environmental Protection Agency (EPA), which uses it to identify waters that demonstrate declining water quality (EPA Guidelines for Preparation of the Comprehensive State Water Quality Assessments [305(b) Reports] and Electronic Updates, 1997). Given the difference between the EPA and North Carolina definitions of ST and the resulting confusion that arises from this difference, North Carolina no longer subdivides the non-impaired category. However, these waters and the specific water quality concerns remain identified in the basin plans so that data, management and the need to address the identified concerns are not lost.

Beginning in 2000 with the *Roanoke River Basinwide Water Quality Plan*, DWQ assesses ecosystem health and human health risk through the development of use support ratings for six categories: aquatic life and secondary recreation, fish consumption, shellfish harvesting, primary recreation, water supply and "other" uses. These categories are tied to the uses associated with the primary classifications applied to NC rivers and streams. A single water could have more than one use support rating corresponding to one or more of the six use support categories. For many waters, a use support category will not be applicable (N/A) to the use classification of that water (e.g., water supply is only applied to Class WS waters). This method of determining use support differs from that done prior to 2000; in that, there is no longer an *overall* use support rating for a water. For more detailed information regarding use support methodology, refer to Appendix III.

### **3.5.2 Comparison of Use Support Ratings to Streams on the 303(d) List**

Section 303(d) of the Clean Water Act requires states to identify waters not meeting standards. EPA must then provide review and approval of the listed waters. A list of waters not meeting standards is submitted to EPA biennially. Waters placed on this list, termed the 303(d) list, require the establishment of total maximum daily loads (TMDLs) intended to guide the restoration of water quality. See Appendix IV for a description of 303(d) listing methodology.

Waters are placed on North Carolina's 303(d) list primarily due to a partially or not supporting use support rating. These use support ratings are based on biological and chemical data. When the state water quality standard is exceeded, then this constituent is listed as the problem parameter. TMDLs must be developed for problem parameters on the 303(d) list. Other strategies may be implemented to restore water quality; however, the waterbody must remain on the 303(d) list until improvement has been realized based on either bioclassifications or water quality standards.

The 303(d) list and accompanying data are updated as the basinwide plans are revised. In some cases, the new data will demonstrate water quality improvement and waters may receive a better use support rating. These waters may be removed from the 303(d) list since water quality improvement has been attained. In other cases, the new data will show a stable or decreasing trend in overall water quality resulting in the same, or lower, use support rating. Attention remains focused on these waters until water quality standards are being met.

### **3.5.3 Use Support Ratings for the Hiwassee River Basin**

#### **Aquatic Life/Secondary Recreation**

The aquatic life/secondary recreation use support category is applied to all waters in North Carolina. Therefore, this category is applied to the total number of stream miles (967.6) and lake acres (10,847.8) in the North Carolina portion of the Hiwassee River basin. Table A-22 presents use support ratings by subbasin for both monitored and evaluated streams in the aquatic life/secondary recreation category. Refer to Appendix III for a description of monitored and evaluated waters.

Table A-22 Aquatic Life/Secondary Recreation Use Support Ratings for Monitored and Evaluated Waters Listed by Subbasin (1995-1999)

Subbasin	Fully Supporting	Partially Supporting	Not Supporting	Not Rated	Total
04-05-01	216.1 mi 3,629.0 ac	0.0 mi 0.0 ac	0.0 mi 0.0 ac	97.7 mi 0.0 ac	313.8 mi 3,629 ac
04-05-02	497.9 mi 7,218.8 ac	0.0 mi 0.0 ac	0.0 mi 0.0 ac	155.9 mi 0.0 ac	653.8 mi 7,218.8 ac
<b>TOTAL</b>	<b>714.0 mi</b> <b>10,847.8 ac</b>	<b>0.0 mi</b> <b>0.0 ac</b>	<b>0.0 mi</b> <b>0.0 ac</b>	<b>253.6 mi</b> <b>0.0 ac</b>	<b>967.6 mi</b> <b>10,847.8 ac</b>
Percent Miles	74%	0%	0%	26%	100%
Percent Acres	100%	0%	0%	0%	100%

Approximately 21 percent of stream miles (204.3) and 100 percent of lake acres were monitored for the protection of aquatic life and secondary recreation by DWQ during this basinwide planning cycle. In this category, there are currently no impaired waters in the North Carolina portion of the Hiwassee River basin. A basinwide summary of current aquatic life/secondary recreation use support ratings is presented in Table A-23.

