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

## 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, heavy metals, oil and grease, and any other substance that may be washed off the ground or deposited from the atmosphere into surface waters.

Unlike point source pollution, nonpoint pollution sources are diffuse in nature and occur intermittently, depending on rainfall events and land disturbance. Given the diffuse nature of nonpoint source pollution, 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.

***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.

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.

## 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.

**Statewide 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-19 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, including a database of North Carolina's stream classifications, is also available on DWQ's website at http://h2o.enr.state.nc.us/csu/.

Table A-19 Primary and Supplemental Surface Water Classifications

| PRIMARY FRESHWATER AND SALTWATER CLASSIFICATIONS | |
|---|---|
| **Class** | **Best Uses** |
| **C and SC** | Aquatic life propagation/protection and secondary recreation. |
| **B and SB** | Primary recreation and Class C uses. |
| **SA** | Waters classified for commercial shellfish harvesting. |
| **WS** | *Water Supply watershed.* 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** | |
| **Class** | **Best Uses** |
| **Sw** | *Swamp Waters*: Recognizes waters that will naturally be more acidic (have lower pH values) and have lower levels of dissolved oxygen. |
| **Tr** | *Trout Waters*: Provides protection to freshwaters for natural trout propagation and survival of stocked trout. |
| **HQW** | *High Quality Waters*: 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. |
| **ORW** | *Outstanding Resource Waters*: Unique and special surface waters which are unimpacted by pollution and have some outstanding resource values. |
| **NSW** | *Nutrient Sensitive Waters*: 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 the 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 waters establish the basic protection level for all state surface waters. All of the other primary and supplemental classifications have more stringent standards than for C, 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 or special native trout waters by the Wildlife Resources Commission.
- Waters designated as primary nursery areas or other functional nursery areas by the Division of Marine Fisheries.
- Waters classified by DWQ as WS-I, WS-II or SA.

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 of and draining to HQWs.

## 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-19). 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 Broad River Basin

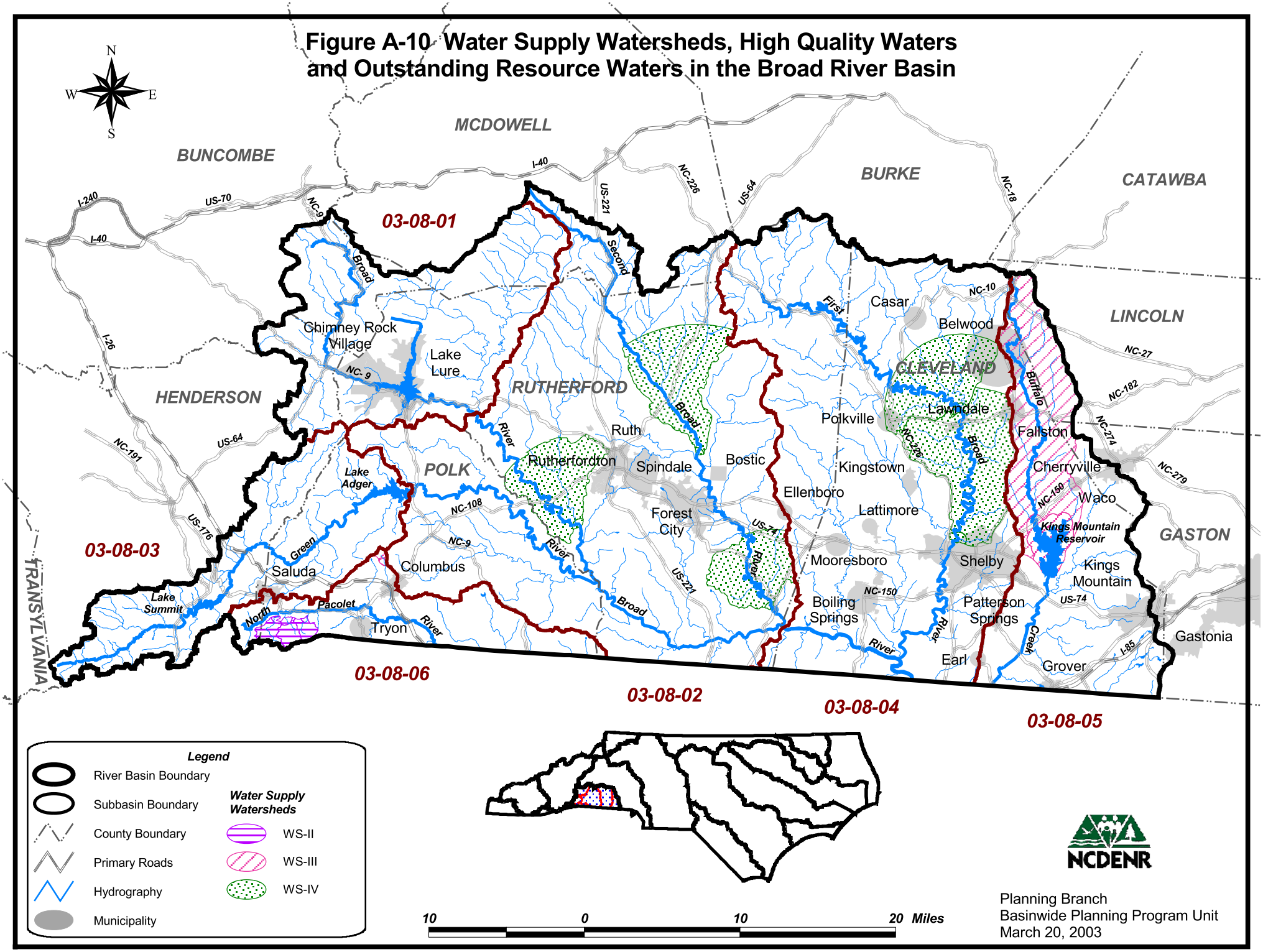
The waters of the Broad River basin have a variety of surface water quality classifications applied to them. Water supply watersheds range from WS-II to WS-IV. Three waters have the supplemental classification of High Quality Waters: the upper headwaters of the Green River and two unnamed tributaries to the Green River at Tuxedo. Portions of the Broad River basin that contain these special classifications are shown on Figure A-10. Approximately 30 percent of the waters in the Broad River basin are classified Trout Waters.

