# Chapter 2 -
# Broad River Subbasin 03-08-02
## Includes middle portion of Broad River, Walnut Creek, Mountain Creek, lower Green River and Second Broad River

## 2.1 Water Quality Overview

***Subbasin 03-08-02 at a Glance***

**Land and Water**

| | |
|---|---|
| Total area: | 512 $mi^2$ |
| Stream miles: | 471.3 |

**Population Statistics**

| | |
|---|---|
| 1990 Est. Pop.: | 57,440 people |
| Pop. Density: | 112 persons / $mi^2$ |

**Land Cover (%)**

| | |
|---|---|
| Forest / Wetland: | 78% |
| Surface Water: | 1% |
| Urban: | 2% |
| Cultivated Crop: | 1% |
| Pasture / Managed Herbaceous: | 18% |

This subbasin includes the middle portion of the Broad River, from about five miles below the Lake Lure dam to the confluence of the Second Broad River near the Cleveland/Rutherford county line, and three larger tributaries (Mountain, Cleghorn and Floyd Creeks). The entire Second Broad River drainage, including two large tributaries, Catheys Creek and Roberson Creek, and the lower drainage of the Green River are also included in this subbasin. Rutherfordton, Spindale and Forest City are the only municipalities within the subbasin.

A map including the locations of NPDES discharges and water quality monitoring stations is presented in Figure B-2. Table B-3 contains a summary of monitoring data types, locations and results. Use support ratings for waters in this subbasin are summarized in Table B-4. 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.

The land in this subbasin is located on the edge of the mountain and piedmont ecoregions. Most of the land in this portion of the basin is forested (78 percent), but a significant portion is also in use as cultivated cropland and pasture (18 percent). The estimated subbasin population, based on the 1990 census, is 57,440. Population is expected to increase by 16 percent in Rutherford County and 37 percent in Polk County over a 20-year period (2000 to 2020).

There are 19 NPDES permitted dischargers in this subbasin. The largest facilities are the Town of Forest City WWTP (4.95 MGD to the Second Broad River) and the Cone Mills Corporation (1.75 MGD to the Second Broad River). Six facilities experienced significant problems meeting permitted limits during this review cycle. Seven facilities in this subbasin are required to monitor their effluent's toxicity. In the two-year review period, no toxicity problems were observed.

# Figure B-2 Broad River Subbasin 03-08-02

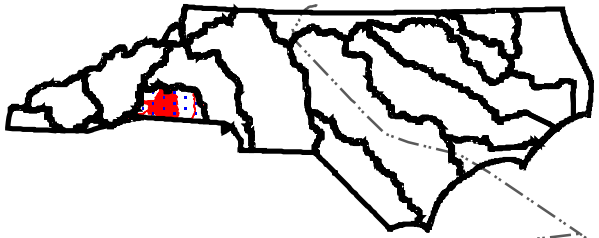

Table B-3 DWQ Monitoring Locations, Bioclassifications and Notable Chemical Parameters (2000) for Broad River Subbasin 03-08-02

| Site | Stream | County | Road | Bioclassification or Noted Parameter[2] |
|---|---|---|---|---|
| ***Benthic Macroinvertebrate Community Monitoring*** | | | | |
| B-1 | Broad River[1] | Rutherford | SR 1181 | Good |
| B-2 | Mountain Creek[1] | Rutherford | SR1149 | Good-Fair |
| B-3 | Broad River | Rutherford | SR 1106 | Good-Fair |
| B-4 | Broad River | Rutherford | US 221 | Good |
| B-5 | Cleghorn Creek[1] | Rutherford | SR 1149 | Good-Fair |
| B-6 | Green River[1] | Rutherford | SR 1302 | Good-Fair |
| B-7 | Walnut Creek[1] | Polk | SR 1315 | Excellent |
| B-8 | Whiteoak Creek[1] | Polk | SR 1352 | Good |
| B-9 | Second Broad River[1] | Rutherford | SR 1358 | Good-Fair |
| B-10 | Catheys Creek[1] | Rutherford | SR 1549 | Fair |
| B-11 | Roberson Creek[1] | Rutherford | SR 1561 | Good-Fair |
| B-12 | Second Broad River | Rutherford | SR 1973 | Good-Fair |
| SB-1 | Hollands Creek | Rutherford | SR 1548 | Fair |
| SB-2 | Second Broad River | Rutherford | Above Chip Mill | Good |
| SB-3 | Second Broad River | Rutherford | Below Chip Mill | Good |
| ***Fish Community Monitoring*** | | | | |
| F-1 | Walnut Creek | Polk | SR 1315 | Excellent |
| F-2 | White Oak Creek | Polk | SR 1526 | Good-Fair |
| F-3 | Second Broad River | Rutherford | SR 1500 | Good |
| F-4 | Cane Creek | Rutherford | SR 1558 | Good-Fair |
| F-5 | Catheys Creek | Rutherford | SR 1549 | Poor |
| F-6 | Roberson Creek | Rutherford | SR 1561 | Good |
| ***Ambient Monitoring*** | | | | |
| A1520000 | Broad River | Rutherford | SR 1181 near Rock Springs | None |
| A2700000 | Second Broad River | Rutherford | SR 1538 near Logan | None |
| A4400000 | Second Broad River | Rutherford | US 221 in Cliffside | Turbidity, Iron |

