

# Chapter 3 -

## Roanoke River Subbasin 03-02-03

### Includes a portion of the Dan and Smith Rivers

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#### 3.1 Water Quality Overview

##### ***Subbasin 03-02-03 at a Glance***

###### **Land and Water Area**

Total area:	340 mi <sup>2</sup>
Land area:	335 mi <sup>2</sup>
Water area:	5 mi <sup>2</sup>

###### **Population Statistics**

1990 Est. Pop.:	11,695 people
Pop. Density:	35 persons/mi <sup>2</sup>

###### **Land Cover (%)**

Forest/Wetland:	74.0
Surface Water:	1.2
Urban:	2.1
Cultivated Crop:	3.3
Pasture/ Managed Herbaceous:	19.4

Approximately 25-river miles of the Dan River (before it flows back into Virginia) are contained in this subbasin. Also included is the lower portion of the Smith River after it flows into North Carolina. Most of the Smith River watershed is in Virginia, and river flow in North Carolina is regulated by dams upstream. Other streams in this subbasin include Buffalo, Rock House, Matrimony, Wolf Island and Hogans Creeks. The Town of Wentworth and the cities of Eden and Reidsville are the only municipalities. A map of this subbasin including water quality sampling locations is presented in Figure B-3.

Bioclassifications for the 1999 sample locations are presented in Table B-6. Use support ratings for each applicable category in this subbasin are summarized in Table B-7. Refer to Appendix III for a complete listing of monitored waters and more information about use support ratings.

The population, based on 1990 census data, is 11,695 people with a low population density of only 35 persons per square mile. Only two percent of the subbasin is urban/built-up area. The land is characteristic of the piedmont. The rolling hills are dominated by forest (74 percent) and agricultural activities (23 percent).

There are 17 NPDES permitted dischargers in this subbasin. The largest facilities discharge to the Dan River, including Fieldcrest/Cannon, Miller Brewing Company and two WWTPs in Eden, one of which is permitted to discharge up to 13.5 MGD. Three small wastewater treatment plants had problems with elevated BOD and ammonia in their discharges. The Smith River has been affected in the past by upstream discharges in Virginia, notably the Town of Martinsville's WWTP. Four facilities are required to monitor their effluent's toxicity: Duke Power's Dan River Station, Miller Brewing Company, and both Eden WWTP discharges. All discharges passed toxicity tests in 1999.

Extremes in flow conditions made it difficult to collect samples at most sites in this subbasin in 1999. Most tributary sites had no flow during drought conditions in mid-August, and high flows near the end of August caused the cancellation of sampling at other sites. Therefore, current benthic macroinvertebrate data are available only from the Smith River.

