Chapter 3 -
Summary of Water Quality Information for the French 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 fall 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
- Residential straightpiping

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

- Stormwater runoff
- Timber Harvesting
- Agricultural lands
- Rural residential development
- Failing septic systems
- Mining

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.

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.

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

Program Overview

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 (Table A-20). 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. A full description of the state's primary and supplemental classifications 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 web site: http://h2o.enr.state.nc.us/wqhome.html.

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 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. These waters may be rated as HQW or ORW.

Table A-20 Primary and Supplemental Surface Water Classifications
(Primary classifications beginning with an "S" are assigned to saltwaters)

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.
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 that 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.
Tr	*Trout Waters*: Provides protection to freshwaters for natural trout propagation and survival of stocked trout.

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.

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 approved local erosion and sedimentation control program, and which

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.
- Critical habitat areas designated by the Wildlife Resources Commission or the Department of Agriculture.
- 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.

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. In addition, the Division of Land Resources requires more stringent sedimentation 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:

- 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;
- being within a state or national park or forest; or
- having 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 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.

Classifications and Standards in the French Broad River Basin

The waters of the French Broad River basin have a variety of surface water quality classifications applied to them. Water Supply watersheds range from WS-I to WS-IV. Water supply watersheds, Outstanding Resource Waters and High Quality Waters are presented in Figure A-11.

Classification and standards for the entire basin can be found in a separate document titled *Classifications and Water Quality Standards Assigned to the Waters of the French Broad River Basin* available by calling the Planning Branch of DWQ at (919) 733-5083. They can also be accessed through DWQ's Water Quality Section web site: http://h2o.enr.state.nc.us/wqhome.html.

Pending and Recent Reclassifications in the French Broad River Basin

Rough Creek in Haywood County was approved for reclassification in October 1999 from a WS-I to a WS-I Trout and ORW. Rules will become effective on August 1, 2000.

The French Broad River mainstem from Transylvania County to the NC/TN state line (approximately 115 river miles) is proposed for reclassification from Class C and WS-IV to Class B and WS-IV waters. The following headwaters to the French Broad River are also included in this reclassification proposal: the North, West, East and Middle Forks of the French Broad. Portions of these waters are supplementally classified as Trout waters and High Quality Waters. The reclassification would maintain these classifications and upgrade the primary classification from Class C to Class B. The Davidson River from its source to Hwy 64 and Bent