## Class B Waters and the Reclassification Process

Class B waters are those used for primary recreation and other uses suitable for Class C. Primary recreational activities include swimming, skin diving, water skiing, and similar uses involving human body contact with water where such activities take place in an organized manner or on a frequent basis. During the public meetings and comment period for this basin plan, several citizens voiced concern about waters that are currently not Class B but which are currently being utilized in a manner consistent with the description of primary recreation.

A waterbody's classification may change at the request of a local government or citizen. DWQ reviews each request for a reclassification and conducts an assessment of the waterbody to determine the appropriateness of the reclassification. DWQ also conducts periodic waterbody assessments which may result in a recommendation to reclassify the waterbody. In order for a waterbody to be reclassified it must proceed through the rule-making process. To initiate a reclassification, complete the "Application to Request Reclassification of NC Surface Waters", which is available from the Planning Branch by calling (919) 733-5083, ext. 558 or by email at elizabeth.kountis@ncmail.net.

# Figure A-10 Water Supply Watersheds, High Quality Waters and Outstanding Resource Waters in the Broad River Basin



**Pending and Recent Reclassifications in the Broad River Basin**

In April 2001, a portion of the upper headwaters of the Green River was reclassified High Quality Waters. DWQ has also received a request from the Town of Forest City to reclassify a section of the northernmost portion of Second Broad River from WS-IV to WS-II HQW. Forest City has submitted this request in order to expand their water treatment plant. This reclassification is currently in the planning process.

## 3.3 DWQ Water Quality Monitoring Programs in the Broad 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 Broad 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 Broad 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 Broad 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 Macroinvertebrate Monitoring

Benthic macroinvertebrates are organisms that live in and on the bottom substrates of rivers and streams. These organisms are primarily aquatic insect larvae. The use of benthic 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 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 the benthic macroinvertebrate collections in the Broad River basin between 1983 and 2000, giving site location, collection date, taxa richness, biotic index values and bioclassifications. Benthic macroinvertebrates have been collected at 66 sites in the Broad River basin since 1983 with 38 of these sites sampled during the 2000 basinwide survey or special studies. Table A-20 lists the most recent bioclassifications since 1983, by subbasin, for all 66 benthic sites.

Table A-20 Summary of Bioclassifications for All Freshwater Benthic Macroinvertebrate Sites (using the most recent bioclassification for each site) in the Broad River Basin

| Subbasin | Excellent | Good | Good-Fair | Fair | Poor | Not Rated | Total |
|---|---|---|---|---|---|---|---|
| 03-08-01 | 2 | 2 | 0 | 0 | 0 | 1 | 5 |
| 03-08-02 | 1 | 6 | 15 | 2 | 0 | 0 | 24 |
| 03-08-03 | 4 | 3 | 2 | 0 | 0 | 0 | 9 |
| 03-08-04 | 1 | 12 | 2 | 1 | 0 | 0 | 16 |
| 03-08-05 | 2 | 3 | 2 | 1 | 0 | 1 | 9 |
| 03-08-06 | 0 | 1 | 2 | 0 | 0 | 0 | 3 |
| **Total (#)** | **10** | **27** | **23** | **4** | **0** | **2** | **66** |
| **Total (%)** | **15%** | **41%** | **35%** | **8%** | **0%** | **1%** | 100% |

Basinwide sampling in 2000 generally occurred during a period of extreme low flows. In 2000, 38 sites were sampled during basinwide surveys or special studies. For the 2000 collections, Figure A-11 presents the following bioclassifications: Excellent – 6 (16%), Good – 17 (44%), Good-Fair – 11 (29%), Fair – 2 (5%), Poor – 0, Not Rated –1 (3%) and Not Impaired – 1 (3%). The distribution of water quality bioclassifications is similar for both the 2000 collection and all collections since 1983, although drought conditions and the corresponding reduction of nonpoint source pollution impacts produced a slightly higher percentage of Good sites in 2000 than in previous years.

