

Chapter 3 -

Catawba River Subbasin 03-08-32

Includes the Little Rivers, Lake Hickory, Lookout Shoals Lake and Lake Norman

3.1 Water Quality Overview

Subbasin 03-08-32 at a Glance

Land and Water Area (sq. mi.)

Total area:	706
Land area:	647
Water area:	59

Population Statistics

1990 Est. Pop.:	151,979 people
Pop. Density:	235 persons/mi ²

Land Cover (%)

Forest/Wetland:	54%
Surface Water:	9%
Urban:	3%
Cultivated Crop:	3%
Pasture/ Managed Herbaceous:	31%

Use Support Ratings:

Freshwater Streams:

Fully Supporting:	341.3 mi.
Fully Supporting but Threatened:	121.0 mi.
Partially Supporting:	0.0 mi.
Not Supporting:	0.0 mi.
Not Rated:	19.8 mi.

Lakes:

Lake Hickory - Fully Supporting
Lookout Shoals Lake - Fully Supporting
Lake Norman - Fully Supporting

This subbasin contains portions of the cities of Hickory, Conover and Newton. Highly erodible soils and moderate gradients contribute to the large amounts of sediment in the Little Rivers (Upper, Middle and Lower) and their tributaries. A map of this subbasin including water quality sampling locations is presented in Figure B-3. Biological ratings for these sample locations are presented in Table B-3.

Biological data showed a Good or Good-Fair rating for all monitored streams in this subbasin except for a section of Lower Little River, which received a Fair rating for fish sampling. Using macroinvertebrate data, water quality only changed in one stream since 1992: Middle Little River declined from Good to Good-Fair.

Fish tissue samples were collected from four stations within the subbasin: Middle Little River, Lake Hickory, Lookout Shoals Lake and Lake Norman. Metals results from all sites were below FDA and EPA criteria. The lake sites were also analyzed for chlorinated pesticides and PCBs with no organic analytes detected.

Twenty facilities in this subbasin currently monitor effluent toxicity under their NPDES permit.

Biological and chemical monitoring data are used to develop use support ratings. These ratings are used to prioritize DWQ activities towards protecting and restoring waters in the basin. There are no impaired waters in this subbasin based on the most recent use support assessment. However, there are some streams that are impacted by

nonpoint sources of pollution. Refer to Appendix III for a complete listing of monitored waters and use support ratings.

