Section A - Chapter 3
Summary of Water Quality Information for the Catawba 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

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 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.

Nonpoint Sources

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

Unlike point source 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.

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-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 and Wetlands of North Carolina*. Information on this subject is also available at DWQ's website: http://h2o.enr.state.nc.us/wqs/.

Table A-17 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 a "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 and SC waters establish the basic protection level for all state surface waters. 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.

High Quality Waters (Class HQW)

There are 279 stream miles of HQW waters (Figure A-11) throughout the Catawba River basin. 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

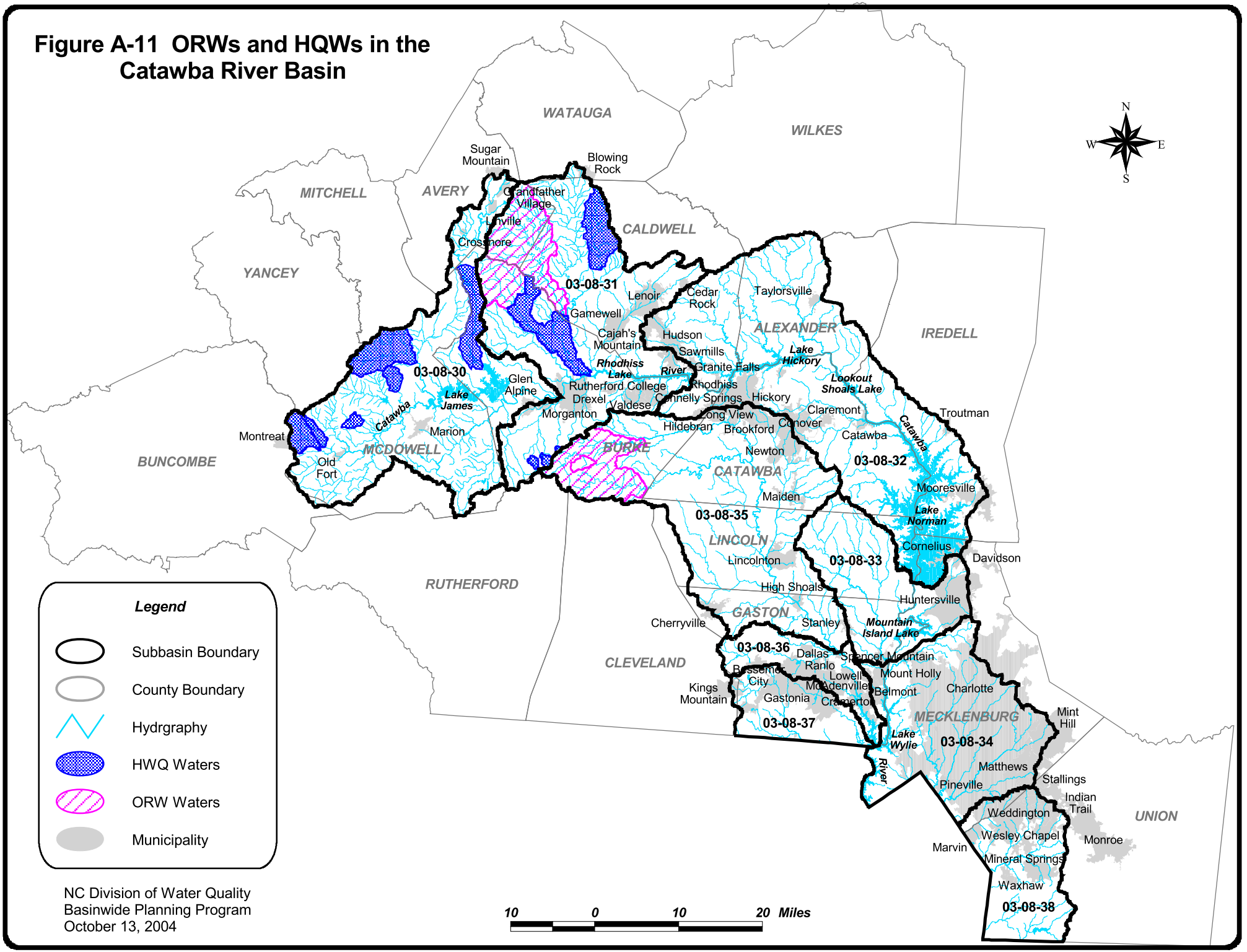
- Waters rated as Excellent based on DWQ's chemical and biological sampling.
- Streams designated as native or special native trout waters by the Wildlife Resources Commission.
- Waters designated as primary nursery areas or other functional nursery areas by the Division of Marine Fisheries.
- Waters 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.

Outstanding Resource Waters (Class ORW)

There are 257 stream miles of ORW waters (Figure A-11) in the Catawba River basin. These waters have excellent water quality (rated based on biological and chemical sampling as with HQWs) and an associated outstanding resource.

Figure A-11 ORWs and HQWs in the Catawba River Basin



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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 vegetated buffer or stormwater controls for 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.

Primary Recreation (Class B and SB)

There are 229 stream miles and 45,687 freshwater acres classified for primary recreation in the Catawba River basin.

Trout Waters (Class Tr)

There are 568 stream miles and 166 freshwater acres with supplemental trout waters (Tr) classification. 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. 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.

