Chapter 7 -
Roanoke River Subbasin 03-02-07
Includes Lake Gaston and Smith, Hawtree and Sixpound Creeks

7.1 Water Quality Overview

Subbasin 03-02-07 at a Glance

Land and Water Area

Total area:	195 mi^2
Land area:	174 mi^2
Water area:	21 mi^2

Population Statistics

1990 Est. Pop.:	8,338 people
Pop. Density:	48 persons / mi^2

Land Cover (%)

Forest / Wetland:	75.1
Surface Water:	10.9
Urban:	0.1
Cultivated Crop:	7.4
Pasture / Managed Herbaceous:	6.4

Lake Gaston and its tributary streams make up this subbasin. Streams flow generally northward into Virginia or Lake Gaston in North Carolina. The towns of Norlina, Macon and Littleton straddle the Roanoke/Tar-Pamlico basin divide and are the only municipal areas. A map of this subbasin including water quality sampling locations is presented in Figure B-7.

Bioclassifications for sites that were sampled during this basinwide planning period are presented in Table B-17. Use support ratings for each applicable category in this subbasin are summarized in Tables B-18 and B-19. Refer to Appendix III for a complete listing of monitored waters and further information about use support ratings.

Seventy-five percent of the land in this subbasin is forested. Land use is a combination of agricultural activities, primarily in the western portion of the subbasin, and residential development around the lake in the eastern portion. Several registered animal operations are located in this subbasin. Nearly 11 percent of the area is surface water reflecting 13,400 acres of Lake Gaston. There are no NPDES permitted dischargers.

More so than Kerr Reservoir upstream, Lake Gaston straddles the North Carolina/Virginia state line. The lake was constructed in 1963 by Virginia Electric and Power Company (currently Dominion) for the purpose of generating hydroelectric power. However, the lake is also used extensively for recreation. Many residential developments, campgrounds, golf courses, marinas and swimming beaches are located along the shoreline. Lake Gaston was sampled by DWQ in 1999. Currently, the lake is fully supporting aquatic life and secondary recreation and primary recreation. However, the lake assessment did reveal some impacts to water quality which are discussed in detail in Part 7.5 of this chapter.

Observations during the very dry summer of 1999 indicated that many streams in this subbasin stopped flowing. Seasonally intermittent low flow may limit the diversity of the fish and benthic macroinvertebrate communities.