Catawba 030832

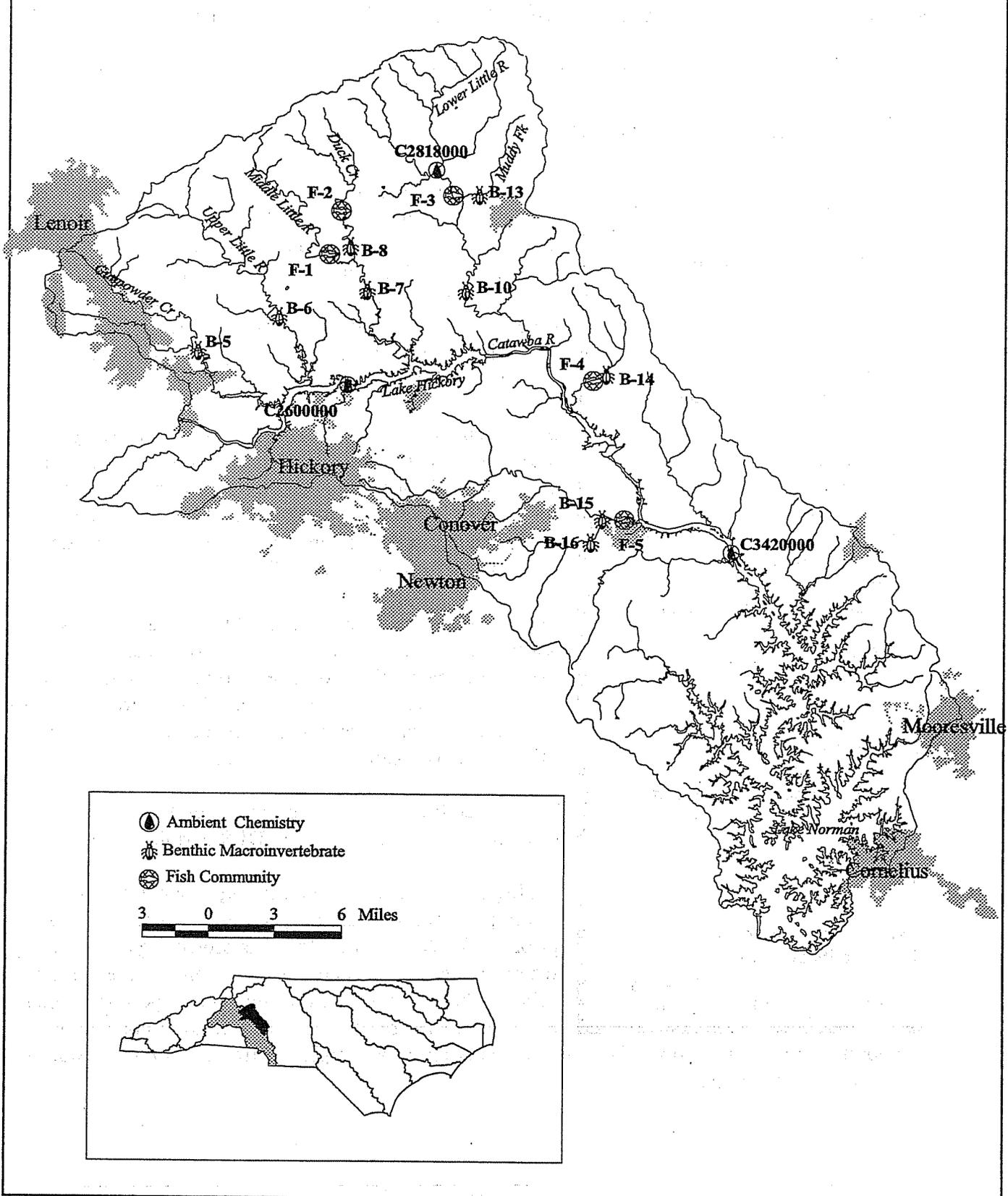


Figure B-3 Sampling Locations within Subbasin 03-08-32

Table B-3 Biological Assessment Sites in Catawba River Subbasin 03-08-32 (1997)

Site	Stream	County	Road	Rating
B-5	Gunpowder Creek	Caldwell	SR 1002	Good-Fair
B-6	Upper Little River	Caldwell	SR 1744	Good
B-7	Middle Little River	Alexander	SR 1153	Good-Fair
B-8	Duck Creek	Alexander	NC 127	Good-Fair
B-10	Lower Little River	Alexander	SR 1131	Good
B-13	Muddy Fork	Alexander	SR 1313	Good-Fair
B-14	Elk Shoal Creek	Alexander	SR 1605	Good-Fair
B-15	Lyle Creek	Catawba	NC 64/70	Good
B-16	McLin Creek	Catawba	SR 1722	Good
F-1	Middle Little River	Alexander	SR 1002	Fair
F-2	Duck Creek	Alexander	NC 90	Good-Fair
F-3	Lower Little River	Alexander	SR 1318	Fair
F-4	Elk Shoal Creek	Alexander	SR 1605	Good-Fair
F-5	Lyle Creek	Catawba	US 70	Good-Fair
F-6	Buffalo Shoals Creek	Iredell	SR 1503	Good-Fair

Key:

B = Benthic Macroinvertebrate Sites

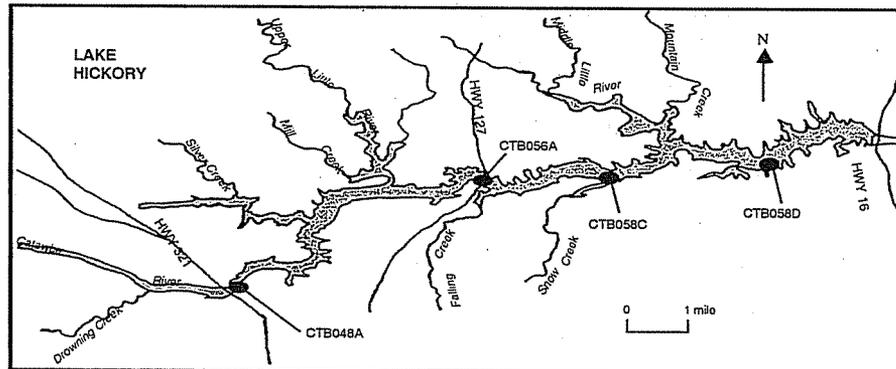
F = Fish Sites

Lake Hickory Assessment

COUNTY:	Alexander/Catawba/Burke	CLASSIFICATION:	WS-V, WS-IV B CA
SURFACE AREA:	4100 acres (1659 hectares)	MEAN DEPTH:	33 feet (10 meters)
VOLUME:	17 x10 ⁶ m ³	WATERSHED:	1310 mi ² (3393 km ²)
SHORELINE:	105 miles	RETENTION TIME:	33 days

Lake Hickory is a run-of-river impoundment located between Lake Rhodhiss and Lookout Shoals Lake on the Catawba River. The lake was filled in 1928. Approximately half of the drainage area is forested and another one-third is agricultural. The major tributaries into Lake Hickory are the Catawba River, Middle Little River and Gunpowder Creek. The lake is owned by Duke Energy, and the waters of the lake are used to generate hydroelectric power and for recreational purposes. Lake Hickory is classified from the Rhodhiss Dam to the US Highway 321 bridge on the Catawba River as WS-IV B CA and from the US Highway 321 bridge to Oxford Dam as WS-V and Class B.

Lake Hickory was sampled by Duke Energy in June, July and August 1997. Lake Hickory was determined to be mesotrophic in June and July and oligotrophic in August. Lake Hickory was previously sampled by DWQ in 1981-1985 and 1992 and was found to be eutrophic.



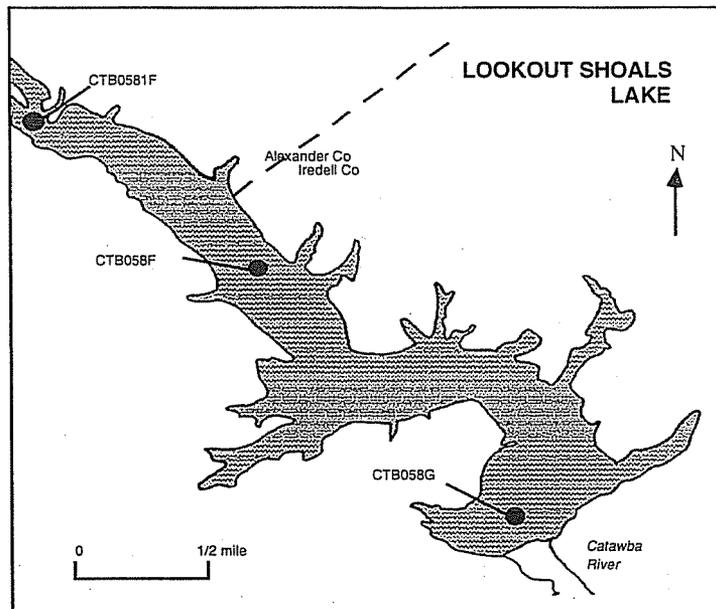
Lookout Shoals Assessment

COUNTY:	Catawba/Iredell	CLASSIFICATION:	WS-IV, WS-V B CA
SURFACE AREA:	1270 acres (514 hectares)	MEAN DEPTH:	30 feet (9 meters)
VOLUME:	$4.6 \times 10^6 \text{ m}^3$	WATERSHED:	$1450 \text{ mi}^2 (3755 \text{ km}^2)$
SHORELINE:	39 miles	RETENTION TIME:	9 days

Lookout Shoals Lake is one of the smaller Catawba chain lakes. The lake is owned by Duke Energy and is located between Lake Hickory and Lake Norman on the Catawba River. Construction of the Lookout Shoals Dam was begun in 1914 and was completed in 1916, making it the first dam built on the Catawba River in North Carolina. The waters of the lake are used to generate electricity at the Lookout Shoals Hydroelectric plant and for recreational purposes. The water quality of Lookout Shoals Lake is more reflective of releases from upstream impoundments (Lake Hickory and Lake Rhodhiss) than conditions in the surrounding watershed. The lake is currently classified as WS-IV from its headwaters to Elk Shoal Creek, and WS-IV and Class B from Elk Shoal Creek to Lookout Shoals Dam.

