Section B: Chapter 1

Yadkin-Pee Dee River Subbasin 03-07-01

Includes the Upper Yadkin River and Kerr Scott Reservoir

1.1 Water Quality Overview

Subbasin 03-07-01 at a Glance

Land and Water

Total area:	830 mi^2
Stream miles:	866.3
Lake acres:	1,043.4

Population Statistics

1990 Est. Pop.:	62,655 people
Pop. Density:	76 persons / mi^2

Land Cover (%)

Forest / Wetland:	81.1
Surface Water:	0.5
Urban:	0.6
Cultivated Crop:	1.1
Pasture / Managed Herbaceous:	16.8

The Yadkin River begins in the mountains of Watauga and Caldwell counties before turning eastward and flowing into Wilkes County. This subbasin contains the upper portion of the Yadkin River which flows through Wilkesboro and North Wilkesboro, past Ronda and into Elkin. Major tributaries include Elk Creek, Lewis Fork, Reddies River and Roaring River. Kerr Scott Reservoir is also included.

A map including the locations of NPDES discharges and water quality monitoring stations is presented in Figure B-1. Table B-1 contains a summary of monitoring data types, locations and results. Use support ratings for waters in this subbasin are summarized in Table B-2. 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.

Most of the land in this portion of the basin is forested (81 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 62,655 and population density is low. Population in the area is expected to increase by 14 percent between 2000 and 2020. There are 28 NPDES permitted discharges and six registered animal operations in the subbasin. The number of small poultry operations increased 9 percent between 1994 and 1998, and this subbasin alone currently contains 11 percent of the state's capacity for poultry production. Facilities with compliance or toxicity problems are discussed in following sections.

There is a significant amount of public land in this subbasin, especially when compared with other parts of the Yadkin-Pee Dee River basin. Stone Mountain State Park encompasses the headwaters of the East Prong Roaring River. The federally-owned Doughton Recreation Area and Blue Ridge Parkway skirt the northeastern portion of the subbasin along the Wilkes County line. The 1,000-acre Cumberland Knob Recreation Area in Alleghany County also lies within the subbasin and was where ground was first broken in the construction of the Parkway in 1935.

Water quality is generally excellent throughout the subbasin. Most streams are classified as Trout Waters and support healthy coldwater and coolwater fisheries. The Elk Creek watershed and several streams in the Roaring River watershed are classified Outstanding Resource Waters. Most of the Reddies River watershed is classified WS-II and Little Cub Creek is WS-I, which offer at least the same protection as the High Quality Waters classification.