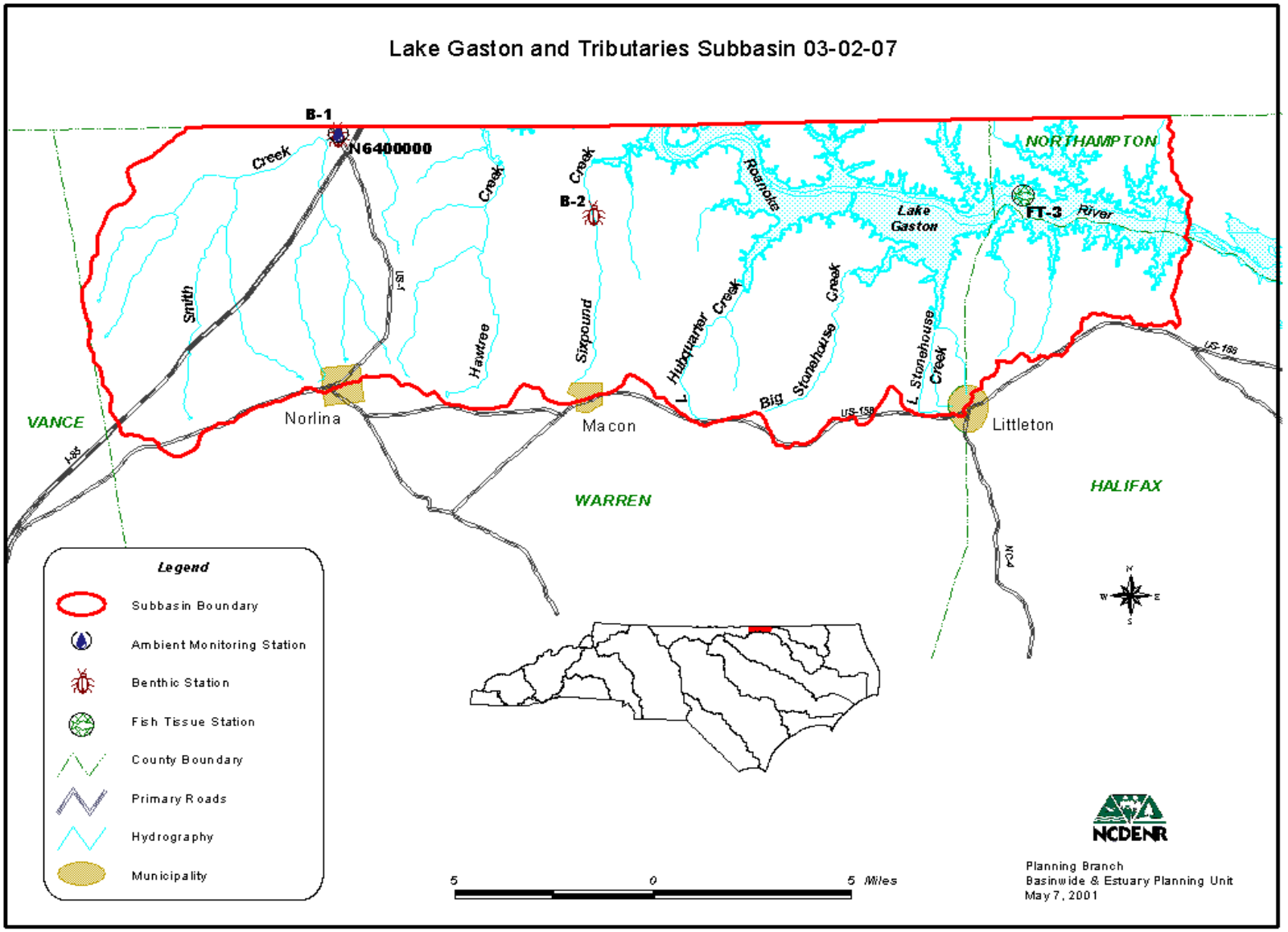

Figure B-7 Sampling Locations within Subbasin 03-02-07

Table B-17 DWQ Monitoring Locations and Benthic Macroinvertebrate Bioclassifications (1999) for Roanoke River Subbasin 03-02-07

Site	Stream	County	Location	Bioclassification
Benthic Macroinvertebrates				
B-1*	Smith Creek	Warren	US 1	Fair
B-2*	Sixpound Creek	Warren	SR 1306	Good-Fair
Fish Tissue				
FT-3	Lake Gaston	Northampton	SR 1214	N/A
Ambient Monitoring				
N6400000	Smith Creek	Warren	US 1	N/A

* Historical data are available; refer to Appendix III.

Benthic macroinvertebrate surveys conducted on Smith Creek produced a Fair bioclassification while Sixpound Creek received a Good-Fair. Both sites indicated slight water quality improvements during the low flow and drought-like conditions in the summer of 1999 compared to samples collected after high flows in 1994. This improvement during low flow indicates that nonpoint source pollution problems may be affecting water quality. During high flow, sediment is carried into stream channels, "scouring" the streambed and removing macroinvertebrate habitat. Despite the slight flow-related improvement between the 1994 and 1999 samples, aquatic life in Smith Creek is impaired. This stream is discussed in more detail in following sections. No other streams in this subbasin were sampled.

Water chemistry samples are collected monthly from Smith Creek near the North Carolina/Virginia state line. Dissolved oxygen concentrations were lower here than at any other tributary site in the Roanoke River basin. Approximately 25 percent of samples were less than the standard of 5.0 mg/l. A steady increase in conductivity values has been observed at this site over the past ten years as well. Refer to Part 7.2.2 for more detailed information and recommendations for Smith Creek.

During July 1999, 20 fish tissue samples (bluegill, largemouth bass, channel catfish and yellow perch) were collected from Lake Gaston in Northampton County. All metals concentrations were below federal and state criteria for consumption (Appendix II).

For more detailed information on sampling and assessment of streams in this subbasin, refer to the *Basinwide Assessment Report - Roanoke River Basin* (DENR-DWQ, May 2000), available from DWQ Environmental Sciences Branch at http://www.esb.enr.state.nc.us/bar.html or by calling (919) 733-9960.

