LAKE & RESERVOIR ASSESSMENTS
CATAWBA RIVER BASIN

Lake Norman

Intensive Survey Unit
Environmental Sciences Section
Division of Water Quality
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GLOSSARY

Algae	Small aquatic plants that occur as single cells, colonies, or filaments. May also be referred to as phytoplankton, although phytoplankton are a subset of algae.
Algal biovolume	The volume of all living algae in a unit area at a given point in time. To determine biovolume, individual cells in a known amount of sample are counted. Cells are measured to obtain their cell volume, which is used in calculating biovolume
Algal density	The density of algae based on the number of units (single cells, filaments and/or colonies) present in a milliliter of water. The severity of an algae bloom many be determined by the algal density as follows: Mild bloom = 20,000 to 30,000 units/ml Severe bloom = 30,000 to 100,000 units/ml Extreme bloom = Greater than 100,000 units/ml
Algal Growth Potential Test (AGPT)	A test to determine the nutrient that is the most limiting to the growth of algae in a body of water. The sample water is split such that one sub-sample is given additional nitrogen, another is given phosphorus, a third may be given a combination of nitrogen and phosphorus, and one sub-sample is not treated and acts as the control. A specific species of algae is added to each sub-sample and is allowed to grow for a given period of time. The dry weights of algae in each sub-sample and the control are then measured to determine the rate of productivity in each treatment. The treatment (nitrogen or phosphorus) with the greatest algal productivity is said to be the limiting nutrient of the sample source. If the control sample has an algal dry weight greater than 5 mg/L, the source water is considered to be unlimited for either nitrogen or phosphorus.
Centric diatom	Photosynthetic algae that have a siliceous skeleton (frustule) and are found in almost every aquatic environment including fresh and marine waters, soils, in fact almost anywhere moist. Centric diatoms are circular in shape and are often found in the water column.
Chlorophyll *a*	Chlorophyll *a* is an algal pigment that is used as an approximate measure of algal biomass. The concentration of chlorophyll *a* is used in the calculation of the NCTSI, and the value listed is a lake-wide average from all sampling locations.
Clinograde	In productive lakes where oxygen levels drop to zero in the lower waters near the bottom, the graphed changes in oxygen from the surface to the lake bottom produces a curve known as clinograde curve.
Coccoid	Round or spherical shaped cell.
Conductivity	This is a measure of the ability of water to conduct an electrical current. This measure increases as water becomes more mineralized. The concentrations listed are the range of values observed in surface readings from the sampling locations.
Dissolved oxygen	The range of surface concentrations found at the sampling locations.
Dissolved oxygen saturation	The capacity of water to absorb oxygen gas. Often expressed as a percentage, the amount of oxygen that can be dissolved into water will change depending on a number of parameters, the most important being temperature. Dissolved oxygen saturation is inversely proportion to temperature, that is, as temperature increases, water’s capacity for oxygen will decrease, and vice versa.
Eutrophic	Describes a lake with high plant productivity and low water transparency.

Eutrophication The process of physical, chemical, and biological changes associated with nutrient, organic matter, and silt enrichment and sedimentation of a lake.

Limiting nutrient The plant nutrient present in lowest concentration relative to need limits growth such that addition of the limiting nutrient will stimulate additional growth. In north temperate lakes, phosphorus (P) is commonly the limiting nutrient for algal growth.

Manganese A naturally occurring metal commonly found in soils and organic matter. As a trace nutrient, manganese is essential to all forms of biological life. Manganese in lakes is released from bottom sediments and enters the water column when the oxygen concentration in the water near the lake bottom is extremely low or absent. Manganese in lake water may cause taste and odor problems in drinking water and require additional treatment of the raw water at water treatment facilities to alleviate this problem.

Mesotrophic Describes a lake with moderate plant productivity and water transparency.

NCTSI North Carolina Trophic State Index was specifically developed for North Carolina lakes as part of the state's original Clean Lakes Classification Survey (NRCD 1982). It takes the nutrients present along with chlorophyll *a* and Secchi depth to calculate a lake's biological productivity.

Oligotrophic Describes a lake with low plant productivity and high water transparency.

pH The range of surface pH readings found at the sampling locations. This value is used to express the relative acidity or alkalinity of water.

Photic zone The portion of the water column in which there is sufficient light for algal growth. DWQ considers 2 times the Secchi depth as depicting the photic zone.

Secchi depth This is a measure of water transparency expressed in meters. This parameter is used in the calculation of the NCTSI value for the lake. The depth listed is an average value from all sampling locations in the lake.

Temperature The range of surface temperatures found at the sampling locations.

Total Kjeldahl nitrogen The sum of organic nitrogen and ammonia in a water body. High measurements of TKN typically results from sewage and manure discharges in water bodies.

Total organic Nitrogen (TON) Total Organic Nitrogen (TON) can represent a major reservoir of nitrogen in aquatic systems during summer months. Similar to phosphorus, this concentration can be related to lake productivity and is used in the calculation of the NCTSI. The concentration listed is a lake-wide average from all sampling stations and is calculated by subtracting Ammonia concentrations from TKN concentrations.

Total phosphorus (TP) Total phosphorus (TP) includes all forms of phosphorus that occur in water. This nutrient is essential for the growth of aquatic plants and is often the nutrient that limits the growth of phytoplankton. It is used to calculate the NCTSI. The concentration listed is a lake-wide average from all sampling stations.

Trophic state This is a relative description of the biological productivity of a lake based on the calculated NCTSI value. Trophic states may range from extremely productive (Hypereutrophic) to very low productivity (Oligotrophic).

Turbidity A measure of the ability of light to pass through a volume of water. Turbidity may be influenced by suspended sediment and/or algae in the water.

Watershed A drainage area in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.

Overview

The Catawba River and the Broad River Basins form the headwaters of the Santee-Cooper River system, which flows through South Carolina to the Atlantic Ocean. The basin is the eighth largest river basin in the state covering 3,279 square miles in the south central portion of western North Carolina. The Catawba River has its source on the eastern slopes of the Blue Ridge Mountains in McDowell County, and flows eastward, then southward, to the state line near Charlotte. The headwaters of the river are formed by swift flowing, cold water streams originating in the steep terrain of the mountains. Although the topography of the upper basin is characterized by mountains, smaller hills give way to a rolling terrain near the state line. As the basin enters the Inner Piedmont, land use shifts from forest to agricultural and urban uses. Though urban areas are not numerous in the upper basin, the lower portion of the basin contains many cities, including the Charlotte metropolitan area.

Five lakes were sampled in this river basin by DWQ staff in 2007. These lakes were Lake James, Lake Rhodhiss, Lake Hickory, Lake Norman and Lake Wylie. All of these lakes are designated as water supplies and as suitable for swimming (Class B). Lake Rhodhiss, from Johns River to Rhodhiss Dam, was placed on the 303(d) List of Impaired Waters in 2006 due to water quality standard violations for elevated pH.

The Catawba Creek from SR249 to Lake Wylie is listed as impaired for biological integrity (1998) due to urban runoff and storm sewers.

Following the description of the assessment methodology used for the Catawba River Basin, there are individual summaries for each of the lakes and a two-paged matrix that distills the information used to make the lakes use support assessments.