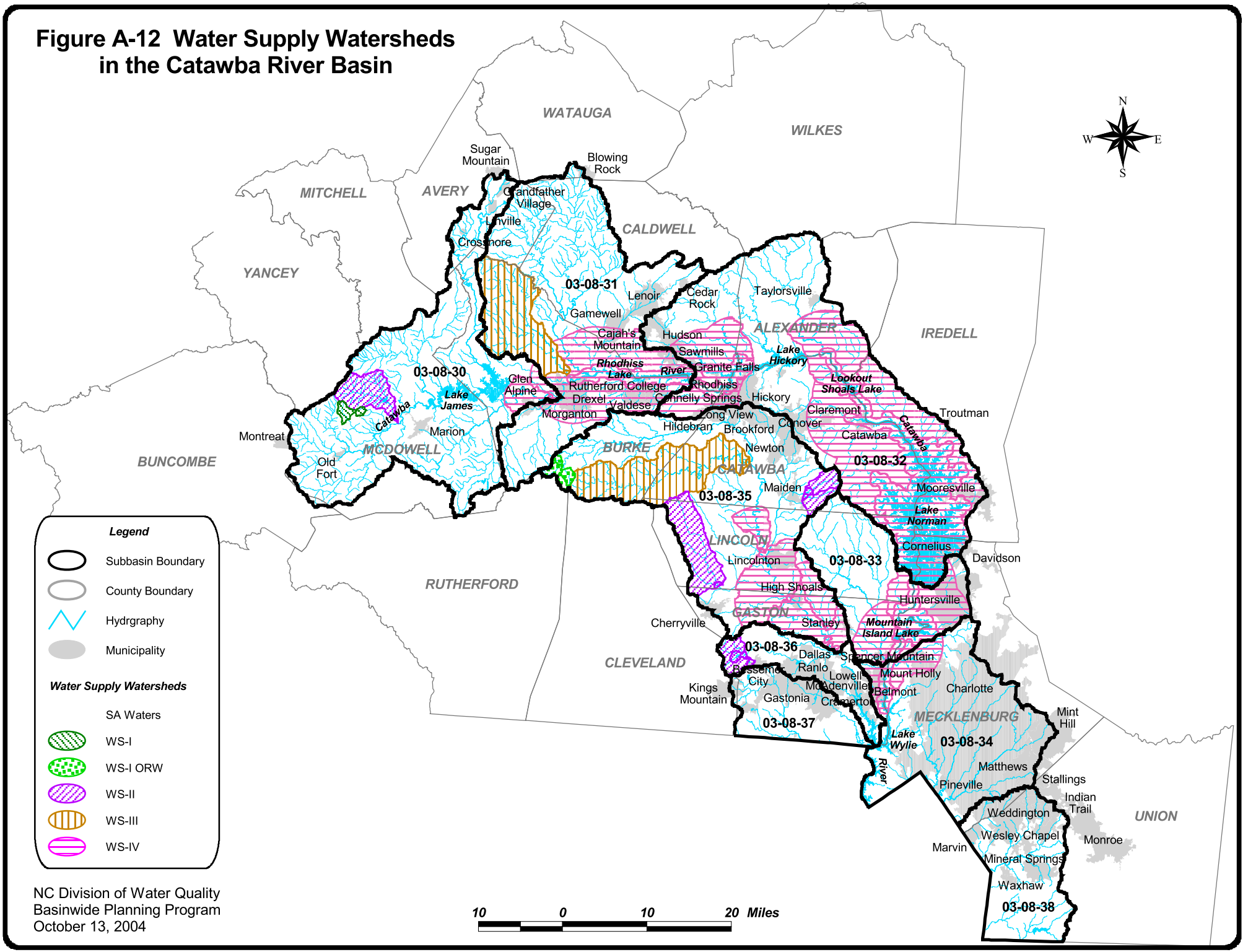
The NC Wildlife Resources Commission also administers a state fishery management classification, Designated Public Mountain Trout Waters. It provides for public access to streams for fishing and regulates fishing activities (seasons, size limits, creel limits, and bait and lure restrictions). Although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

Water Supply Watersheds (Class WS)

There are 998 stream miles and 47,082 freshwater acres classified as water supply watersheds in the Catawba River basin (Figure A-12). The purpose of the Water Supply Watershed Protection Program is to provide a proactive drinking water supply protection program for communities. Local governments administer the program based on state minimum requirements. There are restrictions on wastewater discharges, development, landfills and residual application sites to control the impacts of point and nonpoint sources of pollution.

There are five water supply classifications (WS-I to WS-V) that are defined according to the land use characteristics of the watershed. The WS-I classification carries the greatest protection for water supplies. No development is allowed in these watersheds. Generally, WS-I lands are publicly owned. WS-V watersheds have the least amount of protection and do not require development restrictions. These are either former water supply sources or sources used by

Figure A-12 Water Supply Watersheds in the Catawba River Basin



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industry. WS-I and WS-II classifications are also HQW by definition because requirements for these levels of water supply protection are at least as stringent as those for HQWs. Those watersheds classified as WS-II through WS-IV require local governments having jurisdiction within the watersheds to adopt and implement land use ordinances for development that are at least as stringent as the state's minimum requirements. A 30-foot vegetated setback is required on perennial streams in these watersheds.

