Section B: Chapter 12

Yadkin-Pee Dee River Subbasin 03-07-12

Includes a portion of the Rocky River, Dutch Buffalo, Irish Buffalo, Goose and Crooked Creeks

12.1 Water Quality Overview

Subbasin 03-07-12 at a Glance

Land and Water

Total area:	435 mi^2
Stream miles:	317.1
Lake acres:	722.1

Population Statistics

1990 Est. Pop.:	125,021 people
Pop. Density:	288 persons / mi^2

Land Cover (%)

Forest / Wetland:	53.6
Surface Water:	0.6
Urban:	5.0
Cultivated Crop:	8.8
Pasture / Managed Herbaceous:	32.0

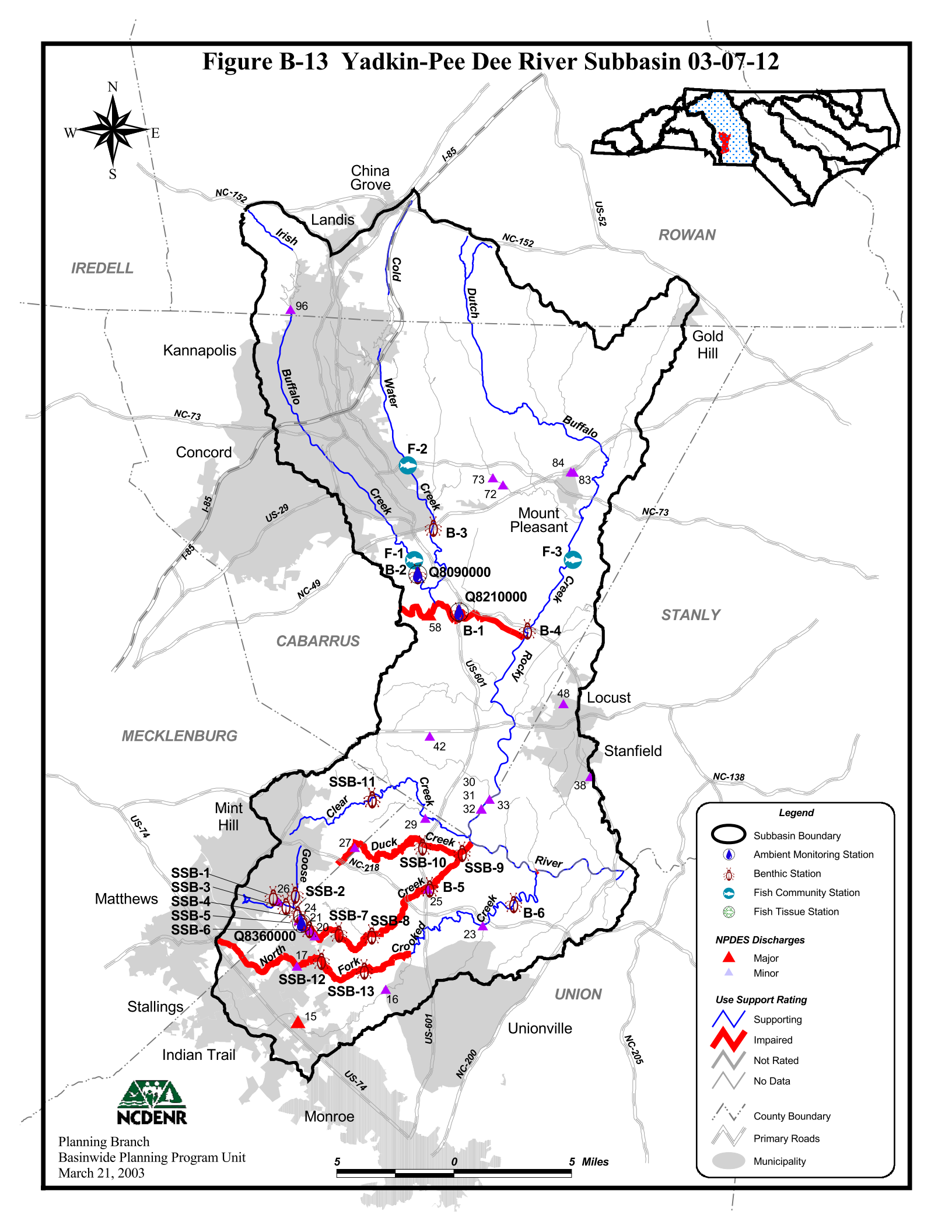
The middle section of the Rocky River flows east, then south, then east again dividing this subbasin almost in half. Tributaries in the upper half include Irish Buffalo and Dutch Buffalo Creeks flowing generally south. Smaller tributaries in the lower half include Clear, Goose and Crooked Creeks flowing generally northeast. The majority of the subbasin lies within Cabarrus County, but portions of Mecklenburg, Union and Stanly counties are also encompassed. Municipalities include Kannapolis, Concord, Locust, Mint Hill, Indian Trail, Lake Park and Unionville.