Assessment Methodology

For this report, data from January 1, 2003 through September 30, 2007 were reviewed. All lakes were sampled only during the summer of 2007 in April through September. Data were assessed for excursions of the state's water quality standards for chlorophyll *a*, pH, dissolved oxygen, water temperature, turbidity, and chloride. Other parameters discussed in this report include Secchi depth and percent dissolved oxygen saturation. Secchi depth provides a measure of water clarity and is used in calculating the trophic or nutrient enriched status of a lake. Percent dissolved oxygen saturation gives information on the amount of dissolved oxygen in the water column and may be increased by photosynthesis or depressed by oxygen-consuming decomposition.

On lakes without obvious segmentation or differences in hydrology and morphology between stations, all samples taken on a particular sampling date regardless of station are treated as replicates and the average concentration is used to determine if the standards are being met. See the matrix at the end of this report for how the stations are grouped.

A water quality standard is exceeded (denoted by CE in matrix) if data values do not meet the state's water quality standard for more than 10% of the samples where the sample size consists of 10 or more observations for the basinwide assessment period. Ideally, ten observations are needed to provide sufficient data to reasonably interpret water quality conditions within the lake or reservoir. Fewer observations increase the possibility of misinterpreting random unusual conditions as representative of ongoing water quality trends. If the water quality standard is exceeded, either in less than 10% of the data collected during the assessment period or if the sample observation size is less than 10 for the basinwide assessment period, then the water quality standard for that parameter is designated exceeded (E in the matrix).

Additional data considered as part of the use support assessment include historic DWQ water quality data, documented algal blooms and/or fish kills, problematic aquatic macrophytes, or listing on the EPA's 303(d) List of Impaired Waters.

Lakes receive an overall rating of Supporting or Impaired when 10 or more samples per water quality criteria are collected for evaluation within the basinwide assessment period. Otherwise, the lake is considered as Not Rated. The exception is for a lake listed on the 303(d) List of Impaired Waters or where additional data indicates water quality problems not captured during sampling. These lakes are listed as Impaired along with the reason for the impairment.

For a more complete discussion of lake ecology and assessment, please go to http://www.esb.enr.state.nc.us/. The 1990 North Carolina Lake Assessment Report (downloadable from this website) contains a detailed chapter on ecological concepts that clarifies how the parameters discussed in this review relate to water quality and reservoir health.

LAKE & RESERVOIR ASSESSMENTS

Subbasin 030830

Lake James

Lake James is formed by the impoundment of the Catawba and Linville Rivers and is the most upstream reservoir of the Catawba Chain Lakes. The Catawba and Linville River portions of Lake James are joined by a small canal. Water flows from the Catawba River portion of Lake James through this canal into the Linville River side. Due to the shallowness of the canal as compared with the reservoir on either side, warm, oxygenated surface water from the Catawba River portions flows into the Linville River section during the summer months, and the colder, less oxygenated water becomes trapped in within the Catawba River side of Lake James. Hypolimnetic water (the deeper, colder bottom water) from Lake James exits the reservoir from the Linville River portion. This leaves the warmer, more oxygenated water flowing in from the Catawba River. The result of these hydrologic dynamics produces distinct differences in the temperature profiles in each side of the reservoir.

Lake James has undergone rapid shoreline development since the water quality evaluation by DWQ in 2002. In 1997, field staff described the shoreline as primarily forested. In 2007, field notes by staff indicated that 50% to 75% of the shoreline had undergone a change to residential development. Additional construction of new homes was also observed along the shoreline in 2007.

DWQ staff monitored Lake James from April through August 2007. Secchi depths in Lake James were similar to those previously observed in this reservoir. The lowest Secchi depths were consistently at the sampling site located in the upper Catawba Creek arm (CTB013B) and the greatest depths were observed near the reservoir dams (CTB015C and CTB23B). Turbidity values in 2007 were generally greater in the Catawba River section of Lake James as compared with the Linville River section, but did not exceed the state water quality standard of 25 NTU for lakes.

Lake-wide mean water temperature was greater than the state water quality standard of 29.0°C on August 21st (29.7°C). This elevated water temperatures on the surface of the lake coincided with air temperatures during the summer that were in the upper 90s °F for multiple days. Water temperature on August 21st were greater than the state water quality standard to a depth of approximately six meters in the Linville River arm of the reservoir but was sufficient to support fish life to depths ranging from seven to twenty meters.

Total phosphorus and total Kjeldahl nitrogen concentrations were greater at the sampling site in the upper Catawba River arm (CTB013B) in 2007 as compared with the other sampling years. Total phosphorus at this site ranged from 0.03 to 0.04 mg/L in 2007. These values are elevated for a mountain lake. Lake-wide nitrite plus nitrate concentrations ranged from elevated to extremely elevated from April through mid June (range = 0.4 to 0.14 mg/L), then decreased to less than 0.01 mg/L by late July. In general, nutrient concentrations were greater in the Catawba River portion of the reservoir as compared with the Linville River side. These data agree with data collected by water quality monitoring volunteers from May 2001 through September 2006 (Westphal et al., December 2006)

Very good water clarity coupled with the available nutrients in Lake James contributed to increased algal productivity. This algal growth contributed to increased chlorophyll *a* values at CTB013C on April 23rd (18 µg/L)) and at CTB013C on June 6th and July 23rd (20 µg/L). Lake-wide mean chlorophyll *a* values did not exceed the state water quality standard in 2007. An Algal Growth Potential Test in 2007 indicated that Lake James did not have nutrient concentrations at levels sufficient to produce nuisance algal blooms and that the limiting nutrient (either phosphorus or nitrogen) varied at the sites tested (Table 1). Results from this test also indicated that, on the date that the water samples were collected, the lower Catawba River side of Lake James (CTB015A) was phosphorus limited and the lower Linville River side (CTB015C) was nitrogen limited. Water collected near the upper end of the Linville River side of the reservoir (CTB023B) was co-limited for nitrogen and phosphorus.

Table 1. Algal Growth Potential Test Results for Lake James, July 2007

Station	Control (mg/L)	Treatments C+N (mg/L)	C+P (mg/L)	C+N+P (mg/L)	Limiting Nutrient (mg/L)
CTB015A	0.34	0.33	0.61		P
CTB015C	0.23	0.45	0.27		N
CTB023B	0.39	0.53	0.48	26.9	N+P

AGPT - Algal Growth Potential Test
MSC - Maximum Standing Crop
C+N - Control + 1.0 mg/L Nitrate-N
C+P - Control + 0.05 mg/L Phosphate-P
C+N+P - Control + 1.0 mg/L Nitrate-N + 0.05 mg/L Phosphate-P
FW - Freshwater AGPT using Selenastrum as test alga

Algae samples were collected on a monthly basis from April to September of 2007. Two sets of samples from April, along with two other non-ambient samples that were collected, were analyzed in response to a concerned citizen's report of lake water odor. The samples were collected from the photic zone, preserved in the field and taken concurrently with chemical and physical measures. Generally, algal densities, biovolumes and assemblage structures were characteristic of oligotrophic mountain waters. Densities were less than 1,000 units /ml (Figure 1) and biovolumes less than 500 mm^3/m^3 (Figure 2). The exception was found in the receiving waters of the Catawba arm at station CTB013B. Densities at this location were consistently over 2,000 units/ml and biovolumes greater than 500mm^3/m^3.