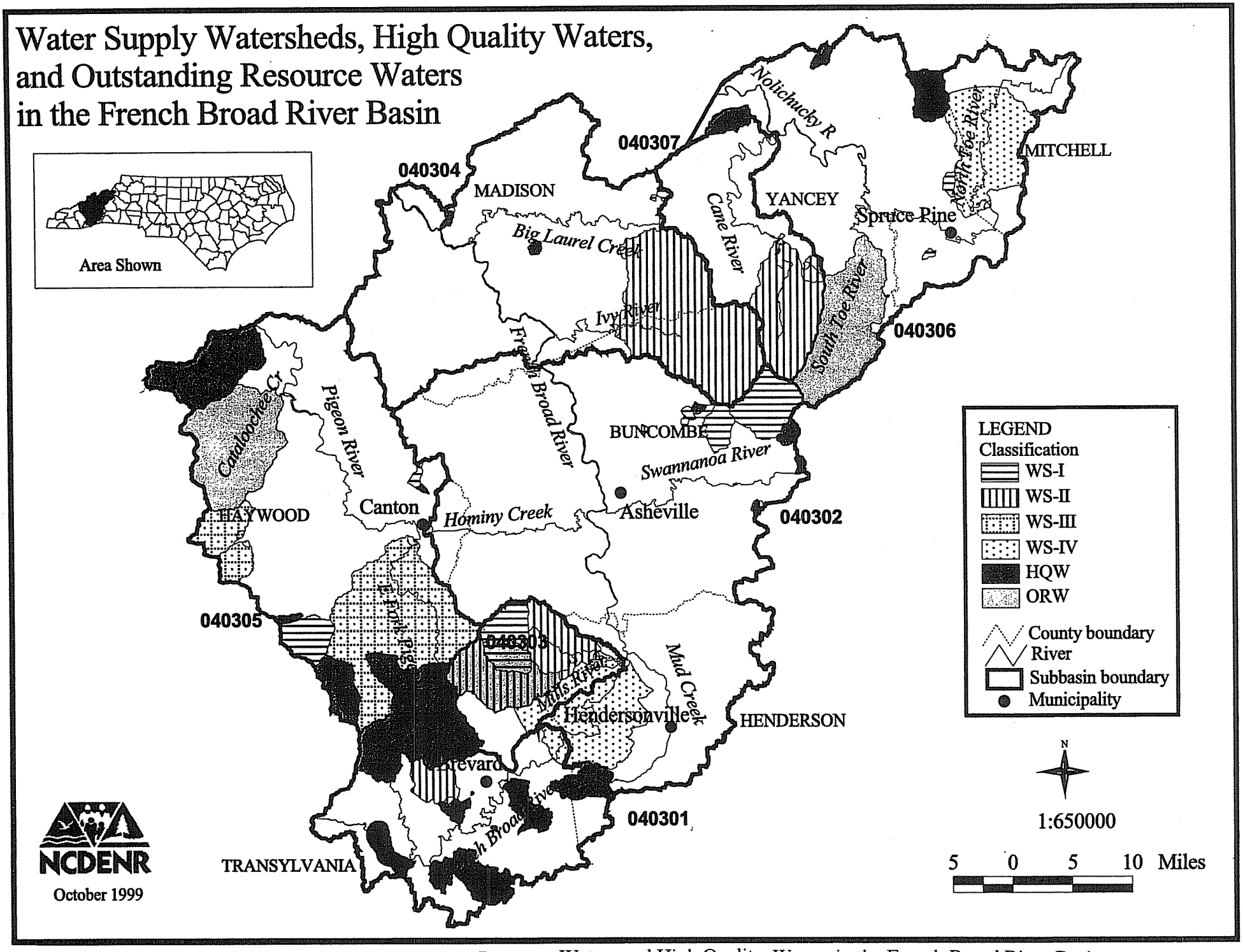


Figure A-11 Water Supply Watersheds, Outstanding Resource Waters and High Quality Waters in the French Broad River Basin

Creek below Lake Powhatan are also included in the reclassification project. The Davidson River has several classifications, depending on the stream segment. These classifications include the primary classification of Class C and Class B, as well as supplemental classifications of Trout and HQW or ORW. The reclassification would upgrade the Class C segments to Class B. Bent Creek also has segments with a Class C or Class B primary classification as well as a Trout water supplemental classification. The primary classification for Bent Creek would be upgraded to Class B. The entire reclassification area would encompass approximately 160 stream miles.

The Nolichucky River mainstem (approximately 9 river miles) from the confluence of the North Toe River and the Cane River to the TN state line are proposed for reclassification from Class C to Class B waters. The North Toe River from Toecane to the Nolichucky River (approximately 14 river miles) is also included in the proposal.

DWQ believes that the high recreational usage of all the above-mentioned waters for rafting, boating, swimming and other activities warrants the proposed reclassification to Class B for protection of these uses. Water quality standards for fecal coliform bacteria must be met for Class B waters. Sampling studies show that fecal coliform levels have decreased in the French Broad and Nolichucky Rivers since the 1970s, primarily due to sewer line improvements, regulations for concentrated animal feeding operations and tougher enforcement of NPDES permits. Public hearings will be held on these reclassification proposals by 2001.

3.3 DWQ Water Quality Monitoring Programs in the French Broad River Basin

DWQ collects 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 French Broad River basin for that program. A more complete discussion on biological and chemical monitoring within the basin can be found in the *French Broad River Basinwide Assessment Report* (DENR, November 1998).

DWQ monitoring programs for the French 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 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); or commonly referred to as EPTs. Different criteria have been developed for different ecoregions (mountains, piedmont and coastal plain) within North Carolina. The ratings fall into five categories ranging from Poor to Excellent.

Overview of Benthic Macroinvertebrate Data

Appendix A-II lists all the benthic macroinvertebrate collections in the French Broad River basin between 1983 and 1997, giving site location, collection date, taxa richness, biotic index values and bioclassifications. Benthic macroinvertebrates have been collected at 199 sites in the French Broad River basin since 1983, with seventy of these sites sampled during the 1997 basinwide surveys or special studies. For the 1997 collections, the following bioclassifications were found: Excellent – 24 (34%), Good – 15 (21%), Good-Fair – 19 (27%), Fair – 6 (9%) and Poor – 6 (9%). The upper mainstem of the French Broad River and tributaries (subbasin 04-03-02) is the only subbasin where the majority of sites received a Fair or Poor rating. The distribution of water quality ratings is very similar for both the 1997 collection and all collections since 1983. The benthos sampling may slightly overestimate the proportion of Fair and Poor sites, as DWQ special studies often have the greatest sampling intensity (number of sites/stream) in areas with severe water quality problems. Individual sites, however, often show distinct long-term changes in water quality. Table A-21 provides a summary of benthic macroinvertebrate samplings since 1983 (by subbasin) for the French Broad River basin.

Table A-21 Summary of Biological Ratings for Benthic Macroinvertebrate Samplings in the French Broad River Basin (1983 –1997)

Subbasin 04-03-01 to 04-03-07	Excellent	Good	Good-Fair	Fair	Poor
Headwaters: 01	10	10	4	4	1
Upper Mainstem & tribs (Asheville): 02	8	5	17	15	18
Davidson/Mills River: 03	10	1	3	1	0
Lower Mainstem & tribs: 04	8	12	7	1	0
Pigeon River: 05	24	3	6	4	1
Nolichucky/Toe River: 06	8	7	4	3	1
Cane River: 07	1	2	0	0	0
Total (#)	69	40	41	28	21
Total (%)	35%	20%	21%	14%	11%

Changes in water quality were evaluated at 44 sites in the French Broad River basin. The majority of sites show no changes in water quality other than flow-related bioclassification changes (Table A-22). Positive changes were primarily related to improvements in wastewater treatment, including sites on the Pigeon River, Richland Creek, Jonathans Creek, French Broad River, Swannanoa River, North Toe River, Nolichucky River and Cane River. Negative changes

were associated with agricultural areas, including the Mills River, South Hominy Creek and the Ivy River area. For greater detail, refer to specific subbasin chapters of this plan.