Lookout Shoals was most recently monitored in June, July and August of 1997 by Duke Power. The reservoir was found to be oligotrophic in June, mesotrophic in July and oligotrophic in August. Lookout Shoals Lake has consistently bordered on the eutrophic/mesotrophic classification from 1981 to 1992.

The City of Statesville requested that Lookout Shoals Lake be reclassified in 1997 as a WS-IV drinking water supply. There are no water supply intakes in the lake at this time.

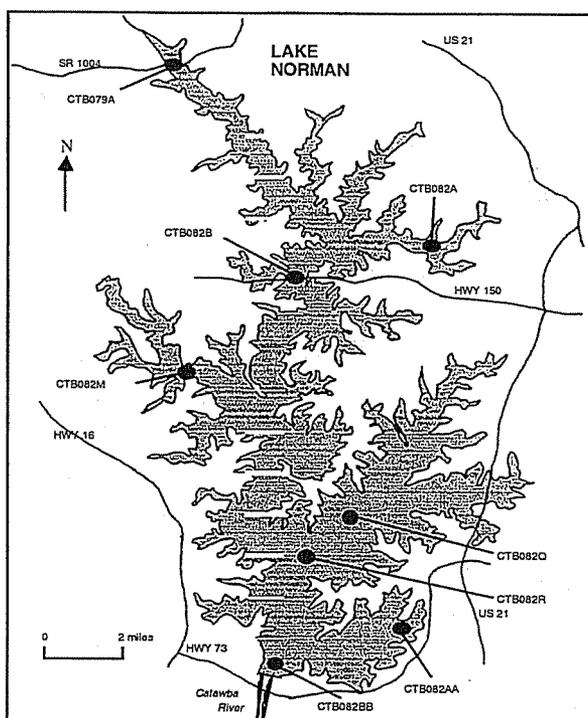


Lake Norman Assessment

COUNTY:	Lincoln/Mecklenburg	CLASSIFICATION:	WS-IV B CA
SURFACE AREA:	32510 acres (13157 hectares)	MEAN DEPTH:	33 feet (10 meters)
VOLUME:	131.5 x10 ⁶ m ³	WATERSHED:	1790 mi ² (4636 km ²)
SHORELINE:	520 miles	RETENTION TIME:	206 days

Lake Norman is North Carolina’s largest man-made reservoir. Located between Lookout Shoals Lake and Mountain Island Lake, the lake extends almost 34 miles from the Cowans Ford Dam to the tailrace of Lookout Shoals Lake. Construction of the dam and the hydroelectric station were completed in 1967. Lake Norman is owned by Duke Energy, and the water from the lake is used to generate electricity. The lake is the largest of the Catawba chain lakes with the Catawba River, Lyle Creek and Buffalo Shoals Creek as its major tributaries. The topography of the drainage area is characterized by rolling hills with approximately half forested and over one-fourth agricultural. The waters of the lake are classified WS-IV CA from Lookout Shoals Dam to Lyle Creek and WS-IV B CA from Lyle Creek to Cowans Ford Dam.

Lake Norman was most recently sampled in June, July and August 1997 by Duke Energy and was found to be oligotrophic on the three days it was sampled. The lake was sampled by DWQ in 1981, 1982, 1983, 1986 and 1992. On three occasions (1982, 1986 and 1992) the lake received an oligotrophic rating.



3.2 Prior Basinwide Plan Recommendations (1995) and Achievements

3.2.1 Impaired Waters

The 1995 basinwide plan identified two waters in this subbasin as impaired. Each of these is presented and discussed below.

Big Branch

The 1995 plan identified Big Branch as partially supporting and not supporting due to a special study to assess the impacts of the Town of Troutman WWTP.

Status of Progress

The facility received toxicity limits prior to finalization of the first basinwide plan. The town has been in compliance with toxicity permit limits. Big Branch has not been resampled.