Pending and Recent Reclassifications in the Catawba River Basin

He Creek (4.8 mi.), Henry Fork (4.26 mi.) and Jerry Branch (1.75 mi.) in Burke County are in the process of being reclassified from WS-I ORW to WS-V ORW. This new classification will reflect the removal of a Morganton water intake from these headwater streams.

3.3 DWQ Water Quality Monitoring Programs in the Catawba 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 Catawba 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 Catawba 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 Catawba River Basin include:

- Benthic Macroinvertebrates (Section A, Chapter 3, Part 3.3.1)
- Fish Assessments (Section A, Chapter 3, Part 3.3.2)
- Aquatic Toxicity Monitoring (Section A, Chapter 3, Part 3.3.3)
- Lake Assessment (Section A, Chapter 3, Part 3.3.4)
- Ambient Monitoring System (Section A, Chapter 3, Part 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 Catawba River basin between 1983 and 2002, giving site location, collection date, taxa richness, biotic index values and bioclassifications. There were 174 benthic samples collected during this assessment period. Table A-18 lists the most recent bioclassifications (by subbasin) for all benthic sites in the Catawba River basin. Streams listed as "Good" or "Excellent" are generally found in the undeveloped mountainous regions of the basin. A designation of Not Impaired may be used for flowing waters that are too small to be assigned a bioclassification (less than four meters in width), but meet the criteria for a Good-Fair or higher bioclassification using the standard qualitative and EPT criteria. Refer to Section A, Chapter 3, Part 3.5 for more information.

Streams in the Catawba Basin showing water quality improvements include:

- Swannanoa Creek (Subbasin 03-08-30) - soybean oil spill recovery
- Mackey Creek (Subbasin 03-08-30) – discharger removal
- Unnamed Tributary to Abernethy Creek (Subbasin 03-08-37) – discharger upgrade

Streams showing a decline in water quality include:

- North Fork Catawba River (Subbasin 03-08-30) – possible discharger impacts
- Warrior Fork and Johns River (Subbasin 03-08-31) – possible impact from nursery plant area
- Headwaters of Lower Creek (Subbasin 03-08-31) – unknown
- McGalliard Creek (Subbasin 03-08-31) – urban impacts
- Middle and Lower Little Rivers (Subbasin 03-08-32) – low flow
- McDowell Creek (Subbasin 03-08-33) – urban impacts
- Dutchmans Creek (Subbasin 03-08-33) – unknown
- Killian Creek (Subbasin 03-08-33) – possible discharger effect
- Indian Creek (Subbasin 03-08-35) – unknown

Table A-18 Summary of Bioclassifications for All Freshwater Benthic Macroinvertebrate Sites (using the most recent rating for each site) in the Catawba River Basin

Subbasin	Excellent	Good	Good-Fair	Fair	Poor	Not Impaired	Not Rated	Total
03-08-30	8	31	6	2	1	2	0	50
03-08-31	16	9	7	10	1	3	9	55
03-08-32	0	2	8	4	0	0	0	14
03-08-33	4	1	1	3	0	0	0	9
03-08-34	0	0	3	7	8	0	1	19
03-08-35	9	12	10	9	2	0	5	47
03-08-36	0	9	6	2	0	0	2	19
03-08-37	0	0	6	7	6	1	3	23
03-08-38	0	0	3	0	0	0	0	3
Total (#)	**37**	**64**	**50**	**44**	**18**	**6**	**20**	**239**
Total (%)	**15**	**27**	**21**	**18**	**8**	**3**	**8**	**100**

3.3.2 Fish Assessments

Scores are assigned to fish community 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. Since the late 1990s, application of the NCIBI has been restricted to wadeable streams that can be sampled by a crew of 2-4 persons using backpack electrofishers and DWQ Standard Operating Procedures (NCDENR-DWQ, 2001 (http://www.esb.enr.state.nc.us/BAU.html)).

Overview of Fish Community Data

Appendix II lists all of the fish community collections in the Catawba River basin between 1990 and 2002, giving site location, collection date and NCIBI rating. Fish community samples have been collected at 55 sites during this assessment period. Table A-19 lists the most recent ratings since 1990, by subbasin, for all fish community sites.

Table A-19 Summary of NCIBI Categories for All Freshwater Fish Community Sites (using the most recent rating for each site) in the Catawba River Basin

Subbasin	Excellent	Good	Good-Fair	Fair	Poor	Total
03-08-30	4	4	2	1	1	12
03-08-31	5	0	1	3	0	9
03-08-32	1	2	1	1	0	5
03-08-33	0	1	1	0	1	3
03-08-34	0	0	1	0	1	2
03-08-35	1	3	1	1	0	6
03-08-36	0	0	1	0	0	1
03-08-37	0	0	0	2	0	2
03-08-38	0	0	1	1	0	2
Total (#)	**11**	**10**	**9**	**9**	**3**	**42**
Total (%)	**26**	**24**	**21.5**	**21.5**	**7**	**100**

Catawba River Basin Fish Kills

DWQ has systematically tracked reported fish kill events across the state since 1996. From 1996 to 2002, DWQ field investigators reported 14 fish kill events in the Catawba River basin. Kill activity extent and fish mortality remained light, never exceeding 50,000. Causes listed on kill reports included chemical spills, toxic discharges and bacterial infections. The extent to which fish kills are related to land use activities is not known. DWQ attributes 34 percent of the 2002 Catawba River fish kills to unknown causes, of which land use cannot be excluded. Further investigation into the relationship between land use within a watershed and fish kills in an associated waterbody is necessary for watershed managers to make informed decisions. For

more information on fish kills in North Carolina, refer to the website at http://www.esb.enr.state.nc.us/Fishkill/fishkillmain.htm.

