

Chapter 5 - Broad River Subbasin 03-08-05 Includes Buffalo Creek and tributaries

5.1 Water Quality Overview

Subbasin 03-08-05 at a Glance

Land and Water

Total area:	180.6 mi ²
Stream miles:	136.7
Lake acres:	530.0

Population Statistics

1990 Est. Pop.:	34,047 people
Pop. Density:	191 persons/mi ²

Land Cover (%)

Forest/Wetland:	48.5
Surface Water:	1.7
Urban:	5.1
Cultivated Crop:	4.1
Pasture/ Managed Herbaceous:	40.5

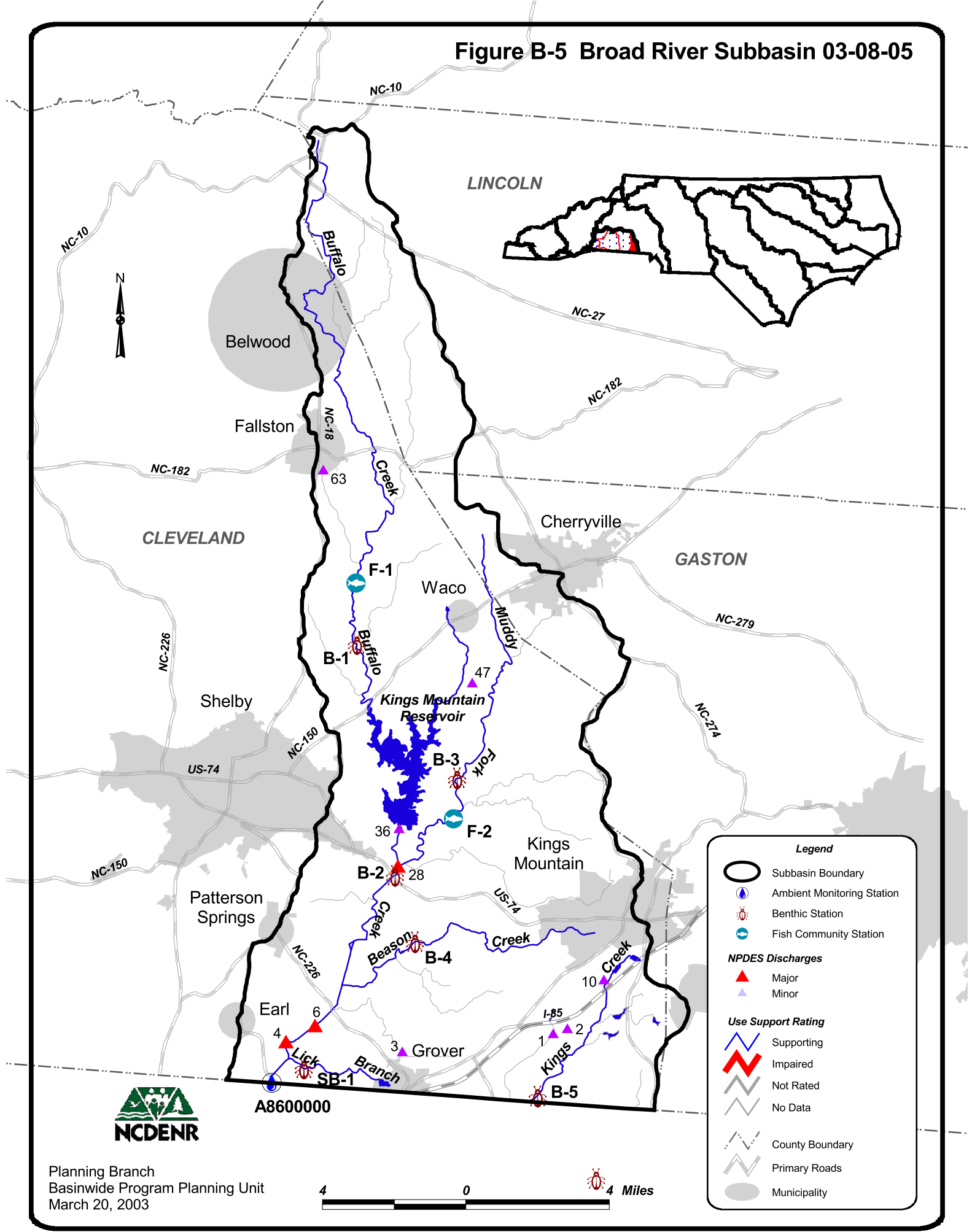
The watershed for this subbasin consists of Buffalo Creek and its tributaries, Muddy Fork, Beason Creek and Kings Creek. In 1963, Buffalo Creek was dammed to form Kings Mountain Reservoir (also known as Moss Lake) which serves as the water supply reservoir for the City of Kings Mountain.