A map including the locations of NPDES discharges and water quality monitoring stations is presented in Figure B-13. Table B-24 contains a summary of monitoring data types, locations and results. Use support ratings for waters in this subbasin are summarized in Table B-25. 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.

This subbasin is rapidly urbanizing, and land cover and population information become outdated quickly. Land cover information compiled between 1993 and 1995 describes approximately 50 percent of the land as forested, more than 40 percent in agricultural uses, and approximately 5 percent as urban. The population in 1990 was estimated to be just over 125,000 people. Estimates of subbasin population have not yet been made for the 2000 census data; however, it is likely that population increased substantially over the ten-year period. Population is projected to increase 57 percent in Mecklenburg County, 53 percent in Cabarrus County, and 70 percent in Union County between 2000 and 2020. There are 17 NPDES permitted discharges and seven registered animal operations within this subbasin. Facilities with compliance or toxicity problems are discussed in following sections.

Water quality varies substantially across this subbasin, although most waters contain some water quality impacts. The headwaters of Dutch Buffalo Creek are classified WS-II and High Quality Waters.

Figure B-13 Yadkin-Pee Dee River Subbasin 03-07-12



Planning Branch
Basinwide Planning Program Unit
March 21, 2003

Table B-24 DWQ Monitoring Locations, Bioclassifications and Notable Chemical Parameters (1998-2002) for Yadkin-Pee Dee River Subbasin 03-07-12

Site	Stream	County	Road	Bioclassification or Noted Parameter[2]
Benthic Macroinvertebrate Community Monitoring				
B-1	Rocky River[1]	Cabarrus	US 601	Fair
B-2	Irish Buffalo Creek[1]	Cabarrus	SR 1132	Good-Fair
B-3	Coldwater Creek[1]	Cabarrus	NC 49	Good-Fair
B-4	Dutch Buffalo Creek[1]	Cabarrus	NC 200	Good-Fair
SSB-11	Clear Creek	Mecklenburg	SR 3181	Good-Fair
SSB-3	Goose Creek	Mecklenburg	SR 1004	Good-Fair
SSB-4	Goose Creek	Union	Glamorgan Rd.	Good
SSB-5	Goose Creek	Union	SR 1524	Good-Fair
SSB-6	Goose Creek	Union	Below Fairfield	Fair
SSB-7	Goose Creek	Union	SR 1525	Poor
SSB-8	Goose Creek	Union	SR 1533	Fair
B-5	Goose Creek[1]	Union	US 601	Poor
SSB-9	Goose Creek	Union	SR 1547	Fair
SSB-1	Stevens Creek	Mecklenburg	Maple Hollow Rd.	Good
SSB-2	UT Stevens Creek	Mecklenburg	Thompson Rd.	Not Impaired
SSB-10	Duck Creek	Union	US 601	Fair
B-6	Crooked Creek[1]	Union	SR 1547	Good-Fair
SSB-12	N. Fork Crooked Cr[1]	Union	SR 1520	Fair
SSB-13	N. Fork Crooked Cr	Union	SR 1514	Fair
Fish Community Monitoring				
F-1	Irish Buffalo Creek[1]	Cabarrus	SR 1132	Good
F-2	Coldwater Creek[1]	Cabarrus	NC 73	Good-Fair
F-3	Dutch Buffalo Creek[1]	Cabarrus	SR 2622	Good
Ambient Monitoring				
Q8090000	Irish Buffalo Creek	Cabarrus	SR 1132	Turbidity, Fecal coliform
Q8210000	Rocky River	Cabarrus	US 601	Fecal coliform
Q8360000	Goose Creek	Union	SR 1524	Fecal coliform
Yadkin-Pee Dee River Basin Association Monitoring				
Q8200000	Coldwater Creek	Cabarrus	SR 1132	Fecal coliform
Q8210000	Rocky River[3]	Cabarrus	US 601	None
Q8340000	UT Clear Creek	Mecklenburg	SR 3104	Dissolved oxygen, Fecal coliform