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 (WET) by their NPDES permit or by administrative letter. DWQ's Aquatic Toxicology Unit (ATU) may also test other facilities. Per Section 106 of the Clean Water Act, the ATU is required to test at least 10 percent of the major discharging facilities over the course of the federal fiscal year (FFY). However, it is ATU's target to test 20 percent of the major dischargers in the FFY. This means that each major facility would get evaluated over the course of their five-year permit. There are no requirements or targets for minor dischargers.

In addition, the ATU maintains a compliance summary for all facilities required to perform tests and provides monthly updates 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.

Ninety-five NPDES permits in the Catawba River basin currently require WET testing. Seventy-three permits have a WET limit; the other 22 permits specify monitoring but with no limit. The number of facilities required to monitor WET has increased steadily since 1987, the first year that WET limits were written into permits in North Carolina. The compliance rate has risen as well. Since 1996, the compliance rate has stabilized at approximately 85-90 percent. Figure A-13 summaries WET monitoring compliance in the Catawba River basin from 1987 to 2001. Facilities with toxicity problems during the most recent two-year review period are discussed in Section B subbasin chapters.

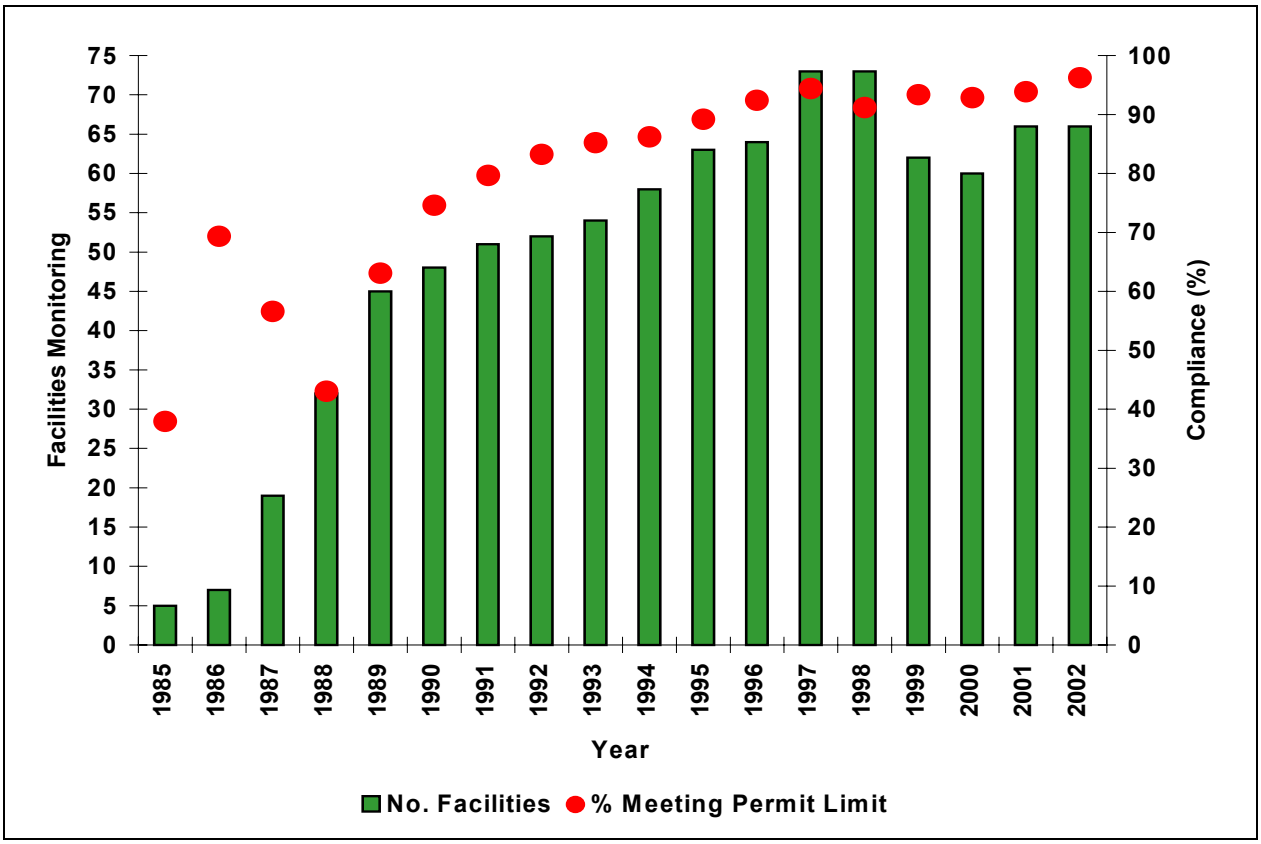

Figure A-13 Summary of Compliance with Aquatic Toxicity Tests in the Catawba River Basin

3.3.4 Lakes Assessment Program

Ten lakes in the Catawba River basin were sampled as part of the Lakes Assessment Program in the summer of 2001. These lakes are discussed in the appropriate subbasin chapter in Section B and in Section A, Chapter 4, Part 4.7: Lake Tahoma and Lake James (03-08-30); Lake Rhodhiss (03-08-31); Lake Hickory, Lookout Shoals Lake and Lake Norman (03-08-32); Mountain Island Lake (03-08-33); Lake Wylie (03-08-34); Newton City Lake (03-08-35); and Bessemer City Lake (03-08-36).