[1] Historical data of this type are available for this waterbody; refer to Appendix II. Sites may vary.

[2] Parameters are noted if in excess of state standards in more than 10 percent of samples collected within the assessment period (9/1995-8/2000).

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 in stream scour) were minimal.

Water quality appears to be primarily Good-Fair throughout most of this subbasin. The greatest problems appear to be associated with nonpoint sources of pollution: sedimentation and runoff from the urban areas of Rutherfordton, Spindale and Forest City. Bioclassifications increased at four of the 12 benthic sites sampled in both 1995 and 2000: Broad River at SR 1181 (Good-Fair to Good), Broad River at Cliffside (Good-Fair to Good), Cleghorn Creek (Fair to Good-fair) and Walnut Creek (Fair to Excellent). However, most of these changes seemed to be related to lower flows in July 2000 compared to more normal flows in 1995, rather than real changes in water quality associated with decreased impacts from nonpoint source runoff.

The middle and lower portion of the Broad River covers approximately 40 river miles from Lake Lure to the confluence of the Second Broad River near the Cleveland/Rutherford county line. During the 2000 and 1995 basin assessment, water quality of the Broad River was Good at a site below Knot Creek and at US 221 near Cliffside, but Good-Fair at a site in between, below the Green River. Good or Good-Fair bioclassifications have been consistently recorded on the Broad River near Cliffside. This site is the most downstream monitoring location on the Broad River and denotes water quality conditions prior to flowing into South Carolina. Benthic macroninvertebrate samples were also collected at sites on two smaller tributaries to the Broad River: Mountain Creek and Cleghorn Creek. In 2000, both sites received Good-Fair bioclassifications.

Major tributaries to the Broad River in this subbasin include the Green River and the Second Broad River. The Green River was sampled at one location near its confluence with the Broad River and received a bioclassification of Good-Fair. The Good-Fair bioclassification remained unchanged in1995 and 2000, but the data indicated a decline from the Good bioclassifications given to this site previously. Two tributaries of the Green River were also sampled in 2000. White Oak Creek received a bioclassification of Good-Fair. In 1995, Walnut Creek was rated impaired based on a bioclassification of Fair. However, in 2000, both benthic macroinvertebrate and fish community surveys indicated Excellent water quality in Walnut Creek. Walnut Creek is discussed further below.

Benthic macroinvertebrates were also collected on the Second Broad River and several of its tributaries and indicated Good to Good-Fair water quality at all but the two sites on Catheys and Hollands Creeks, which both received bioclassifications of Fair. These two creeks are impacted by the Town of Spindale WWTP and nonpoint source runoff. Catheys and Hollands Creeks are impaired for aquatic life and secondary recreational uses and are discussed further on page 89.

Fish community surveys were conducted at six locations in this subbasin and supported the conclusions of the benthic macroinvertebrate sampling.

Water chemistry samples are collected monthly from three sampling sites in this subbasin. Results at the Second Broad River at Cliffside site indicated good water quality with the exception of turbidity and iron. Fourteen percent of the turbidity observations collected between 1996 and 2000 at this site exceeded the state standard of 50 NTU and the highest turbidity value (380 NTU) of all the stations. Iron is a common element in clay soils; therefore, elevated

concentrations may reflect the geochemistry of the watershed. Data from the other two locations do not indicate any water quality problems.

