

# Executive Summary

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## 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 Roanoke River basin was completed in 1996.

This document is the first five-year update of the *Roanoke River Basinwide Water Quality Plan*. The format of this plan was revised in response to comments received during the first planning cycle. DWQ replaced much of the general information in the first plan with more detailed information specific to the Roanoke 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 seriously considered comments from three public workshops and four public meetings held in the basin during plan development. Many changes were made to the draft as a result of public review. This input will help guide continuing DWQ activities in the basin.

### Goals of the Basinwide Approach

The goals of DWQ's basinwide program are to:

- identify water quality problems and restore full use to impaired waters;
- identify and protect high value resource waters;
- protect unimpaired waters while allowing for reasonable economic growth;
- develop appropriate management strategies to protect and restore water quality;
- assure equitable distribution of waste assimilative capacity for dischargers; and
- improve public awareness and involvement in the management of the state's surface waters.

### Roanoke River Basin Overview

The Roanoke River begins in the Blue Ridge Mountains of northwestern Virginia and flows in a generally southeastern direction for 400 miles before emptying into the Albemarle Sound in eastern North Carolina. By the time it reaches the fall line near Roanoke Rapids, it has captured water from nearly 8,000 square miles of land. From Roanoke Rapids to the coast, the river drains another 2,000 square miles, carrying more water than any other river in North Carolina. The North Carolina portion of the basin (roughly 36 percent of the entire watershed) is composed of two major parts: the Dan River and its tributaries in the western section; and the Roanoke River from Virginia to the Sound in the eastern section. The Roanoke River enters North

Carolina through John H. Kerr Reservoir and then flows into Lake Gaston and Roanoke Rapids Lake before regaining its riverine form.

The upper Dan River is classified as trout waters and part of the area is also designated a State Water Trail by the NC Division of Parks and Recreation. The lower portion of the basin contains the largest intact and least disturbed bottomland hardwood and cypress-tupelo ecosystems on the Atlantic Coast of North America. This area is important habitat for anadromous fish, including striped bass, as well as black bear, bobcat, large populations of wild turkey, 14 species of waterfowl, and 220 additional bird species.

Sixty percent of the land in the basin is forested and about twenty-two percent is in cultivated cropland. Cotton, peanuts, tobacco and soybeans are among the most common crops grown. Only six percent of the land falls into the urban/built-up category. Despite the large amount of cultivated cropland and the relatively small amount of urban area, the basin has experienced a significant decrease (-105,300 acres) in the former and increase (+77,700 acres) in the latter over the past fifteen years.

There are 15 counties and 42 municipalities located wholly or partially within the basin. In 1990, the estimated population of the basin was 263,691 people. The most populated areas are located north of the Winston-Salem/Greensboro area and around the larger municipalities in the basin, such as Roanoke Rapids, Eden, Williamston and Plymouth. Population in Stokes and Granville counties is projected to increase 25-30 percent from 1998 to 2018. Population in many other counties along the North Carolina/Virginia border is projected to increase 15 to 20 percent over the same twenty-year period.

There are 11 major reservoirs in the North Carolina portion of the basin. Most of them are located in the upper portion of the basin on tributaries of the Dan and Roanoke Rivers (notably Belews Lake, Hyco Lake and Mayo Reservoir). Three reservoirs, Kerr, Gaston and Roanoke Rapids, are impoundments of the Roanoke River mainstem. They are managed by Dominion and the US Army Corps of Engineers for electrical energy production and flood control. Flow from these reservoirs directly influences the quality of water in the lower Roanoke River.

### **Assessment of Water Quality in the Roanoke River Basin**

Surface waters are classified according to their best intended uses. Determining how well a water supports its designated uses (use support status) is an important method of interpreting water quality data and assessing water quality. Waters are rated fully supporting (FS), partially supporting (PS) or not supporting (NS). The terms refer to whether the classified uses of the water (i.e., aquatic life protection, recreation and water supply) are being met. For example, waters classified for aquatic life protection and secondary recreation (Class C for freshwater or SC for saltwater) are rated FS if data used to determine use support 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 degradation. Waters rated PS or NS are considered to be impaired. Waters lacking data, or having inconclusive data, are listed as not rated (NR).

Beginning in 2000 with the *Roanoke River Basinwide Water Quality Plan*, DWQ assesses ecosystem health and human health risk through several use support categories. Six categories

are used to assess water quality under this approach: aquatic life/secondary recreation, fish consumption, shellfish harvesting, primary recreation, water supply and "other" uses. Each of these categories is related to the primary classifications applied to NC rivers and streams. A single water could have more than one use support rating corresponding to one or more of the multiple use support categories. For many waters, a use support category will not be applicable (N/A) to the best use classification of that water (e.g., drinking water supply is not the best use of a Class C water). The current method of determining use support differs from that done prior to 2000; in that, there is no longer an *overall* use support rating for a water.