Figure B-1 Yadkin-Pee Dee River Subbasin 03-07-01

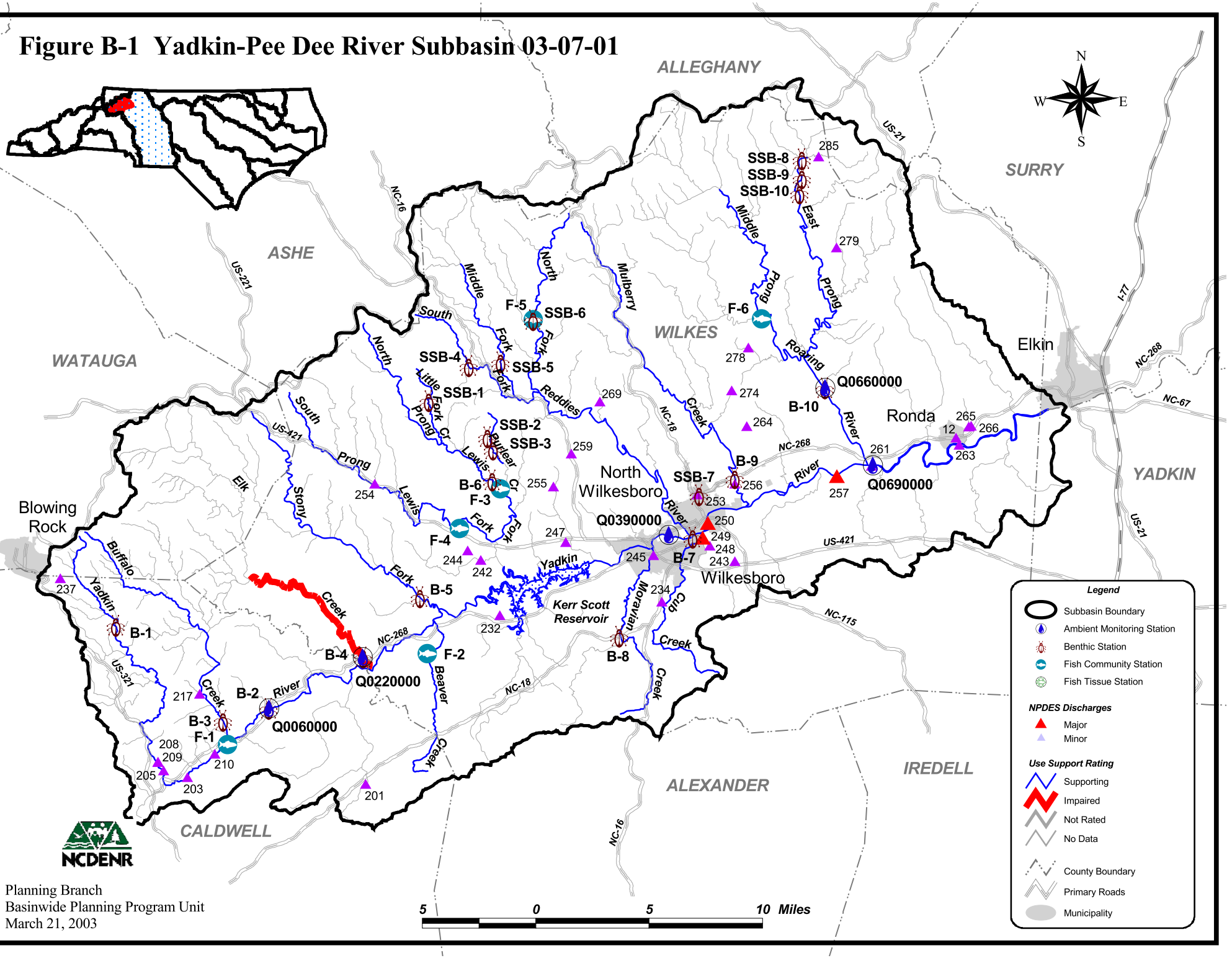

Table B-1 DWQ Monitoring Locations, Bioclassifications and Notable Chemical Parameters (1998-2002) for Yadkin-Pee Dee River Subbasin 03-07-01

Site	Stream	County	Road	Bioclassification or Noted Parameter[2]
Benthic Macroinvertebrate Community Monitoring				
B-1	Yadkin River[1]	Caldwell	SR 1372	Good
B-3	Buffalo Creek[1]	Caldwell	SR 1504	Excellent
B-2	Yadkin River	Caldwell	NC 268	Good-Fair
B-4	Elk Creek[1]	Wilkes	SR 1175	Good
B-5	Stoney Fork Creek[1]	Wilkes	SR 1135	Excellent
B-6	N Prong Lewis Fork[1]	Wilkes	SR 1304	Good
SSB-1	Little Fork	Wilkes	Headwaters	Not Impaired
SSB-3	Purlear Creek	Wilkes	Above Falls	Not Impaired
B-7	Yadkin River	Wilkes	NC 18/268	Good-Fair
B-8	Moravian Creek[1]	Wilkes	NC 18	Good-Fair
SSB-4	S Fork Reddies River	Wilkes	SR 1355	Good
SSB-5	Middle Fk Reddies R	Wilkes	SR 1559	Excellent
SSB-6	N Fork Reddies River	Wilkes	SR 1567	Good
B-9	Mulberry Creek[1]	Wilkes	NC 268	Excellent
SSB-7	UT Mulberry Creek[1]	Wilkes	Flint Hill Rd	Not Rated
B-10	Roaring River[1]	Wilkes	SR 1990	Good
SSB-9	E Prong Roaring River[1]	Wilkes	SR 1739	Good
SSB-10	E Prong Roaring River	Wilkes	Off SR 1739	Good
Fish Community Monitoring				
F-1	Yadkin River	Caldwell	NC 268	Good
	Buffalo Creek	Caldwell	SR 1594	Excellent
	Laurel Creek	Watauga	SR 1508	Excellent
F-2	Beaver Creek	Wilkes	SR 1131	Good
F-3	N Prong Lewis Fork	Wilkes	SR 1304	Excellent
F-4	S Prong Lewis Fork	Wilkes	SR 1154	Good
	Middle Fk Reddies R	Wilkes	SR 1562	Excellent
	N Fork Reddies River	Wilkes	SR 1501	Good
F-5	N Fork Reddies River	Wilkes	SR 1567	Excellent
	Cub Creek	Wilkes	SR 1001	Good
F-6	Middle Pr Roaring R	Wilkes	SR 1002	Excellent
	E Prong Roaring R	Wilkes	#1 SR 1739	Good

