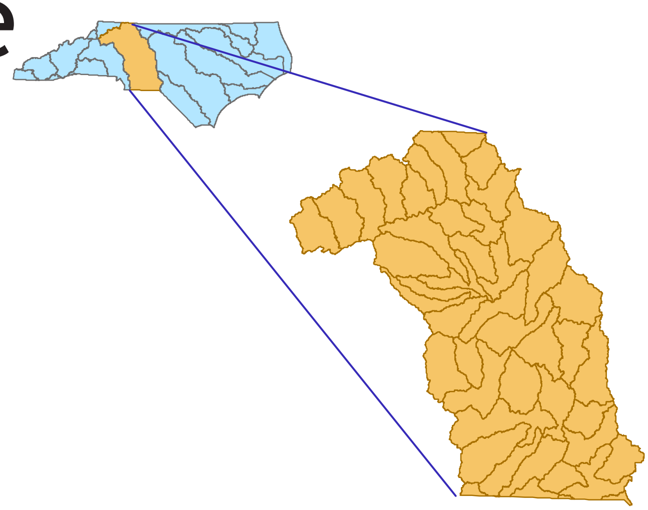
Yadkin - Pee Dee River Basin Plan 2008 Summary

Hydrologic Unit Code 030401



GENERAL DESCRIPTION

The Yadkin-Pee Dee River basin is the second largest basin in North Carolina and covers approximately 7,213 square miles, spanning 21 counties. Originating on the eastern slopes of the Blue Ridge Mountains in Caldwell and Wilkes counties, the Yadkin River flows northeasterly for about 100 miles and then turns southeast until joined by the Uwharrie River to form the Pee Dee River. The Pee Dee River continues its southeast course through North and South Carolina to Winyah Bay at the Atlantic Ocean.

Increasing nutrient enrichment, urbanization, and wastewater are the primary impacts to water quality in this basin. Most of these impacts are focused in the counties of Forsyth, Rowan, Iredell, Cabarrus, Davidson, and Union. Land conversion from forest and agricultural practices to suburban uses is occurring nearly everywhere throughout this basin. Only protected natural areas and steep mountainous terrain are not impacted by these changes.

Despite these areas of concern, there are still streams in largely forested and comparatively undeveloped catchments with very good water quality. Most of these waters are found in northern Wilkes, western Surry, and portions of Montgomery County (Uwharrie National Forest). In fact, of the 51 streams and rivers classified Outstanding Resource Waters (ORW) in the Yadkin-Pee Dee River basin, 73% are located in these counties.

The Yadkin-Pee Dee River basin experienced moderate to severe drought conditions in 2001, which had the potential to reduce the impacts from nonpoint sources and magnify the impacts from point source discharges.

CURRENT STATUS

There are 94 impaired assessment units in the Yadkin Pee-Dee River (Figure 1/Table 1). Impaired waterbodies are those streams/lakes not meeting their associated water quality standards in more than 10 percent of the samples taken within the assessment period (January 1, 2002 through December 31, 2006) or those not meeting the narrative standards for either benthic macroinvertebrate community criteria or fish community criteria. Most of the stream impairments (26%) are based on poor biological integrity measured by aquatic macroinvertebrates and fish communities, followed by turbidity violations (19%), low dissolved oxygen levels (6%) and elevated fecal coliform bacteria (4%). In lakes and reservoirs, chlorophyll *a* exceeds the standards in 36% of the total acres sampled, followed closely by high pH levels (35%) and turbidity in 17% of the samples.

BASIN AT A GLANCE

COUNTIES

Alexander, Alleghany, Anson, Ashe, Cabarrus, Caldwell, Davidson, Davie, Forsyth, Guilford, Iredell, Mecklenburg, Montgomery, Randolph, Richmond, Rowan, Scotland, Stanly, Stokes, Surry, Union, Watauga, Wilkes, Yadkin

PERMITTED FACILITIES

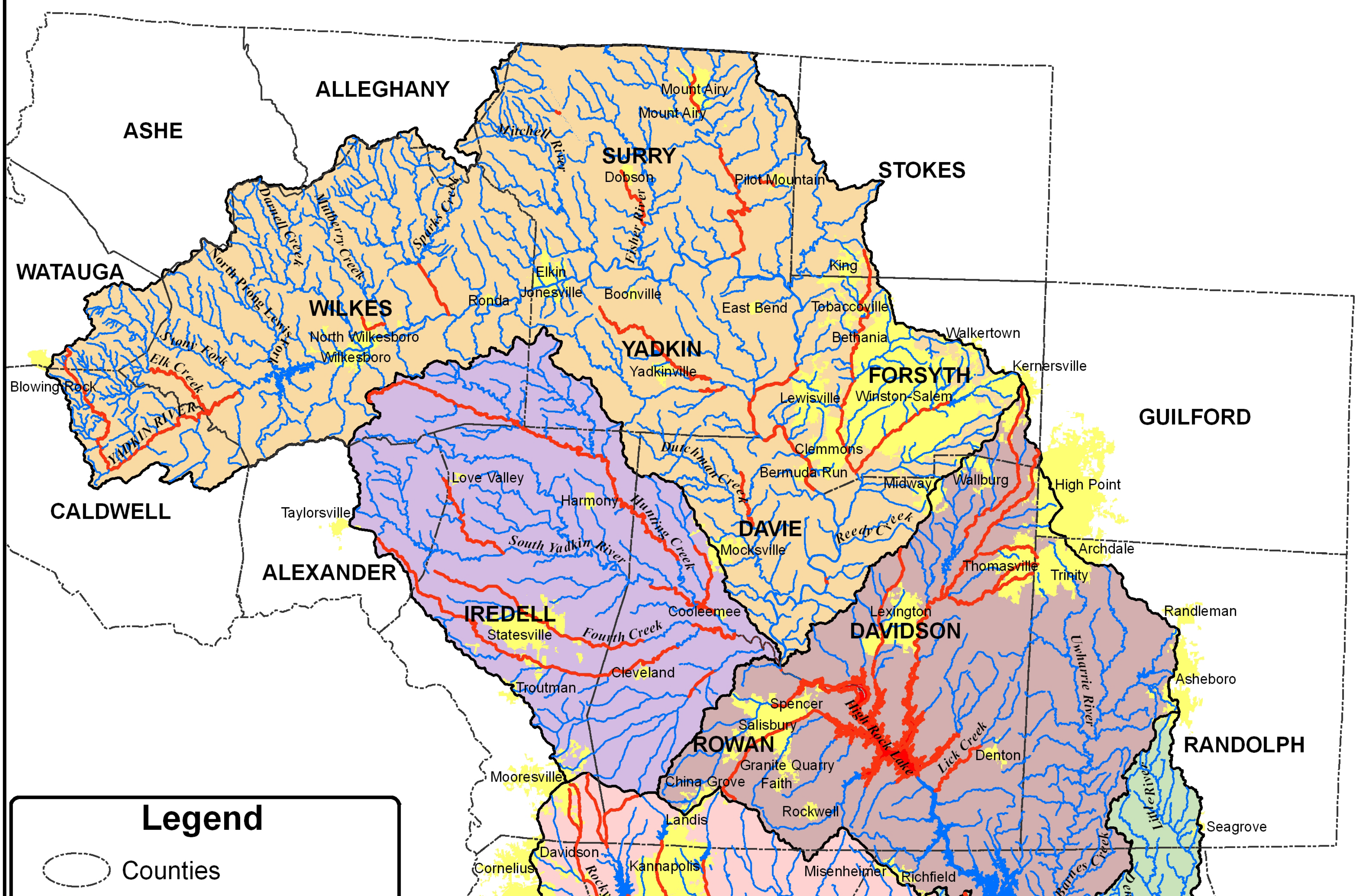
NPDES WWTP	
Major:	40
Minor:	193
NPDES Nondischarge:	80
NPDES Stormwater	
General:	647
Individual:	37
Phase II	21
Animal Operations:	347

