

# Chapter 3 -

## Broad River Subbasin 03-08-03

### Includes Green River drainage above Lake Adger

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#### 3.1 Water Quality Overview

##### ***Subbasin 03-08-03 at a Glance***

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

Total area:	136.7 mi <sup>2</sup>
Stream miles:	192.5
Lake acres:	692.0

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

1990 Est. Pop.:	8,186 people
Pop. Density:	60 persons/mi <sup>2</sup>

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

Forest/Wetland:	90.7%
Surface Water:	1.1%
Urban:	0.4%
Cultivated Crop:	0.7%
Pasture/ Managed Herbaceous:	7.1%

This subbasin contains the headwater reaches of the Green River. This section of the Green River has been dammed at two locations to form Lake Summit and Lake Adger. Both reservoirs are used to produce hydroelectric power and are owned by Duke Power. The Hungry River is the only large tributary in this subbasin. The Green River Game Land between Lake Summit and Lake Adger on the Green and Hungry Rivers provides important protected areas. The Green River Preserve, on the headwaters of the Green River, also serves a similar function. The Town of Saluda is the only municipality in this subbasin.

A map including the locations of NPDES discharges and water quality monitoring stations is presented in Figure B-3. Table B-5 contains a summary of monitoring data types, locations and results. Use support ratings for waters in this subbasin are summarized in Table B-6.

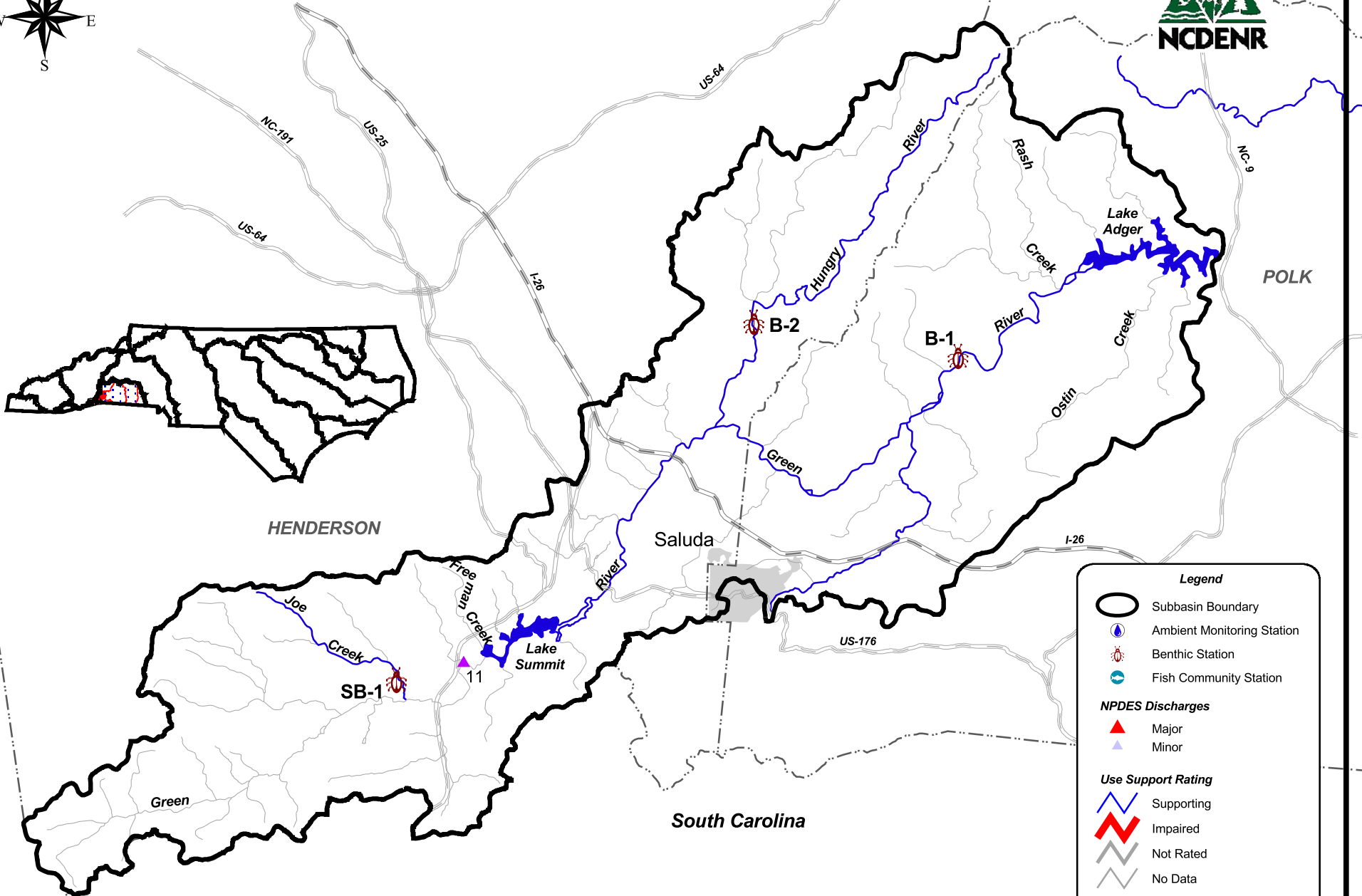
Appendix I provides a key to discharge identification numbers. Refer to Appendix III for a complete listing of monitored waters and more information about use support ratings.