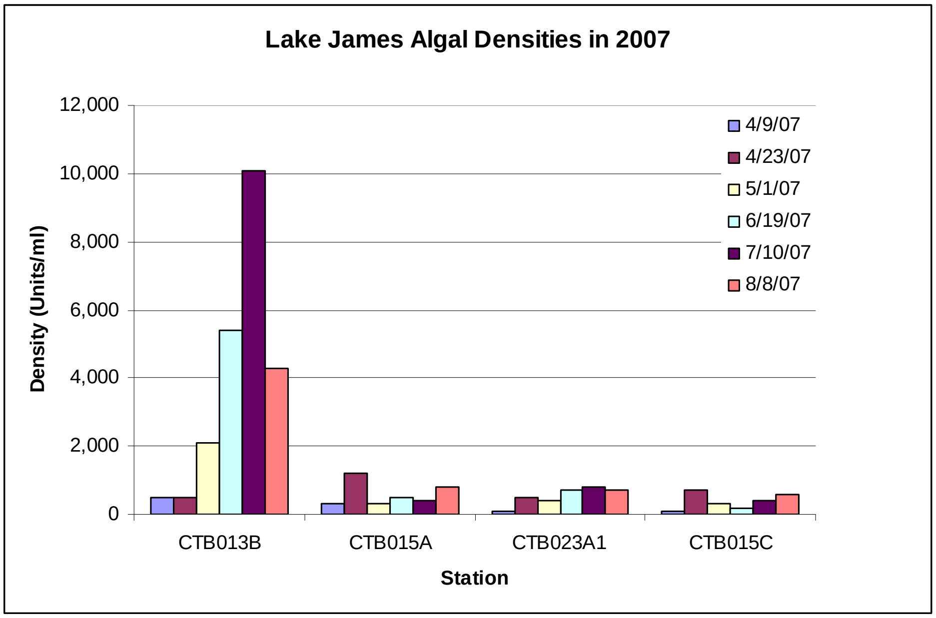

Figure 1. Algal densities in Lake James.

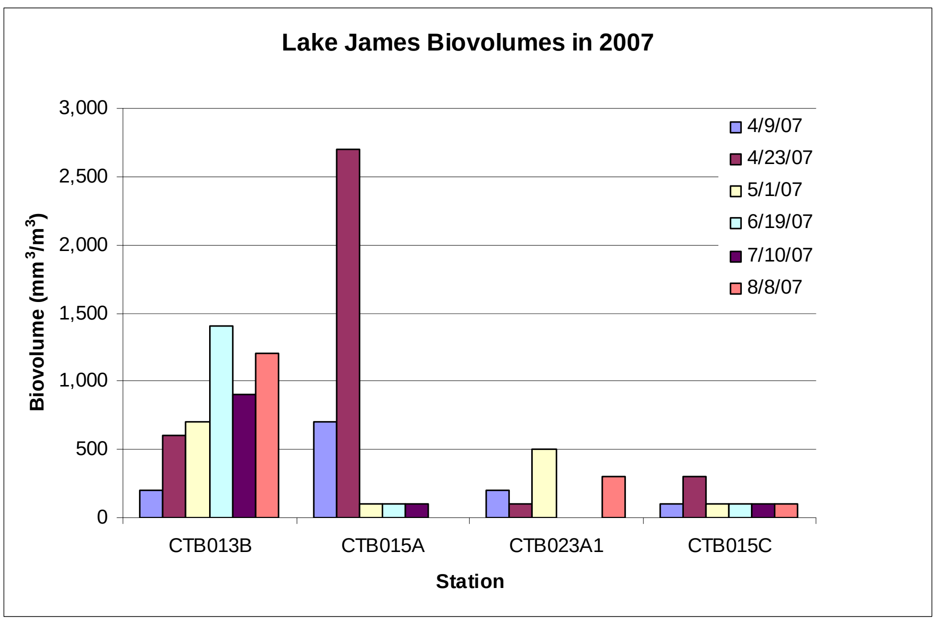

Figure 2. Algal biovolumes in Lake James

The receiving waters in the Catawba arm also varied from the other stations in assemblage structure. By density measure, blue greens were more predominant in July and August (Figure 1). However, since the filamentous blue greens that dominated, *Planktolyngbya*, is relatively small and the larger green alga, *Pandorina sp.*, was dominant in terms of biovolume (Figure 2). The other 3 stations were commonly dominated by chrysophytes and diatoms in both measures with an occasional dominance by dinoflagellates and cryptomonads. Diatoms, chrysophytes and cryptomonads are common in cool, clear waters and considered a beneficial food source for other lake organisms.

Based on the calculated NCTSI scores, Lake James was determined to be oligotrophic (low biological productivity) in 2007. Despite the drought that occurred during the monitoring period, there were not significant changes in the lake water quality that resulted in a change of the trophic state from what has been previously observed based on NCTSI scores. Because of the continuing development of the watershed, monitoring of this reservoir should continue to detect changes in the trophic state related to nutrient and sediment loading.

Lake James was impacted by the state-wide drought that occurred in 2007. By early October, many areas of the lake were exposed as the water levels dropped by nine feet from normal pool levels (Figure 3).

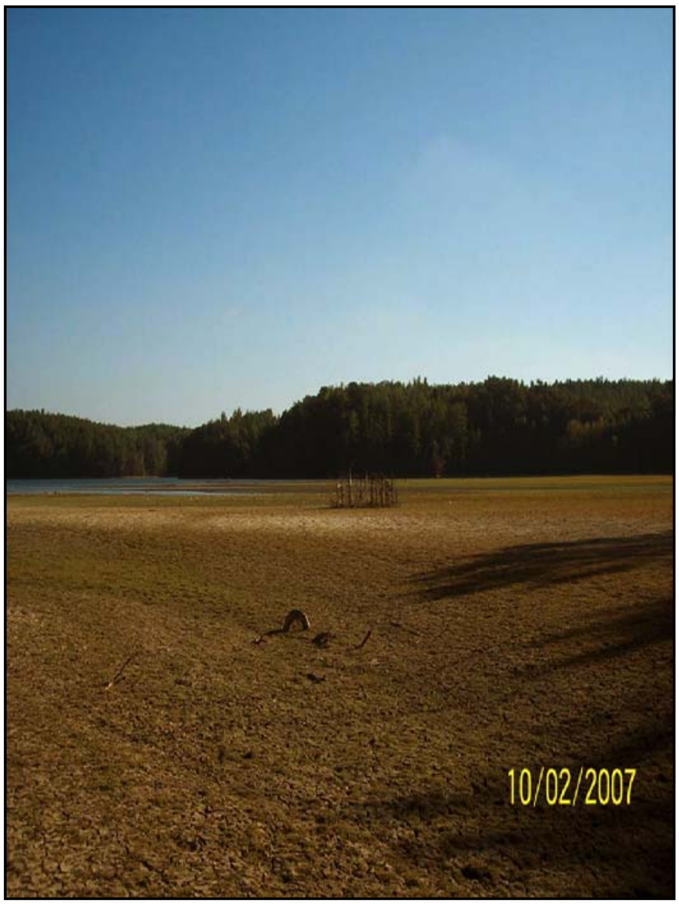

Figure 3. Exposed lake bed at upper end of Lake James (picture from Catawba Riverkeeper)

<u>Reference</u>:

Catawba Riverkeeper, 2007. 2007 Drought Conditions. PowerPoint presentation. http://www.catawbariverkeeper.org/News/2007%20Drought%20v2.pdf

Westphal, Marilyn J., Seven C. Patch, Jillian D. Fishburn and Laurend E. Hodges. December 2006. Evaluation of sediment and pollutant sources to Lake James: year five report. UNC-Asheville Environmental Quality Institute, Technical Report No. 06-170.