The aquatic life/secondary recreation use support category is applied to all waters in North Carolina. Approximately 51,405 acres of lakes were monitored in 1999. Only Roanoke Rapids Lake (4,893 acres) is partially supporting the aquatic life/secondary recreation use support category. All other lakes are fully supporting this category. Approximately 29 percent of total stream miles (638 miles) in the Roanoke River basin were monitored for the protection of aquatic life/secondary recreation by DWQ during this basinwide cycle. Impaired waters accounted for 2.6 percent of the total stream miles (monitored and evaluated) and 8.9 percent of monitored stream miles. Habitat degradation, from a variety of sources, was the primary cause of impairment.

Aquatic life in many swamp streams in the lower portion for the Roanoke River basin was monitored during this basinwide cycle, but the aquatic life/secondary recreation category for these streams is not rated. Currently, DWQ has draft criteria for evaluating swamp streams based on benthic macroinvertebrate data; however, there has been insufficient sampling of reference sites to assign bioclassifications and use the data for use support. A summary of current aquatic life/secondary recreation use support ratings for monitored and evaluated streams in the Roanoke River basin is presented in Table 1.

Table 1 Aquatic Life/Secondary Recreation Use Support Summary Information for Waters in the Roanoke River Basin (1999)

Aquatic Life/Secondary Recreation Use Support Ratings	Monitored and Evaluated Streams*		Monitored Streams Only**	
	Miles	%	Miles	%
<b>Fully Supporting</b>	<b>1113.7</b>	<b>50.3%</b>	<b>357.0</b>	<b>56.0%</b>
<b>Impaired</b>	<b>56.7</b>	<b>2.6%</b>	<b>56.7</b>	<b>8.9%</b>
<i>Partially Supporting</i>	<i>48.7</i>	<i>2.2%</i>	<i>48.7</i>	<i>7.6%</i>
<i>Not Supporting</i>	<i>8.0</i>	<i>0.4%</i>	<i>8.0</i>	<i>1.3%</i>
<b>Not Rated</b>	<b>1042.6</b>	<b>47.1%</b>	<b>223.9</b>	<b>35.1%</b>
<b>TOTAL</b>	<b>2213.0</b>		<b>637.6</b>	

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

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

Like the aquatic life/secondary recreation use support category, the fish consumption use support category also applies to all waters in the state. Approximately 14 percent of stream miles (308.0 miles) and more than 83 percent of lake acres (42,880 acres) in the basin were monitored for the fish consumption 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 (DHHS). Currently, there is a statewide advisory limiting consumption of bowfin due to excessive mercury concentrations. Because of this advisory, all waters in the state are considered partially supporting the fish consumption use. However, many waters across the state do not contain bowfin. Samples collected by DWQ in 1999 from some waters in the basin, including the Dan River, Kerr Reservoir and Lake Gaston, revealed concentrations of metals and PCBs in other fish species well below federal and state consumption criteria.

Table 2 presents a summary of current fish consumption use support ratings for monitored and evaluated streams in the Roanoke River basin.

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

Fish Consumption Use Support Ratings	Monitored and Evaluated Streams*		Monitored Streams Only**	
	Miles	%	Miles	%
<b>Fully Supporting</b>	<b>0.0</b>		<b>0.0</b>	
<b>Impaired</b>	<b>2213.0</b>	<b>100%</b>	<b>308.0</b>	<b>100%</b>
<i>Partially Supporting</i>	<i>2199.7</i>	<i>99.4%</i>	<i>294.7</i>	<i>95.7%</i>
<i>Not Supporting</i>	<i>13.3</i>	<i>0.6%</i>	<i>13.3</i>	<i>4.3%</i>
<b>Not Rated</b>	<b>0.0</b>	<b>0%</b>	<b>0.0</b>	<b>0%</b>
<b>TOTAL</b>	<b>2213.0</b>		<b>308.0</b>	

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

There are 120.2 stream miles currently classified for primary recreation (Class B) in the Roanoke River basin. Approximately 15 percent were monitored by DWQ over the past five years, and all are fully supporting the primary recreation use. A basinwide summary of current primary recreation use support ratings is presented in Table 3.