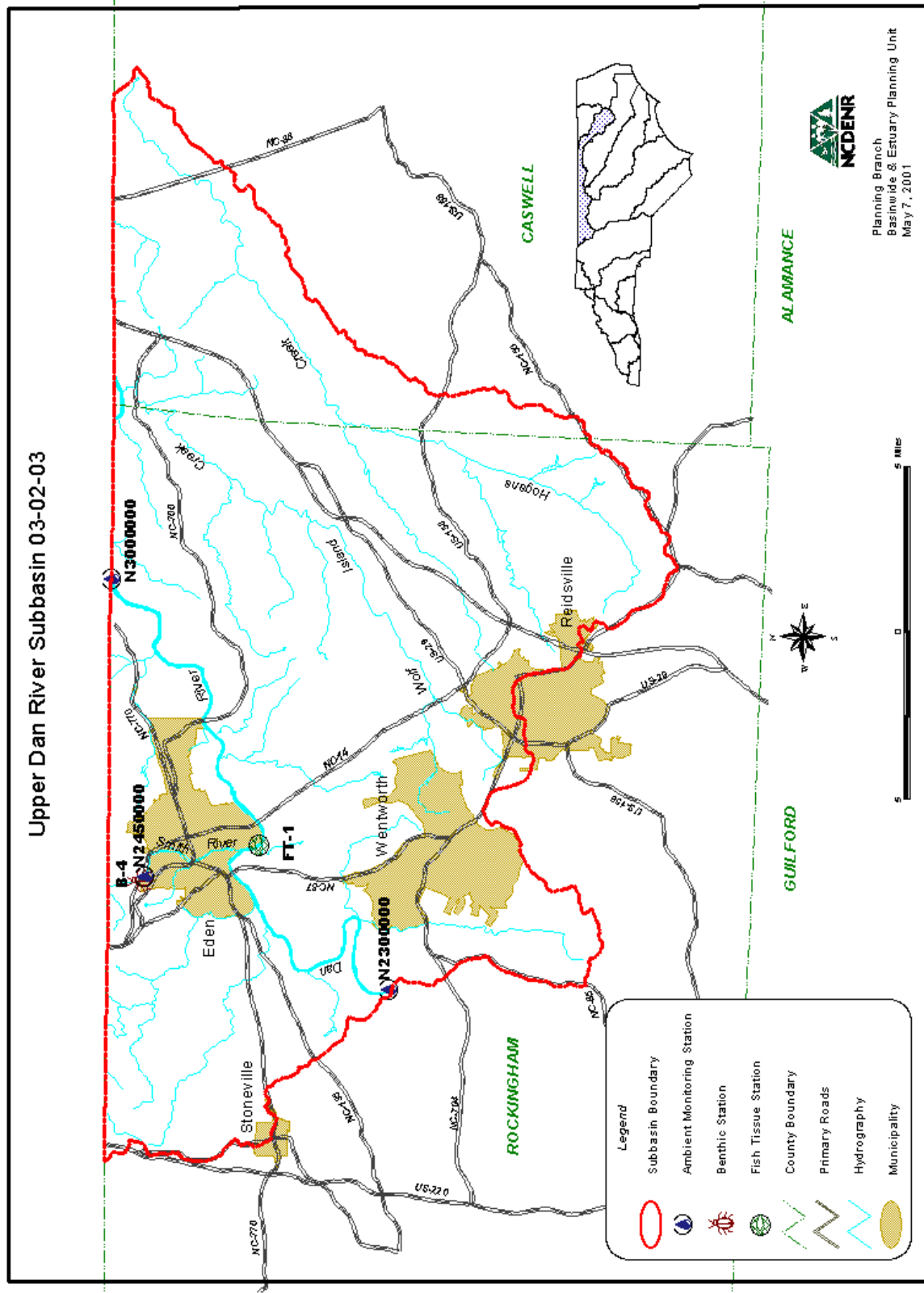


Figure B-3 Sampling Locations within Subbasin 03-02-03

Table B-6 DWQ Monitoring Locations and Benthic Macroinvertebrate Bioclassifications (1999) for Roanoke River Subbasin 03-02-03

Site	Stream	County	Road	Bioclassification
<b><i>Benthic Macroinvertebrates</i></b>				
B-4*	Smith River	Rockingham	NC 14	Fair
<b><i>Fish Tissue</i></b>				
FT-1	Dan River	Rockingham	Near Eden	N/A
<b><i>Ambient Monitoring</i></b>				
N2300000	Dan River	Rockingham	SR 2150	N/A
N2450000	Smith River	Rockingham	NC 14 at Eden	N/A
N3000000	Dan River	Rockingham	SR 1716	N/A

\* Historical data are available; refer to Appendix II.

Benthic macroinvertebrates samples have been collected at this site on the Smith River five times since 1984. Bioclassifications have been mostly Fair (Appendix III). Aquatic life in this stream is considered impaired, and the stream is discussed further in Part 3.3 of this chapter.

Benthic macroinvertebrate samples were also collected from three sites on a small, unnamed tributary to Hogans Creek in November 1996 and June 1998 as part of a special study. This small stream is located in Pittsylvania County (Virginia) and northern Caswell County (North Carolina). These samples were intended to document conditions prior to stream restoration. The existing stream was channelized (straightened) in the 1950s and was severely entrenched. A new stream channel was constructed in 1999 with normal bends and riffle/pool sequences, and the sites will be sampled again to determine improvements in the biological community.

Water chemistry samples are collected monthly from two sites on the Dan River (near Wentworth and near Mayfield) and from the Smith River at Eden. The Dan River stations monitor the influences of the Smith River and discharges near the Town of Eden. There were few violations of water quality standards at either site, with the exception of turbidity. The turbidity standard (50 NTU) was exceeded at the Dan River near Wentworth (N2300000) station in 18 percent of 55 samples between 1995 and 1999. Concentrations in this segment of the Dan River ranged from 2.6 to 200 NTU, compared with a range of 1.4 to 90 NTU near Francisco upstream. The turbidity water quality standard was only exceeded in nine percent of samples at the downstream station near Mayfield (N3000000).

