Section B: Chapter 7

Yadkin-Pee Dee River Subbasin 03-07-07

Abbotts Creek Watershed including Lake Thom-A-Lex, Rich Fork and Hamby Creek

7.1 Water Quality Overview

Subbasin 03-07-07 at a Glance

Land and Water

Total area:	237 mi^2
Stream miles:	203.3
Lake acres:	942.4

Population Statistics

1990 Est. Pop.:	101,019 people
Pop. Density:	428 persons / mi^2

Land Cover (%)

Forest / Wetland:	56.5
Surface Water:	0.8
Urban:	7.8
Cultivated Crop:	3.0
Pasture / Managed Herbaceous:	31.8

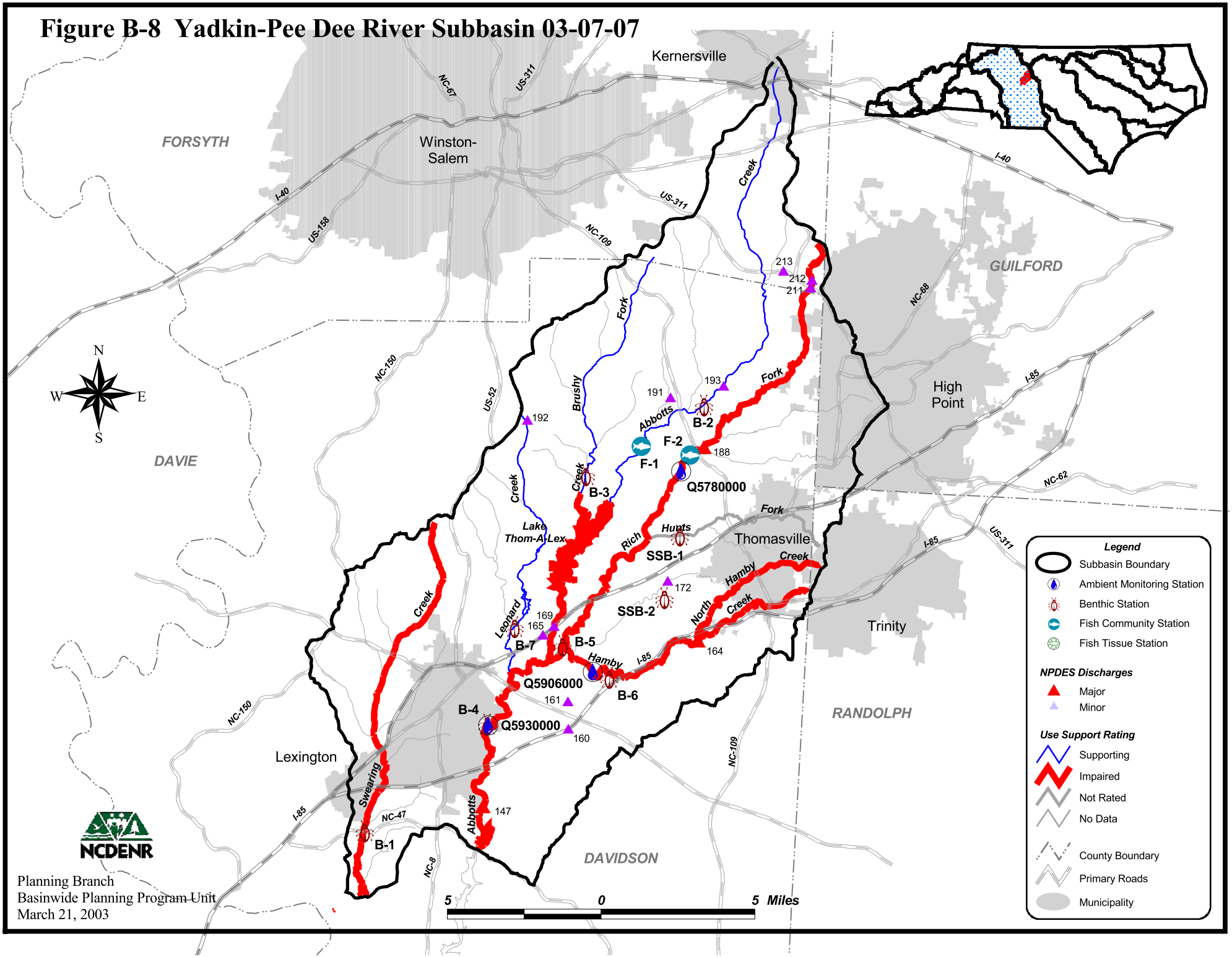
Abbotts Creek begins in Kernersville and flows generally south through Davidson County into High Rock Lake. The watershed is positioned between Winston-Salem and High Point and includes Thomasville and Lexington within its boundaries. Major tributaries include Rich Fork, Brushy Fork and Leonard Creek.