Q8342000	Clear Creek	Union	US 601	Dissolved oxygen, Fecal coliform
Q8355000	Rocky River	Cabarrus	SR 1114	None
Q8359000	Goose Creek	Union	SR 4228	Fecal coliform
Q8360000	Goose Creek[3]	Union	SR 1524	Dissolved oxygen, Fecal coliform
Q8385000	Rocky River	Union	SR 1606	Turbidity
Q8386000	N. Fork Crooked Cr	Union	SR 1520	Dissolved oxygen, Turbidity, Fecal coliform
Q8386200	N. Fork Crooked Cr	Union	SR 1514	Dissolved oxygen, Turbidity, Fecal coliform
Q8388000	Crooked Creek	Union	NC 218	Turbidity
Q8388900	Crooked Creek	Union	SR 1601	Turbidity, Fecal coliform
Lakes Assessment				
--	Kannapolis Lake	Rowan	2 sites	None
--	Lake Fisher	Rowan/Cabarrus	3 sites	None
--	Lake Concord	Cabarrus	3 sites	Turbidity

[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).

[3] This site duplicates a DWQ ambient monitoring station.

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-25 Use Support Ratings Summary (2002) for Monitored and Evaluated Freshwater Streams (miles) and Lakes (acres) in Yadkin-Pee Dee River Subbasin 03-07-12

Use Support Category	Units	Supporting	Impaired	Not Rated	No Data	Total[1]
Aquatic Life/Secondary Recreation	miles	94.8	**33.6**	1.3	187.4	317.1
	acres	0.0	**0.0**	697.0	25.1	722.1
Fish Consumption[2]	miles	0.0	**317.1**	0.0	0.0	317.1
	acres	0.0	**722.1**	0.0	0.0	722.1
Primary Recreation	miles	0.0	0.0	0.0	0.0	0.0
	acres	0.0	0.0	0.0	0.0	0.0
Water Supply	miles	38.6	0.0	0.0	0.0	38.6
	acres	234.8	0.0	0.0	0.0	234.8

[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.

12.2 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 four Impaired streams in this subbasin. Goose Creek, Crooked Creek, and the North and South Forks of Crooked Creek are discussed below.

12.2.1 **Goose Creek** (17.0 miles from source to Rocky River)

1998 Recommendations
Growth pressures, problems with wastewater discharges and infrastructure, and impacts from agricultural activities are discussed in the 1998 basin for the Goose Creek watershed. Recommendations are for DWQ to conducting modeling to evaluate the assimilative capacity of Goose Creek. DWQ planned to pursue enforcement action with some NPDES permit holders for past violations of discharge permits, and chlorine limits are recommended for existing discharges. In addition, the plan recommends local actions to reduce the effects of nonpoint source pollution, particularly from stormwater runoff, and to restore riparian habitat throughout the watershed.