Overall water quality in this subbasin is good as most of the streams drain undeveloped and protected mountain areas. Most of the high gradient tributary streams in this subbasin are classified as Trout waters. Rainbow, brown and brook trout have all been collected from streams in this subbasin (Menhinick, 1991). The headwaters of the Green River above Lake Summit are designated High Quality Waters.

The land comprising this subbasin is mountainous. Most of the land is forested (91 percent) although some of the land is used for agriculture including pasture (7 percent) and cultivated cropland (1 percent). Apple orchards are a significant land use in the upper reaches of many of the Green River tributaries, including the Hungry River. While most of the watershed is forested, portions of the basin are being developed for second homes and recreational activities, such as golf courses. Most agriculture and development activities occur in river valleys and near streams due to the more level ground found in valleys. Development in or near stream corridors potentially affects water quality through nonpoint source runoff.

RJG Inc. is the only facility issued a NPDES permit in this subbasin; however, the facility was never constructed.

Figure B-3 Broad River Subbasin 03-08-03



**Legend**

- Subbasin Boundary
- Ambient Monitoring Station
- Benthic Station
- Fish Community Station

**NPDES Discharges**

- Major
- Minor

**Use Support Rating**

- Supporting
- Impaired
- Not Rated
- No Data

- County Boundary
- Primary Roads
- Municipality



Table B-5 DWQ Monitoring Locations and Bioclassifications (2000) for Broad River Subbasin 03-08-03

Site	Stream	County	Road	Bioclassification
<i>Benthic Macroinvertebrates</i>				
B-1	Green River <sup>1</sup>	Polk	SR 1151	Good-Fair
B-2	Hungry River <sup>1</sup>	Henderson	SR 1799	Good
SB-1	Joe Creek	Henderson	SR 1106	Excellent

<sup>1</sup> Historical data of this type are available for this waterbody; refer to Appendix II. Sites may vary.

Benthic macroinvertebrates in this subbasin were sampled during a three-year drought of a magnitude that local meteorologists compared to the Dust Bowl. Flows in all streams were well below normal, and the effects of nonpoint sources of pollution (nutrient runoff and instream scour) were minimal.

Overall, water quality in this subbasin is good, with the three sites having a bioclassification of Good or Excellent based on macroinvertebrate data. The increase in bioclassification at the site located on the Hungry River from a Good-Fair in 1995, a high flow year, to Good in 2000, a very low flow year, seemed to be due to reduced scour allowing recolonization of the benthic macroinvertebrates. Data analysis indicated that water quality had not actually improved and resumption of normal flow patterns is expected to reduce the bioclassification back to high Good-Fair or low Good levels. Macroinvertebrate sampling has resulted in a Good-Fair bioclassification to the Green River between Lake Summit and Lake Adger.

The two lakes in this subbasin, Lake Summit and Lake Adger, were monitored in 2000. In 1995, both lakes were rated oligotrophic. Sampling in 2000 indicated that both lakes showed a slight increase in total organic nitrogen. In Lake Summit, light penetration has increased since 1995, indicating that the lake is phosphorus limited. From 1995 to 2000, light penetration in Lake Adger has decreased, possibly due to residential development and clearing along the shoreline. Both of these lakes are considered to be supporting all their designated uses.

For more detailed information on sampling and assessment of streams in this subbasin, refer to the *Basinwide Assessment Report - Broad River Basin* (NCDENR-DWQ, December 2001), available from DWQ Environmental Sciences Branch at <http://www.esb.enr.state.nc.us/bar.html> or by calling (919) 733-9960.