A map including the locations of NPDES discharges and water quality monitoring stations is presented in Figure B-8. Table B-14 contains a summary of monitoring data types, locations and results. Use support ratings for waters in this subbasin are summarized in Table B-15. 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.

Nearly 60 percent of the subbasin is forested and 32 percent is characterized as pasture/managed herbaceous. However, this subbasin is one of the most urbanized areas in the basin (nearly 8 percent developed). The population is estimated at more than 100,000 and population density is high. In addition, the population of Davidson County is projected to increase 25 percent between 2000 and 2020 and similar projections have been made for surrounding counties. There are 14 NPDES discharges and two registered animal operations within the subbasin. Facilities with compliance or toxicity problems are discussed in following sections.

The majority of waters within this subbasin exhibit some level of impacts to water quality. Many streams are Impaired by a combination of nonpoint and point source pollution. There are no High Quality Waters or Outstanding Resource Waters.

Figure B-8 Yadkin-Pee Dee River Subbasin 03-07-07



Planning Branch
Basinwide Planning Program Unit
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Table B-14 DWQ Monitoring Locations, Bioclassifications and Notable Chemical Parameters (1998-2002) for Yadkin-Pee Dee River Subbasin 03-07-07

Site	Stream	County	Road	Bioclassification or Noted Parameter[2]
Benthic Macroinvertebrate Community Monitoring				
B-2	Abbotts Creek[1]	Davidson	SR 1755	Good-Fair
B-3	Brushy Fork[1]	Davidson	SR 1810	Good
B-4	Abbotts Creek	Davidson	SR 1243	Fair
B-5	Rich Fork[1]	Davidson	SR 2005	Fair
SSB-1	Hunts Fork[1]	Davidson	SR 1787	Not Rated
	Hamby Creek[1]	Davidson	SR 2025	Poor
B-6	Hamby Creek	Davidson	SR 2017	Fair
SSB-2	North Hamby Creek[1]	Davidson	SR 2031	Poor
B-7	Leonard Creek[1]	Davidson	Leonard Cr Farm	Good-Fair
B-1	Swearing Creek[1]	Davidson	NC 47	Fair
Fish Community Monitoring				
F-1	Abbotts Creek[1]	Davidson	SR 1800	Good-Fair
F-2	Rich Fork[1]	Davidson	NC 109	Poor
Ambient Monitoring				
Q5930000	Abbotts Creek	Davidson	SR 1243	Nutrients Fecal coliform
Q5780000	Rich Fork	Davidson	SR 1800	Nutrients, Fecal coliform, Dissolved oxygen
Q5906000	Hamby Creek	Davidson	SR 2790	Nutrients, Copper
Yadkin-Pee Dee River Basin Association Monitoring				
Q5940000	Abbotts Creek	Davidson	I-85	Dissolved oxygen, Turbidity
Q5750000	Rich Fork	Davidson	SR 1755	None
Q5785000	Rich Fork	Davidson	SR 1787	Dissolved oxygen
Q5790000	Rich Fork	Davidson	SR 2123	Dissolved oxygen, Turbidity
Q5135000	Swearing Creek	Davidson	SR 1272	None
Lakes Assessment				
--	Lake Thom-A-Lex	Davidson	2 stations	% DO saturation

[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 (9/1996-8/2001).

For more detailed information on sampling and assessment of streams in this subbasin, refer to the *Basinwide Assessment Report - Yadkin-Pee Dee River Basin* (NCDENR-DWQ, June 2002), available from DWQ Environmental Sciences Branch at http://www.esb.enr.state.nc.us/bar.html or by calling (919) 733-9960.