Status of Progress
In 1998, the benthic macroinvertebrate community was sampled by DWQ at 11 sites in the watershed: 1 site on Duck Creek; 2 sites on Stevens Creek; and 8 sites on Goose Creek including the regular basinwide monitoring site at US Highway 601. Five sites (63 percent) received Fair or Poor bioclassifications, indicating impairment. Three sites (37 percent) received Good-Fair or Good bioclassifications, indicating the community is not Impaired. Stevens Creek received one Good bioclassification near the mouth and the other site was too small to assign a bioclassification to, but it was found to be not Impaired. Duck Creek received a Fair bioclassification near US Highway 601 in the lower portion of the watershed, indicating impairment.

In 2001, only the US Highway 601 site was sampled by DWQ. This site is at the lower end of the watershed, but above the confluence with Duck Creek. The site contained fairly good instream habitat and riparian vegetation overall, but the streambanks were extremely unstable in places and there were few deep pools. The benthic macroinvertebrate community received a Poor bioclassification, as it had in 1998 and 1996. The specific conductance was high and there were many indicators of organic enrichment. No fish community samples were conducted.

The Goose Creek watershed contains one ambient monitoring station at SR 1524 near Mint Hill (fairly high up in the watershed). A summary of water chemistry monitoring over a five-year period ending in 2001 revealed that all nutrient levels are elevated. Phosphorus, in particular, exceeded the evaluation level (0.05 mg/l) 93 percent of the time, reaching a maximum of 3.70 mg/l. Dissolved oxygen data commonly showed supersaturated conditions, indicating algae blooms.

There are six permitted wastewater discharges in the watershed: Oxford Glen WWTP on Stevens Creek; Ashe Plantation WWTP on Duck Creek; and Fairview Elementary WWTP,

Fairfield Plantation WWTP, Country Woods WWTP and Hunley Creek WWTP on Goose Creek. Each of these facilities received chlorine limits (which became effective by October of 2002) during the last cycle of NPDES permit renewals, as is recommended by the 1998 basin plan. However, owner/operators of the Oxford Glen and Ashe Plantation WWTPs decided to install ultraviolet disinfection systems. Compliance reports from the most recent review period (2000-2001) show problems with excess flow at the Fairfield Plantation and Country Woods WWTPs. No other NPDES permit violations were observed in the Goose Creek watershed.

The Hunley Creek WWTP is a member of the Yadkin-Pee Dee River Basin Association, and water chemistry samples are collected through the monitoring program at two locations on Goose Creek (upstream and downstream of the facility). Dissolved oxygen was less than 5.0 mg/l in 8.6 percent of downstream samples compared with only 1.1 percent of upstream samples. Fecal coliform concentrations were reduced by half from 988 colonies/100ml upstream to 412 colonies/100ml downstream. (The evaluation level is 200 colonies/100ml.)

The geometric means of fecal coliform samples collected from one station between 1996 and 2001 and two stations between 1998 and 2001 from Goose Creek (241, 988 and 412 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. Goose Creek 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 has already been developed by DWQ. Goose Creek was historically placed on the 303(d) list for fecal coliform and DWQ is currently working with Mecklenburg County to develop a TMDL.

Stevens Creek and Goose Creek from its source to SR 1524 just inside Union County are currently Supporting aquatic life and secondary recreation, although impacts were evident in 1998, particularly in the headwaters of Goose Creek. Duck Creek and Goose Creek from SR 1524 to the confluence with the Rocky River are Impaired. Currently, problems with point sources are limited to inflow and infiltration problems at the Fairfield Plantation and County Woods WWTPs. Nonpoint source pollution problems are associated with stormwater runoff from construction sites and developed areas, as well as agricultural activities.

2002 Recommendations

DWQ, in coordination with other natural resource agencies, will develop a site-specific management strategy for the Goose Creek watershed which provides for the maintenance and recovery of water quality conditions necessary to sustain the Carolina heelsplitter. The strategy will likely contain recommendations for point and nonpoint sources of pollution (refer to page 32 for details).

Mecklenburg and Union counties, as well as Mint Hill, Indian Trail and Lake Park, are required to obtain a NPDES permit for municipal stormwater systems under the Phase II stormwater rules (refer to page 37 of Section A, Chapter 2 for details). The City of Charlotte received a NPDES permit under the federal Phase I stormwater rules. DWQ applauds Charlotte-Mecklenburg's Surface Water Improvement and Management Program (page 299 contains details) and recommends that all local governments in the Goose Creek watershed implement programs to reduce the impacts of stormwater runoff, including local riparian buffer ordinances.