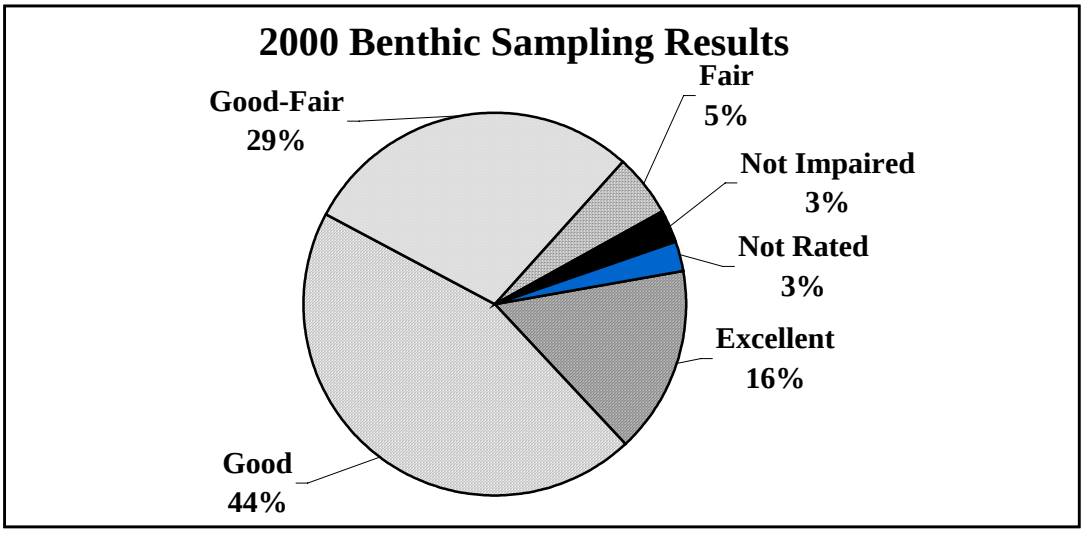



Figure A-11 Bioclassifications for 35 Broad River Basin Benthic Macroinvertebrate Sites Sampled by DWQ in 2000

Trends in water quality over the past five years were evaluated at 33 sites in the Broad River basin, with a majority of the sites (88 percent) showing no change in water quality, other than flow related changes in bioclassification. None of the sites showed a decline in water quality. However, four sites showed improvements related to improvements in wastewater treatment.

A designation of Not Impaired may be used for flowing waters that are too small to be assigned a bioclassification (less than 4 meters in width), but meet the criteria for a Good-Fair or higher bioclassification using the standard qualitative and EPT criteria. Subbasin chapters in Section B contain more specific information regarding these streams.

### 3.3.2 Fish Assessments

Historical studies of fish communities in the Broad River basin were conducted primarily by the North Carolina Wildlife Resources Commission (NCWRC) in the 1960s and late 1970s. Approximately 59 species have been collected from the Broad River basin in North Carolina. Several streams were sampled by DWQ during the last basinwide planning cycle (1995), and 15 samples were collected in 2000. Scores are assigned to these samples using the North Carolina Index of Biotic Integrity (NCIBI). The NCIBI uses a cumulative assessment of 12 parameters or metrics. Each metric is designed to contribute unique information to the overall assessment. The scores for all metrics are then summed to obtain the overall NCIBI score. Appendix II contains more information regarding the NCIBI.

**Overview of Fish Community Data**

Appendix II lists all of the fish community collections in the Broad River basin between 1995 and 2000, giving site location, collection date and NCIBI bioclassification. Fish community samples have been collected at 23 sites in the Broad River basin since 1990. Table A-21 lists the most recent bioclassifications since 1990, by subbasin, for all fish community sites.

