# Section B: Chapter 8

## Yadkin-Pee Dee River Subbasin 03-07-08

### Includes Yadkin River below High Rock Dam, Lick Creek, Badin Lake, Mountain Creek and Lake Tillery

## 8.1 Water Quality Overview

***Subbasin 03-07-08 at a Glance***

**Land and Water**

| | |
|---|---|
| Total area: | 294 $mi^2$ |
| Stream miles: | 155.0 |
| Lake acres: | 5,048.8 |

**Population Statistics**

| | |
|---|---|
| 1990 Est. Pop.: | 18,811 people |
| Pop. Density: | 68 persons / $mi^2$ |

**Land Cover (%)**

| | |
|---|---|
| Forest / Wetland: | 67.9 |
| Surface Water: | 8.0 |
| Urban: | 0.8 |
| Cultivated Crop: | 2.5 |
| Pasture / Managed Herbaceous: | 20.9 |

This long, relatively narrow subbasin is made up almost entirely of reservoirs in the Yadkin-Pee Dee River below High Rock dam. Tuckertown, Narrows (Badin), Falls and Tillery dams are all contained within its boundaries. Major tributaries that are discussed here include Lick Creek and Mountain Creek. The confluence with the Uwharrie River (subbasin 03-07-09) between Falls and Tillery marks the beginning of the Pee Dee River. Municipalities within the subbasin include Denton, Richfield, Badin and Norwood.

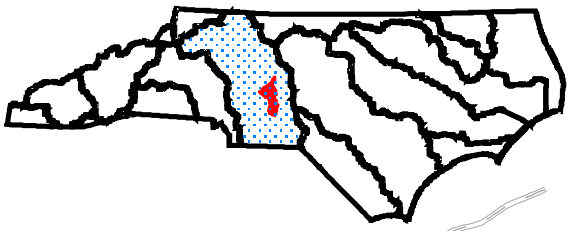
A map including the locations of NPDES discharges and water quality monitoring stations is presented in Figure B-9. Table B-16 contains a summary of monitoring data types, locations and results. Use support ratings for waters in this subbasin are summarized in Table B-17. Appendix I provides a key to discharge identification numbers. Refer to Appendix III for a complete listing of monitored waters and more information about use support ratings.

There is a significant amount of public land in this subbasin, especially when compared with other parts of the Yadkin-Pee Dee River basin. Morrow Mountain State Park is nestled in a large bend of the river between Falls and Tillery. In addition, there are large tracts of the Uwharrie National Forest along the southeastern shoreline of Badin Lake and south beyond where the Uwharrie River enters the Yadkin-Pee Dee.

Public land likely contributes significantly to the 68 percent forested area. A very small portion of the subbasin is characterized as urban and 8 percent is surface water, reflecting two large reservoirs and the riverine environment. The estimated population of the basin and the density are low, although projected population increases range from 21 percent in Stanly County to 25 percent in Davidson County between 2000 and 2020.

There are ten NPDES permitted discharges and one registered animal operation (swine). Although a few discharge violations were reported during this assessment period, most were minor and no facility is currently in significant noncompliance. The capacity for poultry production in this subbasin increased by 50 percent between 1994 and 1998.

# Figure B-9 Yadkin-Pee Dee River Subbasin 03-07-08



DAVIDSON
ROWAN
RANDOLPH
CABARRUS
STANLY
MONTGOMERY
Denton
Gold Hill
Richfield
New London
Badin
Albemarle
Norwood
Tuckertown Reservoir
Badin Lake
Falls Lake
Lake Tillery
Lick Creek
Cabin Creek
Yadkin River
Mountain Little Mtn Cr.
Pee Dee River
NC-109
NC-47
NC-8
NC-49
US-52
NC-740
NC-138
NC-73
B-1
F-1
F-2
B-3
B-2
F-3
Q7150000
103
102
107
93
94
92
85
81
79
80
76
78
77
82
70
69
56
N
W
E
S

**Legend**

- Subbasin Boundary
- Ambient Monitoring Station
- Benthic Station
- Fish Community Station
- Fish Tissue Station