Subbasin 030831

Lake Rhodhiss

Lake Rhodhiss is a run-of-the-river reservoir located on the Catawba River downstream of Lake James and upstream of Lake Hickory. Constructed in 1925 and owned by Duke Energy, Lake Rhodhiss has a mean residence time of 21 days. This reservoir is used for hydropower generation, as a water supply, and for public recreation.

DWQ staff monitored Lake Rhodhiss from May through September, 2007. Secchi depths at the upstream sampling site (CTB034A) were consistently less than a meter while measurements taken in the middle of the reservoir (CTB040A) and near the dam (CTB040B) were usually close to or slightly greater than a meter. Turbidity values followed a similar pattern with greater turbidity observed upstream and decreasing downstream. This pattern of increasing water clarity from upstream to downstream is typical of many run-of-the-river reservoirs. An exception occurred in May when the greatest turbidity values were observed near the dam and improved further upstream.

Dissolved oxygen, pH and percent dissolved oxygen saturation values were elevated in Lake Rhodhiss in 2007. This condition is suggestive of increased algal productivity. Chlorophyll *a* values (an indicator of increased algal growth) were generally low to moderate with the exception of a value observed at CTB034A on September 26th (70 µg/L). This chlorophyll *a* value was greater than the state water quality standard of 40 µg/L. Total phosphorus concentrations were elevated in 2007 and total Kjeldahl nitrogen and total nitrogen ranged from moderate to elevated. An Algal Growth Potential Test run on a water sample collected from Lake Rhodhiss on July 11th. Results indicated that the reservoir was co-limited for nitrogen and phosphorus, (i.e., neither nutrient was limiting to the growth of algae; Table 2).

Table 2. Algal Growth Potential Test Results for Lake Rhodhiss, July 2007

Station	Treatments Control (mg/L)	C+N (mg/L)	C+P (mg/L)	C+N+P (mg/L)	Limiting Nutrient (mg/L)
CTB040A	0.73	1.4	1.2	24.1	N+P

AGPT - Algal Growth Potential Test
MSC - Maximum Standing Crop
C+N - Control + 1.0 mg/L Nitrate-N
C+P - Control + 0.05 mg/L Phosphate-P
C+N+P - Control + 1.0 mg/L Nitrate-N + 0.05 mg/L Phosphate-P
FW - Freshwater AGPT using Selenastrum as test alga

Algal blooms dominated by blue-green algae occurred near the dam from mid- June through late September. Blue-green algae blooms also occurred at the upper end of the reservoir from mid-July through late September. *Cylindrospermopsis sp*, a blue-green alga associated with nutrient-rich water, was the dominant alga in the 2007 Lake Rhodhiss blooms.

Based on the calculated NCTSI scores, Lake Rhodhiss was determined to exhibit moderate biological productivity in May (mesotrophic) and elevated biological productivity from June through September (eutrophic). Drought conditions in 2007 may have increased the amount of time water traveled through the reservoir (residence time), increasing the amount of time that nutrients were available for use by algae in the water column. The trophic state scores in 2007 were higher than those observed the last time Lake Rhodhiss was monitored by DWQ in 2002. The increased intensity and duration of the drought in 2007 as compared with the previous drought of 2002 may have contributed to the increase in the numeric NCTSI trophic state scores. Lake Rhodhiss is listed on the 2006 303(d) List of Impaired Surface Waters for pH values greater than the state water quality standard of 9.0 s.u.

Subbasin 030832

Lake Hickory

Lake Hickory is located immediately downstream of Lake Rhodhiss on the Catawba River. DWQ staff monitored this reservoir from May through September, 2007. Lake-wide Secchi depths ranged from 1.4 to 1.8 meters, with lower Secchi depths generally observed at the upper end of this reservoir and increased downstream toward the dam. Turbidity values were greater at the upper end of the reservoir and lower near the dam, which is suggestive of suspended sediment entering the reservoir at the upper end and gradually settling out of the water column further downstream. Surface dissolved oxygen decreased at the sampling sites CTB058C and CTB058D in September but remained greater than the state water quality standard of 4.0 mg/L for an instantaneous reading. The decrease in surface dissolved oxygen appeared to be the result of lake water turnover as strong dissolved oxygen stratification observed during the previous sampling trips had greatly diminished in September.

Nutrient concentrations in Lake Hickory ranged from low to moderate as did chlorophyll *a* values. Based on an Algal Growth Potential Test run on a water sample collected in July, nitrogen is the limiting nutrient for algal growth in the lake (Table 3). Algal blooms were observed at the lower end of the reservoir from late July through late September. Euglenoid algas dominated these blooms.

Table 3. Algal Growth Potential Test Results for Lake Hickory, July 2007

Station	Treatments			Limiting
	Control (mg/L)	C+N (mg/L)	C+P (mg/L)	Nutrient (mg/L)
CTB058C	1.5	13.7	1.6	N

AGPT - Algal Growth Potential Test
MSC - Maximum Standing Crop
C+N - Control + 1.0 mg/L Nitrate-N
C+P - Control + 0.05 mg/L Phosphate-P
C+N+P - Control + 1.0 mg/L Nitrate-N + 0.05 mg/L Phosphate-P
FW - Freshwater AGPT using Selenastrum as test alga

Based on the calculated NCTSI scores in 2007, Lake Hickory was determined to have moderate biological productivity (mesotrophic). These scores were similar to those calculated for the lake in 2002.

Approximately two to three acres of the invasive aquatic macrophyte, parrotfeather (*Myriophyllum aquaticum*) was discovered in Lake Hickory by Duke Power aquatic plant biologists during the fall of 2001. By June 2002, this plant was found to infest 74 acres of the lake. In the summer of 2003, 125 acres were infested. Two municipal water intakes were located within these infested areas, one belonging to the City of Hickory and the other to the Town of Longview. The 321 Marina on Lake Hickory was also located within the area of the lake infested with parrotfeather. During the summer of 2003, boats could not navigate the waters around the marina or enter the marina for fueling due to parrotfeather. In February 2004, the Aquatic Weed Control Council approved a work-plan for the State of North Carolina's Weed Control Program that allocated $20,000 for the control of parrotfeather in Lake Hickory. In April 2004 a private applicator was contracted to apply herbicide in an effort to control the infestation around the municipal water intakes. In addition, private homeowners hired the same contractor to treat specific shoreline areas (Rob Emens, June 2004). High water flooding of the reservoir washed out most of the parrotfeather from Lake Hickory in 2004 (Jen Aronoff, February 9, 2007) The remaining areas of parrotfeather in Lake Hickory were treated with herbicides in 2006 and 2007 as a control measure.

Lake Hickory was impacted by the state-wide drought that occurred in 2007. Water levels in the reservoir dropped during the late summer through the fall and, as shown in Figure 4, dropping water levels exposed structures in the river normally covered with water.