Table A-21 Summary of NCIBI Categories for All Freshwater Fish Community Sites (using the most recent bioclassification for each site) in the Broad River Basin

| Subbasin | Excellent | Good | Good-Fair | Fair | Poor | Not Rated | Total |
|---|---|---|---|---|---|---|---|
| 03-08-01 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| 03-08-02 | 3 | 3 | 3 | 0 | 1 | 0 | 10 |
| 03-08-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 03-08-04 | 3 | 3 | 2 | 0 | 0 | 0 | 8 |
| 03-08-05 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| 03-08-06 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| **Total (#)** | **6** | **8** | **7** | **0** | **1** | **1** | **23** |
| **Total (%)** | **26%** | **35%** | **31%** | **0%** | **4%** | **4%** | 100% |

In 2000, 15 sites were sampled for fish community surveys. Only one of these sites, Beaverdam Creek, had been previously sampled during the initial basinwide monitoring in 1995, while the remaining 14 sites represented new monitoring sites. For the 2000 collections, Figure A-12 presents the following NCIBI bioclassification: Excellent – 3 (20%), Good – 5 (33%), Good-Fair – 6 (40%), Fair – 0 and Poor – 1 (7%). The NCIBI bioclassification at the survey site on Beaverdam Creek did not change between the 1995 and 2000 sampling periods.

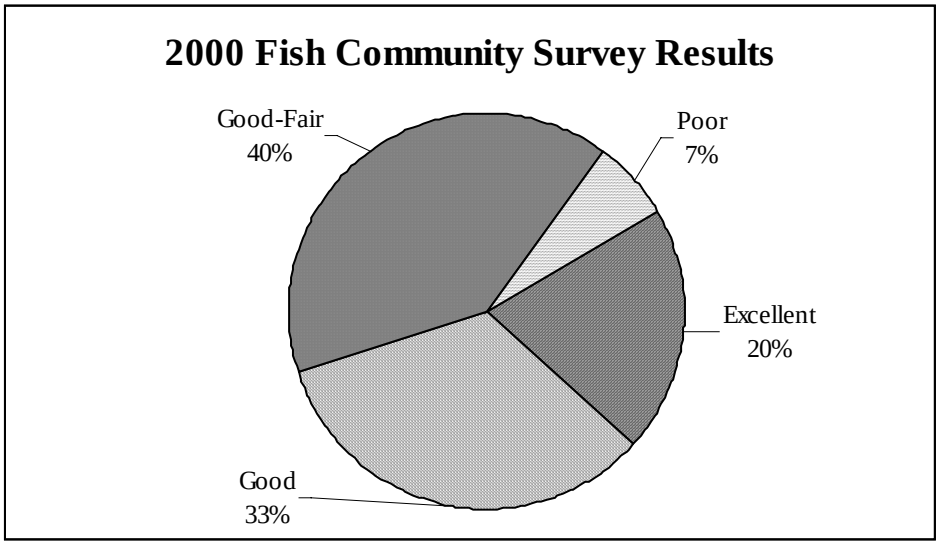



Figure A-12 NCIBI bioclassifications for 15 Broad River Basin Fish Community Survey Sites Sampled by DWQ in 2000

### 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.

Eighteen NPDES permits in the Broad River basin currently require whole effluent toxicity (WET) testing. Seventeen permits have a WET limit; the other facility permit specifies monitoring but with no limit.

The number of facilities required to monitor whole effluent toxicity has increased steadily since 1987, the first year that whole effluent toxicity limits were written into permits in North Carolina. The compliance rate has risen as well. Since 1993, the compliance rate has stabilized at approximately 90-95 percent. Facilities with toxicity problems during the most recent two-year review period are discussed in the subbasin chapters in Section B.

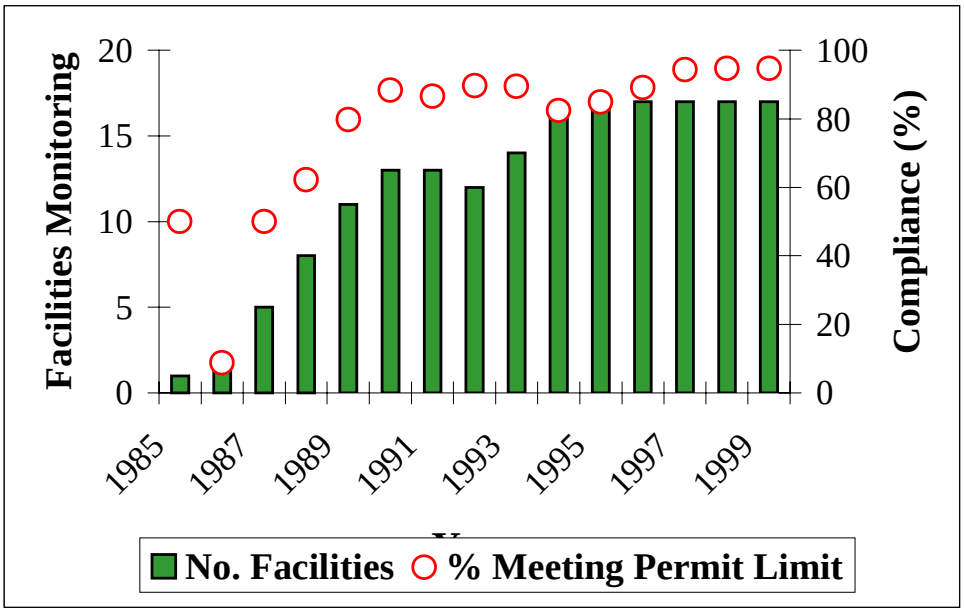



Figure A-13 Summary of Compliance with Aquatic Toxicity Tests in the Broad River Basin