	E Prong Roaring R	Wilkes	#2 SR 1739	Excellent
	E Prong Roaring R	Wilkes	#3 SR 1739	Excellent
Ambient Monitoring				
Q0060000	Yadkin River	Caldwell	NC 268	Turbidity
Q0220000	Elk Creek	Wilkes	NC 268	Fecal coliform
Q0390000	Yadkin River	Wilkes	At Wilkesboro	None
Q0660000	Roaring River	Wilkes	SR 1990	None
Q0690000	Yadkin River	Wilkes	SR 2327	Turbidity Fecal coliform
Q0720000	Yadkin River	Wilkes	SR 2303	None
Yadkin-Pee Dee River Basin Association Monitoring				
Q0360000	Reddies River	Wilkes	SR 1517	None
Q0450000	Yadkin River	Wilkes	US 421 Bus	Fecal coliform
Q0720000	Yadkin River[3]	Wilkes	SR 2303	None
Lakes Assessment				
--	Kerr Scott Reservoir	Wilkes	3 stations	Dissolved oxygen

[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 and lakes 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-2 Use Support Ratings Summary (2002) for Monitored and Evaluated Freshwater Streams (miles) and Lakes (acres) in Yadkin-Pee Dee River Subbasin 03-07-01

Use Support Category	Units	Supporting	Impaired	Not Rated	No Data	Total[1]
Aquatic Life/Secondary Recreation	miles acres	653.1 1,043.4	0.0 0.0	0.0 0.0	213.2 0.0	866.3 1,043.4
Fish Consumption	miles acres	866.3 1,043.4	0.0 0.0	0.0 0.0	0.0 0.0	866.3 1,043.4
Primary Recreation	miles acres	19.9 948.7	**9.1** 0.0	0.0 0.0	49.9 0.0	78.9 948.7
Water Supply	miles acres	185.1 973.7	0.0 0.0	0.0 0.0	0.0 0.0	185.1 973.7

[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.

1.2 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 did not identify any Impaired waters in this subbasin.

1.3 Status and Recommendations for Newly Impaired Waters

A portion of Elk Creek, from the mouth of Dugger Creek to the Yadkin River, is Impaired for the primary recreation use based on a recent swimming advisory posted by the NC Department of Health and Human Services. This section outlines the potential causes and sources of impairment and provides recommendations for improving water quality.

1.3.1 Elk Creek (9.1 miles from Dugger Creek to Yadkin River)

Current Status

The DWQ ambient monitoring station near the mouth of Elk Creek revealed elevated levels of fecal coliform in 2001. Because Elk Creek is classified for primary recreation (Class B), sampling on five days within 30 days was initiated during June 2002 to evaluate the water quality standard. The June sampling produced a geometric mean of 408 colonies per 100 ml of solution (col/100ml); the water quality standard for fecal coliform is currently 200 col/100ml. Additional monitoring results in July indicated a geometric mean of 455 col/100ml. Upstream samples indicated sporadic high levels of fecal coliform as well. A short survey of a portion of the stream conducted by a DWQ staff member revealed cattle and horses with direct access to the stream in several locations. There are no permitted discharges. The Wilkes County Health Department has posted a swimming advisory for Elk Creek and the stream is Impaired for the primary recreation use.

2002 Recommendations

The Elk Creek watershed (03040101 010050) 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.] Nonpoint source pollution programs that work with farmers to implement best management practices, such as fencing livestock out of streams and providing alternative watering sources, should also prioritize the Elk Creek watershed. DWQ will monitor Elk Creek again in the summer of 2003.

1.4 Section 303(d) Listed Waters

In subbasin 03-07-01, an unnamed tributary to Mulberry Creek (discussed below) is currently the only water presented on the state's draft 2002 303(d) list. If a swimming advisory remains persistently posted, Elk Creek will likely be added to the list in the future. Refer to Appendix IV for more information on the state's 303(d) list and listing requirements.

1.5 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.

1.5.1 **Yadkin River** (from the Big Bend north of Lenoir to Mulberry Creek)

Two sites on the upper Yadkin River above Kerr Scott Reservoir were monitored by DWQ over the previous basinwide cycle. The uppermost site received a Good benthic macroinvertebrate bioclassification. Habitat was good and few impacts are present. At NC 268 between Buffalo Creek and Elk Creek, DWQ anticipated that the benthic macroinvertebrate bioclassification would remain the same or improve (similar to the upstream site) due to reduced nonpoint source pollution as a result of the extended drought. However, the benthic macroinvertebrate community declined from Good in 1996 to Good-Fair in 2001. If the impacts were related to flow or weather, the pattern should be visible in other similarly-sized streams within the subbasin. This was not the case as demonstrated by improvement or maintenance of bioclassifications in Buffalo, Elk Creek, Stoney Fork, Moravian and Mulberry Creeks, and North Prong Lewis Fork. Nutrient enrichment was indicated, and 23 percent of samples exceeded the turbidity standard.