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-4 Use Support Ratings Summary (2000) for Monitored and Evaluated Freshwater Streams (miles) and Lakes (acres) in Broad River Subbasin 03-08-02

| Use Support Category | Units | Supporting | Impaired | Not Rated | No Data | Total |
|---|---|---|---|---|---|---|
| **Aquatic Life/Secondary Recreation** | miles | 229.2 | 4.7 | 5.1 | 232.3 | 471.3 |
| | acres | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Fish Consumption** | miles | 471.3 | 0.0 | 0.0 | 0.0 | 471.3 |
| | acres | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Primary Recreation** | miles | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 |
| | acres | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Water Supply** | miles | 242.2 | 0.0 | 0.0 | 0.0 | 242.2 |
| | acres | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

## 2.2 Status and Recommendations for Previously Impaired Waters

This section reviews use support and recommendations detailed in the 1998 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 waterbody. The 1998 Broad River Basinwide Plan identified three impaired streams in this subbasin: Walnut, Catheys and Hollands Creeks.

### 2.2.1 **Walnut Creek** (11.6 miles from source to Green River)

*1998 Recommendations*

Walnut Creek was rated as impaired during the last basin cycle by using macroinvertebrate data that resulted in a Fair bioclassification. The recommendation was to identify the source(s) of impairment and to work with local agencies to encourage the voluntary implementation of BMPs on agricultural lands.

*Status of Progress*

In 2000, both benthic macroinvertebrate and fish community surveys indicated Excellent water quality in Walnut Creek and the creek is not currently considered impaired. However, habitat degradation was noted in addition to narrow riparian zones and sedimentation.

**2.2.2** **Catheys Creek** (1.9 miles from the confluence with Holland Creek to the Second Broad River)
**Hollands Creek** (2.8 miles from 0.4 miles downstream of Rutherford County SR 1538 to confluence with Catheys Creek)

*1998 Recommendations*
Catheys Creek was rated impaired based on three benthic macroinvertebrate samples conducted between 1988 and 1995. The creek is impacted by the Spindale wastewater treatment plant and nonpoint source runoff. Hollands Creek (which flows into Catheys Creek) was rated impaired based on data that are greater than five years old, but it is the receiving stream for the Spindale wastewater treatment plant. The Town of Spindale WWTP was under a Special Order of Consent (SOC) which required that the WWTP perform toxicity reduction activities, construct treatment plant upgrades, and relocate its discharge from Hollands Creek to Catheys Creek by 1999. In addition, DWQ was to work with local agencies to identify and assess nonpoint source contributions to the impairment.

*Status of Progress*
In 1999, the WWTP met requirements of the 1996 SOC including the construction of the plant upgrades and the relocation of its discharge from Hollands Creek to Catheys Creek. The relocation of the discharge reduced the facility's instream waste concentration (IWC), and thus, its toxicity limit from 67 percent to 26 percent. The facility constructed a dissolved air flotation sludge thickener and added new weirs and baffles in a secondary clarifier. Initial toxicity identification procedures indicated surfactant chemicals as the source of toxicity. The facility's monitoring data indicate compliance with its new limit from October 1998 to the present, except for June and July of 2000.

The relocation of the Spindale WWTP discharge has greatly improved water quality in Hollands Creek. In 1988, the stream received a bioclassification of a low Poor, and in 2000, the bioclassification of the stream improved to a high Fair. Despite this improvement, Hollands Creek is currently still rated as impaired. Since the discharge was removed for less than a year at the time of sampling, it is possible that this stream may improve further as another generation of macroinvertebrates colonizes the stream. However, the stream's watershed drains the northern part of the Town of Spindale and receives stormwater and other nonpoint sources of pollution. Habitat degradation, including sedimentation, embedded riffles and filled in pools, has been noted in the stream. Further recovery of the benthic macroinvertebrate community could be limited by the extent of urban runoff to Hollands Creek.

In 2000, both benthic macroinvertebrates and fish community surveys were sampled in Catheys Creek to monitor any impacts the relocation of the Spindale WWTP may have on the stream. Benthic macroinvertebrates received a bioclassification of Fair, while the fish community survey received a bioclassification of Poor. Catheys Creek is currently rated as impaired for aquatic and secondary recreational uses. This section of Catheys Creek is impaired due to habitat degradation. Sources of the pollution include not only the Spindale WWTP, but also nonpoint sources including agriculture and urban runoff. Habitat problems include sedimentation and lack of pools and riffles.