Table B-18 Use Support Ratings Summary (1999) for Monitored Lakes (acres) in Roanoke River Subbasin 03-02-07

Use Support Category	FS	PS	NS	Total[1]
Aquatic Life/ Secondary Recreation	13,400	0	0	13,400
Fish Consumption[3]	0	13,400	0	13,400
Primary Recreation	13,400	0	0	13,400
Water Supply	13,400	0	0	13,400

Table B-19 Use Support Ratings Summary (1999) for Monitored and Evaluated[2] Freshwater Streams (miles) in Roanoke River Subbasin 03-02-07

Use Support Category	FS	PS	NS	NR	Total[1]
Aquatic Life/ Secondary Recreation	41.7	10.4	0	49.4	101.5
Fish Consumption[3]	0	5.4	0	0	5.4
Primary Recreation	5.4	0	0	0.6	6.0
Water Supply	11.6	0	0	0	11.6

[1] Total stream miles/acres assigned to each use support category in this subbasin. Column is not additive because some stream miles are assigned to more than one category.

[2] For the fish consumption use support category, only monitored stream miles are presented.

[3] These waters are impaired because of a statewide fish consumption advisory for bowfin. Refer to Section A, Part 4.8.4 for further information.

7.2 Status and Recommendations for Previously Impaired Waters

This section reviews use support and recommendations detailed in the 1996 basinwide plan, reports status of progress, gives recommendations for the next five-year cycle, and outlines current projects aimed at improving water quality for each water. The 1996 Roanoke River basin plan identified two impaired waters in this subbasin: Lake Gaston and Smith Creek. These waters are discussed below.

7.2.1 **Lake Gaston** (13,400 acres)

1996 Recommendation(s)

In 1996, Lake Gaston was partially supporting designated uses due to an infestation of aquatic plants. The lake was described as having "prolific growths of aquatic macrophytes", especially *Hydrilla*, that hindered secondary recreation activities such as boating and water-skiing on large portions of the lake. Nutrient levels were moderate, and the recommendation was to assess the need for a nonpoint source pollution nutrient management plan.

Status of Progress
Between 1995 and 1999, the surface area of Lake Gaston affected by aquatic macrophytes decreased. The Lake Gaston Weed Council, in cooperation with the NC Division of Water Resources, managed to keep the aquatic weeds under control through application of aquatic herbicides and the introduction of grass carp. Since almost all of the affected waters were available for recreation during this basinwide cycle, the lake is currently considered to be fully supporting all designated uses, including secondary recreation. However, moderate levels of nutrients and low dissolved oxygen concentrations were observed during DWQ's 1999 lake monitoring, and water quality in the lake is further discussed in Part 7.5.1 of this chapter.

7.2.2 **Smith Creek** (10.4 miles from source to NC/VA state line)

1996 Recommendation(s)
Smith Creek was rated as impaired during the last basin cycle by using benthic macroinvertebrate data that resulted in a Fair bioclassification. The recommendations were to continue to monitor water quality in the creek and to identify and address sources of sedimentation in the watershed, as resources allowed.

Status of Progress
The benthic macroinvertebrate community in Smith Creek again received a Fair bioclassification in 1999 primarily because of habitat degradation. The streambed was almost entirely sand, and the water was turbid at the sampling site in 1999. Median dissolved oxygen concentrations were lower in Smith Creek than at any other tributary site in the basin. Approximately 25 percent of observations were less than the water quality standard of 5.0 mg/l.

Additionally, iron concentrations in Smith Creek are very high. Almost 86 percent of more than 50 samples within the past five years exceeded the water quality standard. Over the last fifteen years, a steady increase in conductivity has also been observed. Water samples from Smith Creek did pass a 7-day chronic toxicity test conducted by DWQ in 2000. However, of the eight toxicity tests conducted in the Roanoke River basin, water from Smith Creek exhibited the largest deviation from control samples. Smith Creek remains impaired (partially supporting the aquatic life/secondary recreation use support category).

2001 Recommendation(s)
There are no NPDES permitted dischargers in the Smith Creek watershed; therefore most, if not all, impacts to this stream are from nonpoint sources of pollution. DWQ will continue to work cooperatively with agencies that administer sediment control programs in order to maximize effectiveness of these programs and to take appropriate enforcement action to protect or restore water quality. However, more voluntary implementation of BMPs on agricultural lands is needed in order to substantially improve water quality in this watershed. Funding is available through numerous federal and state agencies for farmers to restore and/or protect water quality on their land. Local contacts for some of these agencies are listed in Appendix VI. Refer also to Section A, Chapter 4 for more information.