The Smith River ambient monitoring station is located near the Virginia/North Carolina state line. Historically, the Town of Martinsville, Virginia's WWTP was responsible for elevated concentrations of chloride and total dissolved solids in the Smith River, but problems have not been observed for either parameter within the last five years.

Nineteen fish tissue samples (largemouth bass, sunfish and suckers) were collected during August 1999 and analyzed for metal contaminants. All concentrations were below state and federal criteria for consumption. Duke Power Company also monitors selenium in fish tissue in the Dan River near Eden to assess impacts from the Belews Creek Steam Station discharge (refer to Section B, Chapter 1). The most recent data, collected in 1998, showed selenium concentrations ranging from 0.10 to 1.03 µg/g (DPC, 1999). These concentrations were much less than the state’s advisory criterion of 5µg/g for selenium.

The Virginia Department of Environmental Quality (VADEQ) has done extensive fish tissue monitoring in the Dan River for organic compounds called Polychlorinated biphenyls (PCBs). High levels of PCBs have been detected in several fish species collected in the South Boston, Virginia area (refer to Chapter 4 of this section for details). Low levels have also been detected in fish tissue collected from the Dan River below Danville, Virginia (downstream of the NC/VA state line near Eden). However, a series of dams minimizes upstream migration of these fish into the portion of the Dan River in North Carolina located within this subbasin. Concentrations of PCBs in fish tissue are well below the PCB consumption criteria in fish collected from the Dan River upstream of the NC/VA state line above Eden (VADEQ, March 2001).

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-7 Use Support Ratings Summary (1999) for Monitored and Evaluated<sup>1</sup> Freshwater Streams (miles) in Roanoke River Subbasin 03-02-03

Use Support Category	FS	PS	NS	NR	Total <sup>2</sup>
<b>Aquatic Life/ Secondary Recreation</b>	169.5	5.2	0	68.2	242.9
<b>Fish Consumption<sup>3</sup></b>	0	14.8	0	0	14.8
<b>Primary Recreation</b>	0	0	0	5.7	5.7
<b>Water Supply</b>	69.7	0	0	0	69.7

<sup>1</sup> For the fish consumption use support category, only monitored stream miles are presented.

<sup>2</sup> Total stream miles assigned to each use support category in this subbasin. Column is not additive because some stream miles are assigned to more than one category.

<sup>3</sup> These waters are impaired because of a statewide fish consumption advisory for bowfin. Refer to Section A, Part 4.8.4 for further information. Fish tissue monitoring in the Dan River is discussed above.

### 3.2 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 Basinwide Plan did not identify any impaired stream segments in this subbasin.

### 3.3 Status and Recommendations for Newly Impaired Waters

The North Carolina portion of the Smith River is rated impaired based on recent DWQ monitoring (1995-1999). This section outlines the potential causes and sources of impairment and provides recommendations for improving water quality.

#### 3.3.1 Smith River (5.4 miles from North Carolina/Virginia state line to the Dan River)

##### Current Status

As a result of sampling in 1994 and 1999, the benthic community in the Smith River near Eden was assigned a Fair bioclassification. This lowest segment of the river is only partially supporting the aquatic life/secondary recreation designated use. Habitat degradation was documented on both sampling dates, including sedimentation and streambed scour likely resulting from large fluctuations in flow.

Flow in the river is regulated by two dams (Philpott Reservoir and Martinsville Reservoir) upstream in Virginia, and USGS records indicate extreme daily fluctuations (DENR-DWQ, May 2000). Philpott Reservoir, located 43 miles upstream of Eden, NC, has an instream minimum flow requirement designed to protect aquatic life; and the Martinsville Reservoir, located approximately 20 miles upstream of Eden, does not. Fifteen miles of the Smith River in Virginia below the Town of Martinsville are considered partially supporting the aquatic life designated use by the State of Virginia for habitat degradation (VADEQ, 1998).

Historically, the Smith River has also been characterized by high conductivity and discolored water, indicating problems from a point source upstream. The source of these problems was the Town of Martinsville, Virginia's WWTP. The plant receives wastewater from several textile mills and, until the mid-1990s, was not able to adequately treat it. Thanks in part to citizens of Rockingham County, NC and DWQ staff reporting problems to authorities in Virginia, the quality of the discharge from Martinsville's WWTP has improved drastically since 1997. There were few permit violations in 1998 and 1999. Recently, one of the larger mills discontinued operation in the Smith River watershed, and the WWTP discharge is expected to continue to improve (Willis, July 20, 2000).