Table A-22 Changes in Water Quality Using Benthic Macroinvertebrate Samples

Subbasin 04-03-01 to 04-03-07	# Trend Sites	5-year trend			Long-term (>5 years) trend		
		None	+	-	None	+	-
Headwaters: 01	4	4	0	0	3	0	0
Upper Mainstem & tribs (Asheville): 02	10	8	2	0	3	3	0
Davidson/Mills River: 03	3	2	0	1	1	0	0
Lower Mainstem & tribs: 04	7	3	1	3	1	0	0
Pigeon River: 05	12	8	4	0	3	5	0
Nolichucky/Toe River: 06	6	4	1	1	2	2	0
Cane River: 07	2	1	1	0	0	1	0
Total	44	30	9	5	13	11	0

3.3.2 Fish Assessments

Overview of Fish Community Assessment Data

During the 1990s, stream fish community data were collected and analyzed by DWQ using several versions of the North Carolina Index of Biotic Integrity (NCIBI) from the French Broad River basin (NCDEHNR, 1994), from the Pigeon River by Carolina Power & Light Company (Crutchfield and Tracy, 1996) and Champion International (EA 1995), and in 1997, from the entire French Broad River basin by the Tennessee Valley Authority (McDonough and Saylor, pers. comm.). In 1997, 29 sites, representing all seven of the subbasins, were sampled and evaluated using the NCIBI.

NCIBI scores are provided in this report, but NCIBI classes are not listed and the data are not used for use support evaluations. One primary reason for this is that the present metrics are not applicable to trout streams. A survey of mountain reference streams in September 1998 found that none of the streams sampled could achieve the Excellent NCIBI class expected at such sites. A review of the present metrics will be concluded, and metrics will be modified to allow reference sites to reflect an Excellent NCIBI class. Fish community samples can still be used to identify streams where the community is altered due to degradation of water quality or habitat. Additional information on the use of the NCIBI for fish community assessments can be found in Appendix II and Section A, Chapter 3, Part 3.5.2.

Overview of Fish Tissue Sampling Data

Fish tissue samples were collected at 11 stations within the French Broad drainage from 1992 to 1997. DWQ fish tissue surveys were conducted as part of DWQ basinwide assessments and as part of a special study along the Pigeon River in 1996. Annual monitoring of fish tissue for dioxins in the Pigeon River is also performed by Blue Ridge Paper Products and Carolina Power

and Light. This monitoring is required as part of Blue Ridge Paper Products' NPDES permit and as a condition of the FERC license for Carolina Power and Light.

Nearly all fish samples collected from 1992 to 1997 that contained metals pollutants were at levels below FDA and EPA criteria.

Dioxin concentrations in fish collected from the Pigeon River and Walters Lake have declined since the early 1990s, although levels for certain species have fluctuated depending on sample season, station and the size of the fish collected. Dioxin concentrations in sportfishes (redbreast sunfish, rock bass, crappie, largemouth bass and smallmouth bass) have remained non-detectable or well below the NC limit for issuing a consumption advisory (3.0 ppt). Dioxin levels in carp have decreased as much as 80% downstream of the paper mill but remain above the NC limit in Walters Lake. For further information, refer to Section B, Chapter 5.

Currently, there is a limited-consumption advisory for carp and catfish species (bullhead species, channel catfish and flathead catfish) in effect for the Pigeon River between Canton, NC and the North Carolina-Tennessee state line, including Walters Lake. This advisory was revised by the State Health Director from a complete to a limited-consumption advisory in September 1994 due to declining dioxin levels. Additionally, there is a precautionary (limited) fish consumption advisory for carp, catfish species and redbreast sunfish in effect for the Pigeon River within the State of Tennessee from the state line downstream to the confluence with the French Broad River.

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. Other facilities may be tested by DWQ's Aquatic Toxicology Laboratory.

The Aquatic Toxicology Unit maintains a compliance summary 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. A summary of compliance for the French Broad River basin from 1986 through 1997 is presented in Table A-23.

Table A-23 Summary of Compliance with Aquatic Toxicity in the French Broad River Basin

Year	Number of Facilities	Number of Tests**	% Meeting Permit Limit*
1987	8	70	91
1988	11	82	83
1989	15	162	88
1990	15	168	85
1991	17	208	87
1992	23	241	87
1993	26	289	93
1994	26	304	88
1995	33	340	91
1996	40	404	87
1997	43	460	96

* This number was calculated by determining whether a facility was meeting its ultimate permit limit during the given time period, regardless of any SOCs in force. Facilities were not included in any given year unless data was available for the full year.

** "Number of Tests" is not the actual number of tests performed, but the number of opportunities for limit compliance evaluation. Assumptions were made about compliance for months where no monitoring took place based on data previous to that month. Facilities compliant in a given month were assumed to be in compliance during months following until the next actual monitoring event. This same policy was applied to facilities in noncompliance.

3.3.4 Lakes Assessment Program

Six lakes in the French Broad River basin were sampled as part of the Lakes Assessment Program since 1993. These lakes, by river subbasin, are presented below.

Subbasin 04-03-02

Lake Julian
Lake Burnett
Beetree Reservoir

Subbasin 04-03-05

Allen Creek Reservoir
Lake Junaluska
Waterville (Waters) Lake

Each lake is individually discussed in the appropriate subbasin chapter. Figure A-12 shows the most recent North Carolina Trophic State Index (NCTSI) scores for the seven lakes of the French Broad River basin. Three of these lakes (Lake Burnett, Beetree Reservoir and Lake Junaluska) were sampled by DWQ in 1997. Lake Julian and Waterville Lake were most recently sampled by Carolina Power & Light Company in 1996 and 1995, respectively. Allen Creek Reservoir was last sampled in 1993, while Busbee Reservoir was sampled in 1990 and that data was presented in the first basin assessment report. More information on the NCTSI methodology can be found in Appendix II.

