
North Carolina's Basinwide Approach to Water Quality Management

Basinwide water quality planning is a nonregulatory watershed-based approach to restoring and protecting the quality of North Carolina's surface waters. Basinwide water quality plans are prepared by the NC Division of Water Quality (DWQ) for each of the seventeen major river basins in the state. Each basinwide plan is revised at five-year intervals. While these plans are prepared by the DWQ, their implementation and the protection of water quality entails the coordinated efforts of many agencies, local governments and stakeholders in the state. The first basinwide plan for the Neuse River basin was completed in 1993 and the second in 1998.

This document is the third five-year update of the *Neuse River Basinwide Water Quality Plan*. The format of this plan was revised in response to comments received during the first and second planning cycles. DWQ replaced much of the general information in the first plan with more detailed information specific to the Neuse River basin. A greater emphasis was placed on identifying causes and sources of pollution for individual streams in order to facilitate local restoration efforts.

DWQ considered comments from four public workshops held in the basin and subsequent discussions with local resource agency staff and citizens during draft plan development. This input will help guide continuing DWQ activities in the basin.

Goals of the Basinwide Approach

The goals of basinwide planning are to:

- Identify water quality problems and restore full use to impaired waters.
- Identify and protect high value resource waters.
- Protect unimpaired waters yet allow for reasonable economic growth.

DWQ accomplishes these goals through the following objectives:

- Collaborate with other agencies to develop appropriate management strategies.
- Assure equitable distribution of waste assimilative capacity.
- Better evaluate cumulative effects of pollution.
- Improve public awareness and involvement.

Neuse River Basin Overview

The Neuse River originates in north central North Carolina in Person and Orange counties and flows southeasterly until it reaches tidal waters near Streets Ferry upstream of New Bern. At New Bern, the river broadens dramatically and changes from a free-flowing river to a tidal estuary that eventually flows into the Pamlico Sound. The Neuse River basin is the third largest river basin in North Carolina and is one of only four major river basins whose boundaries are located entirely within the state.

From 1982 to 1997 urban and built-up land cover increased by 227,000 acres. Uncultivated cropland and pastureland also increased by 60,000 acres. Forest and cultivated cropland cover significantly decreased by 128,000 and 180,000 acres, respectively. Most land cover change is accounted for in the upper Neuse hydrologic unit that includes rapidly growing areas in Wake, Durham and Johnston counties.

The Neuse River basin encompasses all or portions of 18 counties and 74 municipalities. The overall population of the basin based on Triangle J Council of Governments analysis is 1,353,617, with approximately 211 persons/square mile. Stoney Creek (subbasin 03-04-05) is the most densely populated local watershed with 2,573 persons/square mile. Fifty-four percent of the basin population is located in 10 percent of the basin land area. The watersheds with the highest population densities are near Raleigh, Durham, Goldsboro, Kinston, New Bern and Wilson.

Populations of counties that are wholly or partly contained within the basin increased by over 414,000 people between 1900 and 2000. Durham, Johnston and Wake are growing the fastest in the upper basin, with Pitt County growing the fastest in the lower basin. The county populations are expected to grow by more than 867,000 by 2020 to almost three million people. With the increased population there will be increased drinking water demands and wastewater discharges. There will also be loss of natural areas and increases in impervious surfaces associated with construction of new homes and businesses.

There are 3,497 freshwater stream miles, 16,414 acres of freshwater reservoirs and lakes (Table A-4), 369,977 estuarine acres, and 21 miles of Atlantic coastline in the Neuse River basin. There are also countless miles of unmapped small perennial, intermittent and ephemeral streams. The lower Neuse River basin contains extensive wetland communities also. The basin starts in the eastern Piedmont physiographic region with about two-thirds of the basin in the Coastal Plain.

Assessment of Water Quality in the Neuse River Basin

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 *supporting and 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), 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 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.

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 all 3,497 stream miles, 386,391 freshwater and estuarine acres, and the 21 miles of Atlantic coastline in the Neuse River basin. Approximately 36 percent of stream miles (1,248.9 miles) were monitored. Impaired stream miles (278.6 miles) accounted for 8.0 percent of all stream miles and 22.3 percent of monitored stream miles. Approximately 91 percent of estuarine and freshwater acres (350,323.6 acres) were monitored. There were 31,767.3 impaired estuarine acres that accounted for 8.2 percent of the total acres and 9.1 percent of monitored acres. There were no impaired freshwater acres. Table 1 summarizes aquatic life/secondary recreation use support ratings for the entire basin.