3.3.5 Ambient Monitoring System

The Ambient Monitoring System (AMS) is a network of stream, lake and estuarine stations strategically located for the collections of physical and chemical water quality data. North Carolina has 378 water chemistry monitoring stations statewide, including 34 stations in the Catawba River basin. Between 23 and 32 parameters are collected monthly at each station. The locations of these stations are listed in Table A-20 and shown on individual subbasin maps in Section B. Refer to *2003 Catawba River Basinwide Assessment Report* at the website http://www.esb.enr.state.nc.us/bar.html for more detailed analysis of ambient water quality monitoring data.

Table A-20 Locations of Ambient Monitoring Stations in the Catawba River Basin by Subbasin

Subbasin/ Map Code[1]	Station Number	Waterbody/ Location	County	Class
03-08-30				
A-1	C0145000	Catawba R at SR 1234 near Greenlee	McDowell	C
A-2	C0250000	Catawba R at SR 1221 near Pleasant Gardens	McDowell	C
A-3	C0550000	N Fork Catawba R at SR 1552 near Hankins	McDowell	C
A-4	C1000000	Linville R at NC 126 near Nebo	Burke	B HQW
A-5	C1210000	Catawba R at SR 1147 near Glen Alpine Marion	Burke	WS-IV
03-08-31				
A-6	C1370000	Wilson Cr at US 221 near Gragg	Avery	B Tr ORW
A-7	C1750000	Lower Cr at SR 1501 near Morganton Marion	Burke	WS-IV
A-8 *	C2030000	Lake Rhodhiss at SR 1001 near Baton Marion	Burke	WS-IV & B CA
03-08-32				
A-9	C2600000	Lake Hickory at NC 127 near Hickory	Catawba	WS-V & B
A-10	C2818000	Lower Little R at SR 1313 near All Healing Springs	Alexander	C
A-11	C3420000	Lake Norman at SR 1004 near Mooresville	Iredell	WS-IV & B CA
03-08-33				
A-12	C3699000	Mountain Island Lake Above Gar Cr near Croft	Gaston	WS-IV & B CA
A-13	C3860000	Dutchmans Cr at SR 1918 at Mountain Island	Gaston	WS-IV
A-14	C3900000	Catawba R at NC 27 near Thrift	Mecklenburg	WS-IV CA
03-08-34				
A-15	C4040000	Long Cr at SR 2042 near Paw Creek	Gaston	WS-IV
A-16	C4220000	Catawba R at power line crossing at South Belmont	Mecklenburg	WS-IV & B CA
A-33	C7500000	Lake Wylie at NC 49 near Oak Grove	Mecklenburg	WS-V & B
A-17	C8896500	Irwin Cr at Irwin Cr WWTP near Charlotte	Mecklenburg	C
A-18	C9050000	Sugar Cr at NC 51 at Pineville	Mecklenburg	C
A-19	C9210000	Little Sugar Cr at NC 51 at Pineville	Mecklenburg	C
A-20	C9370000	McAlpine Cr at SR 3356 Sardis Rd near Charlotte	Mecklenburg	C
A-21	C9680000	McAlpine Cr at SC SR 2964 near Camp Cox SC	Lancaster (SC)	FW
A-22	C9790000	Sugar Cr at SC 160 near Fort Mill SC	Mecklenburg	FW
03-08-35				
A-23	C4300000	Henry Fork R at SR 1124 near Henry River	Catawba	C
A-24	C4360000	Henry Fork R at SR 1143 near Brookford	Catawba	C
A-25	C4370000	Jacob Fork at SR 1924 at Ramsey	Burke	WS-III ORW
A-26	C4380000	S Fork Catawba R at NC 10 near Startown	Catawba	WS-IV
A-27	C4800000	Clark Cr at SR 1008 Grove St at Lincolnton	Lincoln	WS-IV
A-28	C5170000	Indian Cr at SR 1252 near Laboratory	Lincoln	WS-IV
03-08-36				
A-29	C5900000	Long Cr at SR 1456 near Bessemer City	Gaston	C
A-30	C6500000	S Fork Catawba R at NC 7 at McAdenville	Gaston	WS-V
A-31	C7000000	S Fork Catawba R at SR 2524 near South Belmont	Gaston	WS-V & B
03-08-37				
A-32	C7400000	Catawba Cr at SR 2302 at SC State Line	Gaston	C
A-34	C8660000	Crowders Cr at SC 564 near Bowling Green, SC	York (SC)	FW
03-08-38				
A-35	C9819500	Twelvemile Cr at NC 16 near Waxhaw	Union	C

* Removed May 2000

3.3.6 Notable Patterns in Ambient Data

The following patterns, as outlined in the *2003 Catawba River Basinwide Assessment Report*, support the conclusion that rapid urbanization and development are one of the greatest threats to water quality in the Catawba River basin. Each parameter discussed below is at its greatest average concentration in watersheds characterized by heavy urban development, such as those encompassing the Greater Charlotte Metropolitan Area and the urbanized corridors along Interstates 77, 85 and 40. In order to prevent the same decreases in water quality in watersheds facing similar impacts from growth, management strategies must be developed that effectively reduce impacts from point sources, nonpoint source runoff and habitat degradation.