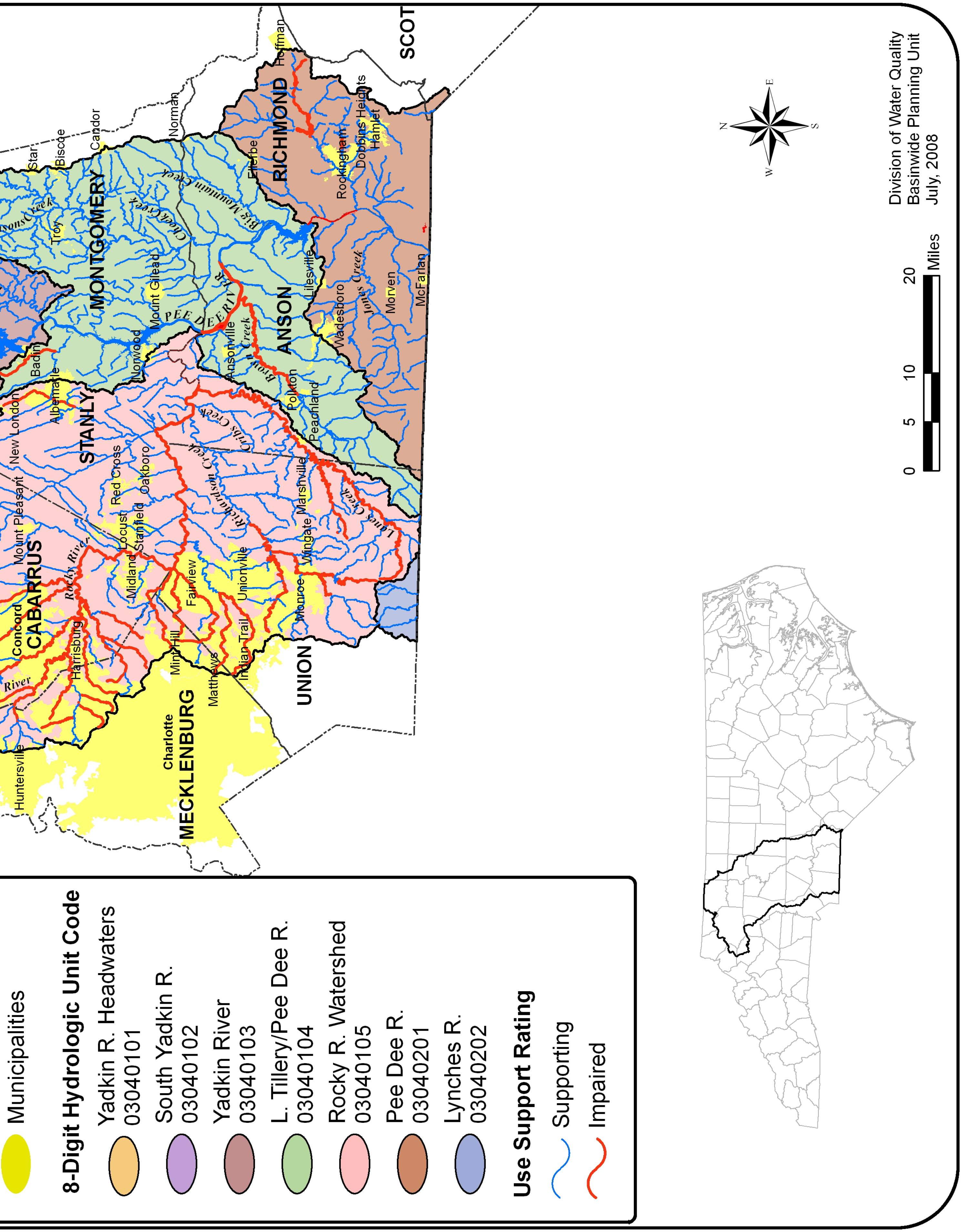
AQUATIC LIFE SUMMARY

	Rivers & Streams (Miles)	Lakes & Reservoirs (Acres)
Monitored	2,320 39%	32,263 92%
Supporting	1,284 55%	12,796 40%
Not Rated	123 5%	8,004 25%
Impaired	912 39%	11,463 36%
No Data	3,626 61%	2,731 8%
Total length or area	5,946	34,994

Figure 1

Yadkin - Pee Dee River Basin

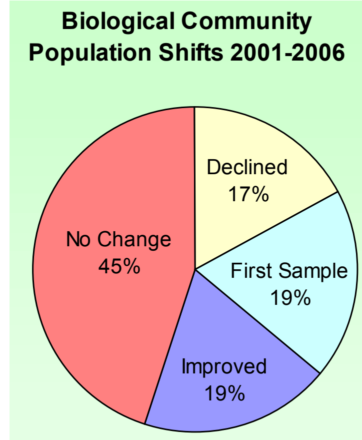



Municipalities
8-Digit Hydrologic Unit Code
Yadkin R. Headwaters 03040101
South Yadkin R. 03040102
Yadkin River 03040103
L. Tillery/Pee Dee R. 03040104
Rocky R. Watershed 03040105
Pee Dee R. 03040201
Lynches R. 03040202
Use Support Rating
Supporting
Impaired
MECKLENBURG
CABARRUS
STANLY
MONTGOMERY
UNION
ANSON
RICHMOND
SCOT
Charlotte
Huntersville
Concord
Harrisburg
Mint Hill
Matthews
Indian Trail
Fairview
Unionville
Monroe
Wingate
Marshville
Midland
Locust
Stanfield
Red Cross
Oakboro
Mount Pleasant
New London
Albemarle
Badin
Norwood
Mount Gilead
Troy
Star
Biscoe
Candor
Norman
Ellerbe
Hoffman
Rockingham
Dobbins Heights
Hamlet
Ansonville
Polkton
Peachland
Wadesboro
Lilesville
Morven
McFarlan
Rocky River
Richardson Creek
Crib Creek
Lanes Creek
Brown Creek
Jones Creek
Cheek Creek
Big Mountain Creek
PEE DEE RIVER
Division of Water Quality
Basinwide Planning Unit
July, 2008
0 5 10 20 Miles

BIOLOGICAL SAMPLING

The basinwide biological (fish and benthic community) sampling effort in the Yadkin-Pee Dee River basin increased by 12 percent between samples collected in 2001 and samples collected in 2006; however, this increased effort did not significantly impact the ratio of supporting and impaired streams. Nineteen percent of the waters sampled between 2001 and 2006 showed an improvement in biological communities (Figure 2). There was a 17 percent decline in benthic and fish populations between 2001 and 2006. Most declines were noted in areas along the urbanizing I-85 and I-40 corridors, particularly in western Cabarrus County.

FIGURE 2.