### 3.3.4 Lakes Assessment Program

Four lakes in the Broad River basin were sampled as part of the Lakes Assessment Program during the summer of 2000: Lake Lure (03-08-01), Lake Summit and Lake Adger (03-08-03), and Kings Mountain Reservoir (03-04-05). Each lake is individually discussed in the appropriate subbasin chapter in Section B.

In January 2001, the NC DWQ discovered quality assurance issues with chlorophyll *a* laboratory analyses for samples from 1996 through February 2001. NC DWQ tracking efforts have identified several different quality assurance issues. In some circumstances, laboratory data for chlorophyll *a* will require recalculation efforts. In other cases, chlorophyll *a* data cannot be recovered from the laboratory methods that were utilized. For lakes that were monitored as part of this time period, all previously reported chlorophyll *a* laboratory analyses have been withheld pending a sufficient quality assurance evaluation and/or recalculation of chlorophyll *a* values. As a result of this dilemma, there are no North Carolina Trophic State Index (NCTSI) values available for this time period.

### 3.3.5 Ambient Monitoring System

The Ambient Monitoring System (AMS) is a network of stream, lake and estuarine sample stations strategically located for the collection of physical and chemical water quality data. North Carolina has nine stations in the Broad River basin listed in Table A-22 and shown on individual subbasin maps in Section B. These stations are sampled monthly for 27 parameters.

Table A-22 Ambient Monitoring System Stations within the Broad River Basin

| Subbasin/ Station Code | Station | County | Classification* |
|---|---|---|---|
| ***03-08-01*** | | | |
| A1510000 | Cove Creek at US 64/74, near Lake Lure | Rutherford | C |
| ***03-08-02*** | | | |
| A1520000 | Broad River at SR 1181, near Rock Spring | Rutherford | WS-IV |
| A2700000 | Second Broad River at 1538, near Logan | Rutherford | WS-IV |
| A4400000 | Second Broad River at 1538, near Cliffside | Rutherford | C |
| ***03-08-04*** | | | |
| A4700000 | Broad River at NC 150, near Boiling Springs | Cleveland | C |
| A4800000 | First Broad River at SR 1530, near Casar | Cleveland | WS-IV |
| A6400000 | First Broad River at SR 1140, near Earl | Cleveland | C |
| A6450000 | Sugar Branch at NC 150, near Boiling Springs | Cleveland | C |
| ***03-08-05*** | | | |
| A8600000 | Buffalo Creek at NC 198, near Grover | Cleveland | C |

* An index for DWQ freshwater classifications can be found in Part 3.2 of this section (Table A-19).

Generally, water quality at all locations is good. However, land-disturbing activities such as the construction of roads and buildings, crop production, livestock grazing and logging can all lead to accelerated erosion rates by causing more soil than usual to be detached and moved by water, especially after periods of rain. In the Broad River basin, individual samples at all monitoring stations documented turbidity in excess of the state standard (50 NTU). The ambient monitoring station in the Second Broad at Cliffside had eight (14 percent) observations in excess of 50 NTU and the highest turbidity value (380 NTU) of all the stations.

Iron exceeded its action level at three locations: the Second Broad River at Cliffside, the Broad River at Boiling Springs, and the First Broad River at SR 1140. Iron is a common element in clay soils; therefore, elevated concentrations may reflect the natural geochemistry of the watershed.

**Fecal Coliform Bacteria**

Fecal coliform bacteria are widely used as an indicator of the potential presence of pathogens typically associated with the intestinal tract of warm-blooded animals and are therefore found in their wastes. Coliform bacteria are relatively easy to identify and are usually present in larger numbers than more dangerous pathogens, even though they respond to the environment and to treatment in much the same way. Sources of fecal coliform bacteria, as well as other more dangerous pathogens, include runoff from pastures, feedlots, poultry operations and lagoons that do not employ appropriate best management practices. Other sources include straight pipes, leaking and failing septic systems, and noncompliant WWTPs. Wildlife and pet waste also contribute to elevated concentrations of pathogens.

Table A-23 presents Broad River basin ambient monitoring stations with geometric means greater than 200 colonies/100ml. Stations where 20 percent or more of samples contained concentrations greater than 400 colonies/100ml are also presented. All three stations are located in subbasin 03-08-04. Further discussion of these waters is found in Section B, Chapter (page 102). The majority of stations in the basin (67 percent) had geometric means of less than 150 colonies/100ml.