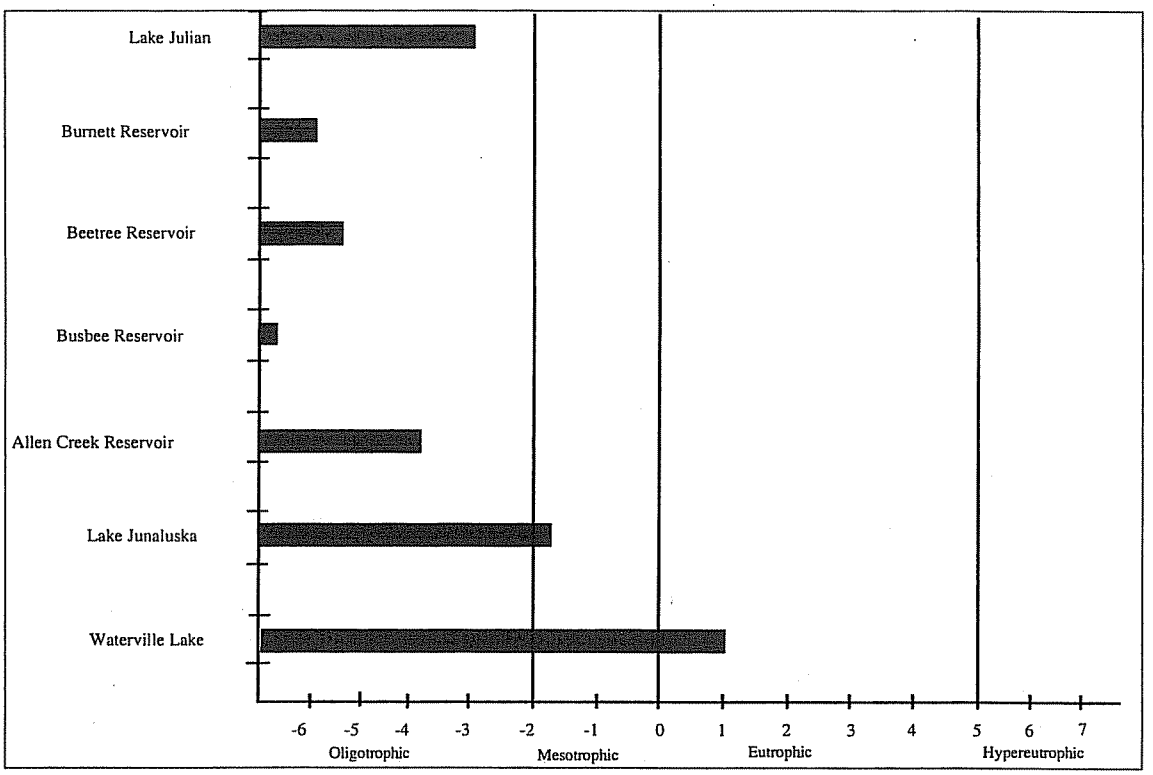


Figure A-12 NCTSI Scores for Lakes in the French Broad Basin

3.3.5 Ambient Monitoring System Program

Ambient monitoring stations for the basin are listed in Table A-24. For this discussion the basin has been segregated into three major drainages: French Broad River, Pigeon River and Nolichucky River. Mainstem stations are listed first followed by tributary stations. There are a total of 28 stations in the basin (17 mainstem and 11 tributary). All stations appear on individual subbasin maps in Section B.

Several general observations can be made about monitored water quality parameters in the French Broad River basin. As is characteristic with most larger basins, the cumulative effects of land-disturbing activities and development create an upstream to downstream increase in pollutant load.

Along the mainstem of the French Broad River, the patterns of increasing load can be seen in levels of conductivity and nutrient parameters. Metals (Al, Fe, Mn) similarly demonstrate a downstream increasing trend frequently associated with loads of clay soils. Mainstem stations E2730000, E4280000, E4770000 and E5120000 all had 10% or more of the samples with fecal coliform concentrations greater than 200 colonies/100ml.

Table A-24 Ambient Monitoring System Stations within the French Broad River Basin