AMBIENT SAMPLING

Problem areas were scattered throughout the basin. See 8-digit hydrologic unit code (HUC) subbasin sections to get specifics on individual streams and lakes.

The majority of North Carolina, including the Yadkin-Pee Dee River basin, experienced drought in 2002, and significant rains in 2003. These dramatic changes in flow appear to account for fluctuations for many parameters, including temperature, specific conductance, dissolved oxygen, pH, turbidity, and fecal coliform. Comparisons of the six hydrologic units (HU) within the Yadkin-Pee Dee River basin yielded the following:

·Physical Parameters; all HUs:

- Temperature: The majority of variation in temperature is caused by seasonal and daily variation in solar radiation and air temperature. A slight increase in surface water temperature was detected in the South Yadkin HU. There were no discernible trends in the other five HUs.
- Specific Conductance: Conductance peaked in 2002 during the drought. Similarly it reached its lowest point during 2003 and the end of the drought. Downward trends in conductivity values in the Yadkin River Headwaters, the Rocky River, and the Pee Dee River reflect the end of the drought and resultant dilution due to increased runoff and rainfall.
- Dissolved Oxygen: Dissolved Oxygen was at its lowest during the 2002 drought. Increasing concentrations in the Yadkin River Headwaters, the Rocky River, and the Pee Dee River reflect the end of the drought.
- pH: The ending of the drought in 2003 caused a steep decline in pH values throughout the basin.
- Turbidity concentrations appear to be decreasing in the South Yadkin and High Rock Lake HUs and increasing in the Rocky River HU. Turbidity concentrations were low during the 2002 drought, rose in 2003, and have since stayed relatively even.
- Fecal Coliform bacteria levels peaked during the 2003 rains, and has decreased since then. Significant downward trends are present in the Yadkin River Headwaters, the South Yadkin River, the High Rock Lake, and the Lake Tillery HUs.

·Nutrients in Yadkin River Headwaters & South Yadkin River 8-digit HUs:

- Ammonia concentrations appeared to decrease slightly and do not appear to be related to the drought.
- Total Kjeldahl Nitrogen concentrations appeared to be decreasing and do not appear to be related to the drought.
- Total Nitrate and Nitrite concentrations peaked during the drought and were beginning to decrease after the drought ended.
- Total Phosphorus concentrations appeared to decrease. Concentrations were slightly higher during the drought.
- Nutrients in Lake Tillery HU: Total Nitrate and Nitrite concentrations appeared to increase slightly.
- Nutrients in Rocky River HU: Total Phosphorus concentrations tended to be higher than in the rest of the HUs.

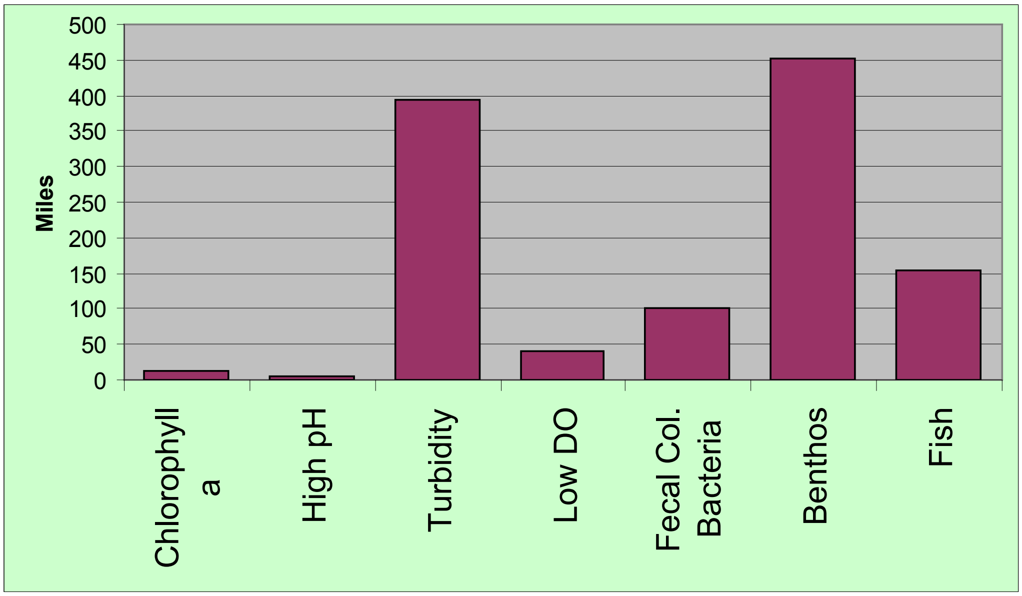
SIGNIFICANT ISSUES

WATER QUALITY STRESSORS & SOURCES

Rivers and Streams

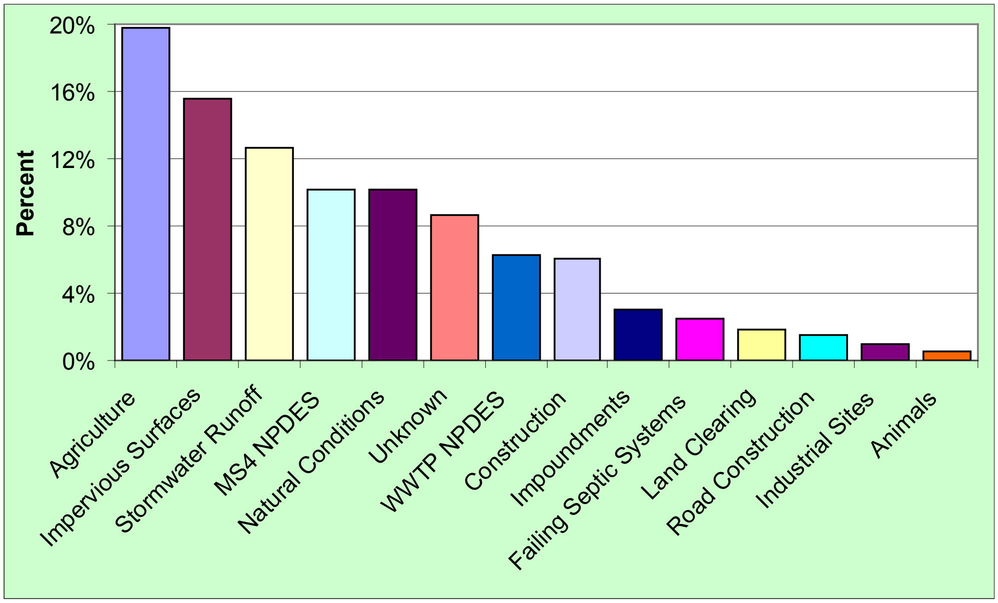
Stressors are indicators or parameters that may cause water quality degradation. Twenty-six percent of stream impairments are based on poor biological integrity measured by aquatic macroinvertebrates and fish communities, turbidity violations account for 19 percent, low dissolved oxygen levels six percent and elevated fecal coliform bacteria four percent. Stream miles impaired by these parameters are indicated in Figure 3.