Although much work is currently being conducted in the Goose Creek watershed by DWQ, other natural resource agencies and local governments, local actions by citizens are still needed to reduce nonpoint source pollution. Many parts of the Goose Creek watershed could benefit greatly from riparian area restoration and protection. Section A, Chapter 4 outlines general best management practices for protecting and improving water quality. In addition, an organized group of dedicated citizens can be one of the most effective tools for affecting watershed protection and preservation of quality of life in communities.

Water Quality Improvement Initiatives

In 1999, the NC Wildlife Resources Commission initiated a project in the Stevens Creek watershed (tributary to Goose Creek in the headwaters of Mecklenburg County) to reduce the peak flows and pollutant load carried by stormwater from residential areas, improve streambanks through stabilization and buffering, conduct community education about use of household and lawn chemicals, increase community involvement in the protection and restoration of Stevens Creek, and implement livestock exclusion to prevent direct access to the creek or its tributaries. This project was funded in part through the Clean Water Act – Section 319 Program (page 273).

The Goose Creek Watershed Advisory Committee was convened in December 2000 to make recommendations to local governments, state agencies and other appropriate organizations that would protect and improve water quality and wildlife habitat in the Goose Creek watershed. The committee is comprised of stakeholders representing diverse interests in the watershed. Refer to page 290 in Section C for details about the committee and its sources of funding. Appendix V contains a summary of the recommendations.

The Goose Creek watershed (03040105 030020) is one of 55 watersheds in the Yadkin-Pee Dee River basin that has been identified by the NC Wetlands Restoration Program (NCWRP) 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.

12.2.2 Crooked Creek (13.1 miles from source to Rocky River)

1998 Recommendations

The 1998 basin plan suggests that Crooked Creek is Impaired primarily by low dissolved oxygen problems and nonpoint source pollution in the upstream watersheds of the North and South Forks. The plan recommends that DWQ collect additional data and assess assimilative capacity for oxygen-consuming wastes before any additional discharges are permitted into the watershed.

Status of Progress

In 2001, sampling of the benthic macroinvertebrate community resulted in a Good-Fair bioclassification below the Union County Grassy Branch WWTP in the lower third of the watershed. Water chemistry data revealed elevated turbidity concentrations at two locations. DWQ biologists noted good habitat in Crooked Creek; however, indicators of organic enrichment were numerous. Crooked Creek is currently rated Supporting; however, the increase in bioclassification (from Fair in 1996) could be partly due to reduced nonpoint source pollution impacts as a result of the extended drought.

The geometric means of fecal coliform samples collected from two stations between 1998 and 2001 from Crooked Creek (290 and 210 colonies/100ml) indicate that the stream may not be suitable for primary recreation. Fecal coliform concentrations were greater than 400 colonies/100ml in more than 20 percent of samples from each 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. Crooked Creek is not currently classified for primary recreation (Class B).

2002 Recommendations

Local actions are needed to reduce the effects of nonpoint source pollution, particularly from stormwater runoff, as further development occurs in the Crooked Creek watershed.

Water Quality Improvement Initiatives

The Crooked Creek watershed (03040105 040010) is one of 55 watersheds in the Yadkin-Pee Dee River basin that has been identified by the NC Wetlands Restoration Program (NCWRP) 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.

12.2.3 North Fork Crooked Creek (9.2 miles from source to Crooked Creek)

1998 Recommendations

Streamflow in the upper Crooked Creek watershed is naturally very low in the summer months and smaller tributaries often stop flowing completely. Problems with low dissolved oxygen were thought to be contributing to impairment in 1998. The 1998 basin plan recommends that DWQ collect additional data and assess assimilative capacity for oxygen-consuming wastes before any additional discharges are permitted into North Fork Crooked Creek.