Table A-23 Ambient Monitoring Stations with Fecal Coliform Geometric Means Greater than 200 Colonies/100ml or with 20 Percent of Samples Greater than 400 Colonies/100ml in the Broad River Basin

| Station | Location | Classification | No. of Samples Used in Mean | Geometric Mean | % >400 col/100ml |
|---|---|---|---|---|---|
| A4700000 | Broad River near Boiling Springs | C | 55 | 118 | 25.5 |
| A6400000 | First Broad River near Earl | C | 51 | 239 | 31.4 |
| A6450000 | Sugar Branch near Boiling Springs | C | 53 | 189 | 32.1 |

## 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 from 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, October 2000). The next data solicitation period for the Broad River is planned for fall 2004.

Any data submitted to DWQ from other water sampling programs conducted in the Broad River basin have been reviewed. Data that meet quality and accessibility requirements were considered for use support assessments and the 303(d) list. These data are also used by DWQ to adjust the location of biological and chemical monitoring sites.

***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.*

In particular, DWQ has reviewed and considered information developed through the Volunteer Water Information Network (VWIN) as managed by the UNC-Asheville Environmental Quality Institute (see page 137) and the State of South Carolina. Other programs or research that developed data or information are presented in Section C or discussed in individual subbasin chapters in Section B.

In the Broad River Basin VWIN monitors 27 sites (Table A-24). VWIN has collected at least three years of monthly data for most sites and over six years of monthly data for many sites. Parameters monitored include major nutrients, turbidity, suspended solids, pH, alkalinity, conductivity and heavy metals such as zinc, copper and lead.

Each county having monitoring stations has a coordinator to organize and train volunteers and to ensure that all stations are monitored monthly. The Upper Broad River Watershed Protection Program (UBRWPP) is the lead organization for VWIN in Henderson and Rutherford counties. For more information on the UBRWPP, please refer to Section C, page 138. The Pacolet Area Conservancy (PAC) is the lead organization for VWIN in Polk County. For more information on PAC, please refer to page 135 of Section C. The subbasin chapters in Section B discuss streams where VWIN monitoring revealed water quality impacts.

Table A-24 Location of VWIN Monitoring Sites in the Broad River Basin

| County | Stream Name | Sampling Location |
|---|---|---|
| Rutherford | Reddypatch Creek | HWY 64 |
| | Hickory Creek | HWY 74 |
| | Broad River | HWY 9 |
| | Broad River | at Hickory Nut Falls Camp Ground |
| | Broad River | at Lake Lure |
| | Pool Creek | HWY 64/74/9 |
| | Public Golf Course Creek | HWY 64/74 |
| | Cane Creek | ¼ mile above Tryon Bay |
| | Buffalo Creek | above Lake Lure |
| | Fairfield Mountains Creek | at Fairfield Mountain |
| | Lake Lure | Main Channel at Center of the Lake |
| | Lake Lure | at the Dam |
| Polk | White Oak Creek | SR 1137 |
| | White Oak Creek | SR 1531 |
| | White Oak Creek | SR 1322 |
| | Horse Creek | SR 1153 |
| | Horse Creek | SR 1516 |
| | North Pacolet River | SR 1516 |
| | Demannu Creek | SR 1140 and Route 9N |
| | Joel's Creek | above Saluda WWTP |
| | Joel's Creek | below Saluda WWTP |
| | Green River | HWY 9 |
| | White Oak Creek | at Briar Hill Farm |
| | North Pacolet River | at Melrose |
| | North Pacolet River | Route 108 |
| | White Oak Creek | at Weidman's |
| | Camp Creek | |

## 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 S*upporting or Impaired*. These ratings refer to whether the classified uses of the water (such as water supply, aquatic life protection and recreation) 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 Supporting if data used to determine use

support meet certain criteria. However, if these criteria were not met, then the waters would be rated as Impaired. Waters with inconclusive data are listed as Not Rated. Waters lacking data are listed as No Data. More specific methods are presented in Appendix III.

In previous use support assessments, surface waters were rated fully supporting (FS), fully supporting but threatened (ST), partially supporting (PS), not supporting (NS) and not rated (NR). FS was used to identify waters that were meeting their designated uses. ST was used to identify waters that were fully supporting but had some notable water quality concerns and could represent constant, degrading or improving water quality conditions. Impaired waters were rated PS and NS, depending on their degree of degradation. NR was used to identify waters lacking data, or having inconclusive data. The 2002 Integrated Water Quality Monitoring and Assessment Report Guidance issued by the EPA requested that states no longer subdivide the supporting or impaired categories. In agreement with this guidance, North Carolina no longer subdivides the use support categories and rates waters as Supporting, Impaired, Not Rated or No Data.