Figure 3. Stream Monitored Parameters



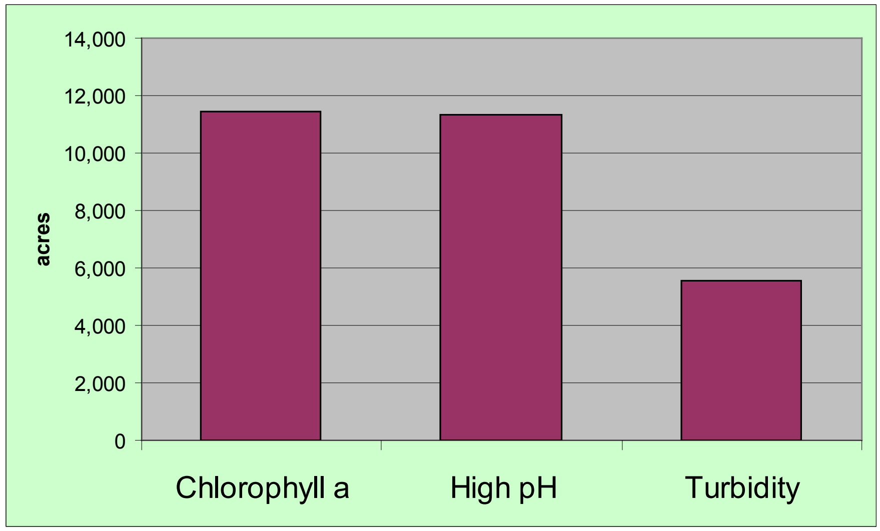
When evaluating water quality stressors, DWQ evaluates and identifies the source of the stressor as specifically as possible depending on the amount of information available for that particular watershed. ***Sources*** are most often associated with the predominant land use where the altered hydrology is able to easily deliver the water quality stressor to the waterbody. Factors that contribute to habitat degradation include increased impervious surfaces, sedimentation and erosion from construction, general agriculture, and other land disturbing activities. Sources identified as contributing to water quality degradation in the Yadkin- Pee Dee River basin are found in Figure 4.

Figure 4. Identified Sources Contributing to Water Quality Degradation in Streams



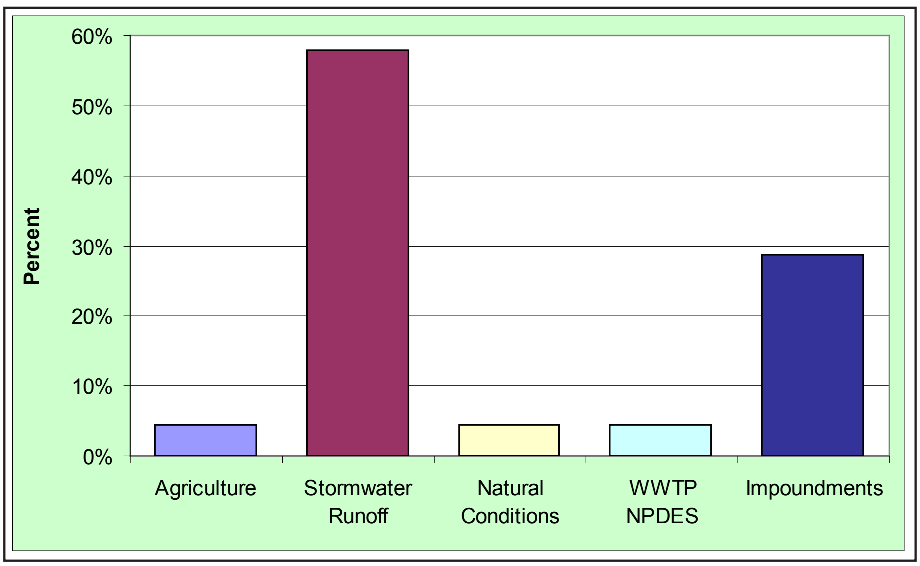
Lakes and Reservoirs

Figure 5. Lake Impaired Parameters



For lakes and reservoirs in the Yadkin-Pee Dee River basin, nutrient overenrichment is the largest stressor as evidenced by the high percentage of waters impacted by high chlorophyll a levels and high pH (Figure 5). Turbidity and temperature were the next most common stressors to these lake and reservoir systems. Stormwater is the predominant stressor source for lakes and reservoirs in the Yadkin- Pee Dee River basin (Figure 6). Stormwater is the flow of water that results from precipitation and usually occurs immediately following a rainfall. Common stormwater pollutants include sediment, nutrients, organic matter, bacteria, oil and grease, and toxic substances (i.e., metals, pesticides, herbicides, hydrocarbons). Stormwater can also impact the temperature of a surface waterbody, which can affect the water's ability to support healthy aquatic communities.

Figure 6. Identified Sources Contributing to Water Quality Degradation in Lakes



Nutrients

Nutrients are significantly impacting lakes throughout the basin as evidenced by algal productivity. Most impoundments in the piedmont are sensitive to nutrient inputs and are unable to effectively assimilate the nutrient loads exported from developed and agricultural areas, as well as wastewater discharges. Most of the lakes sampled by DWQ during this assessment cycle showed evidence of nutrient overenrichment (Table 1). Nutrient overenrichment can result in algal blooms that deplete oxygen, kill fish and create taste and odor problems in drinking water. A detailed sampling report of these Lakes and Reservoirs is available from DWQ's Environmental Sciences Section: ***http://h2o.enr.state.nc.us/esb/Basinwide/YadkinLakes2006v7.pdf***.

Table 1. Impoundments with Indications of Nutrient Overenrichment

Waterbody	
High Rock Lake	Lake Fisher
Salem Lake	Lake Concord
Lake Thom-a-lex	Lake Lee
Tuckertown Reservoir	Lake Monroe
Back Creek Lake	Lake Twitty
Bunch lake	City Pond (Wadesboro Lake)

Fecal Coliform

Fecal coliform concentrations peaked during the 2003 rains and have since decreased. Significant decreases are present in the Yadkin River headwaters, South Yadkin River, High Rock Lake, and Lake Tillery HUs. Concentrations appear to be increasing in the Rocky River HU. While fecal coliform concentrations appear to be decreasing in many HUs, many samples in all HUs were well above the 400 colonies/ml maximum limit.

Turbidity

The distribution of turbidity violations and sample locations make it difficult to isolate a single source of erosion in the Yadkin River headwaters. It appears, however, violations are highest in the Yadkin River mainstem, agricultural areas, and transitional suburban areas. Violations are lowest in the upper watershed where land use is predominantly forest. This observation exemplifies the utility of ***stream buffers and natural areas***.

Figure 7 depicts the distribution of fecal coliform and turbidity standards violations within the Yadkin-Pee Dee River basin. For the most part, elevated concentrations of one are associated with elevated concentrations of the other and are found in some of the more developed areas of the basin.

Figure 8 shows the percent of samples per year that exceeded 50 NTUs for all ambient stations in the entire Yadkin- Pee Dee Basin between 1997-2007. High rainfall events in 2003 clearly result in increased turbidity impairments.

See: ***Yadkin Ambient Monitoring System Report*** and ***Yadkin Basinwide Assessments*** for detailed sample results and discussion.