Status of Progress

Benthic macroinvertebrates and water chemistry were sampled at two locations on North Fork Crooked Creek over the most recent basinwide planning cycle. Bioclassifications were Fair, and elevated turbidity and fecal coliform concentrations were recorded at both sites. In addition, low dissolved oxygen concentrations were observed. Aquatic life and secondary recreation continues to be Impaired in North Fork Crooked Creek.

The geometric means of fecal coliform samples collected from two stations between 1998 and 2001 from North Fork Crooked Creek (349 and 318 colonies/100ml) indicate that the stream may not be suitable for primary recreation. Fecal coliform concentrations were greater than 400 colonies/100ml in more than 20 percent of samples from each 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. North Fork Crooked Creek is not currently classified for primary recreation (Class B).

2002 Recommendations
Further investigation into the causes and sources of these water quality impacts is needed before recommendations to improve water quality can be made. However, local actions to reduce the effects of nonpoint source pollution, particularly from stormwater runoff as further development occurs in the Crooked Creek watershed, will be an imperative part of improving water quality.

12.2.4 South Fork Crooked Creek (13.7 miles from source to Crooked Creek)

1998 Recommendations
Streamflow in the upper Crooked Creek watershed is naturally very low in the summer months and smaller tributaries often stop flowing completely. Problems with low dissolved oxygen associated with the Union County WWTP discharge were thought to be contributing to impairment at the time of the 1998 basin plan. In 1996, Union County relocated its WWTP discharge to Crooked Creek downstream and some improvement in the stream was expected in the future as a result. DWQ recommended that no discharge containing an additional loading of oxygen-consuming waste be permitted into South Fork Crooked Creek.

Status of Progress
Due to reduced flows during an extended drought, DWQ did not resample South Fork Crooked Creek during the most recent basinwide planning cycle and the stream is currently not rated.

2002 Recommendations
As resources and stream condition allow, DWQ will sample South Fork Crooked Creek to evaluate any improvement following the relocation of the Union County WWTP discharge during the next basinwide planning cycle.

12.3 Status and Recommendations for Newly Impaired Waters

A portion of the Rocky River within this subbasin was rated 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.

12.3.1 Rocky River (8.5 miles from Reedy Creek to Dutch Buffalo Creek)

Current Status
Benthic macroinvertebrates received a Fair bioclassification at a location one mile below the Water and Sewer Authority of Cabarrus County (formerly Rocky River Regional) WWTP in 2001 and 2002. Previously, this segment of river received Good-Fair bioclassifications. This decline during an extended drought indicates point source problems. However, this portion of the Rocky River was included in a field-calibrated QUAL2E modeling analysis which was conducted by DWQ in the mid-1990s, and the WWTP has maintained compliance with its NPDES permit.

Low flows in the Rocky River watershed are difficult to assess. USGS 7Q10 estimates for various reaches of the river were made at different times using varying methodologies and, at the time of modeling for the Rocky River Regional WWTP permit, did not provide a clear picture of low flow conditions.

The geometric mean of fecal coliform samples collected between 1996 and 2001 from this portion of the Rocky River (234 colonies/100ml) indicates that the stream may not be suitable for primary recreation. Fecal coliform concentrations were greater than 400 colonies/100ml in nearly 22 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. The Rocky River is not currently classified for primary recreation (Class B).

2002 Recommendations

Further investigation into the causes and sources of these water quality impacts is needed before recommendations to improve water quality can be made.

Water Quality Improvement Initiatives

The Rocky River watershed is one of three priority areas in the Yadkin-Pee Dee River basin under the USDA Environmental Quality Incentives Program (EQIP). EQIP provides technical, educational and financial assistance to farmers and ranchers to address soil, water and related natural resource concerns on their lands. Refer to page 274 in Section C for details.

12.4 Section 303(d) Listed Waters

Currently, portions of four waters in this subbasin are listed on the state's draft 2002 303(d) list. Goose Creek is listed for fecal coliform and biological impairment. Crooked Creek and North and South Forks Crooked Creek are listed for biological impairment. In the future, another segment of the Rocky River will likely be added to the list for biological impairment. Appendix IV contains more information on the state's 303(d) list and listing requirements.