Table B-6 Use Support Ratings Summary (2000) for Monitored and Evaluated Freshwater Streams (miles) and Lakes (acres) in Broad River Subbasin 03-08-03

Use Support Category	Units	Supporting	Impaired	Not Rated	No Data	Total
<b>Aquatic Life/Secondary Recreation</b>	miles	143.9	0.0	0.0	48.6	192.5
	acres	692.0	0.0	0.0	0.0	692.0
<b>Fish Consumption</b>	miles	192.5	0.0	0.0	0.0	192.5
	acres	692.0	0.0	0.0	0.0	692.0
<b>Primary Recreation</b>	miles	0.0	0.0	0.0	7.5	7.5
	acres	232.0	0.0	0.0	0.0	232.0
<b>Water Supply</b>	miles	0.0	0.0	0.0	0.0	0.0
	acres	0.0	0.0	0.0	0.0	0.0

### 3.2 Status and Recommendations for Previously Impaired Waters

The 1998 Broad River Basinwide Plan did not identify any impaired stream segments in this subbasin.

### 3.3 Status and Recommendations for Newly Impaired Waters

Although no new stream segments in this subbasin were rated as impaired based on recent DWQ monitoring (2000), impacts to the Green River from narrow riparian buffer zones were observed. Part 3.5 below discusses these impacts.

### 3.4 Section 303(d) Listed Waters

There are no new stream segments in this subbasin that are impaired and on the state's draft 2002 303(d) list. Refer to Appendix IV for more information on the state's 303(d) list and listing requirements.

### 3.5 Other Water Quality Concerns and Recommendations

The surface waters discussed in this section are supporting designated uses based on DWQ's use support assessment and are not considered to be impaired. However, notable water quality problems and concerns have been documented for some waters based on this assessment. While these waters are not considered impaired, attention and resources should be focused on these waters over the next basinwide planning cycle to prevent additional degradation or facilitate water quality improvement. A discussion of how impairment is determined can be found on page 47.

Water quality problems in the Broad River basin are varied and complex. Inevitably, many of the water quality impacts noted are associated with human activities within the watershed. Solving these problems and protecting the surface water quality of the basin in the face of continued growth and development will be a major challenge. Voluntary implementation of

BMPs is encouraged and continued monitoring is recommended. DWQ will notify local agencies and others of water quality concerns for the waters discussed below 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.

### **3.5.1 Green River**

The benthic macroinvertebrate community of the Green River between Lake Summit and Lake Adger was sampled in 2000. The site received a Good-Fair bioclassification, indicating some impacts to water quality were present, but the biological community was not considered impaired. However, the river has a narrow riparian zone with no canopy or instream woody habitat. This likely contributes to sedimentation and other forms of habitat degradation. Refer to Section A, Chapter 4 for more information regarding these problems.

The Volunteer Water Information Network (VWIN) also monitors one site along the Green River at HWY 9 just below the Lake Adger Dam, and data indicate excellent water quality (Maas et al., June 2000). For more information of the VWIN program, refer to page 46 and page 137.

## **3.6 Additional Issues within this Subbasin**

The previous section discussed water quality concerns for specific stream segments. This section discusses water quality issues that relate to multiple watersheds in subbasin 03-08-03. Increased growth and stormwater management were all identified by participants at the public workshop as significant issues in this subbasin.

### **3.6.1 Streams Where Volunteer Monitoring Results Indicate Water Quality Impacts**

In subbasin 03-08-03, VWIN monitors two sites on the Demannu and Camp Creeks in addition to the site on the Green River. Sampling data from this program indicate good water quality in Camp Creek and noted water quality impacts in Damannu Creek (Maas et al., June 2000). Sedimentation, especially during rain events, was noted at both monitoring sites. BMPs should be put in place during construction and on agricultural operations to reduce sediment inputs in order to protect these streams and to prevent further water quality degradation. For more information of the VWIN program, refer to page 46 and page 137.

### **3.6.2 Projected Population Growth**

From 2000 to 2020, the estimated population growth for Polk County is 37 percent and Henderson County is 40 percent. Growth management within the next five years will be imperative, especially in and around developing areas, in order to maintain good water quality in this subbasin. Growth management can be defined as the application of strategies and practices that help achieve sustainable development in harmony with the conservation of environmental qualities and features of an area. On a local level, growth management often involves planning and development review requirements that are designed to maintain or improve water quality.

Refer to Section A, Chapter 4 for more information about urbanization and development and recommendations to minimize impacts to water quality.

### **3.6.3 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 dischargers associated with storm sewer systems. Part of Phase II requires some county and municipal storm sewers systems serving populations under 100,000, which are located in larger urban areas and/or that have a high population density to obtain an NPDES stormwater permit. The county and municipal permitting requirements are designed to lead into the formation of comprehensive stormwater management areas for county and municipal areas. Henderson County will be considered for inclusion under 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 Henderson County and other counties and/or municipalities will be required to obtain a NPDES permit. Refer page 26 for further information.