Conductivity

Conductivity can be used to evaluate variations in dissolved mineral concentrations (ions) among sites with varying degree of impact resulting from point source discharges. Generally, impacted sites show elevated and widely ranging values for conductivity. Many stations (for example in subbasins 03-08-34, 03-08-35, and 03-08-36) showed widely varying values which were the result of point source dischargers located upstream of the sample site. Notable were the effluent and urban-dominated streams of Mecklenburg County. Please refer to Section B, Chapters 4 - 6 for further discussion.

Metals

Twenty stations had more than 10 percent of the copper concentrations greater than the action level (7.0 µg/l). Station C7000000, on the South Fork Catawba River, exhibited the most chronic copper concentrations, exceeding the action level on 81 percent of the measurements. Additionally, the great majority of stations exceeding the copper action level are located in the most heavily urbanized subbasins. In cases where an individual discharger has a documented toxic impact on a stream, those concerns are addressed through their NPDES permit. In many cases, however, metal contaminants are found in urban stormwater runoff. Proper use of stormwater BMP can reduce this impact. Please refer to Section A, Chapter 4, Part 4.11 for further discussion on this issue.

Fecal Coliform Bacteria

Fecal coliform bacteria live in the digestive tract of warm-blooded animals (humans as well as other mammals) and are excreted in their waste. Fecal coliform bacteria do not actually pose a danger to people or animals. However, where fecal coliform are present; disease-causing bacteria may also be present, and water that is polluted by human or animal waste can harbor other pathogens that may threaten human health. For further discussion on fecal coliform bacteria, human health impacts and management issues, refer to Section A, Chapter 4, Part 4.14.

Ambient monitoring revealed continuing bacteria concerns at many sites in the Catawba River basin. Although none of these sites were in waters classified for primary recreation, they indicate areas in the basin where pollution originating from urbanized and developing areas is a major concern. Table A-21 lists sites in each subbasin that show elevated fecal coliform bacteria concentrations. The North Carolina fecal coliform standard for freshwater is 200 colonies/100ml based on the geometric mean of at least five consecutive samples taken during a 30-day period nor to exceed 400 colonies/100ml in more than 20 percent of the samples during the same period.

Table A-21 Summary of Ambient Sites with Elevated Fecal Coliform Bacteria Concentrations in the Catawba River Basin, September 1997 – August 2002[1]

Subbasin/ Station	Waterbody/ Location	N	% > 400	Geometric Mean
03-08-31				
C1750000	Lower Cr at SR 1501 near Morganton Marion	54	38.9	252.7
03-08-32				
C2818000	Lower Little R at SR 1313 near All Healing Springs	59	42.4	199.6
03-08-34				
C4040000	Long Cr at SR 2042 near Paw Creek	59	39	324.2
C8896500	Irwin Cr at Irwin Cr WWTP near Charlotte	59	49.2	592.0
C9050000	Sugar Cr at NC 51 at Pineville	58	36.2	308.6
C9210000	Little Sugar Cr at NC 51 at Pineville	58	29.3	233.5
C9370000	McAlpine Cr at SR 3356 Sardis Rd near Charlotte	59	40.7	287.9
C9680000	McAlpine Cr at SC SR 2964 near Camp Cox, SC	58	25.9	230.5
C9790000	Sugar Cr at SC 160 near Fort Mill, SC	58	32.8	325.0
03-08-35				
C4800000	Clark Cr at SR 1008 Grove St at Lincolnton	59	42.4	361.7
03-08-36				
C5900000	Long Cr at SR 1456 near Bessemer City	58	37.9	349.6
03-08-37				
C8660000	Crowders Cr at SC 564 near Bowling Green, SC	58	22.4	224.1
03-08-38				
C9819500	Twelvemile Cr at NC 16 near Waxahaw	57	31.6	285.9

[1] Stations sorted first by subbasin number, then by station number.

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, particularly when considering waters for the 303(d) list. Methodology for soliciting and evaluating outside data is presented in Appendix III, Part D and in *North Carolina's 2002 Integrated 305(b) and 303(d) Report* (NCDENR-DWQ, February 2003). Mecklenburg County, Winthrop

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.

University and several citizens submitted data during the open solicitation period in October 2001. The next data solicitation period for the Catawba River basin is planned for fall 2007.

3.5 Use Support Summary

3.5.1 Introduction to Use Support Assessment

Surface waters are classified according to their best-intended uses as described earlier in Part 3.2 of this chapter. Determining how well a waterbody supports the best-intended uses (use support assessment) is an important method of interpreting water quality data. A use support rating is assigned during use support assessment and refers to whether the best-intended uses of the water (such as water supply, aquatic life protection, shellfish harvesting and recreation) are being supported. For example, waters with a healthy biological community (Excellent, Good or Good-Fair) are *Supporting*, and waters with an unhealthy biological community (Fair or Poor) are *Impaired*. Waters with inconclusive data (biological community Not Rated) are *Not Rated*. Waters lacking data are not assigned a use support rating and listed as *No Data*. Specific details on use support assessment and assigning use support ratings can be found in Appendix III.