STORET #	Station Name	County	Subbasin
E5410000	West Fork Pigeon River upstream Lake Logan near Hazelwood	Haywood	040305
E5495000	Pigeon River at Hwy 215 near Canton	Haywood	040305
E5600000	Pigeon River at SR 1624 near Clyde	Haywood	040305
E6480000	Pigeon River at SR 1338 near Hepco	Haywood	040305
E6500000	Pigeon River at Waterville	Cocke, TN	040305
E6110000	Richland Creek at SR 1184 near Waynesville	Haywood	040305
E6300000	Jonathans Creek at Hwy 276 at Cove Creek	Haywood	040305
E6450000	Cataloochee Creek at SR 1395 near Cataloochee	Haywood	040305
E0150000	French Broad River at Hwy 178 at Rosman	Transylvania	040301
E1270000	French Broad River at SR 1503 at Blantyre	Transylvania	040302
E2730000	French Broad River at Hwy 280 near Skyland	Buncombe	040302
E4280000	French Broad River at SR 1348 at Asheville	Buncombe	040302
E4770000	French Broad River at SR 1634 at Alexander	Buncombe	040302
E5120000	French Broad River at Marshall	Madison	040304
E0850000	Davidson River at Hwy 64 near Brevard	Transylvania	040303
E1130000	Little River above High Falls near Cedar Mountain	Transylvania	040301
E1470000	Bradley Creek at USFS Road off SR 1345 near Yellow Gap	Henderson	040303
E1490000	Mills River near Mills River	Henderson	040303
E2120000	Mud Creek at SR 1508 near Hilgart	Henderson	040302
E3520000	Hominy Creek at SR 3413 near Asheville	Buncombe	040302
E4030000	Beetree Creek near Swannanoa	Buncombe	040302
E4170000	Swannanoa River at Biltmore Avenue bridge at Biltmore	Buncombe	040302
E7000000	North Toe River at Hwy 19E near Ingalls	Avery	040306
E8100000	North Toe River at SR 1162 at Penland	Mitchell	040306
E8150000	South Toe River near Deep Gap	Yancey	040306
E8200000	South Toe River at SR 1168 near Celo	Yancey	040306
E9800000	Cane River at SR 1417 near Sioux	Yancey	040307
E9990000	Nolichucky River at Poplar	Mitchell	040306

Among the French Broad tributaries, Mud Creek (which receives the discharges of the Hendersonville WWTP and General Electric) and Hominy Creek (which receives the discharge of BASF) both have elevated levels of total phosphorus and total nitrogen. These stations, as well as the one on the Swannanoa River, have exceedences of 200 colonies/100ml. The influence of development and land-disturbing activities are possibly reflected again by the coincidence of higher aluminum and iron values observed in these watersheds. The Davidson River, Little River, Mills River and Beetree Creek have relatively low nutrient levels, conductivity and fecal coliform counts.

The Pigeon River drainage has five ambient monitoring sites on the mainstem and four tributary stations. The mainstem stations have all maintained adequate dissolved oxygen levels, though slight decreases are seen at the Clyde and Waterville stations. The station at Clyde, downstream of the Town of Canton and the Blue Ridge Paper Products discharge, reflects the effects of these

nonpoint and point source inputs on water quality through increases in pH, conductance, nitrogen, phosphorus, fecal coliform bacteria and several metals parameters, particularly aluminum and manganese.

The Nolichucky River Drainage, including the North and South Toe Rivers and the Cane River, shows little influence of point or nonpoint source effects on monitored parameters with the exception of the North Toe as it passes through the area of Spruce Pine. Conductivity and flouride levels are measurably higher below the Town of Spruce Pine. Across measured parameters, the South Toe River appears to have very good water quality relative to other stations in the basin.

3.4 Other Water Quality Research

There are many water quality sampling programs being conducted throughout the French Broad River basin beyond DWQ sampling. Any available data from this research has been reviewed and included in DWQ analysis for developing biological ratings, use support determinations and the 303(d) list. These research efforts have also been used by DWQ to adjust biological and chemical sampling sites. 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 Section C, Chapter 1, Part 1.4.7) and the TVA. Other programs or research that developed data or information are presented in Section C or discussed in individual subbasin chapters in Section B.

3.5 Use Support Summary

3.5.1 Introduction to Use Support

Waters are classified according to their best intended uses. Determining how well a waterbody supports its designated uses is an important method of interpreting water quality data and assessing water quality. Use support assessments for the French Broad River basin are summarized in this section and presented in the appropriate subbasin chapters in Section B.

Use support ratings for streams and lakes:

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

The use support ratings refer to whether the classified uses of the water (such as water supply, aquatic life protection and swimming) are fully supported (FS), partially supported (PS) or not supported (NS). For instance, waters classified for fishing and water contact recreation (Class C) are rated as fully supporting if data used to determine use support (such as chemical/physical data collected at ambient sites or benthic macroinvertebrate bioclassifications) did not exceed specific criteria. However, if these criteria were exceeded, then the waters would be rated as PS or NS, depending on the degree of exceedence. Streams rated as either partially supporting or not supporting are considered *impaired.* Impaired waters are discussed in the separate subbasin chapters in Section B.

Impaired waters categories:

- Partially Supporting
- Not Supporting

An additional use support category, fully supporting but threatened (ST), was used in previous basinwide plans. In the past, ST was used to identify a water that was fully supporting but had some notable water quality problems. ST could represent constant, degrading or improving conditions. North Carolina's use of ST was very different from that of the US Environmental Protection Agency (EPA), which uses it to identify waters that are characterized by declining water quality. In addition, the US EPA requires the inclusion of ST waters on the 303(d) list in its proposed revision to the 303(d) list rules (Appendix IV). Due to the difference between US EPA's and North Carolina's definitions of ST, North Carolina no longer uses this term. Because North Carolina has used fully supporting but threatened as a subset of fully supporting (FS) waters, those waters formerly called ST are now rated FS. Waters that are fully supporting but have some notable water quality problems are discussed individually in the subbasin chapters (Section B).

Streams which had no data to determine their use support were listed as not rated (NR). For a more complete description of use support methodology, refer to Appendix III.