##### 2001 Recommendation(s)

DWQ will work with the NC Division of Water Resources, the State of Virginia's Department of Environmental Quality and the Town of Martinsville, Virginia to address flow fluctuation issues. However, nonpoint source pollution in the North Carolina portion of the watershed may also contribute to further degradation of habitat and water quality downstream. It is imperative that, in addition to citizens' and municipalities' actions in the State of Virginia, citizens and municipalities in the State of North Carolina implement best management practices as well. Of particular concern are urban areas and construction stormwater activities in and around the City of Eden. Please refer to Section A, Chapter 4 for further information.

### **3.3.2 Dan River** (14.2 miles from Jacobs Creek to Matrimony Creek)

#### Current Status

As was discussed in the previous section, the water quality standard for turbidity was exceeded at the Dan River near Wentworth ambient monitoring station in 18 percent of 55 samples collected from 1995 to 1999. Therefore, this section of the Dan River is partially supporting the aquatic life/secondary recreation use support category. All particles in the water that may scatter or absorb light, including suspended sediment, aquatic organisms and organic particles such as pieces of leaves, contribute to turbidity. Therefore, all types of nonpoint source pollution have the potential to increase turbidity. Construction in the Madison/Mayodan area, agricultural activities, loading from upstream in both the Dan and the Mayo Rivers, as well as permitted instream mining operations are all potential sources.

#### 2001 Recommendations

DWQ will work with the NC Division of Land Resources to evaluate and reduce turbidity from permitted instream mining operations in the Dan River. As permits are renewed, monitoring upstream and downstream of mining operations and instream BMPs (such as those used by the NC Department of Transportation during bridge construction) could be required. Refer to Section A, Chapter 4 for further discussion and recommendations about instream mining operations and other potential sources of nonpoint source pollution in the watershed. In addition, 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.

### **3.4 Section 303(d) Listed Waters**

Currently in this subbasin, no waters are listed on the state's year 2000 §303(d) list. The Smith River and a portion of the Dan River, from Jacobs Creek to Matrimony Creek, will likely be added to the list in 2002. Refer to Appendix IV for more information on the state's §303(d) list and listing requirements.

### **3.5 Other Issues and Recommendations**

There are no additional issues for specific surface waters in this subbasin; however, recent DWQ monitoring revealed habitat degradation impacts to aquatic life resulting from nonpoint source pollution. Although no action is required, voluntary implementation of BMPs is encouraged and continued monitoring is recommended. Section A, Chapter 4 contains general information and recommendations about habitat degradation and other water quality problems that affect more than one watershed in the basin. 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 descriptions and agency contacts are listed in Appendix VI.

#### **3.5.1 Phase II Stormwater Requirements**

Amendments were made to the Clean Water Act in 1990 (Phase I) and most recently in 1999 (Phase II) pertaining to permit requirements for stormwater discharges associated with storm sewer systems. Part of Phase II requires some municipal storm sewer systems serving

populations under 100,000, which are located in larger urbanized areas and/or that have a high population density to obtain an NPDES stormwater permit. The municipal permitting requirements are designed to lead into the formation of comprehensive stormwater management programs for municipal areas. The cities of Eden and Reidsville will be considered for inclusion under the Phase II rules because of a population greater than 10,000 and/or a population density greater than 1,000 persons per square mile. DWQ is currently developing criteria that will be used to determine whether these and other municipalities will be required to obtain a NPDES permit. Refer to Section A, Part 2.7.2 for further information.

### **3.5.2 NPDES Discharges**

As was mentioned in this chapter's overview, three facilities experienced problems complying with NPDES permit limits over the most recent two-year review period: Happy Home and Sadler Elementary School WWTPs and the Betsy Jeff Penn 4-H Education WWTP. Betsy Jeff Penn 4-H Education's WWTP was upgraded to include ultraviolet disinfection. This WWTP serves a 4-H camp, and the discharge is difficult to manage because of the large increase in volume that occurs during the summer months.

Rockingham County built a new school to replace both Sadler and Happy Home Elementary Schools. The new facility began sending waste to the Eden WWTP in October 2000, and the two smaller discharges were eliminated.