There are five use categories: aquatic life, fish consumption, recreation, shellfish harvesting and water supply. A use support rating is assigned to applicable categories depending on the surface water classification or best-intended use. For example, all waters with appropriate data are assigned a use support rating in the aquatic life, recreation and fish consumption categories. Class WS waters are assigned a use support rating for the water supply category as well as for the aquatic life, recreation and fish consumption categories. A single waterbody could potentially be assigned a use support rating in all five categories, though most waters are assigned a use support rating for the aquatic life, recreation and fish consumption categories. For many waters, a category will not be applicable to the best-intended use of that water (e.g., the shellfish harvesting category does not apply to Class C, SC, B, SB or WS waters) and no assessment is made in that category. 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*, online at http://h2o.enr.state.nc.us/admin/rules/.

In previous use support assessments, surface waters were rated fully supporting (FS), partially supporting (PS), not supporting (NS) and not rated (NR). FS was used to identify waters that were meeting their designated uses. 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 Impaired category. In agreement with this guidance, North Carolina no longer subdivides the Impaired category and assigns the following use support ratings: Supporting, Impaired, Not Rated or No Data.

Historically, the Supporting use support rating was also subdivided into fully supporting (FS) 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 water quality 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 arose from this difference, North Carolina no longer subdivides the Supporting category. However, these waters and the specific water quality concerns are identified in the Section B subbasin chapters so that data, management and the need to address the identified concerns are presented.

3.5.2 Comparison of Use Support Rating to Streams on the List of Impaired Waters

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 use support rating of Impaired. 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 when water quality standards are 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 met. Currently, there are 97 segments listed on the *North Carolina's Water Quality Assessment and Impaired Waters List (2004 Integrated 305(b) and 303(d) Report)* in the Catawba River basin. These waters are listed for variety of reasons including habitat degradation, fecal coliform bacteria, toxicity and unknown causes. Refer to the website at http://h2o.enr.state.nc.us/tmdl/ for the complete listing.

3.5.3 Use Support Assessment in the Catawba River Basin

Aquatic Life Category

The aquatic life category is applied to all waters in North Carolina. Therefore, this category is applied to all 3,048 freshwater miles and 50,764 freshwater acres in the Catawba River basin. Biological, chemical and physical monitoring data collected between September 1997 and August 2002 were used to assign a use support rating in this category. Table A-22 summarizes aquatic life use support ratings in the entire Catawba River basin. Use support ratings by subbasin are summarized in Section B.

Table A-22 Aquatic Life Use Support Ratings Summary for All Waters in the Catawba River Basin (1997-2002)

Aquatic Life Ratings/Basis	Miles	Acres
Impaired/Monitored	174.2	5,868.1
Supporting/Monitored	508.9	40,931.4
Not Rated/Monitored	62.9	3,964.7
Total Monitored	**746.0**	**50,764.2**
Supporting/Evaluated	681.66	0.0
Not Rated/Evaluated	501.1	0.0
No Data	1,119.5	0.0
Total Unmonitored	**2,302.3**	**0.0**
Total	**3,048.3**	**50,764.2**
Percent of Total Monitored	24.5	100.0
Percent of Monitored/Impaired	23.4	11.6
Percent of Total Impaired	5.4	11.6

Recreation Category

Like the aquatic life category, the recreation category is applied to all waters in North Carolina. Therefore, this category is applied to all 3,048 freshwater miles and 50,764 freshwater acres in the Catawba River basin. DWQ fecal coliform monitoring data collected between September 1997 and August 2002 were used to assign use support ratings in this category. Table A-23 summarizes recreation use support ratings in the Catawba River basin. Use support ratings by subbasin are summarized in Section B.

Table A-23 Recreation Use Support Ratings Summary for Waters in the Catawba River Basin (1997-2002)

Recreation Ratings and Basis	Miles	Acres
Impaired/Monitored	24.4	0.0
Supporting/Monitored	121.5	41,255.1
Not Rated/Monitored	89.2	0.0
Total Monitored	**235.1**	**41,255.1**
Supporting/Evaluated	0.0	0.0
Not Rated/Evaluated	0.0	0.0
No Data	2,813.1	9,509.0
Total Unmonitored	**2,813.1**	**9,509.0**
Total	**3,048.2**	**50,764.1**
Percent of Total Monitored	7.7	81.3
Percent of Monitored/Impaired	10.4	0.0
Percent of Total Impaired	0.8	0.0

Fish Consumption Category

Like the aquatic life and recreation categories, the fish consumption category is applied to all waters in North Carolina. Therefore, this category is applied to all 3,048 freshwater miles and 50,764 freshwater acres in the Catawba River basin. The Department of Health and Human Services fish consumption advice was used to assign a use support rating in this category. 705 miles and 4,395 acres are Impaired in the Catawba River basin based on this advice. Refer to Section A, Chapter 4, Part 4.10 for a detailed discussion of the NCDHHS advice. Use support ratings by subbasin are summarized in Section B.