*2003 Recommendations*

DWQ will plan to sample both Catheys and Hollands Creeks during the next basinwide cycle to monitor the water quality effects from improvements to the Spindale WWTP. However, BMPs to address any nonpoint source pollution problems should be put in place now to prevent further degradation to water quality. Section A, Chapter 4 contains general recommendations for development, construction, stormwater and agricultural best management practices.

## 2.3 Status and Recommendations for Newly Impaired Waters

No new stream segments were rated as impaired based on recent DWQ monitoring (1996-2000); however, as mentioned previously, some impacts to water quality were observed. Refer to Part 2.5 of this chapter, as well as Section A, Chapter 4 for further discussion of potential water quality problems in this portion of the basin.

## 2.4 Section 303(d) Listed Waters

Currently in this subbasin, Walnut, Catheys and Hollands Creeks are 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.

## 2.5 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 and Appendix III.

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.

### 2.5.1 Broad River

The middle and lower portion of the Broad River covers approximately 40 river miles from Lake Lure to the confluence of the Second Broad River near the Cleveland/Rutherford county line. During the 2000 basinwide assessment, the Broad River was sampled at three locations: below

the confluence with Knot Creek, below the confluence with the Green River, and at the ambient station near Cliffside. In 2000, the benthic macroinvertebrate site on the Broad River below the confluence with Knot Creek received a bioclassification of Good, an increase from the Good-Fair bioclassification in 1995. This increase in bioclassification is likely due to low flows, rather than a real change in water quality. At the site, biologists noted impacts to water quality and aquatic habitat including sedimentation and lack of pool and riffle habitat. Nonpoint source pollution, including agriculture and instream sand mining, is most likely the cause of the water quality impacts noted in this segment of the Broad River. Refer to Section A, Chapter 4 for further discussion and recommendations about instream mining operations and other potential sources of nonpoint source pollution.

Sampling on the Broad River below the confluence with the Green River was conducted upstream of a new bridge being built and resulted in a Good-Fair bioclassification. Based on changes in the benthic macroinvertebrate community between 1995 and 2000, it seemed that flow in this section of the river has been significantly reduced. However, no determination on whether the lowered streamflow is associated with temporary stream damming or diversion because of bridge construction or upstream water withdrawals was able to be made. Habitat degradation, including sedimentation, lack of riffle habitat and lack of woody debris, was also noted at this site.

The benthic sampling site located on the Broad River near the ambient monitoring station at Cliffside is the most downstream monitoring location on the Broad River and denotes water quality conditions prior to the Broad River flowing into South Carolina. In 2000, benthic macroinvertebrate sampling resulted in a bioclassification of Good, an increase from the Good-Fair bioclassification the site received in 1984, 1987, 1989 and 1995. This increase in bioclassification in 2000 is likely associated with low flow conditions and reduced scour caused by drought conditions.

*2003 Recommendations*

DWQ will plan to sample this stream again in a normal flow year to determine if water quality in this segment of the Broad River has really improved. Nonpoint source runoff associated with residential and agricultural land uses is most likely the cause of the water quality impacts noted in the Broad River watershed. BMPs should be carefully installed and maintained in this area during construction because of the moderate slopes and high erosion potential of soils in this area. Agricultural BMPs for controlling sediment should also be installed to protect aquatic life in the Broad River watershed. Section A, Chapter 4 discusses habitat degradation, including sedimentation, and provides general recommendations.

### 2.5.2 Mountain Creek

In August 2000, the benthic macroinvertebrate community of Mountain Creek received a bioclassification of Good-Fair, a decline from its 1995 bioclassification of Good. This decline in water quality may be associated with high rains in July 2000. The rains would have likely increased sedimentation and scour just prior to sampling in August. However, this may also reflect an actual decline in water quality as the benthic community in 1995, a normal to high flow year, would also have been affected by scour.

Biologists also noted that flow in this section of Mountain Creek has been significantly reduced. Whether this has been due to temporary stream damming or diversion because of bridge construction or upstream water withdrawals was unclear.