Powder Spring Branch

Powder Spring Branch was listed as impaired due to impacts from the South Iredell High School WWTP to a zero flow stream reach. It was recommended that additional monitoring should be done to determine if the stream has improved.

Status of Progress

This facility has ceased its discharge, and the NPDES permit was rescinded in 1992. This stream will not be sampled because it is a zero flow stream, and the dischargers have been removed.

3.2.2 Other Recommendations

Lake Hickory

The Western Piedmont Council of Governments (WPCOG), United States Geological Survey (USGS) and DWQ have completed a three-year water quality study of Lake Hickory. Recommendations were to include results from this study in the updated basinwide plan.

Status of Progress

The Lake Hickory system was monitored for hydrologic and water quality conditions from January 1993 - March 1994. The monitoring data was used by USGS (Bales and Giorgino, 1998 and USGS Report 98-4149) to develop a calibrated water quality model. The model is capable of simulating flow, transport and water quality conditions within the Lake Hickory reservoir. DWQ will use this model to develop management strategies for the reservoir and its watershed.

During the monitoring study, two samples from the upper portion of the lake exceeded the North Carolina water quality standard for chlorophyll *a*. Nutrients, chlorophyll *a* and dissolved oxygen levels are parameters of concern. While samples from the lake did not document fecal coliform bacteria standard violations, the state fecal coliform bacteria standard was commonly exceeded in two of Lake Hickory's monitored tributaries: Upper Little River (40 percent of the samples) and Middle Little River (60 percent of the samples).

Flow from Rhodhiss Dam accounts for most of the total suspended solids, nitrogen and phosphorus loading to the system. However, the loading from the three major tributaries is also important. In general, increased tributary flow was accompanied by increased concentrations of total suspended solids and phosphorus. Nitrogen concentrations did not vary with flow. The six permitted point sources within the watershed contributed about 10 percent of the total nitrogen and about 18 percent of the total phosphorus.

The hydraulic retention time of the lake averaged 19 days with a range of 3.8 to 65 days. During periods of thermal stratification, relatively coldwater coming from the base of Rhodhiss Dam sinks beneath the relatively warmwater on the surface of Lake Hickory. This action results in a strong subsurface "interflow" that rapidly delivers coolwater from the base of Rhodhiss Dam through the middle layers of Lake Hickory to the release at Oxford Dam. This circulation pattern magnifies the effects of nutrient loading to the surface waters of Lake Hickory. Initial runs of the calibrated model show an increased sensitivity to nutrient loading delivered mid-reservoir.

Nonpoint sources of pollution are having a greater impact on Lake Hickory water quality than point sources. Additional studies of the Lake Hickory watershed should be conducted to assess the sources of fecal coliform bacteria in Upper Little River and Middle Little River. Since the

majority of total suspended solids and nutrients are attributed to flow from Rhodhiss Lake, additional management strategies will be needed upstream of Lake Hickory.

DWQ may develop a management strategy for this watershed based on completion of modeling and the development of a management strategy for Lake Rhodhiss (see Section B, Chapter 2, Part 2.2.2 for more information).

Lyle Creek Watershed Management Strategy

This watershed includes Lyle Creek, Huffman Branch, McLin Creek, Mull Creek, Hagan Fork and all other Lyle Creek tributaries. In July 1988, a modeling study of the Lyle Creek watershed was conducted to address an expansion request for the Conover Northeast. The model was used to establish NPDES permit limits for new and expanding facilities in the Lyle Creek watershed. This approach has been used since 1988. It was recommended that this strategy continue as part of the Catawba Basinwide Plan.

Status of Progress

All new and expanding facilities receive BOD limits of 8 mg/l and NH₃ limits of 2 mg/l to hold the load of oxygen-consuming wastes constant.

3.3 Current Priority Issues and Recommendations

3.3.1 Monitored Impaired Waters

During the next five years, addressing monitored impaired waters will be a priority. This subbasin has no monitored impaired waters; however, there are a number of streams showing impacts from nonpoint source pollution. These impacts are attributable to urban runoff and agricultural land use including cattle access to streams. Local land use planning efforts and the use of best management practices (BMPs) and naturally vegetated buffer zones could help improve water quality in these impacted streams.

3.3.2 303(d) Listed Waters

There are no 303(d) listed waters in this subbasin.