Figure 7. Water Quality Violations

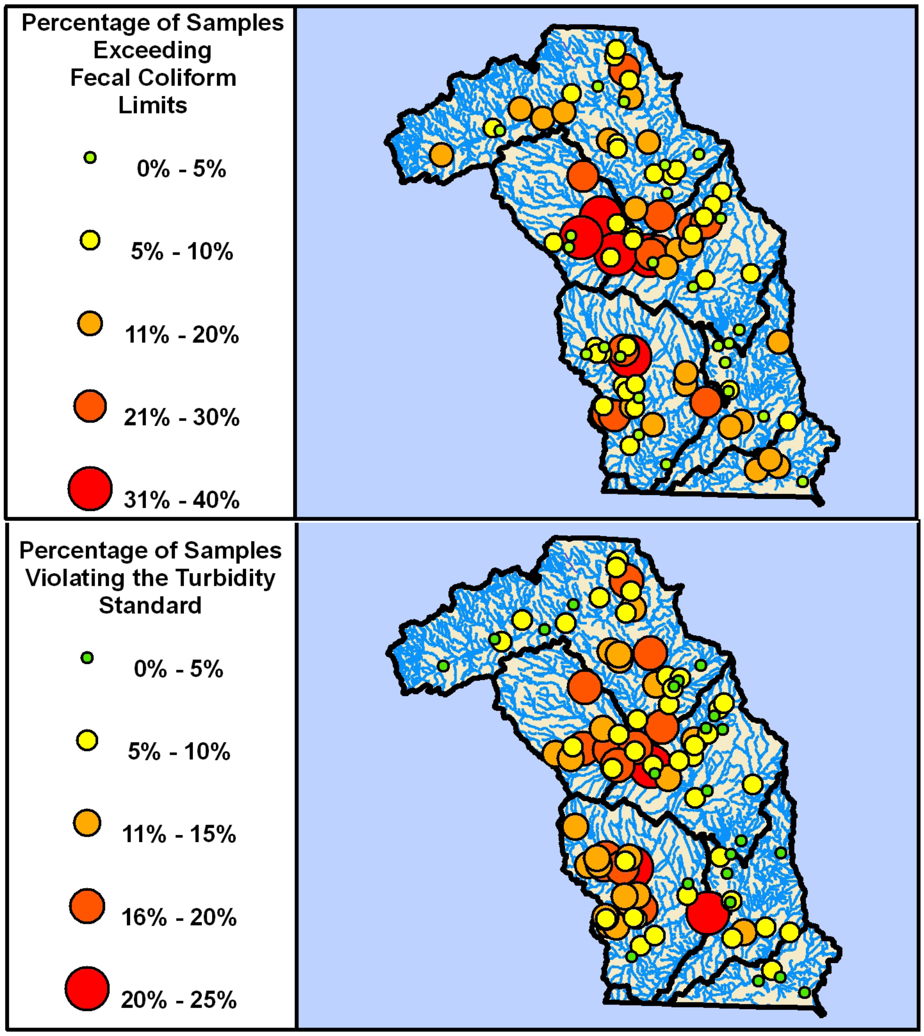
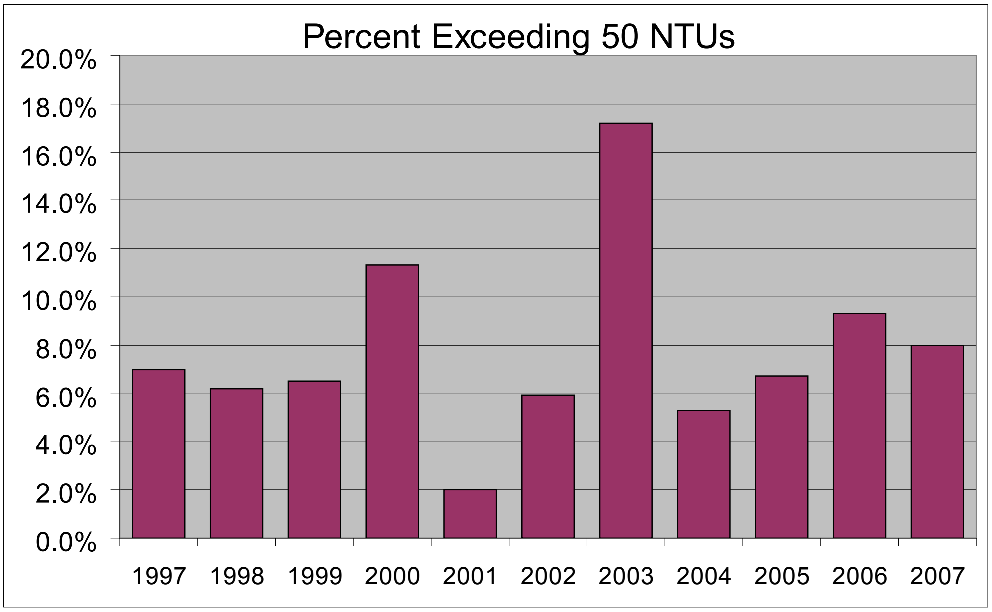