Table A-23 Aquatic Life/Secondary Recreation Use Support Summary Information for Waters in the Hiwassee River Basin (1999)

Aquatic Life/Secondary Recreation Use Support Ratings	Monitored and Evaluated Waters*		Monitored Waters Only**	
	Miles and Acres	%	Miles and Acres	%
<b>Fully Supporting</b>	<b>714.0 mi</b> <b>10,847.8 ac</b>	<b>74%</b> <b>100%</b>	<b>204.3 mi</b> <b>10,847.8 ac</b>	<b>100%</b> <b>100%</b>
<b>Impaired</b>	<b>0.0 mi</b>	<b>0%</b>	<b>0.0 mi</b>	
<i>Partially Supporting</i>	<i>0.0</i>		<i>0.0</i>	
<i>Not Supporting</i>	<i>0.0</i>		<i>0.0</i>	
<b>Not Rated</b>	<b>253.6 mi</b>	<b>26%</b>	<b>0.0</b>	
<b>TOTAL</b>	<b>967.6 mi</b> <b>10,847.8 ac</b>		<b>204.3 mi</b> <b>10,847.8 ac</b>	

\* = Percent based on total of all waters, both monitored and evaluated.

\*\* = Percent based on total of all monitored waters.

### Fish Consumption

Like the aquatic life/secondary recreation use support category, fish consumption is also applied to all waters in the state. Fish consumption use support ratings are based on fish consumption advisories issued by the NC Department of Health and Human Services. Currently, there are no fish consumption advisories specific to the NC portion of the basin. Therefore, all waters are considered to be fully supporting the fish consumption category. No waters were monitored for

the fish consumption category during this basinwide cycle because of the lack of any significant contaminant concerns in the Hiwassee River basin.

### Primary Recreation

There are 30.3 stream miles and 10,847.8 lake acres currently classified for primary recreation (Class B) in the Hiwassee River basin. All (100 percent) were monitored by DWQ and the Tennessee Valley Authority over the past five years. Primary recreation use support ratings are based on swimming advisories issued by the NC Department of Health and Human Services (NCDHHS). Currently, there are no swimming advisories in the Hiwassee River basin and all waters classified for primary recreation are fully supporting. Table A-24 presents use support ratings by subbasin for both monitored and evaluated waters in the primary recreation category. A basinwide summary of current use support ratings is presented in Table A-25.

Table A-24 Primary Recreation Use Support Ratings for Monitored and Evaluated Waters Listed by Subbasin (1995-1999)

Subbasin	Fully Supporting	Partially Supporting	Not Supporting	Not Rated	Total
04-05-01	2.6 mi 3,629.0 ac	0.0 mi 0.0 ac	0.0 mi 0.0 ac	0.0 mi 0.0 ac	2.6 mi 3,629.0 ac
04-05-02	27.7 mi 7,218.8 ac	0.0 mi 0.0 ac	0.0 mi 0.0 ac	0.0 mi 0.0 ac	27.7 mi 7,218.8 ac
<b>TOTAL</b>	<b>30.3 mi 10,847.8 ac</b>	<b>0.0 mi 0.0 ac</b>	<b>0.0 mi 0.0 ac</b>	<b>19.9 mi 1,366 ac</b>	<b>24.5 mi 1,366 ac</b>
Percent Miles	100%	0%	0%	0%	100%
Percent Acres	100%	0%	0%	0%	100%

Table A-25 Primary Recreation Use Support Summary Information for Waters in the Hiwassee River Basin (1999)

Primary Recreation Use Support Ratings	Monitored and Evaluated Waters*		Monitored Waters Only**	
	Miles	%	Miles	%
<b>Fully Supporting</b>	<b>30.3 mi 10,847.8 ac</b>	<b>100% 100%</b>	<b>30.3 mi 10,847.8 ac</b>	<b>100% 100%</b>
<b>Impaired</b>	<b>0.0 mi 0.0 ac</b>		<b>0.0 mi 0.0 ac</b>	
<b>Not Rated</b>	<b>0.0 mi 0.0 ac</b>		<b>0.0 mi 0.0 ac</b>	
<b>TOTAL</b>	<b>30.3 mi 10,847.8 ac</b>		<b>30.3 mi 10,847.8 ac</b>	

\* = Percent based on total of all waters, both monitored and evaluated.

\*\* = Percent based on total of all monitored waters.



## Water Supply

There are 163.3 stream miles currently classified for water supply in the Hiwassee River basin. Approximately 79 percent of stream miles (128.4) were monitored within the past five years; all are fully supporting the water supply use. A basinwide summary of current water supply use support ratings is presented in Table A-26.