3.5.2 Revisions to Methodology Since 1992-1993 305(b) Report

Methodology for determining use support has been revised. As mentioned above, fully supporting but threatened (ST) is no longer used as a use support category. In the 1992-1993 305(b) Report, evaluated information (subjective information not based on actual monitoring) from older reports and workshops was included in the use support process. Streams rated using this information were considered to be rated on an evaluated basis. In the current use support process, this older, evaluated information has been discarded, and streams are now rated using only information from biological or physical/chemical monitoring (including current and older monitoring data). Streams are rated on a monitored basis if the data are less than five years old. Streams are rated on an evaluated basis under the following conditions:

- If the only existing data for a stream are more than five years old.
- If a stream is a tributary to a monitored segment of a stream rated fully supporting (FS) and it has land use similar to that of the monitored stream, the tributary will receive the same rating on an evaluated basis. If a stream is a tributary to a monitored segment rated partially supporting (PS) or not supporting (NS), the stream is considered not rated (NR).

These changes resulted in a reduction in streams rated on an evaluated basis.

The North Carolina Index of Biotic Integrity (NCIBI) is one of the tools that DWQ uses to summarize all classes of factors such as water and habitat quality, flow regime, and energy sources that influence the freshwater fish communities of wadeable streams across the state. Data from the 1997 fish community assessments were not used in the recent use support ratings for the French Broad River basin because of recent revisions to the criteria and metrics that constitute the Index. All metrics and criteria have been, and are continuing to be, revised based upon a better understanding of the fish communities in each river basin throughout the state. Studies are being conducted to:

1. Identify ecoregion Reference Sites and calibrate the Index based upon these sites.
2. Identify the temporal variability in the Index by sampling the fish communities at a selected group of streams several times during the year.
3. Identify the spatial variability in the Index by sampling the fish community in a stream at multiple reaches.
4. Identify the variability in the Index by sampling the fish communities at a selected group of streams known to be impacted by point and nonpoint sources.
5. Develop metrics and criteria that may allow future assessments of coldwater Blue Ridge trout streams.

Until these studies are completed, it would be premature to assign a "Final" bioclassification to the stream and apply a use support rating to the stream based on fish community sampling. Additional information on NCIBI for fish community assessments can be found in Appendix II.

3.5.3 Comparison of Use Support Ratings to Streams on the 303(d) List

For the next several years, addressing water quality impairment in waters that are on the state's 303(d) list will be a priority. The waters in the French Broad River basin that are on this list are presented in the individual subbasin chapters in Section B. The waters presented in this basinwide plan represent those that will be submitted to EPA for approval in 2000. These waters are on the state's 303(d) list based on recent monitoring data. The actual 303(d) list for the French Broad River basin may be somewhat different than presented in this plan, depending on EPA approval.

Section 303(d) of the federal Clean Water Act requires states develop a 303(d) list of waters not meeting water quality standards or which have impaired uses. EPA must then provide review and approval of the listed waters. A list of waters not meeting standards is submitted to EPA biennially. States are also required to develop Total Maximum Daily Loads (TMDLs) or management strategies for 303(d) listed waters to address impairment. In the last few years, the TMDL program has received a great deal of attention as the result of a number of lawsuits filed across the country against EPA. These lawsuits argue that TMDLs have not adequately been developed for specific impaired waters. As a result of these lawsuits, EPA issued a guidance memorandum in August 1997 that called for states to develop schedules for developing TMDLs for all waters on the 303(d) list. The schedules for TMDL development, according to this EPA memo, are to span 8-13 years.

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 criterion 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 ratings 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 has improved.

In some cases, a waterbody appears on the 303(d) list, but has a fully supporting rating. There are two major reasons for this: 1) biological data show full use support, but chemical impairment continues; or 2) fish consumption advisories exist on the water. These waters will remain on the 303(d) list until the problem pollutant meets water quality standards or a TMDL is developed.

3.5.4 Use Support Ratings for the French Broad River Basin

A summary of current use support ratings for the French Broad River basin are presented in Table A-25. For further information and definition of monitored and evaluated streams, refer to Appendix A-III.

Table A-25 Use Support Summary Information for All Monitored and Evaluated Streams in the French Broad River Basin (1999)

		Monitored and Evaluated Streams*			Monitored Streams Only**	
		Miles	**%**		**Miles**	**%**
Fully Supporting		3190.9	77		812.2	90
Impaired		88.5	2			
	Partially Supporting	*50.6*	*1*		*50.1*	*6*
	Not Supporting	*37.9*	*1*		*37.9*	*4*
Not Rated		856.5	21			
Total		4135.9			900.2	

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

Table A-26 shows the total number of stream miles and stream miles per each use support category for each subbasin. This table presents use support for both the monitored and evaluated streams in the basin. More detailed information on the monitored stream segments can be found in Appendix III. Color maps showing use support ratings for the basin are presented in Figure A-13 and A-14. Table A-27 shows a list of impaired waters in the basin.