12.5 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.

12.5.1 Irish Buffalo Creek Coldwater Creek

Irish Buffalo Creek drains Kannapolis and Concord in northeastern Cabarrus County, and much of the watershed is developed. Water chemistry samples revealed elevated phosphorus and turbidity levels. Benthic macroinvertebrates received a Good-Fair bioclassification in 2001. However, the fish community remains diverse despite these water quality impacts.

Coldwater Creek makes up a large portion of the Irish Buffalo Creek watershed. With the exception of the Lake Concord watershed which is rapidly developing, there is very little urban area in the Coldwater Creek watershed. However, a decline in bioclassification was observed at NC 73 between 1996 (Good) and 2001 (Good-Fair). At the most downstream station, instream habitat was lacking and the site also received a Good-Fair bioclassification.

The geometric means of fecal coliform samples collected from Irish Buffalo Creek between 1996 and 2001 (234 colonies/100ml) and Coldwater Creek between 1998 and 2001 (290 colonies/100ml) indicate that these streams may not be suitable for primary recreation. Fecal coliform concentrations were greater than 400 colonies/100ml in more than 20 percent of samples from each 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. Neither Irish Buffalo nor Coldwater Creeks are currently classified for primary recreation (Class B).

Local actions to reduce the effects of nonpoint source pollution, particularly from stormwater runoff as further development occurs in the Irish Buffalo Creek watershed, will be an imperative part of protecting water quality. The Irish Buffalo Creek watershed (03040105 020040) is one of 55 watersheds in the Yadkin-Pee Dee River basin that has been identified by the NC Wetlands Restoration Program (NCWRP) 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.

12.5.2 Dutch Buffalo Creek

The Dutch Buffalo Creek watershed in northeastern Cabarrus County is primarily agricultural, and many small headwater tributaries are dammed for farm ponds. Although the stream continued to receive a Good-Fair bioclassification, severe bank erosion and a lack of riparian vegetation was observed. Local actions are needed to reduce the effects of nonpoint source pollution, particularly from agricultural activities, and to restore habitat throughout the watershed. Refer to Section A, Chapter 4 for details about reducing habitat degradation.

The Dutch Buffalo Creek watershed (03040105 020060) is one of 55 watersheds in the Yadkin-Pee Dee River basin that has been identified by the NC Wetlands Restoration Program (NCWRP) 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.

12.6 Additional Water Quality Issues within Subbasin 03-07-12

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.

12.6.1 Projected Population Growth

From 2000 to 2020, the estimated population increase for Mecklenburg County is 57 percent and for Cabarrus County is 53 percent. 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.

12.6.2 High Fecal Coliform Concentrations

Fecal coliform bacteria are widely used as an indicator of the potential presence of pathogens typically associated with the intestinal tract of warm-blooded animals and are therefore found in their wastes. Coliform bacteria are relatively easy to identify and are usually present in larger numbers than more dangerous pathogens, even though they respond to the environment and to treatment in much the same way. Sources of fecal coliform bacteria, as well as other more dangerous pathogens, include runoff from pastures, feedlots, poultry operations and lagoons that do not employ appropriate best management practices. Other sources include straight pipes, leaking and failing septic systems, and noncompliant WWTPs. Wildlife and pet waste also contribute to elevated concentrations of pathogens.

The water quality standard for fecal coliform bacteria is based on a geometric mean of 200 colonies/100ml of five samples collected within 30 days, or 20 percent of samples having a concentration greater than 400 colonies/100ml. High levels of fecal coliform bacteria are widespread through this subbasin. Samples were collected from 13 locations on seven streams, and the geometric means for 10 locations (77 percent) were greater than 200 colonies/100ml over the five-year assessment period. These data indicate that many streams in this subbasin may not be suitable for primary recreation. Current methodology requires additional bacteriological sampling for streams with a geometric mean greater than 200 colonies/100ml. 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. Currently, no waters in this subbasin are classified for primary recreation (Class B).