**NPDES Discharges**

- Major
- Minor

**Use Support Rating**

- Supporting
- Impaired
- Not Rated
- No Data

- County Boundary
- Primary Roads
- Municipality

NCDENR

Planning Branch
Basinwide Planning Program Unit
March 21, 2003

5 0 5 Miles

Table B-16 DWQ Monitoring Locations, Bioclassifications and Notable Chemical Parameters (1998-2002) for Yadkin-Pee Dee River Subbasin 03-07-08

| Site | Stream | County | Road | Bioclassification or Noted Parameter[2] |
|---|---|---|---|---|
| ***Benthic Macroinvertebrate Community Monitoring*** | | | | |
| B-1 | Lick Creek[1] | Davidson | NC 8 | Fair |
| B-2 | Mountain Creek[1] | Stanly | SR 1720 | Good-Fair |
| B-3 | Little Mountain Creek[1] | Stanly | SR 1720 | Fair |
| ***Fish Community Monitoring*** | | | | |
| F-1 | Lick Creek[1] | Davidson | NC 8 | Good-Fair |
| F-2 | Cabin Creek[1] | Davidson | SR 2536 | Good |
| F-3 | Mountain Creek[1] | Stanly | SR 1720 | Good-Fair |
| ***Ambient Monitoring*** | | | | |
| Q6120000 | Yadkin River | Rowan/ Davidson | SR 1002 | Dissolved oxygen |
| ***Yadkin-Pee Dee River Basin Association Monitoring*** | | | | |
| Q6360000 | Yadkin River | Rowan/ Davidson | NC 8/49 | None |
| Q6180000 | UT Lick Creek | Davidson | SR 2505 | Dissolved oxygen |
| Q6960000 | Mountain Creek Arm of Lake Tillery | Stanly | SR 1730 | None |
| Q6950000 | Little Mountain Creek | Stanly | SR 1798 | None |
| Q7030000 | Pee Dee River | Stanly/ Montgomery | NC 24/27/73 | None |
| ***Lakes Assessment*** | | | | |
| -- | Tuckertown Reservoir | Rowan/ Davidson | 2 stations | None |
| -- | Badin Lake (Narrows) | Mostly Montgomery | 4 stations | Nutrients |
| -- | Lake Tillery | Stanly/ Montgomery | 4 stations | None |

[1] Historical data of this type are available for this waterbody; refer to Appendix II. Sites may vary.

[2] Parameters are noted if in excess of state standards in more than 10 percent of samples collected within the assessment period (9/1996-8/2001).

Water quality in this subbasin is generally good. However, there are a few problem areas and areas where impacts have been observed. There are no waters classified as High Quality Waters or Outstanding Resource Waters.

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-17 Use Support Ratings Summary (2002) for Monitored and Evaluated Freshwater Streams (miles) and Lakes (acres) in Yadkin-Pee Dee River Subbasin 03-07-08

| Use Support Category | Units | Supporting | Impaired | Not Rated | No Data | Total[1] |
|---|---|---|---|---|---|---|
| **Aquatic Life/Secondary Recreation** | miles | 59.2 | **13.5** | 0.0 | 82.3 | 155.0 |
| | acres | 2,498.8 | **0.0** | 2,550.0 | 0.0 | 5,048.8 |
| **Fish Consumption**[2] | miles | 0.0 | **155.0** | 0.0 | 0.0 | 155.0 |
| | acres | 0.0 | **5,048.8** | 0.0 | 0.0 | 5,048.8 |
| **Primary Recreation** | miles | 5.0 | 0.0 | 0.0 | 9.0 | 14.0 |
| | acres | 5,048.8 | 0.0 | 0.0 | 0.0 | 5,048.8 |
| **Water Supply** | miles | 122.4 | 0.0 | 0.0 | 0.0 | 122.4 |
| | acres | 5,048.8 | 0.0 | 0.0 | 0.0 | 5,048.8 |

[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.