Table A-26 Summary of Use Support Determinations by Subbasin for Monitored and Evaluated Freshwater Streams

French Broad Use Support Ratings in Miles (1999)					
Subbasin	**Fully Supporting**	**Partially Supporting**	**Not Supporting**	**Not Rated**	**Total**
04-03-01	338.2	1.6	0	103.7	443.5
04-03-02	554.5	35.1	33.3	354.5	977.7
04-03-03	222.4	1.9	4.6	4.3	233.2
04-03-04	728.7	2.6	0.0	30.7	762.0
04-03-05	612.1	9.4	0.0	155.6	777.1
04-03-06	555.7	0.0	0.0	166.5	722.2
04-03-07	179.3	0.0	0.0	40.9	220.2
TOTAL	3190.9	50.6	37.9	856.5	4135.9

Table A-27 Impaired Waters within the French Broad River Basin (as of 1999) •

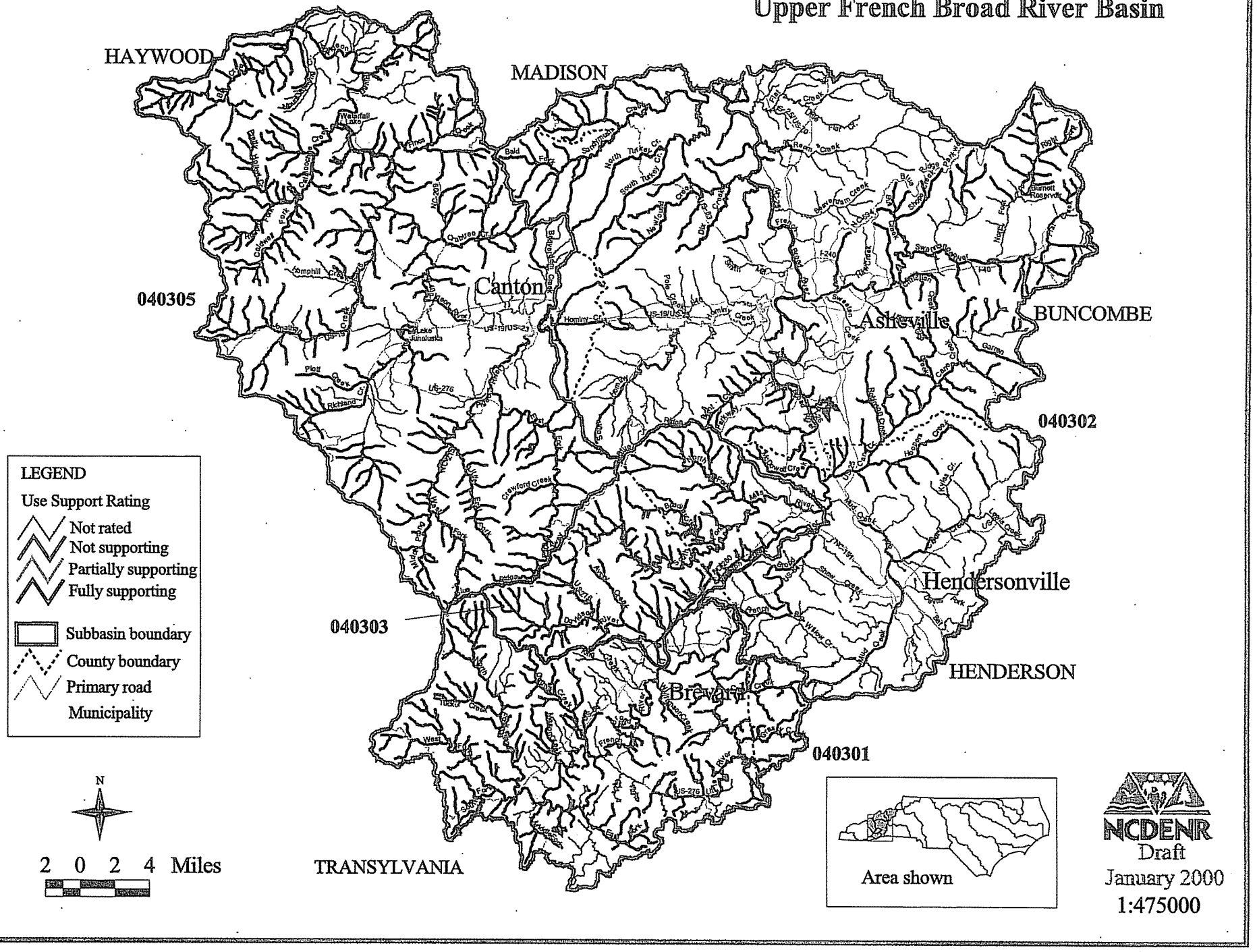
Subbasin	Chapter in Section B	Listed Water	Use Support Rating	Potential Sources*	Recommended Management Strategy
04-03-01	1	Peter Weaver Creek	PS	P	DWQ will resample this creek to obtain information for a management strategy. Holders of individual NPDES permits may be required to conduct upstream/downstream sampling or obtain an individual permit.
04-03-01	1	Morgan Mill Creek	PS	P	DWQ will resample this creek to obtain information for a management strategy. Holders of individual NPDES permits may be required to conduct upstream/downstream sampling or obtain an individual permit.
04-03-02	2	Gash Creek	NS	NP	Local actions are needed on NPS inventory.
04-03-02	2	Mill Pond Creek	PS	NP	DWQ will continue to monitor to better identify problem parameters.
04-03-02	2	Mud Creek	NS	NP P	Local restoration initiatives are underway, and DWQ will continue to monitor results.
04-03-02	2	Bat Fork Creek	PS	NP	DWQ will continue to monitor the creek and increase coordination with other agencies to address the various pollution sources.
04-03-02	2	Clear Creek	PS	NP	Local actions are needed to expand buffer and BMP implementation.
04-03-02	2	Hominy Creek	PS	NP	There is a need to increase the funding and implementation of chemical handling facilities.
04-03-02	2	South Hominy Creek	NS	NP	There is a need to increase the funding and implementation of chemical handling facilities.
04-03-02	2	Ross Creek	NS	NP	Local initiatives are underway, and DWQ will continue to monitor results.
04-03-03	3	Mills River	NS	NP	Local initiatives are underway, and DWQ will continue to monitor results.
04-03-03	3	Brandy Branch	PS	NP	Local projects aimed at identifying sources of pollution and necessary actions would be very useful to DWQ and various funding agencies. DWQ will continue to monitor Brandy Branch to better identify problem parameters.
04-03-04	4	Little Ivy Creek	PS	NP	Local restoration initiatives are underway, and DWQ will continue to monitor results.
04-03-05	5	Pigeon River	PS	NP P	DWQ will continue to monitor process improvements made at BRPP and work with the Joint Watershed Advisory Group. Local nonpoint source initiatives are needed.
04-03-05	5	Richland Creek	PS	NP	Local restoration initiatives are underway, and DWQ will continue to monitor results.