A map including the locations of NPDES discharges and water quality monitoring stations is presented in Figure B-5. Table B-9 contains a summary of monitoring data types, locations and results. Use support ratings for waters in this subbasin are summarized in Table B-10. 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.

Although a few streams in the northern portion of the watershed exhibit some mountain characteristics, this area is considered to be in the piedmont ecoregion. Land use is dominated by forest and agricultural activities, although residential development is increasing. The Town of Kings Mountain is the largest urban area. The population of Cleveland County is expected to increase 20 percent from 2000 to 2020. Kings Mountain's population has increased approximately 11 percent over the past ten years and is expected to continue growing. This is the most densely populated subbasin in the Broad River basin with a population density in 1990 of 191 persons per square mile.

This subbasin contains ten permitted dischargers. Major dischargers include the Kings Mountain-Pilot Creek WWTP (6.0 MGD to Buffalo Creek), CNA Holdings (0.8 MDG to Buffalo Creek), Grover Industries (0.4 MGD to Buffalo Creek), and the Town of Grover WWTP (0.1 MGD to unnamed tributary to Buffalo Creek). Four facilities experienced problems meeting their effluent limits during the two-year review period: Cleveland County Schools-Fallston Elementary, CNA Holdings, the Town of Grover WWTP, and the Town of Kings Mountain's T.J. Ellison Water Treatment Plant. Five dischargers, Cyprus Foote Mineral Company, Grover Industries, CNA Holdings, Kings Mountain-Pilot Creek WWTP and New Minette Textiles, are required to monitor their effluent's toxicity. In the two-year review period, toxicity problems were observed at the Kings Mountain-Pilot Creek WWTP.

Figure B-5 Broad River Subbasin 03-08-05



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



Planning Branch
 Basinwide Program Planning Unit
 March 20, 2003

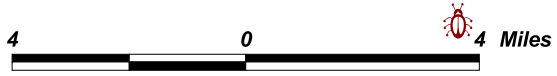


Table B-9 DWQ Monitoring Locations, Bioclassifications and Notable Chemical Parameters (2000) for Broad River Subbasin 03-08-05

Site	Stream	County	Location	Bioclassification or Noted Parameter ²
<i>Benthic Macroinvertebrate Monitoring</i>				
B-1	Buffalo Creek ¹	Cleveland	SR 1908	Excellent
B-2	Buffalo Creek	Cleveland	NC 198	Good
B-3	Muddy Fork ¹	Cleveland	SR 2012	Good
B-4	Beason Creek ¹	Cleveland	SR 2246	Good-Fair
B-5	Kings Creek ¹	Cleveland	SR 2286	Good
SB-1	Lick Branch ¹	Cleveland	SR 2227	Not Impaired
<i>Fish Community Monitoring</i>				
F-1	Buffalo Creek	Cleveland	SR 1906	Good-Fair
F-2	Muddy Fork	Cleveland	SR 1001	Good
<i>Ambient Monitoring</i>				
A8600000	Buffalo Creek	Cleveland	NC 198	None

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 in the Buffalo Creek watershed was generally good using biological data. Buffalo Creek above Kings Mountain Reservoir had both benthic macroinvertebrate and fish community collections in 2000. There was a big difference in the bioclassifications assigned, with benthic macroinvertebrates noting Excellent water quality, while the fish bioclassification was Good-Fair. However, the fish sampling site was in an area of eroding banks and very sandy substrate, and the fish community assessment integrates these habitat problems. The benthic sampling site had a boulder and bedrock substrate, providing more diverse habitat. Nonpoint source impacts were likely lower in the drought of 2000, and the benthic macroinvertebrates improved from a Good bioclassification in 1995.