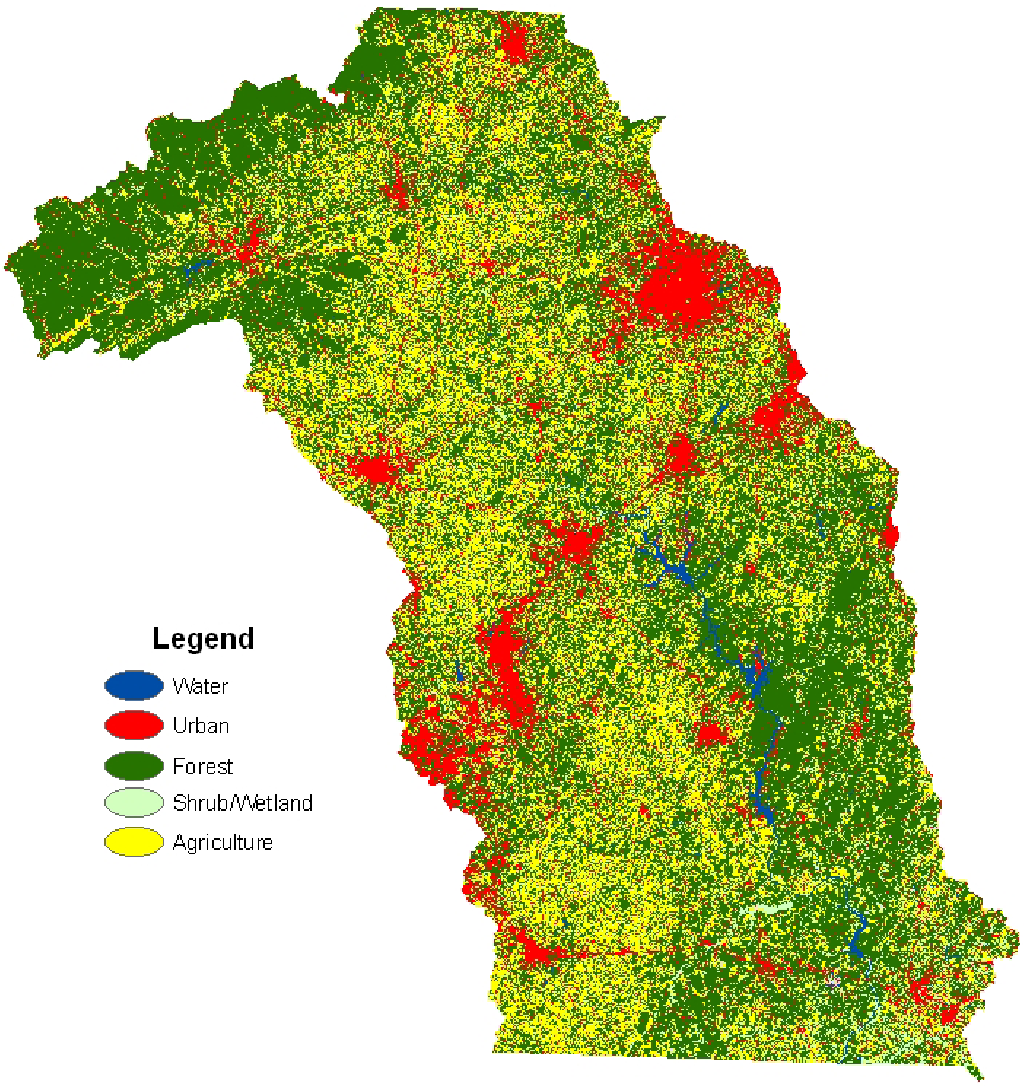
Figure 8. Turbidity Comparison



POPULATION AND LAND USE

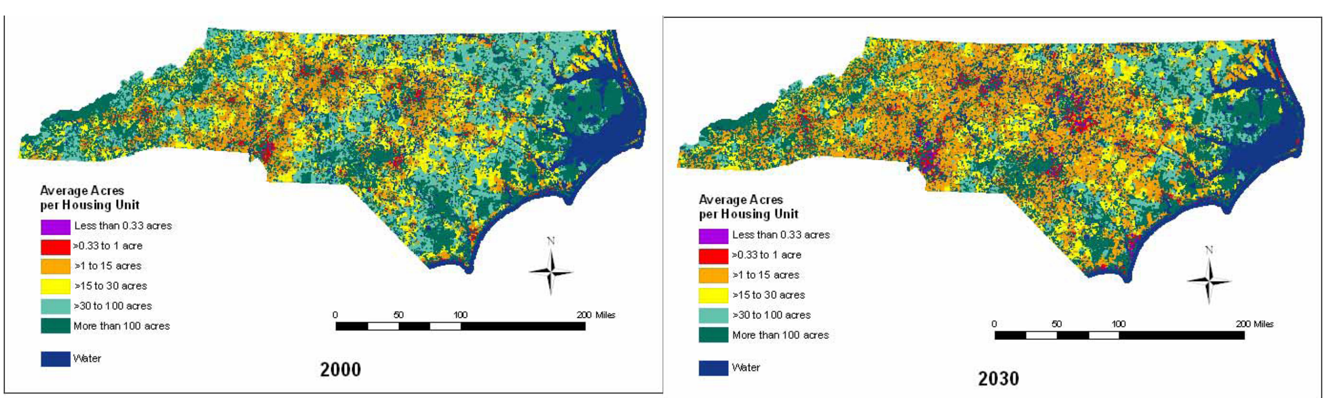
Population distribution and land use patterns are highly variable in the Yadkin-Pee Dee River Basin. Land use varies from generally undisturbed in the western highlands to decidedly urban in the central portion of the watershed along the I-85 and I-40 corridors. The population distribution closely follows this pattern (Figure 9 & Figure 10).

Figure 9. Land Cover



* USGS 2003, National Land Cover Database Zone 60 Land Cover Layer

Figure 10. NC Housing Density Comparison 2000 vs. 2030



* Maps provided by Conservation Trust for North Carolina http://www.ctnc.org

HIGH QUALITY WATERSHEDS AT A CROSSROADS

Stream degradation in this river basin closely follows population density and land use patterns. Degradation is more common in agriculture areas than in forested headwaters and most concentrated in urban areas.   However, this pattern may be changing as new development pressure, in the form of secluded resort communities and low-density second home developments, increases in the forested headwaters. Many of these developments are sited in designated High Quality and Outstanding Resource Watersheds ***(HQW/ORW)***.

One of the largest residential/resort communities in North Carolina is currently under construction in the Elk Creek ORW. Because ORW watersheds usually occur in historically rural and undisturbed areas, the long-term ability of the management strategies to maintain ORW status in the face of these new developments remains untested.

Research suggests that streams begin to degrade when watershed imperviousness reaches ten percent of the total land area. The ORW management strategy, however, allows for much higher densities provided the development treats the first inch of rainfall. The management strategy also requires enhanced sediment and erosion control and, in some cases, a 30-foot stream buffer. The management strategy does not restrict the number of developments or homes that may be constructed in a watershed. It is unclear if these restrictions are sufficient to maintain excellent water quality as development and cumulative imperviousness increases.   New research that accurately projects development scenarios and their impact on water quality is needed in the short term.

INTERSECTING WATER QUALITY WITH WATER QUANTITY

Recent droughts in North Carolina have raised significant concern about long term water availability for human uses. Efforts are underway to study and update North Carolina's water supply laws and raise local water supply resistance to future droughts. These efforts will lead to inevitable alterations in stream flow, and thus directly impact water quality. Impacts to water quality and biological integrity must be fully examined in these planning efforts.

The Rocky River Watershed (HUC 03040105), in the southwestern portion of the basin, is one of the first regions in North Carolina forced to find the difficult balance between clean and reliable drinking water, healthy streams, and rapid urbanization. From Mooresville in the north to Monroe in the south, most of the suburban communities around Charlotte depend in some way on the ecological services provided by the Rocky River and are facing strong development pressure.

With the growing population come additional demands for drinking water supply and wastewater assimilative capacity. Solutions for one of these will directly impact the other. For example, the stream flow volume altered by new interbasin transfers will alter the calculations used to derive wastewater discharge permit limits. In another possible scenario, access to additional water withdrawals by an upstream community may be restricted because downstream discharges require a certain flow to remain in permit compliance. The complexity of this system requires close coordination between DWQ and the Divisions of Water Resources (DWR) and Environmental Health (DEH) if a sustainable solution is to be derived.

COORDINATING STREAM RESTORATION AND PROTECTION EFFORTS

Sixty-three waterbodies in the Yadkin-Pee Dee River basin are impaired (Appendix A) and more streams are added during each new assessment. Population growth and associated land use changes, higher water consumption, greater wastewater production, and stormwater runoff are major contributors to these impairments. The protection and restoration of streams is a multi-agency effort, requiring various levels of resources and expertise. North Carolina has shown great leadership by dedicating funding for water quality protection and restoration through several trust funds. Additionally, a broad network of local governments, conservation trusts, and other nonprofit organizations support stream protection and restoration at the local level. Despite these accomplishments, many water quality improvement efforts lack adequate resources resulting in management that may be under-coordinated and inefficient.

Tighter coordination between organizations involved in restoration and protection of surface waters will lead to expeditious and cost-effective projects. Specifically, common program goals and watersheds with the potential to meet these goals should be identified. These watersheds should be prioritized and a concerted effort to focus each organization's technical specialties should be undertaken. By focusing resources and spreading the burden between organizations restoration projects will proceed more efficiently. DWQ has initiated an effort to bring the state organizations together for the purpose of identifying common goals and mandates. Encouragement from DENR management and partnerships with local organizations will go a long way towards advancing this effort and lead to new restoration synergy.

Currently, multiple state and local agencies are actively involved in restoration efforts in Ararat River and Grants, Coddle, Goose and Crooked Creeks' watersheds. Specific information regarding each of these efforts is detailed in its own ***subbasin/watershed report***. As information and resources become available these reports will be updated to assist in coordination and tracking activities.