Table 1 Aquatic Life/Secondary Recreation Use Support Summary Information for Waters in the Neuse River Basin (2001)

Aquatic Life and Secondary Recreation Use Support Ratings	All Waters	Percent of All Waters	Monitored Waters	Percent of Monitored Waters
Supporting	907.5 Miles 319,180.1 Acres	26.0 82.6	736.1 Miles 318,205.7 Acres	58.9 90.8
Impaired	278.6 Miles 31,767.3 Acres	8.0 8.2	278.6 Miles 31,767.3 Acres	22.3 9.1
Not Rated	234.2 Miles 350.6 Acres	6.7 <1	234.2 Miles 350.6 Acres	18.8 <1
No Data**	2,076.7 Miles 35,093.0 Acres	59.4 9.0	N/A N/A	N/A N/A
TOTAL	3,497.0 Miles 386,391.0 Acres	100.0 100.0	1,248.9* Miles 350,323.6* Acres	100.0 100.0

Note: Acres are a combination of freshwater acres in upper subbasins and estuarine acres in lower subbasins.

* 35.7 percent of all stream miles and 90.7 percent of all acres were monitored.

** There are also 21 miles of Atlantic Coastline with No Data.

Fish Consumption

Like the aquatic life/secondary recreation use support category, the fish consumption category is also applied to all waters in the state. Approximately 2.2 percent of stream miles (69.0 miles) and 100 percent (20 coastline miles) in the Neuse River basin were monitored for the fish consumption use support category during this basinwide cycle. Fish consumption use support ratings are based on fish consumption advisories issued by the NC Department of Health and Human Services (NCDHHS). Due to the above mentioned fish consumption advisory, all waters in the Neuse River basin are considered to be impaired for this use support category. A basinwide summary of current fish consumption use support ratings is presented in Table 2.

Table 2 Fish Consumption Use Support Summary Information for Waters in the Neuse River Basin (1999)

Fish Consumption	All Waters	Monitored Waters	Percent Monitored
Supporting	0 Miles 0 Acres	0 Miles 0 Acres	0 0
Impaired	3,461.4 Miles 386,391.0 Acres	69 Miles 0 Acres	1.9 0
Not Rated	0 Miles 0 Acres	0 Miles 0 Acres	0 0
TOTAL	3,461.4 Miles 386,391.0 Acres	69 Miles 0 Acres	1.9 0

Note: There are 21 miles of Atlantic coastline impaired monitored in this use support category not added to total mileage.

Primary Recreation

There are 93.1 stream miles, 370,643.9 freshwater and estuarine acres currently classified for primary recreation in the Neuse River basin. Approximately 31 percent of stream miles (28.4 miles) were monitored by DWQ. There were no stream miles impaired in the primary recreation use support category. Approximately 91.9 percent of freshwater and estuarine acres were monitored. There were no impaired acres in this use support category. Table 3 summarizes primary recreation use support ratings for the entire basin.

Table 3 Primary Recreation Use Support Summary for Waters in the Neuse River Basin (1999)

Primary Recreation	All Waters	Monitored Waters	Percent of All Waters
Supporting	28.4 Miles 344,338.4 Acres	28.4 Miles 344,338.4 Acres	30.5 92.9
Impaired	0 Miles 0 Acres	0 Miles 0 Acres	0 0
No Data	64.7 Miles 29,645.6 Acres	N/A Miles N/A Acres	69.5 7.1
TOTAL	93.1 Miles 370,643.9 Acres	28.4 Miles 344,338.4 Acres	100.0 100.0

Water Supply

There are 847.2 stream miles and 15,961.6 freshwater acres currently classified for water supply in the Neuse River basin. All water supply waters are supporting on an evaluated basis based on reports from DEH regional water treatment consultants. A basinwide summary of current water supply use support ratings is presented in Table 4.

Table 4 Water Supply Use Support Summary Information for Waters in the Neuse River Basin (2000)

Water Supply	All Waters	Monitored Waters	Percent Monitored
Supporting	847.2 Miles 15,961.6 Acres	0 Miles 0 Acres	0 0
Impaired	0 Miles 0 Acres	0 Miles 0 Acres	0 0
Not Rated	0 Miles 0 Acres	0 Miles 0 Acres	0 0
TOTAL	847.2 Miles 15,961.6 Acres	0 Miles 0 Acres	0 0

Shellfish Harvesting

There are 332,457.3 estuarine acres classified for shellfish harvesting (Class SA) in the Neuse River basin. All were monitored during the past five years by DEH Shellfish Sanitation (refer to page 52). Impaired estuarine acres accounted for 1.1 percent of the total estuarine acres in the shellfish harvesting use support category. A basinwide summary of current shellfish harvest use support ratings is presented in Table 5.