Buffalo Creek was also sampled for benthic macroinvertebrates below the reservoir and below discharges from Kings Mountain WWTP and Grover Industries. A Good bioclassification was found, as it was in 1995. Fish community and benthic samples from Muddy Fork, a tributary of Buffalo Creek below the reservoir, also indicated Good water quality.

Smaller tributaries in this subbasin were also sampled for benthic macroinvertebrates in 2000. The benthic macroinvertebrates in Kings Creek improved from Good-Fair in 1995 to Good in 2000 when there was less nonpoint impacts because of the drought conditions. Beason Creek was also sampled and received a bioclassification of Good-Fair in 2000, as it did in 1995.

The benthic macroinvertebrate community of Lick Branch was also sampled in 1995 and 2000. In 1995, Lick Branch was rated impaired based on a bioclassification of Fair. In 2000, the macroinvertebrate sampling indicated no water quality problems, and the stream received a designation of Not Impaired. Lick Branch is currently fully supporting its designated uses.

Kings Mountain Reservoir (also known as Moss Lake) is a water supply reservoir for the Town of Kings Mountain. The reservoir was considered oligotrophic in 1995. Although phytoplankton samples collected in June showed algae known to produce taste and odor problems and clog filters of water intakes, Kings Mountain Reservoir is currently supporting all its designated uses.

Water chemistry samples are collected monthly from one sampling site in this subbasin: Buffalo Creek near Grover. Data from this location does 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-10 Use Support Ratings Summary (2000) for Monitored and Evaluated Freshwater Streams (miles) and Lakes (acres) in Broad River Subbasin 03-08-05

Use Support Category	Units	Supporting	Impaired	Not Rated	No Data	Total
Aquatic Life/Secondary Recreation	miles	64.1	0.0	0.0	72.6	136.7
	acres	530.0	0.0	0.0	0.0	530.0
Fish Consumption	miles	136.7	0.0	0.0	0.0	136.7
	acres	530.0	0.0	0.0	0.0	530.0
Primary Recreation	miles	0.0	0.0	0.0	1.6	1.6
	acres	0.0	0.0	0.0	0.0	0.0
Water Supply	miles	51.7	0.0	0.0	0.0	51.7
	acres	530.0	0.0	0.0	0.0	530.0

5.2 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 basin plan identified two impaired stream segments in this subbasin: Buffalo Creek (between the Kings Mountain Reservoir Dam and US 74) and Lick Branch. These streams are discussed below.

5.2.1 Buffalo Creek (1.6 miles from the Kings Mountain Reservoir Dam and US 74)

1998 Recommendations

Buffalo Creek was rated as partially supporting during the last basin cycle by using macroinvertebrate data from 1990 that resulted in a Fair bioclassification at US 74. The recommendations were to resample the stream during the next basinwide cycle and to identify the source(s) of impairment.

Status of Progress

In 2000, the site at US 74 was not resampled because the site is located too close to the Kings Mountain dam and would not be representative of water quality conditions below the dam. Typically, a filter-feeding community develops in river reaches below dams because of all the particulate matter (mainly algae and zooplankton) that is released from the lake. This results in a community that reflects food source more than water or habitat quality, and for this reason, benthic macroinvertebrate sampling is avoided immediately downstream of dams. In 2000, Buffalo Creek was sampled a short distance downstream from the US 74 crossing where the community is not so influenced by food source, and the benthic macroinvertebrates indicated Good water quality and the stream is no longer impaired.

2003 Recommendations

However, Buffalo Creek still had notable impacts to water quality and aquatic habitat. Habitat problems associated with agriculture and cleared lands were noted in lower Buffalo Creek and include sedimentation, severe bank erosion, and infrequent pools and riffles. Agricultural BMPs for controlling sediment should also be installed to protect aquatic life in the Country Line Creek watershed. Section A, Chapter 4 beginning on page 54 discusses habitat degradation, including sedimentation, and provides general recommendations.