TOTAL MAXIMUM DAILY LOADS (TMDL)

A ***Total Maximum Daily Load*** (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. This includes an allocation of that amount to the pollutant's sources and a margin of safety. A TMDL includes a detailed water quality assessment that can provide the scientific foundation for a restoration implementation plan. However, under the Federal Clean Water Act there is no requirement to develop an implementation plan. Therefore, a TMDL by itself can only identify controls to point sources since the allocation estimates are used for development of discharger permit limits. DWQ is supporting local development and implementation of management strategies to address nonpoint sources in these watersheds.

TMDLs have been completed in the basin for the waters listed in Table 2. A management strategy including rules is under development for Goose Creek. More information on Goose Creek is available at ***http://h2o.enr.state.nc.us/csu/GooseCreek.html***.

High Rock Lake TMDL

DWQ has initiated a TMDL development process for High Rock Lake due to violations of the turbidity and chlorophyll a standards. Turbidity and sedimentation are significant water quality issues in the Yadkin River Headwaters. The sediment generated in the Yadkin River Headwaters contributes directly to the water quality impairment observed in High Rock Lake. In addition to sediment, runoff from the landscape delivers substantial nutrients to High Rock Lake that lead to chlorophyll a violations. Residents and government agencies in the Yadkin River Headwaters are active in the TMDL development process for the lake and will be working together to implement point and nonpoint source pollution reduction strategies.

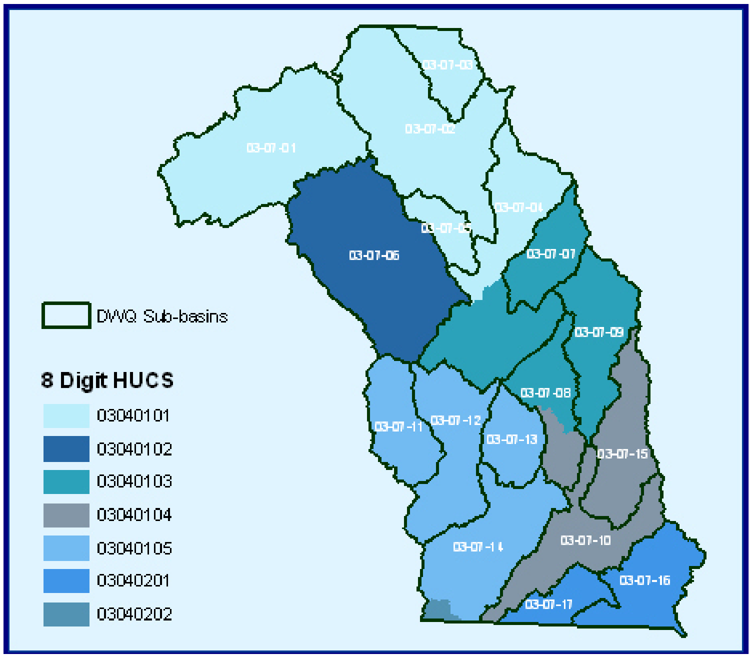
Table 2: Finalized TMDLs in the Yadkin - Pee Dee River Basin

Waterbody	Pollutant	Link	Final TMDL Date
Elk Creek	Fecal Coliform	***Final TMDL***	Feb. 20, 2008
McKee and Clear Creeks	Fecal Coliform	***Final TMDL***	Aug. 1, 2003
Rocky River	Fecal Coliform	***Final TMDL***	Sept. 19, 2002
Grants Creek	Fecal Coliform	***Final TMDL***	Sept. 27, 2002
Fourth Creek	Fecal Coliform	***Final TMDL***	Dec. 19, 2001
Rich Fork and Hamby Creeks	Fecal Coliform	***Final TMDL***	Apr. 28, 2004
Fourth Creek	Turbidity	***Final TMDL***	Nov. 22, 2004
Goose Creek	Fecal Coliform	***Final TMDL***	July 8, 2005
Grants Creek	Turbidity	***Final TMDL***	Sept. 25, 2006
Salem Creek	Fecal Coliform	***Final TMDL***	Sept. 25, 2006

RIVER BASIN HYDROLOGIC UNITS

The Yadkin River basin covers over 7,000 square miles. Many management strategies a more appropriate to smaller land areas. Therefore the basin is divided into smaller watersheds based on major drainages. Under the federal system, the Yadkin River basin is made up of hydrologic areas referred to as cataloging units (USGS 8-digit hydrologic units). Cataloging units ar further divided into smaller watershed units (10 and 12-digit hydrologic units or local watersheds) that are used for smaller scale planning. Historically, DWQ has used its own 6-digit watershed numbering system but is migrating to the federal system for consistency. A comparative map of the different systems is show in Figure 11.

Figure 11. Yadkin-Pee Dee River Basin Hydrologic Divisions



RECOMMENDATIONS

WATER QUALITY STRESSORS: HABITAT DEGRADATION, TURBIDITY, FECAL COLIFORM & NUTRIENTS

- Encourage and support implementation of Best Management Practices, Sediment & Erosion Control Local Programs and Local Stormwater Control Ordinances.
- Support research to determine the contribution of human accelerated erosion sources vs. natural processes.
- Develop watershed restoration plans for through federal, state and local stakeholder initiatives.
- Collect sufficient samples at locations with elevated fecal coliform bacteria counts prioritized such that those sites classified for organized swimming (B) are addressed first to allow complete use support determinations.
- Use High Rock Lake restoration efforts and research to direct nutrient management strategies in the upper basin.

HIGH QUALITY WATERS

- Conduct a comprehensive review of the North Carolina's High Quality Waters management strategy to determine how it is working and where it needs to be adjusted.
- Support new research that accurately projects development scenarios and their impact on water quality.

COORDINATED EFFORTS

- Evaluate the need for basinwide sediment, buffer and stormwater management programs with appropriate agency partners.
- In partnership with Division of Water Resources, assess water supply and assimilative capacity in the Rocky River watershed with the goal of deriving a sustainable solution to the area's water supply and wastewater concerns.
- Continue support of the Yadkin-Pee Dee River Basin Association's monitoring efforts.
- Continue support of the restoration projects within the basin and pursue opportunities to develop partnerships and restoration activities in other impaired watersheds.

11

Appendix A. Impaired Waterbodies in Yadkin Pee-Dee River Basin because of Standard Violations or Exceeded Biological Criteria