*2003 Recommendations*
DWQ will plan to sample this stream again in a normal flow year to determine if water quality in Mountain Creek has really declined.

### 2.5.3 Cleghorn Creek

The benthic macroinvertebrate communities of Cleghorn Creek was sampled in 2000 and received a bioclassification of Good-Fair. Although the current Good-Fair bioclassification is an improvement from the Fair bioclassification the stream received in 1995, the stream still had notable impacts to water quality and aquatic habitat. Habitat problems included sedimentation, eroding banks, and lack of pool and riffle habitat.

The headwaters of the Cleghorn Creek watershed drain the Town of Rutherfordton. Land use in the headwaters is dominated by residential and commercial use while the lower sections of the stream drain an agricultural watershed. Nonpoint source runoff associated with these land uses is most likely the cause of the water quality impacts noted in this portion of the watershed.

*2003 Recommendations*
Stormwater issues need to be addressed by Rutherfordton. This urban area is not automatically covered by the EPA's Phase II stormwater rules, based on total population and density. However, Rutherfordton could begin to develop a stormwater program that addresses stormwater runoff. Also, agricultural BMPs for controlling sediment should also be installed to protect aquatic life in the Cleghorn Creek watershed. Section A, Chapter 4 discusses habitat degradation, including sedimentation, and provides general recommendations.

### 2.5.4 Green River

The benthic macroinvertebrate community of the Green River near the confluence with the Broad River was sampled in 2000. This site received a Good-Fair bioclassification, indicating some impacts to water quality were present, but the biological community was not considered impaired.

Land use in the lower Green River watershed is dominated by agriculture and forestlands. However, development upstream and around Lake Adger is likely having an effect on water quality in the lower Green River. Habitat problems associated with development and stormwater runoff were noted in the watershed and include sedimentation and loss of pool and riffle habitat. Abundant algae growths were also observed at this site, suggesting some nutrient enrichment.

*2003 Recommendations*
Nonpoint source runoff associated with residential and agricultural land uses is most likely the cause of the water quality impacts noted in this portion of the watershed. BMPs should be carefully installed and maintained in this area during construction because of the moderate slopes and high erosion potential of soils in this area. Agricultural BMPs for controlling sediment

should also be installed to protect aquatic life in the Green River watershed. Section A, Chapter 4 discusses habitat degradation, including sedimentation, and provides general recommendations.

### 2.5.5 White Oak Creek

The benthic macroinvertebrate community of White Oak Creek was sampled in 2000 at two locations. The upstream site received a Good-Fair bioclassification, indicating some impacts to water quality were present, but the biological community was not considered impaired, while the downstream site received a bioclassification of Good.

The Volunteer Water Information Network (VWIN) monitors five sites on White Oak Creek. The sites located at SR 1137, SR 1531 and SR 1322 have been monitored since 1994 while the sites at the Briar Hill Farm and Weidmans have only been monitored since 1998. VWIN sampling data indicate good water quality in the White Oak Creek watershed (Maas et al., June 2000). However, sedimentation, especially during rain events, was noted in the most downstream site (SR 1322). For information of the VWIN program, refer to page 46 and page 137.

The headwaters of White Oak Creek drain the Town of Columbus. Land use in the headwaters is dominated by residential and commercial use while the lower sections of the stream drain a forested watershed. Habitat problems associated with development and stormwater runoff were noted throughout the entire White Oak Creek watershed and include sedimentation, loss of pool habitat, unstable banks, narrow riparian zones, and frequent breaks in the riparian zone.

*2003 Recommendations*

Nonpoint source runoff associated with the residential and commercial land uses is most likely the cause of the water quality impacts noted in this watershed. BMPs should be carefully installed and maintained in this area during construction because of the moderate slopes and high erosion potential of soils in this area. Measures should be put in place now to reduce sediment inputs, to protect these streams, and to prevent further water quality degradation. Bank stabilization and channel restoration projects should also be implemented in the watershed to help alleviate existing problems. Section A, Chapter 4 contains general recommendations for development, construction and stormwater best management practices.

Stormwater issues also need to be addressed by Columbus. This urban area is not automatically covered by the EPA's Phase II stormwater rules, based on total population and density. However, Columbus could begin to develop a stormwater program that addresses stormwater runoff.