## 8.2 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. Lick Creek and Little Mountain Creek are discussed below.

### 8.2.1 **Lick Creek** (14.6 miles from source to a point 1.0 mile upstream of SR 2501)

*1998 Recommendations*

Streamflow in the Lick 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 biological impairment in 1998. The Town of Denton was pursuing a relocation of its WWTP discharge from an unnamed tributary of Lick Creek into Lick Creek downstream. The basin plan recommends that any new discharges, including the Town of Denton's proposed outfall, should receive advanced tertiary limits for oxygen-consuming wastes. Local efforts to reduce nonpoint source pollution in the watershed are also recommended.

*Status of Progress*

Benthic macroinvertebrate communities in Lick Creek continued to indicate impairment in 2001. The stream had relatively good habitat; however, conductivity was high and dissolved oxygen was slightly low. Approximately 42 percent of samples collected from the unnamed tributary to Lick Creek contained dissolved oxygen concentrations less than 5.0 mg/l; 30 percent were below

4.0 mg/l between June 1998 and August 2001. The Town of Denton WWTP discharge was relocated from the unnamed tributary to Lick Creek mainstem in 2000.

*2002 Recommendations*
DWQ will continue to monitor Lick Creek and the unnamed tributary to Lick Creek to evaluate improvements following the upgrade of the Denton WWTP. However, local actions are needed to reduce the effects of nonpoint source pollution, particularly from agricultural activities in the watershed.

### 8.2.2 Little Mountain Creek (7.0 miles from source to Mountain Creek)

*1998 Recommendations*
Streamflow in the Little Mountain 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 biological impairment in 1998. Low instream dissolved oxygen concentrations had been reported by the Greater Badin WWTP. There were also historical concerns with toxicity in Alcoa stormwater and cooling water discharges to an unnamed tributary of Little Mountain Creek. The 1998 basin plan recommended that any new or expanding discharges to the Little Mountain Creek watershed receive advanced tertiary limits for oxygen-consuming wastes. Local efforts to reduce nonpoint source pollution in the watershed were also recommended.

*Status of Progress*
Benthic macroinvertebrate surveys in Little Mountain Creek continued to indicate impairment in 2001. The stream had relatively good habitat; however, conductivity was high and dissolved oxygen was slightly low. The Alcoa aluminum production facility closed in 2002 and no longer discharges to the Little Mountain Creek watershed.

*2002 Recommendations*
DWQ plans to conduct further investigation into the causes and sources of the biological impairment of Little Mountain 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.

*Water Quality Improvement Initiatives*
The Mountain Creek watershed, including Little Mountain Creek, (03040104 010010) 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.

## 8.3 Status and Recommendations for Newly Impaired Waters

A portion of the Yadkin River is 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.

### 8.3.1 **Yadkin River** (0.8 miles from the dam at High Rock Lake to Cabin Creek)

*1998 Recommendations*
This portion of the Yadkin River was not rated in 1998. The basin plan discusses concerns with low summer dissolved oxygen (DO) levels. Recommendations were for DWQ to further evaluate the situation and coordinate efforts with the Division of Water Resources during the hydropower project relicensing process.

*Current Status*
Approximately 25 percent of samples collected between September 1996 and August 2001 contained DO concentrations that were less than 5.0 mg/l; 10.4 percent were less than 4.0 mg/l. Percent DO saturation is also of concern in this reach of the Yadkin River, as concentrations ranged from 2.5 mg/l to 15.9 mg/l. These problems likely result from deep water (hypolimnetic) releases through the hydropower facility at High Rock Lake.

Alcoa held an informational meeting with DWQ and DWR staff in 2002 to discuss the process and projected timeline (2002-2006) for upcoming relicensing of the Yadkin Division of APGI hydropower project. This project includes High Rock, Tuckertown, Badin (Narrows) and Falls dams and reservoirs. Alcoa has already done one large water quality study of the project area that also documents the problem with dissolved oxygen at this location.

*2002 Recommendations*
DWQ will work with Yadkin Division of APGI to improve water quality below High Rock dam during the hydropower relicensing process. In addition to the license application, Alcoa must also obtain a 401 Water Quality Certification for the project. DWQ will ensure, through the 401 Water Quality Certification review, that project operations will not result in violations of water quality standards.