AU Number	HUC (Watershed Boundary #)	Name	Class	Parameter of Interest
12-(1)	03040101	Yadkin River	C;Tr	Turbidity
12-(80.7)	03040101	Yadkin River	WS-IV	Turbidity
12-(86.7)	03040101	Yadkin River	WS-IV	Turbidity
12-(97.5)	03040101	Yadkin River	WS-IV;CA	Turbidity
12-102-13-(2)	03040101	Cedar Creek	C	Fish
12-24-(10)	03040101	Elk Creek	B;ORW	Recreation- Fecal Coliform Bacteria
12-42-9	03040101	Long Creek	C	Benthos
12-46	03040101	Roaring River	B	Recreation- Fecal Coliform Bacteria
12-63-14	03040101	Cody Creek	C	Turbidity
12-63-5-(3)	03040101	Endicott Creek (Branch)	WS-II; Tr,HQW	Benthos
12-72-(18)	03040101	Ararat River	WS-IV	Turbidity
12-72-(4.5)b	03040101	Ararat River	C	Turbidity
12-72-14-5b	03040101	Heatherly Creek	C	Benthos
12-72-8-(3)	03040101	Lovills Creek (Lovell Creek)	C	Benthos
12-84-1-(0.5)	03040101	North Deep Creek	C	Turbidity
12-84-2-(5.5)	03040101	South Deep Creek	WS-IV	Turbidity
12-94-(0.5)a	03040101	Muddy Creek	C	Benthos
12-94-(0.5)b	03040101	Muddy Creek	C	Benthos
12-94-12-(4)	03040101	Salem Creek (Middle Fork Muddy Creek)	C	Benthos, Recreation- Fecal Coliform Bacteria
12-108-(14.5)	03040102	South Yadkin River	WS-IV	Turbidity
12-108-(19.5)b	03040102	South Yadkin River	C	Turbidity
12-108-16-(0.5)	03040102	Hunting Creek	WS-III	Turbidity
12-108-18-(3)	03040102	Bear Creek	WS-IV	Fish
12-108-20-4a	03040102	Third Creek	C	Turbidity
12-108-20-4b	03040102	Third Creek	C	Fish, Turbidity
12-108-20a1	03040102	Fourth Creek	C	Fish
12-108-20a3	03040102	Fourth Creek	C	Turbidity, Benthos, Fish, Recreation- Fecal C. Bacteria
12-108-20c	03040102	Fourth Creek	C	Fish
12-108-21b	03040102	Second Creek (North Second Creek)	C	Turbidity
12-108-9-(0.6)	03040102	Snow Creek	WS-IV	Fish
12-(108.5)b	03040103	Yadkin River (upper portion of High Rock Lake below normal operating level)	WS-V	Turbidity, High pH, Chlorophyll a
12-(114)	03040103	Yadkin River (including lower portion of High Rock Lake)	WS-IV,B	Chlorophyll a, High pH
12-(124.5)a	03040103	Yadkin River (including lower portion of High Rock Lake)	WS-IV,B;CA	Chlorophyll a, High pH
12-110b	03040103	Grants Creek	C	Turbidity, Recreation- Fecal Coliform Bacteria
12-113	03040103	Swearing Creek	C	Fish
12-115-3	03040103	Town Creek	C	Benthos, Fish
12-117-(3)	03040103	Second Creek Arm of High Rock Lake	WS-IV,B	Chlorophyll a, High pH
12-118.5a	03040103	Abbotts Creek Arm of High Rock Lake	WS-V,B	Chlorophyll a
12-118.5b	03040103	Abbotts Creek Arm of High Rock Lake	WS-V,B	Chlorophyll a, Turbidity, High pH
12-119-(1)	03040103	Abbotts Creek	WS-III	Fish
12-119-(6)a	03040103	Abbotts Creek	C	Turbidity, Benthos
12-119-(6)b	03040103	Abbotts Creek	C	Benthos
12-119-7-3	03040103	Hunts Fork	C	Benthos
12-119-7-4	03040103	Hamby Creek	C	Benthos
12-119-7-4-1	03040103	North Hamby Creek	C	Benthos

AU Number	HUC (Watershed Boundary #)	Name	Class	Parameter of Interest
12-119-7a	03040103	Rich Fork	C	Recreation- Fecal Coliform Bacteria
12-119-7b	03040103	Rich Fork	C	Fish
12-126-(3)	03040103	Lick Creek	WS-IV	Benthos
12-126-(4)	03040103	Lick Creek	WS-IV;CA	Benthos
13-(15.5)b	03040104	Pee Dee River	WS-V,B	Turbidity
13-(34)a	03040104	Pee Dee River	C	Mercury
13-20b	03040104	Brown Creek	C	Low DO, Benthos
13-5-1-(1)	03040104	Little Mountain Creek	C	Benthos
13-5-1-(2)	03040104	Little Mountain Creek	WS-IV	Benthos
13-17-17	03040105	Clear Creek	C	Turbidity
13-17-18-3	03040105	Duck Creek	C	Benthos
13-17-18a	03040105	Goose Creek	C	Recreation- Fecal Coliform Bacteria
13-17-18b	03040105	Goose Creek	C	Benthos, Recreation- Fecal Coliform Bacteria
13-17-2	03040105	Dye Creek (Branch)	C	Benthos
13-17-20-1	03040105	North Fork Crooked Creek	C	Turbidity, Benthos
13-17-20-2a	03040105	South Fork Crooked Creek	C	Fish, Benthos
13-17-20-2b	03040105	South Fork Crooked Creek	C	Benthos
13-17-31-1	03040105	Little Long Creek	C	Benthos
13-17-36-(3.5)	03040105	Richardson Creek (Lake Lee)	WS-IV;CA	Chlorophyll a
13-17-36-(5)a1a	03040105	Richardson Creek	C	Turbidity, Benthos
13-17-36-(5)a1b	03040105	Richardson Creek	C	Benthos
13-17-36-4-(0.5)	03040105	Little Richardson Creek (Lake Monroe)	WS-IV	Chlorophyll a
13-17-36-4-(2)	03040105	Little Richardson Creek (Lake Monroe)	WS-IV;CA	Chlorophyll a
13-17-36-9-(1)	03040105	Stewarts Creek	WS-III	Benthos
13-17-36-9-(4.5)	03040105	Stewarts Creek (Lake Twitty/L. Stewart)	WS-III;CA	Chlorophyll a
13-17-4	03040105	Clarke Creek	C	Fish
13-17-40-(1)	03040105	Lanes Creek	WS-V	Benthos
13-17-40-(12)	03040105	Lanes Creek	C	Benthos
13-17-40-11	03040105	Beaverdam Creek	WS-V	Low DO
13-17-5-2	03040105	Clarks Creek	C	Benthos
13-17-5-3	03040105	Doby Creek	C	Benthos
13-17-5-4	03040105	Toby Creek	C	Benthos
13-17-5-5	03040105	Stony Creek	C	Benthos
13-17-5b	03040105	Mallard Creek	C	Turbidity, Benthos
13-17-6-(0.5)	03040105	Coddle Creek	WS-II; HQW	Fish
13-17-6-(5.5)	03040105	Coddle Creek	C	Turbidity, Benthos
13-17-6-1	03040105	East Fork Coddle Creek	WS-II; HQW	Benthos
13-17-7	03040105	Back Creek	C	Benthos
13-17-8	03040105	Reedy Creek	C	Benthos
13-17-8-4	03040105	McKee Creek	C	Benthos, Recreation- Fecal Coliform Bacteria
13-17-8-5a	03040105	Caldwell Creek	C	Benthos
13-17-9-(2)	03040105	Irish Buffalo Creek	C	Benthos
13-17-9-4-(1.5)	03040105	Cold Water Creek	C	Benthos, Turbidity
13-17a	03040105	Rocky River	C	Turbidity, Benthos, Recreation- Fecal Coliform Bacteria
13-17b	03040105	Rocky River	C	Turbidity, Benthos
13-17c	03040105	Rocky River	C	Turbidity
13-17d	03040105	Rocky River	C	Turbidity
13-39-(1)	03040201	Hitchcock Creek (McKinney Lake, Ledbetter Lake)	WS-III	Mercury
13-45-(2)b	03040201	Marks Creek (Boyds Lake, City Lake, Everetts Lake)	C	Benthos