Water Supply Category

There are 997.7 freshwater stream miles and 47,081.9 freshwater acres currently classified for water supply in the Catawba River basin. All water supply waters have been assigned a use support rating of Supporting on an Evaluated basis based on reports from DEH regional water treatment consultants. The reports are used to evaluate the ability of water treatment plants to provide potable water to consumers for Class WS waters. Raw water quality is not assessed in this category.

Impaired Waters

Table A-24 presents Impaired waters (in all categories) in the Catawba River basin that were monitored by DWQ within the last five years. The category for which a water is Impaired is indicated in the table. Descriptions of Impaired segments, as well as problem parameters, are

outlined in Appendix III. Current status and recommendations for restoration of water quality for each water and maps showing current use support ratings for waters in the Catawba River basin are presented in each subbasin chapter in Section B.

Table A-24 Impaired Monitored Waters within the Catawba River Basin (1997 to 2002)

Name	Assessment Unit	Class	Subbasin	Miles	Acres	Category
Youngs Fork (Corpening Creek)	11-32-1-4b	C	03-08-30	1.9		Aquatic Life
Youngs Fork (Corpening Creek)	11-32-1-4a	C	03-08-30	3.6		Aquatic Life
Jacktown Creek	11-32-1-4-1	C	03-08-30	2.4		Aquatic Life
North Fork Catawba River	11-24-(2.5)b	B- TR	03-08-30	3.5		Aquatic Life
Irish Creek	11-35-3-(2)b	WS-III	03-08-31	3.0		Aquatic Life
Hunting Creek	11-36-(0.7)	WS-IV	03-08-31	7.4		Aquatic Life
CATAWBA RIVER (Rhodhiss Lake below elevation 995)	11-(37)	WS-IV & B CA	03-08-31		1,848.5	Aquatic Life
Lower Creek	11-39-(0.5)a	C	03-08-31	8.8		Aquatic Life
Lower Creek	11-39-(0.5)b	C	03-08-31	5.1		Aquatic Life
Lower Creek	11-39-(6.5)	WS-IV	03-08-31	6.8		Aquatic Life
Spainhour Creek	11-39-3	C	03-08-31	4.7		Aquatic Life
McGalliard Creek	11-44-(3)	WS-IV CA	03-08-31	3.9		Aquatic Life
Horseford Creek	11-54-(0.5)	WS-IV	03-08-32	0.4		Aquatic Life
Lower Little River	11-69-(0.5)	C	03-08-32	14.0		Aquatic Life
McDowell Creek	11-115-(1.5)b	WS-IV	03-08-33	2.9		Aquatic Life
McDowell Creek	11-115-(1.5)a	WS-IV	03-08-33	4.4		Aquatic Life
Killian Creek	11-119-2-(0.5)b	C	03-08-33	3.2		Aquatic Life
CATAWBA RIVER (Lake Wylie below elevation 570)	11-(122)	WS-IV & B CA	03-08-34		601.1	Aquatic Life
CATAWBA RIVER (Lake Wylie below elevation 570) North Carolina portion	11-(123.5)	WS-V & B	03-08-34		3,418.5	Aquatic Life
Long Creek	11-120-(2.5)	WS-IV	03-08-34	11.3		Aquatic Life & Recreation
Sugar Creek	11-137a	C	03-08-34	0.3		Aquatic Life
Irwin Creek	11-137-1	C	03-08-34	11.8		Aquatic Life
Little Sugar Creek	11-137-8a	C	03-08-34	5.5		Aquatic Life
McAlpine Creek (Waverly Lake)	11-137-9c	C	03-08-34	4.6		Aquatic Life

Clark Creek (Shooks Lake)	11-129-5-(0.3)b	C	03-08-35	14.3		Aquatic Life
Clark Creek (Shooks Lake)	11-129-5-(0.3)c(1)	C	03-08-35	2.4		Aquatic Life
Henry Fork	11-129-1-(12.5)a	C	03-08-35	10.3		Aquatic Life
Maiden Creek	11-129-5-7-2-(1)	WS-II	03-08-35	4.9		Aquatic Life
Maiden Creek (Including Maiden reservoir below elevation 842)	11-129-5-7-2-(2.5)	WS-II CA	03-08-35	2.1		Aquatic Life
Clark Creek	11-129-5-(9.5)	WS-IV	03-08-35	1.8		Aquatic Life
Indian Creek	11-129-8-(6.5)b	C	03-08-35	6.0		Aquatic Life
Catawba Creek	11-130c	C	03-08-37	4.9		Aquatic Life
Crowders Creek	11-135c	C	03-08-37	3.3		Aquatic Life & Recreation
Crowders Creek	11-135g	C	03-08-37	1.5		Aquatic Life & Recreation
Crowders Creek	11-135d	C	03-08-37	7.3		Aquatic Life & Recreation
Crowders Creek	11-135a	C	03-08-37	1.9		Recreation
Crowders Creek	11-135b	C	03-08-37	3.1		Recreation
Crowders Creek	11-135e	C	03-08-37	1.5		Recreation
Crowders Creek	11-135f	C	03-08-37	1.4		Recreation
Abernethy Creek	11-135-4b	C	03-08-37	1.8		Aquatic Life
Blackwood Creek	11-135-7	C	03-08-37	4.4		Recreation
Sixmile Creek	11-138-3	C	03-08-38	8.8		Aquatic Life