Table 5 Shellfish Harvesting Use Support Summary Information for Waters in the Neuse River Basin

Shellfish Harvesting	Monitored Waters	Percent of Monitored
Supporting	328,746.7 Acres	98.9
Impaired	3,710.6 Acres	1.1
Not Rated	0 Acres	0
TOTAL	332,457.3 Acres	100

Impaired Waters

Table 6 presents impaired waters (in all categories) in the Neuse River basin that were monitored by DWQ within the last five years. The use support 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. Management strategies for each water are discussed in detail in the appropriate subbasin chapter. Maps showing current use support ratings for waters in the Neuse River basin are presented in each subbasin chapter in Section B.

Table 6 Monitored Impaired Waters within the Neuse River Basin (as of 2000)¹

Waterbody	Chapter in Section B	Page #	Classification	Miles	Acres	Use Support Category
Ellerbe Creek	1	100	C NSW	11.0	0.0	Aquatic Life/Sec. Rec
Flat River	1	100	WS-IV NSW	1.1	0.0	Aquatic Life/Sec. Rec
Knap of Reeds Creek	1	100	WS-IV NSW	5.2	0.0	Aquatic Life/Sec. Rec
Lick Creek	1	100	WS-IV NSW	7.2	0.0	Aquatic Life/Sec. Rec
Little Lick Creek	1	100	WS-IV NSW	7.8	0.0	Aquatic Life/Sec. Rec
Black Creek	2	112	C NSW	3.6	0.0	Aquatic Life/Sec. Rec
Crabtree Creek	2	112	C NSW	16.0	0.0	Aquatic Life/Sec. Rec
Hare Snipe Creek	2	112	B NSW	4.5	0.0	Aquatic Life/Sec. Rec
Little Creek	2	112	C NSW	11.4	0.0	Aquatic Life/Sec. Rec
Marsh Creek	2	112	C NSW	6.2	0.0	Aquatic Life/Sec. Rec
Mine Creek	2	112	C NSW	4.7	0.0	Aquatic Life/Sec. Rec
Perry Creek	2	112	B NSW	4.9	0.0	Aquatic Life/Sec. Rec
Pigeon House Branch	2	112	C NSW	2.9	0.0	Aquatic Life/Sec. Rec
Richlands Creek	2	112	C NSW	4.7	0.0	Aquatic Life/Sec. Rec
Swift Creek	2	112	WS-III NSW	7.9	0.0	Aquatic Life/Sec. Rec
Toms Creek	2	112	C NSW	1.5	0.0	Aquatic Life/Sec. Rec
Middle Creek	3	126	C NSW	1.4	0.0	Aquatic Life/Sec. Rec
Black	4	131	C NSW	2.0	0.0	Aquatic Life/Sec. Rec

Hannah Creek	4	131	C NSW	10.3	0.0	Aquatic Life/Sec. Rec
Neuse River	5	137	C NSW	63.2	0.0	Fish Consumption
Stoney Creek	5	137	C NSW	10.7	0.0	Aquatic Life/Sec. Rec
Walnut Creek	5	137	C NSW	6.9	0.0	Aquatic Life/Sec. Rec
Little River	6	143	WS-IV NSW	20.0	0.0	Aquatic Life/Sec. Rec
Nahunta Swamp	7	150	C Sw NSW	27.1	0.0	Aquatic Life/Sec. Rec
Hominy Swamp	7	150	C Sw NSW	9.9	0.0	Aquatic Life/Sec. Rec
Little Contentnea Creek	7	150	C Sw NSW	34.9	0.0	Aquatic Life/Sec. Rec
Core Creek	8	158	C Sw NSW	15.4	0.0	Aquatic Life/Sec. Rec
Neuse River	8	158	SC Sw NSW	0.0	426.5	Aquatic Life/Sec. Rec
Swift Creek	9	164	C Sw NSW	22.4	0.0	Aquatic Life/Sec. Rec
Clayroot Swamp	9	164	C Sw NSW	12.9	0.0	Aquatic Life/Sec. Rec
Neuse River	10	171	SC/SB Sw NSW	0.0	30,330.9	Aquatic Life/Sec. Rec
Trent River	10	171	SB Sw NSW	0.0	1,009.9	Aquatic Life/Sec. Rec
Neuse River	10	171	SA NSW	0.0	165.6	Shellfish Harvesting
Adams Creek and Tributaries	10	171	SA NSW	0.0	841.5	Shellfish Harvesting
Clubfoot Creek and Tributaries	10	171	SA NSW	0.0	747.1	Shellfish Harvesting
South River and Tributaries	10	171	SA NSW	0.0	784.6	Shellfish Harvesting
Broad Creek and Tributaries	10	171	SA NSW	0.0	412.1	Shellfish Harvesting
Dawson Creek	10	171	SA NSW	0.0	122.1	Shellfish Harvesting
Whittaker Creek	10	171	SA NSW	0.0	96.1	Shellfish Harvesting
Pierce Creek	10	171	SA NSW	0.0	50.7	Shellfish Harvesting
Orchard Creek	10	171	SA NSW	0.0	37.1	Shellfish Harvesting
Bright Creek	10	171	SA NSW	0.0	10.9	Shellfish Harvesting
Neuse River	12	184	C NSW	5.8	0.0	Fish Consumption
Bay River	13	189	SA NSW	0.0	100.0	Shellfish Harvesting
Harper Creek	13	189	SA NSW	0.0	32.5	Shellfish Harvesting
Bear Creek	13	189	SA NSW	0.0	199.9	Shellfish Harvesting
Bennett Creek	13	189	SA NSW	0.0	15.7	Shellfish Harvesting
Gale Creek	13	189	SA NSW	0.0	29.4	Shellfish Harvesting
Bills Creek	13	189	SA NSW	0.0	8.1	Shellfish Harvesting
Pamlico Sound	14	194	SA NSW	0.0	12.5	Shellfish Harvesting
Golden Creek	14	194	SA NSW	0.0	9.7	Shellfish Harvesting
Thorofare	14	194	SA NSW	0.0	34.9	Shellfish Harvesting
Atlantic Ocean	14	194	SB NSW	21.0	0.0	Fish Consumption