### 2.5.6 Second Broad River<br>Cane Creek<br>Roberson Creek

The benthic macroinvertebrate community of the Second Broad River (2 sites) and Roberson Creek (1 site) were sampled in 2000. All three sites received a Good-Fair bioclassification, indicating some impacts to water quality; and aquatic habitat was present, but the biological community was not considered impaired. Habitat problems included sedimentation, eroding

banks, and lack of pool and riffle habitat. The fish community of Cane Creek was sampled in 2000 and received a bioclassification of Good-Fair. The fish community site was surrounded by pastures on both banks, and impacts to habitat, including infrequent pools, collapsing banks and lack of riparian vegetation, were noted at the site.

Water chemistry samples are also collected monthly from a site on the Second Broad River at Cliffside. Results at this site indicated good water quality with the exception of turbidity and iron. Fourteen percent of the turbidity observations collected between 1996 and 2000 at this site exceeded the state standard of 50 NTU and the highest turbidity value (380 NTU) of all the stations. Iron is a common element in clay soils; therefore, elevated concentrations may reflect the geochemistry of the watershed.

*2003 Recommendations*

Nonpoint source runoff associated with agricultural land uses is most likely the cause of the water quality impacts noted in the Second Broad River, Cane Creek and Roberson Creek watersheds. Agricultural BMPs for controlling sediment should also be installed to protect aquatic life in these watersheds. These watersheds are included in the 2001 Broad Environmental Quality Incentives Program (EQIP) Priority Area. In the Priority Area, the Natural Resource Conservation Service is actively working with landowners on projects that include streambank stabilization, reduction/prevention of excess sedimentation, exclusion of livestock, and establishment of resource management systems on pastureland. For more information of the Broad EQIP Priority area, please refer to page 126. Section A, Chapter 4 discusses habitat degradation, including sedimentation, and provides general recommendations.

## 2.6 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 03-08-02. Increased growth and NPDES dischargers were all identified by participants at the public workshop as significant issues in this subbasin.

### 2.6.1 Rutherford County Source Water Protection Plan

Rutherford County was selected as one of a small number of national pilot projects for Source Water Assessment Planning. In 2001, a local steering committee, including representatives from the Broad River Water Authority, Forest City's water system, local governments and local natural resource agencies, began meeting to discuss potential sources of pollution in two surface water supply watersheds: the mainstem of the Broad River and the Second Broad River. Risks to surface waters prioritized by the committee include transportation accidents (road and railroad corridors), sedimentation and turbidity from land-disturbing activities, contamination from stormwater runoff, wastes in groundwater (particularly leaking underground storage tanks), and bacteria from animal and human waste. The group recommended that the Rutherford County Water Resources Committee be created to serve as an advisory and implementing body for all matters pertaining to drinking water protection in the county. Several specific management measures were also recommended. These measures are outlined beginning on page 139 of Section C.

### 2.6.2 Projected Population Growth

From 2000 to 2020, the estimated population growth for Rutherford County is 16 percent. Rutherfordton's population has increased approximately 14 percent over the past ten years and is expected to continue growing. Growth management within the next five years will be imperative, especially in and around urbanizing 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.

### 2.6.3 NPDES Discharges

As was mentioned in this chapter's overview, six facilities experienced problems complying with NPDES permit limits over the most recent two-year review period. The Town of Rutherfordton WWTP experienced chronic violations of $BOD_5$ limits throughout early 1999 and 2000. In June 1999, the town built a new plant and moved the discharge from Cleghorn Creek to Stonecutter Creek. The new plant expanded the facility from 1.0 MGD lagoon system to a 3.0 MGD extended aeration system. The expansion and upgrade was undertaken to handle an increased flow from a new industry that planned on relocating to Rutherfordton. The industry has not relocated as promised, and the average flow for the WWTP is 0.4 to 0.5 MGD. Given the low flow, the new plant is not operating correctly and $BOD_5$ and ammonia violations are persistent. In order to help alleviate these problems, the plant has converted an aeration basin into an equalization basin. These modifications have been marginally successful in correcting the problems and further action needs to be taken.

Five other facilities also experienced problems complying with their NPDES limits over the two-year review period: the Town of Forest City WWTP, the Spindale WWTP, Central School, White Oak Manor and United World Mission. Problems were addressed by operational changes at each facility and all are currently in full compliance of their permits.