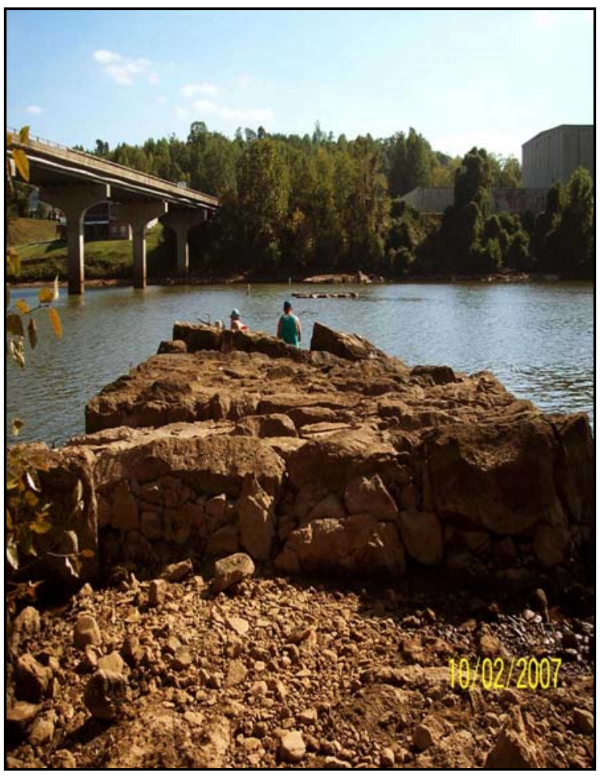

Figure 4. Exposed bridge pilings from an old bridge (from the Catawba Riverkeeper)

References:

Aronoff, Jen. February 9, 2007. What Parrotfeather Problem? Charlotte Observer, Charlotte, NC.

Catawba Riverkeeper, 2007. 2007 Drought Conditions. PowerPoint presentation. http://www.catawbariverkeeper.org/News/2007%20Drought%20v2.pdf

Emens, Rob. June 2004. Brief Report on the Lake Hickory Parrotfeather Infestation. Aquatic Weed Control Program, NC Division of Water Resources. Raleigh, NC.

Catawba Riverkeeper, 2007. 2007 Drought Conditions. PowerPoint presentation. http://www.catawbariverkeeper.org/News/2007%20Drought%20v2.pdf

Lake Norman

Lake Norman, North Carolina's largest man-made lake, is located between Lookout Shoals Lake and Mountain Island Lake on the Catawba River. Owned by Duke Energy, Lake Norman is used in two ways to generate electricity through hydroelectric generators at Cowans Ford Dam, the Marshall Steam Station and McGuire Nuclear Station. This reservoir is also a popular public recreation lake. Recreational activities include fishing, boating and swimming.

Lake Norman was monitored by DWQ staff once a month from May through September 2007. Lake-wide mean Secchi depths ranged from 1.8 meters to 2.6 meters, indicating very good water clarity in this reservoir. Turbidity values were also low, and this supported the Secchi depths observed. Total phosphorus concentrations were below DWQ laboratory detection levels except at the most upstream sampling site (CTB079A) where total phosphorus ranged from <0.02 to 0.04 mg/L. Ammonia and total organic nitrogen values were low in 2007. Nitrite plus nitrate concentrations, however, were elevated. Chlorophyll *a* values in Lake Norman for the months is was sampled in 2007 ranged from low to moderate. The invasive aquatic macrophyte, Hydrilla, has become established in Lake Norman. Control efforts are through the stocking of sterile grass carp. In 2006 and in 2007, Lake Norman was re-stocked with 400 grass carp through a joint effort of the Lake Norman Marine Commission, Duke Energy, and the NC Division of Water Resources.

Based on the calculated NCTSI score, Lake Norman was determined to have low biological productivity (oligotrophic) in 2007. The NCTSI scores for 2007 were similar to those previously calculated for this lake, indicating that the trophic status of Lake Norman remains unchanged. The state-wide drought in 2007 impacted Lake Norman (Figure 5). Decreased water levels in the reservoir resulted in the closure of five boat ramps on the lake in late August and reduced public recreation, which is a major use of this lake. No impacts were reported on the operation of the nuclear power station which uses the reservoir as a source of cooling water.

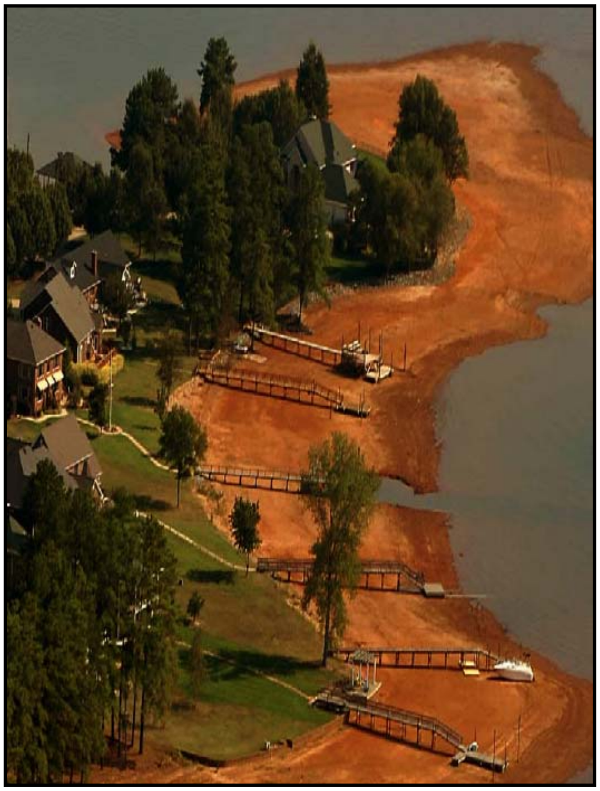

Figure 5. Exposed shoreline at Lake Norman (from Charlotte Observer, September 27, 2007).

Duke Energy routinely monitors the water quality of Lake Norman as a requirement of the NPDES permit for the McGuire Nuclear Station. Lake Norman was monitored in 2005 for water quality, phytoplankton, zooplankton, and fish communities. No obvious short-term or long-term impacts of the nuclear station operations were observed. Physical and chemical parameters measured in 2005 were similar to those observed in 2004. The highest chlorophyll *a* value recorded in 2005 was well below the NC state water quality standard of 40 µg/L (Duke Energy, November 2006).

The Town of Mooresville proposed to discharge 19 MGD of wastewater to Lake Norman. At the time of this request, Mooresville's Rocky River WWTP discharged 5.2 MGD of wastewater to Dye Branch in the Yadkin River Basin. The discharge, if permitted, would be located at the Highway 150 bridge on Lake Norman.

<u>Reference</u>:

Duke Energy. November 2006. Lake Norman Maintenance Monitoring Program, 2005 Summary, McGuire Nuclear Station: NPDES No. NC0024392.Huntersville, NC.

Subbasin 030834

Lake Wylie

Lake Wylie is a large reservoir on the Catawba River and is the primary water supply source for the City of Charlotte. This reservoir was monitored by DWQ staff twice a month from May through September, 2007. Secchi depths were similar to those observed in previous years, with lake-wide Secchi depths ranging from 1.0 to 1.2 meters. Lake-wide pH values were not greater than the state water quality standard of 9.0 s.u. Lake-wide surface water temperature was less than the water quality standard of 32°C with the exception of August 6. Surface water temperatures on that sampling date were greater than the water quality standard of 32°C for a lake located in the Piedmont. Exceptionally hot air temperatures and abundant sunlight in may have contributed to the elevated water temperatures observed on that date.