Table B-15 Use Support Ratings Summary (2002) for Monitored and Evaluated Freshwater Streams (miles) and Lakes (acres) in Yadkin-Pee Dee River Subbasin 03-07-07

Use Support Category	Units	Supporting	Impaired	Not Rated	No Data	Total[1]
Aquatic Life/Secondary Recreation	miles	52.8	**65.9**	7.1	77.5	203.3
	acres	52.5	**889.9**	0.0	0.0	942.4
Fish Consumption[2]	miles	146.6	**56.7**	0.0	0.0	203.3
	acres	86.7	**855.7**	0.0	0.0	942.4
Primary Recreation	miles	11.0	0.0	0.0	0.0	11.0
	acres	855.7	0.0	0.0	0.0	855.7
Water Supply	miles	79.9	0.0	0.0	0.0	79.9
	acres	942.3	0.0	0.0	0.0	942.3

[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] These waters are impaired based on fish consumption advice issued for three species of freshwater fish due to mercury contamination. Refer to page 104 of Section A for details.

7.2 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 water. The 1998 Yadkin-Pee Dee River basin plan identified two Impaired waters in this subbasin: Brushy Fork and Hamby Creek. These waters are discussed below.

7.2.1 **Brushy Fork** (9.8 miles from source to Lake Thom-A-Lex)

1998 Recommendations

Brushy Fork was rated Impaired based on a Fair benthic macroinvertebrate sample collected in 1996. Recommendations for improving water quality were for reduction of nonpoint source pollution, primarily sedimentation.

Status of Progress

The benthic macroinvertebrate in Brushy Fork was resampled in 2001 and received a Good bioclassification. The score was on the border of the Good-Fair category and would likely receive the lesser bioclassification in a higher flow year. There is quite a bit of development in the headwaters of the Brushy Fork watershed and there is a substantial amount of agriculture also. There are no permitted NPDES discharges nor registered animal operations. The stream is currently rated Supporting in the aquatic life/secondary recreation category.

2002 Recommendations

Although Brushy Fork is currently Supporting designated uses, instream habitat degradation was observed. Considering the fluctuation in bioclassifications, nonpoint source pollution likely impacts the stream heavily at times. Local actions are still needed to reduce the effects of nonpoint source pollution. 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.

7.2.2 **Hamby Creek** (12.5 miles from source to Rich Fork)

1998 Recommendations

Hamby Creek was Impaired in 1998 due to problems with oxygen-consuming wastes and habitat degradation, primarily sedimentation. Recommendations were for no new discharges of oxygen-consuming wastes. In addition, the Thomasville WWTP would be required to pursue reuse options before additional loading of oxygen-consuming waste would be permitted. Hamby Creek was also considered a major contributor to impairment of the Abbotts Creek Arm of High Rock Lake for nutrients and low dissolved oxygen. For this reason, recommendations included reductions in phosphorus loading for the Thomasville WWTP.

Status of Progress

Benthic macroinvertabrate communities in the low end of the watershed were assigned a Fair bioclassification. Habitat was in relatively good shape compared with other biological survey sites in this subbasin. Water chemistry data revealed high nutrient concentrations and conductivity, but no problems with dissolved oxgyen. Data also indicate that high copper concentrations may be causing toxicity problems in the stream.

Over the most recent review period, Thomasville was in significant noncompliance for BOD, ammonia and cyanide. The current NPDES permit for the Thomasville WWTP outlines mass-based summer and winter discharge limits for total phosphorus which will be required beginning in 2004 as part of a point source nutrient reduction strategy for High Rock Lake. This strategy is outlined in Section A, Chapter 4, beginning on page 107.

Fecal coliform concentrations are slightly elevated, but are not at levels high enough to cause concern. However, this stream was historically placed on the 303(d) list for fecal coliform. Because Hamby Creek is a tributary to Rich Fork and fecal coliform concentrations are still high in other parts of the watershed, Hamby Creek is included along with Rich Fork in the schedule for fecal coliform TMDL development.

2002 Recommendations

DWQ will continue to monitor Hamby Creek as strategies to reduce nutrient concentrations in High Rock Lake watershed are implemented. DWQ will also continue to work with Thomasville WWTP to regain and maintain compliance with its NPDES permit. In addition, DWQ will develop a TMDL for fecal coliform and work with local agencies to implement it over the next five-year basinwide planning cycle.

DWQ plans to conduct further investigation into the causes and sources of the biological impairment of Hamby Creek during this basinwide planning cycle. 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. In addition, Davidson County as well as High Point, Trinity and Thomasville are required to obtain an NPDES permit for municipal stormwater systems under the Phase II stormwater rules. Refer to page 37 of Section A, Chapter 2 for details.