Table A-26 Water Supply Use Support Summary Information for Waters in the Hiwassee River Basin (1999)

Water Supply Use Support Ratings	Monitored and Evaluated Streams*		Monitored Streamss Only**	
	Miles	%	Miles	%
<b>Fully Supporting</b>	<b>163.3</b>	<b>100%</b>	<b>128.4</b>	<b>100%</b>
<b>Impaired</b>	<b>0.0</b>		<b>0.0</b>	
<b>Not Rated</b>	<b>0.0</b>		<b>0.0</b>	
<b>TOTAL</b>	<b>163.3</b>		<b>128.4</b>	

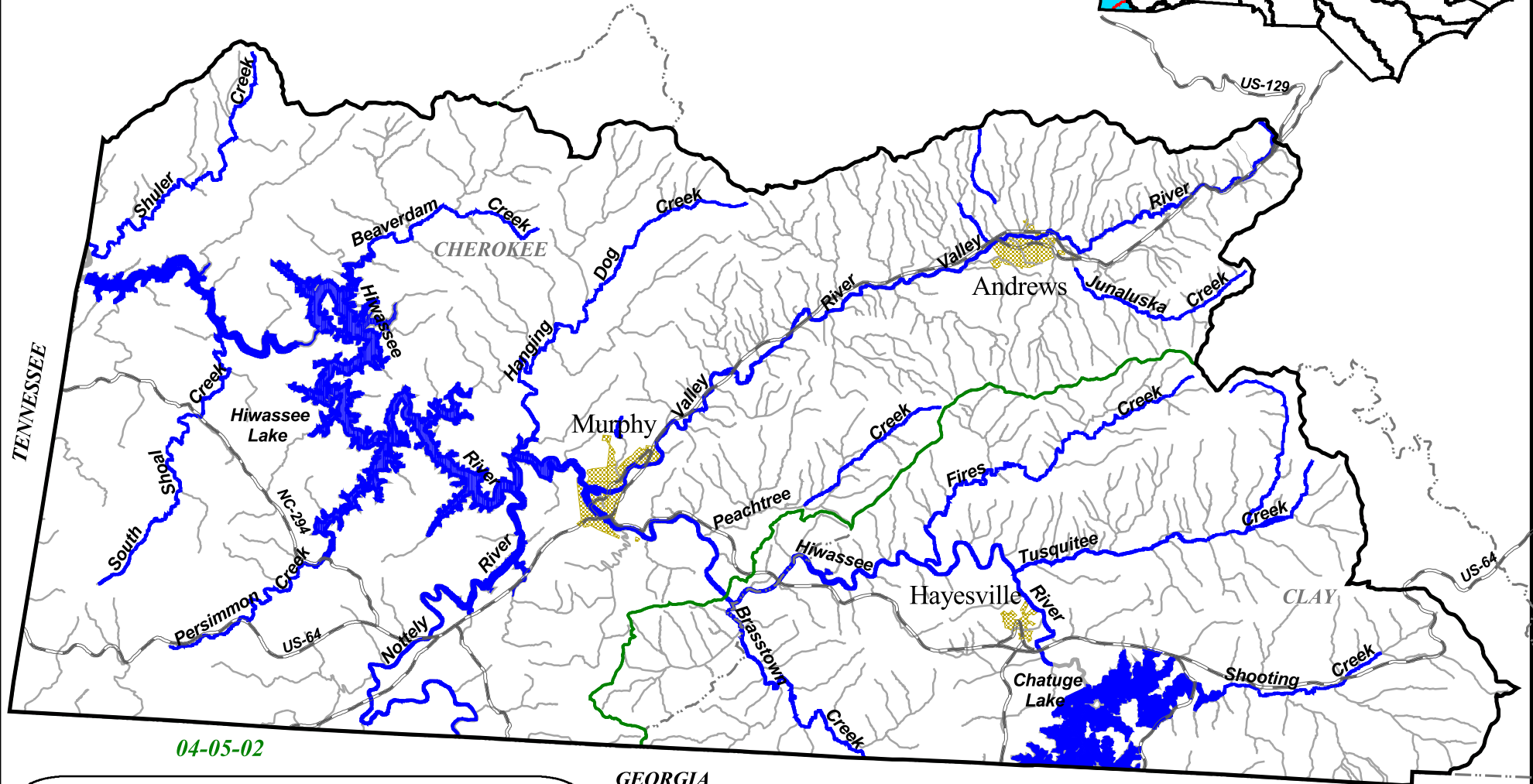
\* = Percent based on total of all streams, both monitored and evaluated.

\*\* = Percent based on total of all monitored streams.

## Use Support Summary

There are currently no impaired waters in the North Carolina portion of the Hiwassee River basin. A color map showing use support ratings for monitored waters in the basin is presented in Figure A- 15.

**Figure A-15 Monitored Waters in the Hiwassee River Basin  
Use Support Ratings**













04-05-02

04-05-01

GEORGIA

**Legend**

	River Basin Boundary		Fully Supporting
	Subbasin Boundary		Partially Supporting
	County Boundary		Not Supporting
	Primary Roads		Not Rated
	Municipality		Not Monitored



Planning Branch  
Basinwide & Estuary Planning Unit  
October 23, 2001