Further downstream at Wilkesboro, the river also received a Good-Fair bioclassification. Instream and riparian habitat were in worse condition in this developed area with notable sedimentation, little riparian vegetation and lots of filamentous algae. Nutrient enrichment was indicated, and the geometric mean of fecal coliform samples collected between 1998 and 2001 (323 colonies/100ml) indicates 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 two sites 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 Yadkin River is not currently classified for primary recreation (Class B) within this subbasin.

With the exception of the developed area of Wilkesboro and North Wilkesboro below Kerr Scott Reservoir, the watershed is primarily in agriculture. NC 268 follows this portion of the Yadkin River closely, crossing every 1-2 stream miles. There are four small NPDES discharges above

the sampling site; however, all are in compliance and have been over the previous assessment period. There is one registered dairy operation; however, it is no longer in operation. Further investigation into the causes and sources of these water quality impacts is needed before recommendations to improve water quality can be made.

1.5.2 Moravian Creek

Moravian Creek flows north from the Alexander/Wilkes County line into the Yadkin River at Wilkesboro. The headwaters are mostly forested in the Brushy Mountains; however, roads follow many of the streams and the mainstem closely. The West Prong is more agricultural. DWQ sampled the stream at NC 18 in both 1996 and 2001 and found some water quality impacts. Instream habitat is poor with evidence of historic channelization. Further investigation into the causes and sources of these water quality impacts is needed before recommendations to improve water quality can be made.

1.5.3 Cub Creek

The Cub Creek watershed is adjacent to the Moravian Creek watershed, although land use is more built-up in the lower reaches. Degraded instream and riparian habitat were noted during fish community sampling in 2001. No historical DWQ data exist for this stream. There is a large poultry processing facility and a dairy product manufacturing facility in the watershed.

1.5.4 Lewis Fork Watershed

Although the North and South Prongs of Lewis Fork and several major tributaries received Good bioclassifications during the assessment period, impacts to smaller streams from agricultural activities are evident. Although exceptional water quality was observed in the headwaters of Purlear Creek in June of 2001, severe water quality impacts were observed at a site lower in the watershed during a special study in June 2002. Large quantities of organic matter were deposited in areas of slower flow as well as riffle areas, and indicators of organic enrichment were very abundant. The community observed was similar to that which would be expected below a poorly operating WWTP; however, there are no NPDES permitted discharges in this primarily agricultural watershed. Naked Creek also contained abundant indicators of organic loading and low dissolved oxygen (NCDENR-DWQ, October 18, 2002).

An increase in turbidity has been observed in the South Prong Lewis Fork that is attributed to the widening/construction of US 421. A trophic shift is also being observed in the fish community that indicates nutrient enrichment.

The Lewis Fork watershed and the North and South Prong Lewis Fork watersheds (03040101 010080-010100) comprise three of 55 watersheds in the Yadkin-Pee Dee River basin that have been identified by the Wetlands Restoration Program as areas with the greatest need and opportunity for stream and wetland restoration efforts. These watersheds will be given higher priority than nontargeted watersheds for the implementation of NCWRP restoration projects. [Refer to page 278 in Section C for details.] Nonpoint source pollution programs that work with farmers to implement best management practices, such as fencing livestock out of streams and providing alternative watering sources, should also prioritize the Lewis Fork watershed.

1.5.5 **UT Mulberry Creek** (Long Creek)

This stream was originally assessed in 1990 to determine impacts of toxicity problems with the Gardner Mirror WWTP discharge. The benthic macroinvertebrate community was assigned a Good-Fair bioclassification above the discharge and a Poor bioclassification below the discharge, and the stream was placed on the 303(d) list of Impaired waters. Gardner Mirror is now closed and there is no longer a discharge from the facility. DWQ resampled the stream in 2001 to evaluate improvement in the watershed. Due to reduced flows in this stream, it was too small to assign a bioclassification. Even though improvement was observed (from 3 EPT species in 1990 to 13 in 2001), water quality in this stream is still heavily impacted. There is still one discharge above the sampling site from Carolina Mirror, and development from North Wilkesboro also impacts the watershed.