7.3 Status and Recommendations for Newly Impaired Waters

Rich Fork, North Hamby Creek, Swearing Creek, Lake Thom-A-Lex and a portion of Abbotts Creek are Impaired based on recent DWQ monitoring (1998-2001). This section outlines the potential causes and sources of impairment and provides recommendations for improving water quality.

7.3.1 **Rich Fork** (20.7 miles from source to Abbotts Creek)

1998 Recommendations

Rich Fork was not rated in 1998, but problems associated with low dissolved oxygen were discussed in the basin plan. The plan stated that predictions from the model used to determine NPDES permit limits overestimated the ability of the stream to handle oxygen-consuming wastes. The plan recommended that no additional loading of oxygen-consuming wastes be permitted into Rich Fork.

Status of Progress

Biological surveys were conducted at two locations along Rich Fork in 2001 and water chemistry measurements were collected at four sites over the five-year assessment period. The biological community in Rich Fork is currently Impaired. Although the riparian vegetation was good at both biological monitoring locations, instream habitat was severely degraded. The stream bottom was almost completely filled with sediment and indicators of organic enrichment and toxicity were present.

Water chemistry samples revealed significant problems with low dissolved oxygen concentrations. Turbidity is only slightly elevated, but nutrient concentrations are high. In addition, the geometric means of fecal coliform samples collected from one station between 1996 and 2001 and two stations between 1998 and 2001 in Rich Fork (254, 330 and 236 colonies/100ml) indicate that the stream may not be suitable for primary recreation. In addition, fecal coliform concentrations were greater than 400 colonies/100ml in more than 20 percent of samples from each site. Rich Fork is not currently classified for primary recreation (Class B). However, the stream was historically placed on the 303(d) list for fecal coliform and a TMDL is currently being developed by DWQ.

Over the most recent review period (2000-2001), High Point-Westside WWTP was in significant noncompliance for BOD and fecal coliform. Currently, the NPDES permit for the High Point-Westside WWTP contains a 2.0 mg/l discharge limit for total phosphorus. The permit also outlines mass-based summer and winter discharge limits for total phosphorus which will be required beginning in 2004 as part of a point source nutrient reduction strategy for High Rock Lake. This strategy is outlined in Section A, Chapter 4, beginning on page 107.

2002 Recommendations

DWQ will continue to monitor Rich Fork as strategies to reduce nutrient concentrations in High Rock Lake are implemented (refer to the discussion beginning on page 107 of Section A for details). DWQ will also continue to work with High Point-Westside WWTP to regain and maintain compliance with its NPDES permit. If dissolved oxygen problems downstream do not improve when the facility regains compliance, more modeling will likely be needed in order to further reduce sources of oxygen-consuming wastes. DWQ is currently developing a TMDL for fecal coliform in the Rich Fork watershed and will work with local agencies to implement it over the next five-year basinwide planning cycle.

Although problems with point sources have been identified in Rich Fork, there are habitat degradation issues as well. Development in the headwaters of Rich Fork west of High Point continues to increase, and control of stormwater from construction sites and these new developed areas is imperative. Davidson County, Randolph County and the City of High Point are required to obtain NPDES permits for municipal stormwater systems under the Phase II stormwater rules. Refer to page 37 of Section A, Chapter 2 for details.

7.3.2 **North Hamby Creek** (5.8 miles from source to Hamby Creek)

Current Status

North Hamby Creek is the largest tributary to Hamby Creek in the Rich Fork watershed and is almost completely developed. Benthic macroinvertebrates received a Poor bioclassification in 2001 and the stream is rated Impaired. Data from 1987 and 1985 also indicated Poor conditions. Despite the developed watershed, instream habitat was available; however, there was little riparian vegetation. The water had a reddish tinge. There are no permitted point source discharges in the watershed.

2002 Recommendations

Biologists report that flow and habitat are not likely to be limiting the benthic macroinvertebrate community of North Hamby Creek. Therefore, further investigation into the causes and sources of these water quality impacts is needed before recommendations to improve water quality can be made. Thomasville is required to obtain an NPDES permit for municipal stormwater systems under the Phase II stormwater rules. Refer to page 37 of Section A, Chapter 2 for details.