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

Primary Recreation Use Support Ratings	Monitored and Evaluated Streams*		Monitored Streams Only**	
	Miles	%	Miles	%
<b>Fully Supporting</b>	<b>18.5</b>	<b>15.4%</b>	<b>18.5</b>	<b>100%</b>
<b>Impaired</b>	<b>0.0</b>	<b>0%</b>	<b>0.0</b>	<b>0%</b>
<b>Not Rated</b>	<b>101.7</b>	<b>84.6%</b>	<b>0.0</b>	<b>0%</b>
<b>TOTAL</b>	<b>120.2</b>		<b>18.5</b>	

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

Approximately 270 stream miles are currently classified for water supply (WS-I through WS-V) in the Roanoke River basin. All were monitored within the past five years and all are fully

supporting the water supply use. 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 Roanoke River Basin (1999)

Water Supply Use Support Ratings	Monitored and Evaluated Streams*		Monitored Streams Only**	
	Miles	%	Miles	%
<b>Fully Supporting</b>	<b>270.4</b>	<b>100%</b>	<b>270.4</b>	<b>100%</b>
<b>Impaired</b>	<b>0.0</b>	<b>0%</b>	<b>0.0</b>	<b>0%</b>
<b>Not Rated</b>	<b>0.0</b>	<b>0%</b>	<b>0.0</b>	<b>0%</b>
<b>TOTAL</b>	<b>270.4</b>		<b>270.4</b>	

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

All lakes that were assessed by DWQ are fully supporting both the primary recreation and water supply use support categories.

### 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 Roanoke 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. Table 5 presents impaired waters by subbasin, the potential sources of impairment and summaries of the recommended management strategies.

Major water quality problems in the basin include habitat degradation and turbidity (affecting aquatic life) and high levels of selenium, mercury and dioxin in fish tissue (affecting fish consumption). 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. High levels of selenium and dioxin are attributed to historical point source pollution, and high levels of mercury are likely from atmospheric sources.

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.

Table 5 Monitored Impaired Waters within the Roanoke River Basin (as of 1999)\*

Subbasin	Name of Water	Miles or Acres	Use Support Rating – Category	Potential Pollution Sources+	Management Strategy or Recommendation
03-02-01	Town Fork Creek	8.0 miles	NS – Aquatic Life/Secondary Recreation	NP	Local initiatives are needed to address nonpoint source pollution in the watershed.
03-02-02 03-02-03	Dan River	14.2 miles	PS – Aquatic Life/Secondary Recreation	NP, P	DWQ will work with DLR to evaluate turbidity contributions of instream mining operations. Local initiatives are needed to address nonpoint source pollution in the watershed.
03-02-03	Smith River	5.4 miles	PS – Aquatic Life/Secondary Recreation	NP, P	DWQ will work with appropriate agencies to address flow fluctuation issues. Local actions needed to control stormwater.
03-02-05	Hyc0 Lake	3,750 acres	PS – Fish Consumption	P	DWQ will continue to monitor selenium concentrations in fish tissue and further adjust permit limits, if necessary.
03-02-05	Marlowe Creek	10.9 miles	PS – Aquatic Life/Secondary Recreation	P, NP	DWQ will work with Cogentrix to improve its discharge and the Town of Roxboro. Local actions needed to control stormwater.
03-02-06	Nutbush Creek	4.6 miles	PS – Aquatic Life/Secondary Recreation	P, NP	DWQ will work with the City of Henderson to improve the WWTP discharge. Local actions needed to control stormwater.
03-02-07	Smith Creek	10.4 miles	PS – Aquatic Life/Secondary Recreation	NP	Local initiatives are needed to address nonpoint source pollution in the watershed.
03-02-08	Quankey Creek	3.4 miles	PS – Aquatic Life/Secondary Recreation	P, NP	DWQ will work with the Town of Halifax to improve the WWTP discharge. DWQ will continue to monitor this stream.
03-02-08	Roanoke Rapids Lake	4,893 acres	PS – Aquatic Life/Secondary Recreation	NP	DWQ will work with appropriate agencies and citizens to control aquatic weeds. Local actions needed to reduce nutrients and for a boater education program.
03-02-08 03-02-09	Roanoke River	137.8 miles	PS – Fish Consumption	NP, P	DWQ will continue to monitor mercury and dioxin in fish tissue and work with point sources as needed to achieve reductions.
03-02-09	Albemarle Sound	2,586 acres	PS – Fish Consumption	NP, P	DWQ will continue to monitor mercury and dioxin in fish tissue.
03-02-09	Welch Creek	13.3 miles	NS – Fish Consumption	NP, P	DWQ will continue to monitor mercury and dioxin in fish tissue. Source of dioxin has been removed.
03-02-10	Cashie River	54.6 miles	PS – Fish Consumption	NP	DWQ will continue to monitor mercury in fish tissue.

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

+ = Only limited progress towards developing and implementing nonpoint source reduction strategies for these impaired waters can be expected without additional resources.

\* = These waters are currently, or will be placed, on the §303(d) list, and a TMDL and/or management strategy will be developed to address causes and sources of impairment.

DWQ plans to further evaluate impaired waters in the Roanoke 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 *Roanoke River Basinwide Water Quality Plan* (2006).

### **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 Roanoke 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 draft 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.