Key: NS = Not Supporting PS = Partially Supporting
NP = Nonpoint sources P = Point Sources

* = Only limited progress towards developing and implementing NPS strategies for these impaired waters can be expected without additional resources.

• = These waters are also on the 303(d) list, and a TMDL and/or management strategy will be developed to remove the water from the list.

Upper French Broad River Basin



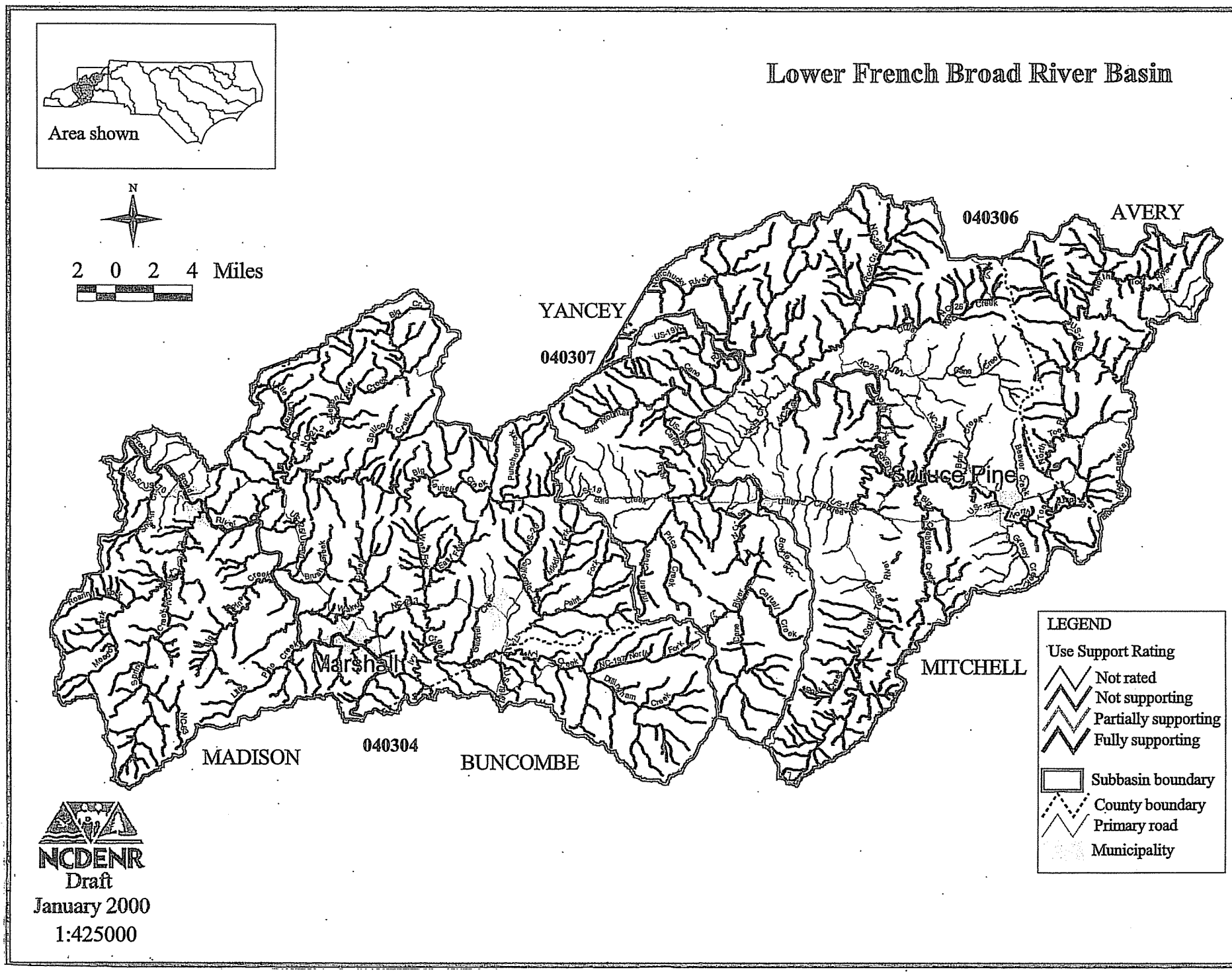


Figure A-14 Use Support Ratings for the Lower French Broad River Basin