7.3.3 **Swearing Creek** (14.3 miles from source to High Rock Lake)

Current Status

The Swearing Creek watershed is primarily in agricultural land uses, but there is some development near Lexington. The stream has received Good-Fair or Fair bioclassifications over six collections at five locations since the 1980s. In 1996, the stream received a Good-Fair score. However, in 2001 the bioclassification declined to Fair. A decline in habitat over the five-year period was also observed. Because of the historical fluctuation in bioclassification, the stream was resampled in 2002. The benthic community again received a Fair bioclassification. Swearing Creek is currently rated Impaired. Severe habitat degradation was noted including sedimentation and bank erosion. Dissolved oxygen was slightly depressed, and turbidity was slightly elevated in water chemistry samples. There are no permitted point source discharges in the watershed.

The geometric mean of fecal coliform samples collected between 1998 and 2001 from Swearing Creek (295 colonies/100ml) indicates that the stream may not be suitable for primary recreation. Fecal coliform concentrations were greater than 400 colonies/100ml in nearly 32 percent of samples from this site as well. Current methodology requires additional bacteriological sampling for streams with a geometric mean greater than 200 colonies/100ml or when concentrations exceed 400 col/100ml in more than 20 percent of samples. However, these additional assessments are prioritized such that, as monitoring resources become available, the highest priority is given to those streams where the likelihood of full-body contact recreation is greatest. Swearing Creek is not currently classified for primary recreation (Class B).

2002 Recommendations

Local actions are needed to reduce sedimentation, turbidity and fecal coliform contamination and to promote the production of instream habitat by restoring riparian vegetation throughout the watershed. Section A, Chapter 4 contains recommendations for reducing habitat degradation. Further investigation into the causes and sources of these water quality impacts is needed before more specific recommendations to improve water quality can be made.

Water Quality Improvement Initiatives

The Swearing Creek watershed (03040103 020020) is one of 55 watersheds in the Yadkin-Pee Dee River basin that has been identified by the Wetlands Restoration Program as an area with the greatest need and opportunity for stream and wetland restoration efforts. This watershed will be given higher priority than a nontargeted watershed for the implementation of NCWRP restoration projects. Refer to page 278 in Section C for details.

7.3.4 **Lake Thom-A-Lex** (650 acres)

Current Status

Lake Thom-A-Lex is currently Impaired due to violations of the percent dissolved oxygen saturation water quality standard. In addition, nutrient concentrations are high, and algae blooms which contribute to taste and odor problems in drinking water are common. Lake Thom-A-Lex is a drinking water supply source for the cities of Lexington and Thomasville. There are three minor NPDES permitted discharges and several small animal operations in the watershed upstream.

2002 Recommendations

A strategy for nutrient reduction, that includes best management practices for agricultural activities, is needed for the Abbotts Creek watershed upstream of Lake Thom-A-Lex. Additionally, the amount of developed area is rapidly increasing. Davidson and Forsyth counties are required to obtain NPDES permits for municipal stormwater systems under the Phase II stormwater rules. Refer to page 37 of Section A, Chapter 2 for details. Controlling erosion from construction sites and implementing best management practices to control stormwater are two important strategies for reducing nutrient input to the lake.

7.3.5 **Abbotts Creek** (8.0 miles from dam at Lake Thom-A-Lex to High Rock Lake)

1998 Recommendations
Abbotts Creek was support threatened in 1998 due to problems with low dissolved oxygen. Recommendations were for no new discharges of oxygen-consuming wastes. In addition, the Lexington WWTP would be required to pursue reuse options before additional loading of oxygen-consuming waste would be permitted. Abbotts Creek was also considered a major contributor of nutrients and low dissolved oxygen in the Abbotts Creek Arm of High Rock Lake. For this reason, recommendations included reductions in phosphorus loading for the Lexington WWTP.

Status of Progress
Abbotts Creek below Lake Thom-A-Lex and the Abbotts Creek Arm of High Rock Lake are rated Impaired based on Fair benthic macroinvertebrate bioclassifications at one location and water chemistry data collected from four locations. Habitat was in relatively good condition when compared with other sampling locations throughout the subbasin; however, development is beginning to encroach on the stream from Lexington. Conductivity, turbidity and nutrient concentrations were elevated and dissolved oxygen concentrations were low over the five-year assessment period.

The current NPDES permit for the Lexington WWTP outlines mass-based summer and winter discharge limits for total phosphorus which will be required beginning in 2004 as part of a point source nutrient reduction strategy for High Rock Lake. This strategy is outlined in Section A, Chapter 4, beginning on page 107. Over the most recent review period, the Lexington WWTP was in compliance with permit limits.