## 8.4 Section 303(d) Listed Waters

Currently, portions of three waters in this subbasin are on the state's draft 2002 303(d) list for biological impairment: Lick Creek, UT to Lick Creek, and Little Mountain Creek. A portion of the Yadkin River below High Rock Lake will likely be added to the list for low dissolved oxygen in the future. Refer to Appendix IV for more information on the state's 303(d) list and listing requirements.

## 8.5 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.

### 8.5.1 Mountain Creek

Concerns about low dissolved oxygen in the Mountain Creek Arm of Lake Tillery are discussed in the 1998 Yadkin-Pee Dee River basin plan. The stream was not rated and recommendations were to further investigate the problem.

Mountain Creek is currently rated Supporting. Benthic macroinvertebrate and fish communities received Good-Fair bioclassifications in 2001. Although in 1996 the communities received Good bioclassifications, no real decline was detected and the drop in score was attributed to low flows as a result of the extended drought. Water chemistry samples collected from the Mountain Creek Arm of Lake Tillery over the most recent assessment period show only a few samples (<5 percent) that are slightly below the water quality standard.

Lake Tillery is part of a Carolina Power and Light (CP&L) hydropower project that will also be undergoing relicensing between 2002 and 2006. DWQ will work with CP&L to better evaluate water quality in the Mountain Creek Arm of Lake Tillery during the hydropower relicensing process. In addition to the license application, CP&L must also obtain a 401 Water Quality Certification for the project. DWQ will ensure, through the 401 Water Quality Certification review, that project operations will not result in violations of water quality standards.

*Water Quality Improvement Initiatives*

The Mountain Creek watershed, including Little Mountain Creek, (03040104 010010) 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.

### 8.5.2 Badin Lake

Badin Lake has been monitored 13 times by DWQ since 1981. Nutrient enrichment, particularly in the arms, has been an ongoing concern. Potential sources of nutrient loading to Badin Lake include development in the immediate watershed and inflow of nutrient-rich water from High Rock Lake upstream. The Fayetteville Regional Office of DWQ received public complaints regarding fish kills and poor water quality conditions in Badin Lake in 2000 and 2001. Fish kills have involved striped bass, sunfish and catfish.

In May and June 2001, a nuisance blue-green algae, which forms thick fibrous mats and is generally an indicator of nutrient-rich water, was observed at a lakes monitoring station on the lower end of the lake. These algae are already a problem in South Carolina waters and appear to be expanding their range in North Carolina, taking advantage of lower water levels and high nutrient concentrations.

The Intensive Survey Unit and Fayetteville Regional Office of DWQ conducted an intensive water quality survey of Badin Lake in 2002 to better document water quality conditions. Data indicate that the productivity of Badin Lake was similar in 2002 to previous years. The fish kills of 2000 and 2001 appear to have been the culmination of stress due to an inadequate food supply (threadfin shad), along with elevated water temperatures and dissolved oxygen concentrations. Elevated nutrient and supersaturated dissolved oxygen concentrations were again observed in 2002; however, no fish kills were observed or reported. Percent DO saturation ranged from 118.5 to 138.5 in the Yadkin River arm of the lake (NCDENR-DWQ, November 8, 2002). These concentrations indicate impairment.

Badin Lake is part of the Yadkin Division of APGI Hydropower project that also includes High Rock and Tuckertown dams/reservoirs upstream and Falls dam downstream. As part of the initial relicensing process, Alcoa prepared and implemented a Shoreline Management Plan to protect shoreline habitat and water quality around the reservoir. Badin Lake was also included in the initial water quality study which was completed by Alcoa in 2002.

DWQ will work with Yadkin Division of APGI to improve water quality in Badin Lake during the hydropower relicensing process. In to the license application, Alcoa must also obtain a 401 Water Quality Certification for the project. DWQ will ensure, through the 401 Water Quality Certification review, that project operations will not result in violations of water quality standards. A nutrient reduction strategy for the immediate watershed is needed in order to protect the aquatic life communities of Badin Lake from becoming impaired.

## 8.6 Additional Water Quality Issues within Subbasin 03-07-08

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.

### 8.6.1 Projected Population Growth

From 2000 to 2020, the estimated population increase for Davidson County is 25 percent, Montgomery – 24 percent, and Stanly – 21 percent. Growth management within the next five years will be imperative, especially around Badin Lake 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.