* Although all waters in the basin are considered impaired for the fish consumption use support category, only the Neuse River (69 miles) and the Atlantic coastline (21 miles) were monitored (see page 93).

Recommended Management Strategies for Restoring Impaired Waters

The long-range mission of basinwide planning is to provide a means of addressing the complex problem of planning for increased development and economic growth while maintaining, protecting and enhancing water quality and intended uses of the Neuse River basin's surface waters.

Within this basinwide plan, DWQ presents management strategies and recommendations for those waters considered to be impaired or that exhibit some notable water quality problem. Major water quality problems in the basin include habitat degradation, algal blooms, low dissolved oxygen (affecting aquatic life), mercury in fish tissue (affecting fish consumption) and fecal coliform bacteria contamination (affecting shellfish harvesting). Habitat degradation, including sedimentation, streambed scour and streambank erosion, is primarily attributed to nonpoint source pollution (NPS). Sources of nonpoint source pollution include runoff from construction sites, agricultural lands and urban areas, and hydromodification.

For streams degraded by point source pollution, the plan presents a management strategy to reduce the impacts from that pollutant source. The task of quantifying nonpoint sources of pollution and developing management strategies for these impaired waters is very resource intensive. This task is overwhelming, given the current limited resources of DWQ, other agencies (e.g., Division of Land Resources, Division of Soil and Water Conservation, Cooperative Extension Service, etc.) and local governments.

DWQ plans to further evaluate impaired waters in the Neuse River basin in conjunction with other agencies that deal with nonpoint source pollution issues and develop management strategies for a portion of these impaired waters for the next *Neuse River Basinwide Water Quality Plan* (2007).

Addressing Waters on the State's 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 DWQ priority. Section 303(d) of the federal Clean Water Act requires states to develop a list of waters not meeting water quality standards or which have impaired uses. The waters in the Neuse River basin that are on this list are discussed in the individual subbasin descriptions in Section B. States are also required to develop Total Maximum Daily Loads (TMDLs) or management strategies for 303(d) listed waters to address impairment. EPA issued guidance in August 1997 that called for states to develop schedules for developing TMDLs for all waters on the 303(d) list within 8-13 years.

There are approximately 2,387 impaired stream miles on the 2000 303(d) list in NC. The rigorous and demanding task of developing TMDLs for each listed water during a 13-year time frame will require the focus of many resources. It will be a priority for North Carolina's water quality programs over the next several years to develop TMDLs for 303(d) listed waters.

Challenges Related to Achieving Water Quality Improvements

To achieve the goal of restoring impaired waters throughout the basin, DWQ will need to work more closely with other state agencies and stakeholders to identify and control pollutants. The costs of restoration will be high, but several programs exist to provide funding for restoration efforts. These programs include the Clean Water Management Trust Fund, the NC Agricultural Cost Share Program, the Wetlands Restoration Program and the federally funded Conservation Reserve Enhancement Program.

With increased development occurring, there will be significant challenges ahead in balancing economic growth with the protection of water quality in this basin. Point source impacts on surface waters can be measured and addressed through the basinwide planning process. Nonpoint sources of pollution can be identified through the basinwide plan, but actions to address these impacts must be taken at the local level. Such actions should include: development and enforcement of local erosion control ordinances; requirement of stormwater best management practices for existing and new development; development and enforcement of buffer ordinances; and land use planning that assesses impacts on natural resources. This basinwide plan presents many water quality initiatives and accomplishments that are underway within the basin. These actions provide a foundation on which future initiatives can be built.