Lake-wide mean total phosphorus concentrations were moderate while elevated total phosphorus values (>5.0 mg/L) were observed at the sampling site located in the South Fork Catawba River (CTB174). Total Kjeldahl nitrogen was moderate throughout the lake with the exception of elevated values observed in August in Crowders and Allison Creeks. Total organic nitrogen was also elevated (>0.6 mg/L) in Crowders Creek in August. Algal Growth Potential Test chlorophyll *a* values for Lake Wylie were moderate. Total organic nitrogen was also elevated (>0.6 mg/L) in Crowders Creek in August. An Algal Growth Potential Test (AGPT) conducted on August 6, 2007 at all seven of the lake sampling sites indicated that the nutrient limiting algal growth in Lake Wylie was nitrogen (Table 4).

Table 4. Algal Growth Potential Test Results for Lake Wylie, August 2007

Station	Control	C+N (mg/L)	C+P (mg/L)	Limiting Nutrient
CTB105B	1.6	12.8	1.8	N
CTB174	2.8	24.6	3.0	N
CTB177	1.6	16.7	1.7	N
CTB178	1.0	10.4	1.1	N
CTB198B5	1.6	21.1	1.9	N
CTB198C5	1.4	21.3	1.6	N
CTB198D	0.81	8.2	1.05	N

Algal assemblages in Lake Wylie were characterized as part of the basinwide assessment program. Two stations were selected, one mid-lake (CTB178) and the other near the dam (CTB198D), to obtain general lake characteristics. A third station in Crowders Creek (CTB198B5) was also evaluated due to algal problems recorded in the past. Mild blooms were occurring consistently in all stations throughout the study with the exceptions of mid-lake in May and near the dam in August. A severe bloom was recorded in Crowders Creek in August that was followed by moderate blooms there and near the dam in September. The densities in 2007 were a bit lower than densities recorded in 2002 when moderate blooms recorded during June and July in Crowders Creek and near the dam that developed into severe blooms in August.

The blooms in spring of 2007 consisted of multiple algal groups with no individual one group dominating. Blue greens, and most specifically *Cylindrospermopsis*, dominated the assemblages in July. Blue greens continued to dominate the assemblage into September with no particular taxa dominant.

Based on the calculated NCTSI scores, Lake Wylie was determined to be eutrophic in 2007. Lake Wylie has been consistently eutrophic since 1989 when the lake was first sampled by DWQ. Water levels in Lake Wylie dropped throughout the summer in response to an ongoing, state-wide drought in 2007. By October 17, 2007 the water level in the reservoir was down to 92.9 ft. This was lower than the previous all time level of 93.8 feet set in 2002. Overall, Lake Wylie was down seven feet by mid-October (WSOCTV, October 18, 2007).

Reference:

WSOCTV. October 19, 2007. http://www.wsoctv.com/drought/14371130/detail.html

APPENDIX A

CATAWBA RIVER BASIN AMBIENT LAKES USE SUPPORT MATRIX FOR 10/1/2003 - 9/31/2007

		030830	*030831*	*030832*			*030834*
Lakes Ambient Program Name		**Lake James**	**Lake Rhodhiss**	**Lake Hickory**		**Lake Norman**	**Lake Wylie**
Trophic Status (NC TSI)		Oligotrophic	Eutrophic	Mesotrophic		Oligotrophic	Eutrophic
Mean Depth (meters)		14.0	6.0	10.0		10.0	7.0
Volume ($10^6 m^3$)		36.0	36.70	17.0		131.5	35.3
Watershed Area (mi^2)		380.0	1090.0	1310.0		1790.0	3020.0
Assessment Unit Name (Gray = changes to AU description)		**Catawba River (Lake James below elevation 1200)**	**Catawba River (Rhodhiss Lake below elevation 995)**	**Catawba River (Lake Hickory below elevation 935)**		**Catawba River (Lake Normana below elevation 760)**	**Catawba River ake Wylie below elevation 570) NC portion**
Classification		WS-V B	WS-IV B CA	WS-IV B CA	WS-V B	WS-IV B CA	WS-V B
Assessment Unit		11-(23)	11-(37)	11-(53)	11-(59.5)	11-(75)	11-(123.5)
Stations in Assessment Unit		CTB013B,CTB013C, CTB015A, CTB015C, CTB023B, CTB023A1	CTB034A, CTB040A, CTB040B	CTB048A, CTB056A	CTB058C, CTB059D	CTB079A, CTB082A, CTB082B, CTB082M, CTB082Q, CTB082R, CTB082AA, CTB082BB	CTB105, CTB174, CTB177, CTB198B5, CTB178, CTB198C5, CTB198D
Number of Sampling Trips		10	9	9	9	5	10
Water Quality Standards							
Chlorophyll *a*	>40 ug/L	NCE	NCE	NCE	NCE	NCE	NCE
Dissolved Oxygen	<4.0 mg/L	NCE	NCE	NCE	NCE	NCE	NCE
pH	<6 s.u. or > 9 s.u.	NCE	E	NCE	NCE	NCE	NCE
Turbidity	>25 NTU	NCE	CE (11%)	NCE	NCE	NCE	NCE
Temperature	>29°C Mountains and Upper Piedmont >32°C Piedmont	CE (10%) *	NCE	NCE	NCE	NCE	CE (10%) *
Metals (excluding copper, iron & zinc)	15A NCAC 2B .0211	NR	NR	NR	NR	NR	NR
Other Data							
% Saturation DO	>120%	N	Y (56%)	N	N	N	Y (40%)
Algae	Documented blooms during 2 or more sampling events in 1 year with historic blooms	N				N	
Fish	Kills related to eutrophication	N	N	N	N	N	N
Chemically/Biologically Treated	For algal or macrophyte control - either chemicals or biologically by fish, etc.	N	N	Herbicide	Herbicide	Grass Carp (Hydrilla)	Copper (Hydrilla)
Aesthetics complaints	Documented sheens, discoloration, etc. - written complaint and follow-up by a state	N	N	N	N	N	N
TSI	Increase of 2 trophic levels from one 5-yr period to next	N	N	N	N	N	N
Historic DWQ Data	Conclusions from other reports	N	Y	Y		N	Y
303(d)	Listed on 303(d) [year listed]	N	Y (2006-Elevated pH))	N	N	N	N
AGPT	Algal Growth Potential Test 5-9 mg/L = concern 10 mg/L or more = problematic	N	N	NR	N	NR	N
Macrophytes	Limiting access to public ramps, docks, swimming areas; reducing access by fish and other aquatic life to habitat	N	N	Y Parrotfeather Brazilian elodea	Y Parrotfeather Brazilian elodea	N	N
Taste and Odor	Public complaints or taste and odor causing algal species are dominant	N	N	N	N	N	N
Sediments	Clogging intakes – dredging program necessary; Frequent public/agency complaints - visual observation	N	N	N	N	N	N
Rating:		**S**	**I - Elevated pH**	**S**	**S**	**S**	**S**

RATING KEY:
S = Supporting
I = Impaired
NR = Not Rated

Not rated is used where there are <10 samples and Other Data indicate potential problems

KEY:
E = Criteria is exceeded in less than 10% of the measurements **or** criteria exceeded but n<10
CE = Criteria Exceeded - parameter is problematic, highly productive or exceeds the standard in >10% of samples
NCE = No Criteria Exceeded
- = Standard not applicable based on Classification
ND = No Data - sample not taken for this parameter
Y = In Other Data portion, indicates that the parameter has exceeded target or has occurred
N = In Other Data portion, indicates that the parameter is within target or has not occurred per available information

* Water temperatures were measured at the surface (0.15 m) of the lake.
Air temperatures during the summer of 2007 were frequently in the upper 90's to low 1000's F and rainfall was infrequent. These conditions may have contributed to elevated water temperatures observed, particularly in Lake James and Lake Wylie. There were no field observations of fish in distress or reports of fish kills in these reservoirs related to elevated water tempreatures.