Use support methods have been developed to assess 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, streams and lakes. 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., shellfish harvesting is only applied to Class SA waters). A full description of the classifications is available in the DWQ document titled: *Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina*. For more detailed information regarding use support methodology refer, to Appendix III.

### 3.5.2 Comparison of Use Support Ratings to Streams on the Section 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 an impaired use support rating. These use support ratings are based on biological and chemical data and, for some categories, human health advisories. 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 biological 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 Broad 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 (1,494.8) in the North Carolina portion of the Broad River basin. Table A-25 presents use support ratings by subbasin for both monitored and evaluated streams in the aquatic life/secondary recreation category. A basinwide summary of current aquatic life/secondary recreation use support ratings is presented in Table A-26.

Approximately 37 percent of stream miles (546.2 miles) were monitored for the protection of aquatic life and secondary recreation by DWQ during this basinwide planning cycle. All waters rated Impaired in the aquatic life/secondary recreation use support category were monitored within the past five years. Impaired waters accounted for 0.3 percent of the total stream miles and 0.9 percent of monitored stream miles.

Table A-25 Aquatic Life/Secondary Recreation Use Support Ratings for Monitored and Evaluated Waters Listed by Subbasin (1995-2000)

| Subbasin | Units | Supporting | Impaired | Not Rated | No Data | Total |
|---|---|---|---|---|---|---|
| 03-08-01 | miles | 151.1 | 0.0 | 10.0 | 42.3 | **203.4** |
| | acres | 732.0 | 0.0 | 0.0 | 0.0 | **732** |
| 03-08-02 | miles | 229.2 | 4.7 | 5.1 | 232.3 | **471.3** |
| | acres | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| 03-08-03 | miles | 143.9 | 0.0 | 0.0 | 48.6 | **192.5** |
| | acres | 692.0 | 0.0 | 0.0 | 0.0 | **692** |
| 03-08-04 | miles | 226.5 | 0.0 | 0.0 | 199.9 | **426.4** |
| | acres | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| 03-08-05 | miles | 64.1 | 0.0 | 0.0 | 72.6 | **136.7** |
| | acres | 530.0 | 0.0 | 0.0 | 0.0 | **530** |
| 03-08-06 | miles | 29.9 | 0.0 | 1.6 | 33.0 | **64.5** |
| | acres | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** |
| **Total** | **miles** | **844.7** | **4.7** | **16.7** | **628.7** | **1,494.8** |
| | **acres** | **1,954.0** | **0.0** | **0.0** | **0.0** | **1,954.0** |

Table A-26 Aquatic Life/Secondary Recreation Use Support Summary Information for Waters in the Broad River Basin (2000)

| Aquatic Life/Secondary Recreation Use Support Ratings | Monitored and Evaluated Waters* | | Monitored Waters Only** | |
|---|---|---|---|---|
| | Miles or Acres | % | Miles or Acres | % |
| **Supporting** | **844.7** Miles<br>**1,954.0** Acres | **56.5%**<br>**100.0%** | **531.5** Miles<br>**1,954.0** Acres | **97.3%**<br>**100%** |
| **Impaired** | **4.7** Miles<br>**0.0** Acres | **0.3%**<br>**0.0%** | **4.7** Miles<br>**0.0** Acres | **0.9%**<br>**0.0%** |
| **Not Rated** | **16.7** Miles<br>**0.0** Acres | **1.1%**<br>**0.0%** | **10.0** Miles<br>**0.0** Acres | **1.8%**<br>**0.0%** |
| **No Data** | **628.7** Miles<br>**0.0** Acres | **42.1%**<br>**0.0%** | | |
| **TOTAL** | **1,494.8** Miles<br>**1,954.0** Acres | | **546.2** Miles<br>**1,954.0** Acres | |

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

## Fish Consumption

Like the aquatic life/secondary recreation use support category, the fish consumption use support category is also applied to all waters in the state. No streams were monitored for the fish consumption category during this basinwide cycle because of the lack of any significant contaminant issues in the basin. Fish consumption use support ratings are based on fish consumption advisories issued by the NC Department of Health and Human Services (NCDHHS). Currently, there are no fish consumption advisories specific to the NC portion of the Broad River basin; and therefore, all waters are fully supporting the fish consumption use.

## Primary Recreation

There are 11.8 stream miles and 964 lake acres currently classified for primary recreation (Class B) in the Broad River basin. Table A-27 presents use support ratings by subbasin for all waters in the primary recreation use support category.

No stream miles were monitored by DWQ over the past five years for the primary recreation use. However, Lake Lure and Lake Summit were monitored by DWQ over the past five years and are fully supporting the primary recreation use. A basinwide summary of current primary recreation use support ratings is presented in Table A-28.