2002 Recommendations
DWQ will continue to monitor Abbotts Creek as strategies to reduce nutrient concentrations in High Rock Lake are implemented. However, further investigation into the causes and sources of these water quality impacts, including an assessment of what level of impact is caused by the inflow of the severely Impaired Rich Fork watershed, is needed before more specific recommendations to improve water quality can be made. Davidson County is required by DWQ to obtain an NPDES permit for municipal stormwater systems under the Phase II stormwater rules. It is likely that Lexington will be required to obtain a stormwater permit during the next basinwide planning cycle. Refer to page 37 of Section A, Chapter 2 for details.

7.4 Section 303(d) Listed Waters

Currently, portions of four waters in this subbasin are on the state's draft 2002 303(d) list for biological impairment: Brushy Creek, Hamby Creek, North Hamby Creek and Hunts Fork. Hamby Creek and Rich Fork are listed for fecal coliform and TMDLs are currently being developed by DWQ. Refer to Appendix IV for more information on the state's 303(d) list and listing requirements.

7.5 Status and Recommendations for Waters with Notable Impacts

Based on DWQ's most recent use support assessment, the surface waters discussed below are not Impaired. However, notable water quality impacts were documented. While these waters are not considered Impaired, attention and resources should be focused on them 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 in Appendix III.

Although no action is required for these streams, voluntary implementation of BMPs is encouraged and continued monitoring is recommended. DWQ will notify local agencies and others of water quality concerns 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 agency contacts are listed in Appendix VI.

7.5.1 Hunts Fork

Hunts Fork flows generally west from Thomasville and into Rich Fork about halfway down the watershed. I-85 bisects the watershed and the upper portion is almost completely developed. Biological surveys have revealed Fair or Poor bioclassifications over four samples at three locations since the 1980s. In 2001, DWQ sampled benthic macroinvertebrates in the lower portion of the watershed. Due to reduced flows, the stream was too small to assign a bioclassification; however, some signs of improvement were noted, possibly due to reduced nonpoint source pollution related to the extended drought. Habitat is still poor. Although this stream was not rated Impaired and discussed in the 1998 basin plan, it was historically listed on the 303(d) list and will likely remain listed despite its not rated status.

Local actions are needed to reduce habitat degradation and the effects of stormwater runoff from developed areas. Davidson County and Thomasville are required to obtain an NPDES permit for municipal stormwater systems under the Phase II stormwater rules. Refer to page 37 of Section A, Chapter 2 for details. Section A, Chaper 4 contains recommendations for reducing habitat degradation and the effects of urban runoff.

7.6 Additional Water Quality Issues within Subbasin 03-07-07

The previous parts discussed water quality concerns for specific stream segments. This section discusses water quality issues related to multiple watersheds within the subbasin. Information found in this section may be related to concerns about things that threaten water quality or about plans and actions to improve water quality.

7.6.1 NPDES Discharges

Eleven of the 14 NPDES discharges had a few permit violations over the two-year review period (September 1999 - August 2001). Seven facilities are in significant noncompliance; five are Davidson County schools. Almost every school in Davidson County is in significant noncompliance for at least one parameter. Because the facilities are scattered throughout several

subbasins, these problems and the plans to correct them are discussed in Section A, on page 113. The City of Thomasville WWTP had significant problems meeting BOD, ammonia and cyanide permit limits throughout the two-year review period. The City of High Point Westside WWTP was in significant noncompliance for BOD and fecal coliform.

Five facilities are required to monitor effluent toxicity; one had significant compliance problems over the previous basinwide planning cycle. The Centerclair Nursing Home WWTP failed to comply with its toxicity testing limit from the inception of its permit limit in July 1999 through June 2000. According to the plant's operator, dechlorination was installed in October 1999 which mitigated some of the toxicity problems. However, a change in detergent used at the facility's on-site laundry operation in the summer of 2000 seemed to have significantly reduced toxicity in the effluent. The facility has only failed one toxicity test since July 2000.

7.6.2 Projected Population Growth

From 2000 to 2020, the estimated population increase for Davidson County is 25 percent. Population is also expected to increase by 37 percent for Randolph County over the same 20-year period. Growth management within the next five years will be imperative, especially in and around urbanizing areas and along highway corridors, in order to protect or improve 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.