APPENDIX B

CATAWBA RIVER BASIN LAKES 2007 USE SUPPORT

MOUNTAIN/PIEDMONT	DO mg/L	Water Temp C	pH s.u.	Percent SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardness Calculated mg/L
C & B Criteria	**<4.0**	**29/32**	**<6 or >9**	**120%**	**40**	**-**	**25**	**0.0**	**50**	**25**	**88**	**7**	**50**	**2**	**50**	**-**	**1000**	**-**	**-**
Tr Criteria	**<6.0**				**15**		**10**												
WS II - WS V Criteria if different than C&B						**500**					**25**					**200**		**250**	**100**

						SURFACE PHYSICAL DATA							SURFACE METALS											
Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Mountain	C0580000	LAKE JAMES	11-(23)	April 9, 2007	CTB013B	11.2	12.4	8.1	104.9%	7	4.0	6.1												
Mountain	C0590000	LAKE JAMES	11-(23)	April 9, 2007	CTB013C	11.5	11.3	7.5	105.0%	4	1.3	2.1												
Mountain	C0670000	LAKE JAMES	11-(23)	April 9, 2007	CTB015A	11.2	13.3	7.5	107.0%	3	1.3	2.9												
Mountain	C0730000	LAKE JAMES	11-(27.5)	April 9, 2007	CTB015C	9.8	13.6	7.5	94.3%	<1	1.3	2.3											2.9	
Mountain	C1010000	LAKE JAMES	11-(27.5)	April 9, 2007	CTB023B	9.5	14.1	7.5	92.4%	<1	2.5	2.1												
Mountain	C1030000	LAKE JAMES	11-(27.5)	April 9, 2007	CTB023A1	11.0	12.5	7.3	103.3%	<1	1.3	2.2												
						10.7	**12.9**	**7.6**	**101.2%**	**2.6**	**2.0**	**3.0**											**2.9**	
Mountain	C0580000	LAKE JAMES	11-(23)	April 23, 2007	CTB013B	8.7	19.3	7.2	94.4%	8	7.2	8.0												
Mountain	C0590000	LAKE JAMES	11-(23)	April 23, 2007	CTB013C	10.8	17.3	7.8	111.3%	13	4.0	5.9												
Mountain	C0670000	LAKE JAMES	11-(23)	April 23, 2007	CTB015A	11.0	16.8	7.9	113.4%	18	3.0	2.2												
Mountain	C0730000	LAKE JAMES	11-(27.5)	April 23, 2007	CTB015C	10.1	15.9	7.3	102.1%	2	2.5	1.1											3.1	6.6
Mountain	C1010000	LAKE JAMES	11-(27.5)	April 23, 2007	CTB023B	10.1	16.3	7.1	103.0%	1	1.3	1.2												
Mountain	C1030000	LAKE JAMES	11-(27.5)	April 23, 2007	CTB023A1	10.3	16.3	7.1	105.1%	1	1.3	1.1												
						10.2	**17.0**	**7.4**	**104.9%**	**7.2**	**3.2**	**3.3**											**3.1**	**6.6**
Mountain	C0580000	LAKE JAMES	11-(23)	May 1, 2007	CTB013B	9.8	20.9	7.6	109.7%	12	6.0	5.8												
Mountain	C0590000	LAKE JAMES	11-(23)	May 1, 2007	CTB013C	10.4	19.9	8.0	114.2%	1	3.0	2.5												
Mountain	C0670000	LAKE JAMES	11-(23)	May 1, 2007	CTB015A	10.5	19.5	8.3	114.4%	6	1.3	1.6												
Mountain		LAKE JAMES	11-(23)	May 1, 2007	CTB015A-a	10.6	20.5	8.3	117.8%	10	2.5	2.5												
Mountain	C0730000	LAKE JAMES	11-(27.5)	May 1, 2007	CTB015C	10.7	19.4	8.3	116.3%	9	1.3	0.5											2.8	16.5
Mountain	C1010000	LAKE JAMES	11-(27.5)	May 1, 2007	CTB023B	10.6	19.2	7.8	114.8%	2	1.3	0.5												
Mountain	C1030000	LAKE JAMES	11-(27.5)	May 1, 2007	CTB023A1	10.2	18.4	7.5	108.7%	1	1.3	0.5												
						10.4	**19.7**	**8.0**	**113.7%**	**5.9**	**2.4**	**2.0**											**2.8**	**16.5**
Mountain	C0580000	LAKE JAMES	11-(23)	May 15, 2007	CTB013B	9.1	22.4	7.6	104.9%	12	5.0	4.9												
Mountain	C0590000	LAKE JAMES	11-(23)	May 15, 2007	CTB013C	9.9	22.9	7.7	115.2%	4	1.3	2.2												
Mountain	C0670000	LAKE JAMES	11-(23)	May 15, 2007	CTB015A	8.4	22.2	7.6	95.6%	1	1.3	1.2												
Mountain	C0730000	LAKE JAMES	11-(27.5)	May 15, 2007	CTB015C	8.9	21.9	7.6	101.6%	0.5	1.3	1.2											3.6	16.5
Mountain	C1010000	LAKE JAMES	11-(27.5)	May 15, 2007	CTB023B	9.4	21.7	7.6	106.9%	0.5	1.3	0.5												
Mountain	C1030000	LAKE JAMES	11-(27.5)	May 15, 2007	CTB023A1	8.6	22.3	7.3	99.0%	2	1.3	1.1												
						9.1	**22.2**	**7.6**	**103.9%**	**3.3**	**1.9**	**1.9**											**3.6**	**16.5**
Mountain	C0580000	LAKE JAMES	11-(23)	June 6, 2007	CTB013B	9.4	26.5	8.3	116.9%	20	3.1	6.5												
Mountain	C0590000	LAKE JAMES	11-(23)	June 6, 2007	CTB013C	8.7	25.5	7.9	106.3%	8	3.1	2.6												
Mountain	C0670000	LAKE JAMES	11-(23)	June 6, 2007	CTB015A	8.1	25.2	7.2	98.4%	1	3.1	0.5												
Mountain	C0730000	LAKE JAMES	11-(27.5)	June 6, 2007	CTB015C	8.0	25.3	7.6	97.4%	1	3.1	1.4											3.5	15.8
Mountain	C1010000	LAKE JAMES	11-(27.5)	June 6, 2007	CTB023B	8.0	25.3	7.4	97.4%	1	3.1	0.5												
Mountain	C1030000	LAKE JAMES	11-(27.5)	June 6, 2007	CTB023A1	8.0	24.9	7.3	96.7%	2	3.1	1.0												
						8.4	**25.5**	**7.6**	**102.2%**	**5.3**	**3.1**	**2.1**											**3.5**	**15.8**
Mountain	C0580000	LAKE JAMES	11-(23)	June 19, 2007	CTB013B	9.2	26.8	8.0	115.1%	15	3.1	4.6												
Mountain	C0590000	LAKE JAMES	11-(23)	June 19, 2007	CTB013C	8.6	26.7	7.5	107.4%	5	3.1	4.6												
Mountain	C0670000	LAKE JAMES	11-(23)	June 19, 2007	CTB015A	8.3	26.8	7.5	103.8%	1	3.1	1.7												
Mountain	C0730000	LAKE JAMES	11-(27.5)	June 19, 2007	CTB015C	8.1	26.8	7.4	101.3%		3.1	0.5											3.7	15.6
Mountain	C1010000	LAKE JAMES	11-(27.5)	June 19, 2007	CTB023B	7.9	26.7	7.3	98.6%	2	3.1	2.2												
Mountain	C1030000	LAKE JAMES	11-(27.5)	June 19, 2007	CTB023A1	8.2	27.3	7.4	103.5%	2	3.1	2.8												
						8.4	**26.9**	**7.5**	**105.0%**	**5.0**	**3.1**	**2.7**											**3.7**	**15.6**
Mountain	C0580000	LAKE JAMES	11-(23)	July 10, 2007	CTB013B	9.6	29.8	8.4	126.6%	14	3.1	4.6												
Mountain	C0590000	LAKE JAMES	11-(23)	July 10, 2007	CTB013C	8.1	28.8	7.5	105.0%	6	3.1	1.7												
Mountain	C0670000	LAKE JAMES	11-(23)	July 10, 2007	CTB015A	7.4	28.6	7.5	95.6%	2	3.1	1.5												
Mountain	C0730000	LAKE JAMES	11-(27.5)	July 10, 2007	CTB015C	7.8	28.8	7.6	101.1%	1	3.1	1.2											3.1	16
Mountain	C1010000	LAKE JAMES	11-(27.5)	July 10, 2007	CTB023B	7.8	28.7	7.5	100.9%	2	3.1	1.1												
Mountain	C1030000	LAKE JAMES	11-(27.5)	July 10, 2007	CTB023A1	8.0	28.9	7.6	103.9%	4	3.1	1.5												
						8.1	**28.9**	**7.7**	**105.5%**	**4.8**	**3.1**	**1.9**											**3.1**	**16**
Mountain	C0580000	LAKE JAMES	11-(23)	July 23, 2003	CTB013B	8.6	27.5	7.6	108.9%	20	3.1	4.6												
Mountain	C0590000	LAKE JAMES	11-(23)	July 23, 2003	CTB013C	8.0	27.3	7.2	101.0%	6	3.1	2.5												
Mountain	C0670000	LAKE JAMES	11-(23)	July 23, 2003	CTB015A	7.9	27.1	7.2	99.4%	2	3.1	1.0												
Mountain	C0730000	LAKE JAMES	11-(27.5)	July 23, 2003	CTB015C	8.6	27.6	7.4	109.1%	2	3.1	1.1											3.3	15.3
Mountain	C1010000	LAKE JAMES	11-(27.5)	July 23, 2003	CTB023B	8.1	27.3	7.4	102.2%	2	3.1	0.5												
Mountain	C1030000	LAKE JAMES	11-(27.5)	July 23, 2003	CTB023A1	8.1	27.1	7.3	101.9%	4	3.1	1.6												
						8.2	**27.3**	**7.4**	**103.8%**	**6.0**	**3.1**	**1.9**											**3.3**	**15.3**
Mountain	C0580000	LAKE JAMES	11-(23)	August 8, 2007	CTB013B	8.9	28.8	7.8	115.3%	13	3.1	4.8												
Mountain	C0590000	LAKE JAMES	11-(23)	August 8, 2007	CTB013C	8.5	28.8	7.9	110.2%	5	3.1	2.2												
Mountain	C0670000	LAKE JAMES	11-(23)	August 8, 2007	CTB015A	7.8	29.1	7.4	101.6%		3.1	1.6												
Mountain	C0730000	LAKE JAMES	11-(27.5)	August 8, 2007	CTB015C	7.9	29.1	7.3	102.9%	0.5	3.1	1.3											3.1	15.3
Mountain	C1010000	LAKE JAMES	11-(27.5)	August 8, 2007	CTB023B	8.5	27.9	7.1	108.4%	0.5	3.1	1.1												
Mountain	C1030000	LAKE JAMES	11-(27.5)	August 8, 2007	CTB023A1	8.1	29.1	7.7	105.5%	3	3.1	2.1												
						8.3	**28.8**	**7.5**	**107.3%**	**4.4**	**3.1**	**2.2**											**3.1**	**15.3**