Table A-27 Primary Recreation Use Support Ratings for Monitored and Evaluated Waters Listed by Subbasin (1995-2000)

| Subbasin | Units | Supporting | Impaired | No Data | Total |
|---|---|---|---|---|---|
| 03-08-01 | miles | 0.0 | 0.0 | 2.5 | **2.5** |
| | acres | 732.0 | 0.0 | 0.0 | **732.0** |
| 03-08-02 | miles | 0.0 | 0.0 | 0.2 | **0.2** |
| | acres | 0.0 | 0.0 | 0.0 | **0.0** |
| 03-08-03 | miles | 0.0 | 0.0 | 7.5 | **7.5** |
| | acres | 232.0 | 0.0 | 0.0 | **232.0** |
| 03-08-04 | miles | 0.0 | 0.0 | 0.0 | **0.0** |
| | acres | 0.0 | 0.0 | 0.0 | **0.0** |
| 03-08-05 | miles | 0.0 | 0.0 | 1.6 | **1.6** |
| | acres | 0.0 | 0.0 | 0.0 | **0.0** |
| 03-08-06 | miles | 0.0 | 0.0 | 0.1 | **0.1** |
| | acres | 0.0 | 0.0 | 0.0 | **0.0** |
| **Total** | **miles** | **0.0** | **0.0** | **11.8** | **11.8** |
| | **acres** | **964.0** | **0.0** | **0.0** | **964.0** |

Table A-28 Primary Recreation Use Support Summary for Waters in the Broad River Basin (2000)

| Aquatic Life/Secondary Recreation Use Support Ratings | Monitored and Evaluated Waters* | | | Monitored Waters Only** | |
|---|---|---|---|---|---|
| | Miles or Acres | % | | Miles or Acres | % |
| **Supporting** | **0.0** Miles<br>**964.0** Acres | **0.0%**<br>**100.0%** | | **0.0** Miles<br>**964.0** Acres | **0.0%**<br>**100%** |
| **Impaired** | **0.0** Miles<br>**0.0** Acres | **0.0%**<br>**0.0%** | | **0.0** Miles<br>**0.0** Acres | **0.0%**<br>**0.0%** |
| **Not Rated** | **0.0** Miles<br>**0.0** Acres | **0.0%**<br>**0.0%** | | **0.0** Miles<br>**0.0** Acres | **0.0%**<br>**0.0%** |
| **No Data** | **11.8** Miles<br>**0.0** Acres | **100.0%**<br>**0.0%** | | | |
| **TOTAL** | **11.8** Miles<br>**964.0** Acres | | | **0.0 Miles**<br>**964.0 Acres** | |

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

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

## Water Supply

There are 402.8 stream miles and 530.0 lake acres currently classified for drinking water supply in the Broad River basin. All were evaluated 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-29.

Table A-29 Water Supply Use Support Ratings for All Waters Listed by Subbasin

| Water Supply Use Support Ratings | Evaluated Waters | |
|---|---|---|
| | **Miles** | **%** |
| **Supporting** | **402.8** Miles<br>**530.0** Acres | **100%**<br>**100%** |
| **Impaired** | **0.0** Miles<br>**0.0** Acres | **0%**<br>**0%** |
| **Not Rated** | **0.0** Miles<br>**0.0** Acres | **0%**<br>**0%** |
| **TOTAL** | **402.8** Miles<br>**530.0** Acres | |

## Impaired Waters

Table A-30 presents impaired waters (in all categories), listed by subbasin, in the Broad River basin that were monitored by DWQ within the last five years. Ratings for each applicable use support category are shown, even though only one use may be Impaired. Descriptions of impaired segments, as well as problem parameters, are outlined in Appendix III. These waters are presented on maps in the appropriate subbasin chapter along with management strategies for improving water quality.

Table A-30 Monitored Impaired Waters within the Broad River Basin (as of 2000)[1]

| | | | | Use Support Categories/Rating – Impaired Miles | | | | |
|---|---|---|---|---|---|---|---|---|
| **Impaired Water** | **Subbasin** | **Chapter in Section B** | **Classification[2]** | **Aquatic Life/ Secondary Recreation** | **Fish Consumption** | **Primary Recreation** | **Water Supply** | **Potential Sources** |
| Cathey's Creek | 03-08-02 | 2 | C | **Impaired – 1.9 mi.** | Supporting | *N/A* | *N/A* | P, NP |
| Hollands Creek | 03-08-02 | 2 | C | **Impaired – 2.8 mi.** | Supporting | *N/A* | *N/A* | P, NP |

| | | | | | |
|---|---|---|---|---|---|
| P | Point Sources | NP | Nonpoint Sources | N/A | Not Applicable |

Notes

[1] These waters are currently, or will be placed, on the 303(d) list, and a TMDL and/or management strategy will be developed to address causes and sources of impairment. Refer to Appendix IV for further information regarding 303(d) listing methodology.

[2] An index for DWQ freshwater classifications can be found in Part 3.2 of this section (Table A-19 on page 35).