1.5.6 Warrior Creek

Big Warrior and Little Warrior Creeks were two of 13 stream sites near Wilkesboro sampled by the DWQ Biological Assessment Unit during a special study in June 2002. Moderate to severe habitat degradation was observed along both streams, and indicators of organic enrichment were present in Big Warrior Creek (NCDENR-DWQ, October 18, 2002).

The Warrior Creek watershed (03040101 010110), 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.

1.5.7 Tucker Hole Creek

Tucker Hole Creek was one of 13 stream sites near Wilkesboro sampled by the DWQ Biological Assessment Unit during a special study in June 2002. Tucker Hole drains portions of the Town of Wilkesboro, making it the most urban of the sites monitored. Data indicate that only Purlear Creek (discussed in Part 1.5.4 above) had more severe water quality and/or habitat degradation problems. Although severe habitat degradation was observed at Tucker Hole Creek, it is likely that toxicity problems and organic loading are having a larger impact on the aquatic community (NCDENR-DWQ, October 18, 2002).

The Tucker Hole Creek watershed (03040101 020010) 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.

1.5.8 East Prong Roaring River

Three sites were sampled by DWQ on the East Prong Roaring River in 1998. Severe bank erosion and moderate sedimentation were observed at the lowest site, although all three benthic macroinvertebrate communities received a Good bioclassification. There have been problems

with waste lagoon overflows at some small dairy operations in the watershed and gray water discharges are also a concern.

In October 2000, the NCWRP completed a 10,622-foot stream restoration project in Stone Mountain State Park on the East Prong Roaring River. The goals of this project were to reduce streambank erosion, improve instream and riparian habitat, restore floodplain functions, and educate visitors about natural stream design techniques. Prior to becoming part of a park, the East Prong Roaring River was relocated several times to accommodate gravel mining operations and improve conditions for agriculture. To address these problems, the NCWRP constructed 6,000 feet of new channel and stabilized the channel with rock grade control structures and root wads. The rock structures enhanced fish and aquatic habitat throughout the length of the project. Post-construction monitoring indicates that the project is stable.

The East Prong Roaring River watershed (03040101 060030) 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.] Nonpoint source pollution programs that work with farmers to implement best management practices, such as fencing livestock out of streams and providing alternative watering sources, should also prioritize the East Prong Roaring River watershed.

1.6 Additional Water Quality Issues within Subbasin 03-07-01

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.

1.6.1 NPDES Discharges

Six of the 28 NPDES discharges had 1-2 minor permit violations over the two-year review period (September 1999 - August 2001). No facility is in significant noncompliance at this time. Five facilities are required to monitor effluent toxicity; all were in compliance over the period of review.

1.6.2 NCWRP Projects and Local Watershed Planning Initiative

The NC Wetlands Restoration Program (NCWRP) has four stream restoration projects in this subbasin. Three of these projects, Purlear Creek, Warrior Creek and Bugaboo Creek, are located in agricultural areas currently used as pasture for cattle. These streams lack riparian vegetation to protect and stabilize the streambanks that are severely eroding. In addition, cattle have direct access to the streams at these sites further exacerbating the erosion problems. One of the project goals is to fence the cattle out of the streams at these sites to reduce erosion and bacterial pollution. In addition, the projects will restore riparian vegetation, stabilize streambanks and enhance aquatic habitat.

Currently, the NCWRP Local Watershed Planning initiative for the upper Yadkin-Pee Dee region is focused on in five tributary watersheds to the W. Kerr Scott Reservoir and the Yadkin River above the Town of Wilkesboro's Water Filtration Plant. The water treatment plant struggles with problems tied to turbidity, algae and high concentrations of total coliform bacteria. Animal agriculture, including poultry and beef cattle, and its associated land application of waste are a potential nonpoint source of nutrients and metals to the reservoir and tributary streams. In addition, many streambanks in the study area lack riparian vegetation and are severely eroding. The NCWRP is working with the Wilkes Soil and Water Conservation District and other local stakeholders to reduce nutrient, sediment and bacteriological pollution to the reservoir and the Yadkin River to ensure long-term protection of these resources for public water supply, recreation and aquatic life. As part of the planning effort, the NCWRP, in cooperation with DWQ, has initiated a comprehensive biological and chemical water quality monitoring program in the planning area. The NCWRP has also hired a technical consultant to conduct a detailed watershed assessment that will assess watershed conditions, estimate pollutant loads and identify, and prioritize restoration opportunities. The technical assessment will be completed in summer 2003 with the restoration plan completed in the fall of 2003.