7.3 Status and Recommendations for Newly Impaired Waters

No stream segments were rated as impaired based on recent DWQ monitoring (1995-1999); however, as mentioned previously, some impacts to water quality were observed. Refer to Part 7.5 of this chapter, as well as Section A, Chapter 4 for further discussion of potential water quality problems in this portion of the basin.

7.4 Section 303(d) Listed Waters

Currently in this subbasin, Smith Creek is listed on the state's year 2000 §303(d) list. The stream is biologically impaired, and pollution sources are primarily agricultural. Smith Creek is discussed in detail above. Refer to Appendix IV for more information on the state's §303(d) list and listing requirements.

7.5 Other Issues and Recommendations

The surface waters discussed in this section are fully supporting designated uses (or not rated) based on recent DWQ monitoring; however, data revealed some impacts to water quality. Although no action is required for these streams, voluntary implementation of BMPs is encouraged and continued monitoring is recommended. DWQ will notify local agencies of water quality concerns regarding these waters and work with them to conduct further monitoring and to locate sources of water quality protection funding. Additionally, education on local water quality issues is always a useful tool to prevent water quality problems and to promote restoration efforts. Nonpoint source program agency contacts are listed in Appendix VI.

7.5.1 Lake Gaston

Dissolved oxygen concentrations in the lake are influenced by deep water releases from Kerr Reservoir upstream. In summer, the surface dissolved oxygen is often less than the water quality standard of 5.0 mg/l. The most upstream station in Lake Gaston (in Virginia) has consistently lower dissolved oxygen than the other three sampling sites. In 1999, the first of seven new turbines was modified at Kerr Dam, upstream of Lake Gaston. These modifications are designed to increase downstream dissolved oxygen; however, effects of this increase were not yet observed by DWQ monitoring staff in summer of 1999. Completion of the turbine aeration project is expected in spring of 2000 (DENR-DWQ, May 2000).

Levels of nitrogen and phosphorus in Lake Gaston are still considered moderate. Concentrations are highest in the North Carolina portion of the lake. Increases in nitrogen and/or phosphorus inputs could lead to algae blooms and violations of the chlorophyll *a* standard in the future. Measures should be put in place now to reduce nutrient loads to the reservoir in runoff from residential lawns, impervious surfaces, golf courses and agricultural lands.

Although DWQ's assessment of the secondary recreation category for Lake Gaston led to a fully supporting rating for the 1995-1999 review period, DWQ remains concerned about excessive growth of aquatic plants in the lake and will continue to support the work of the Lake Gaston

Weed Council and DWR in order to ensure that designated uses of the lake remain unimpaired. DWQ will assess the lake again in 2004.

Dominion's Shoreline Management Plan

Dominion (formerly NC Power), in consultation with participants of the relicensing Shoreline Management Technical Work Group, has developed and implemented a Shoreline Management Plan (SMP). The SMP includes measures designed to reduce nutrient loads through the protection of riparian buffers around Lake Gaston and Roanoke Rapids Lake. Components of the SMP include: reducing clearing of shoreline vegetation, encouraging replanting of native species in areas where vegetation has been cleared, protecting emergent macrophytes, prohibiting the use of commercial fertilizers, and identifying and protecting environmentally sensitive areas.

7.5.2 Sixpound Creek

The benthic macroinvertebrate community of Sixpound Creek received a Fair bioclassification in 1994 when flow in the stream was high and Good-Fair in 1999 during low flow. These results indicate impacts to water quality are present and are primarily a result of nonpoint source pollution. However, impacts were not as detrimental to the aquatic community as those in Smith Creek, which is impaired and discussed in previous sections.

Land use in the watershed is primarily agricultural and residential with large amounts of open (not forested) land. DWQ will plan sample this stream again during the next basinwide cycle; however, BMPs to address nonpoint source pollution problems should be put in place now to prevent further degradation and potential impairment of water quality. (Refer to Section C and Appendix VI for nonpoint source pollution program and contact information).