5.2.2 Lick Branch (3.3 miles from source to Buffalo Creek)

1998 Recommendations

Historically, the discharge from the New Minette Mills was not in compliance with permit limits and repeatedly failed toxicity tests. Because of the small size of Lick Branch, the discharge is more than 78 percent of the flow in Lick Branch, so there is essentially no dilution from upstream. Until late 1995, the New Minette Mills plant also discharged waste from another textile mill, Grover Industries. In 1995, Grover Industries constructed its own outfall and began discharging directly into Buffalo Creek. Immediately following the removal of Grover Industries discharge from the New Minette Mills discharge, New Minette Mills no longer experienced toxicity problems. Grover Industries also consistently passes its toxicity tests. The first basin plan listed the stream as partially supporting and recommended the stream be sampled in the next basinwide cycle to monitor the effect the removal of Grover Industries discharge has on water quality.

Status of Progress

The relocation of the Grover Industry's outfall has greatly improved water quality in Lick Branch. In 1995, the stream received a bioclassification of a low Fair. The stream was resampled again in 2000. Current methods do not accurately assess the benthic community of streams of this size unless the stream is in an undisturbed watershed. However, the presence of

stoneflies and other pollution intolerant macroinvertebrates indicates no water quality problems and the development of a natural benthic community. Lick Branch is currently supporting its designated uses.

5.3 Status and Recommendations for Newly Impaired Waters

No new stream segments were rated as impaired based on recent DWQ monitoring (1995-2000); however, as mentioned previously, some impacts to water quality were observed. Refer to Part 5.5 of this chapter, as well as Section A, Chapter 4 for further discussion of potential water quality problems in this portion of the basin.

5.4 Section 303(d) Listed Waters

Only Lick Branch in this subbasin is currently listed on the state's draft 2002 303(d) list. Lick Branch is discussed above. Refer to Appendix IV for more information on the state's 303(d) list and listing requirements.

5.5 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.

5.5.1 Beason Creek

The benthic macroinvertebrate community of Hinton Creek was sampled in 1995 and 2000. The site received a Good-Fair bioclassification in both years, indicating some impacts to water quality were present, but the biological community is not considered impaired. Land use in the Beason Creek watershed is extremely varied. The headwaters of Beason Creek watershed drain the City of Kings Mountain. Land use in the headwaters is dominated by residential and commercial use while the lower sections of the stream drain an agricultural watershed.

2003 Recommendations

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

5.6 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 03-08-05. Increased growth and NPDES dischargers were all identified by participants at the public workshop as significant issues in this subbasin.

5.6.1 NPDES Dischargers

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 and one facility experienced toxicity problems. Fallston School experienced chronic violations of ammonia and BOD₅ throughout the two-year review period and is discussed on page 69 with other dischargers owned by the Cleveland County School System.

The Kings Mountain-Pilot Creek WWTP experienced seven failures of its Whole Effluent Toxicity (WET) test during the two-year review period. A toxicant identification evaluation of the facility effluent indicated that high nickel levels were the cause of the toxicity. The incoming source of the nickel was discovered, and the relevant industry has installed new pretreatment equipment. Since the installation of the new pretreatment equipment, the Kings Mountain-Pilot Creek WWTP has passed all WET tests and toxicity is no longer a problem.

Three other facilities also experienced problems complying with their NPDES limits over the two-year review period: CNA Holdings, the Town of Grover WWTP and the Kings Mountain-Ellison WTP. Problems were addressed by operational changes at each facility and they are currently in full compliance.

5.6.2 Projected Population Growth

From 2000 to 2020, the estimated population growth for Cleveland, Gaston and Lincoln counties is 20 percent, 19 percent and 42 percent, respectively. Kings Mountain's population has increased 11 percent over the past ten years, and Cherryville's population has increased 13 percent in the same time period. Both municipalities are expected to continue growing. 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.