APPENDIX B

CATAWBA RIVER BASIN LAKES 2007 USE SUPPORT

						SURFACE PHYSICAL DATA												SURFACE METALS						
Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Mountain	C0580000	LAKE JAMES	11-(23)	August 21, 2007	CTB013B	8.3	29.6	7.6	109.1%	9	3.1	5.1												
Mountain	C0590000	LAKE JAMES	11-(23)	August 21, 2007	CTB013C	7.8	28.8	7.1	101.1%	2	3.1	1.2												
Mountain	C0670000	LAKE JAMES	11-(23)	August 21, 2007	CTB015A	7.7	29.9	7.5	101.7%	0.5	3.1	1.7												
Mountain	C0730000	LAKE JAMES	11-(27.5)	August 21, 2007	CTB015C	7.7	30.0	7.4	101.9%	0.5	3.1	1.8											3.3	16
Mountain	C1010000	LAKE JAMES	11-(27.5)	August 21, 2007	CTB023B	7.7	30.0	7.4	101.9%	0.5	3.1	1.4												
Mountain	C1030000	LAKE JAMES	11-(27.5)	August 21, 2007	CTB023A1	7.8	29.8	7.5	102.9%	1	3.1	5.5												
						7.8	**29.7**	**7.4**	**103.1%**	**2.3**	**3.1**	**2.8**											**3.3**	**16**
					N=	10	10	10	10	10	10	10												
		Class = WS-V B C			***% EXCEED =***	*NCE*	*E (10%)*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*												

						SURFACE PHYSICAL DATA												SURFACE METALS						
Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Piedmont	C1780000	LAKE RHODHISS	11-(37)	May 2, 2007	CTB034A	8.4	18.8	7.1	90.2%	2	7.5	11.0											3.7	17.3
Piedmont	C2030000	LAKE RHODHISS	11-(37)	May 2, 2007	CTB040A	11.1	20.2	8.4	122.6%	14	4.0	3.6											3.6	17.1
Piedmont	C2060000	LAKE RHODHISS	11-(37)	May 2, 2007	CTB040B	10.7	21.0	8.7	120.1%	7	2.5	2.1											3.3	15.2
						10.1	**20.0**	**8.1**	**111.0%**	**7.7**	**4.7**	**5.6**											**3.5**	**16.5**
Piedmont	C1780000	LAKE RHODHISS	11-(37)	May 16, 2007	CTB034A	10.7	22.3	8.4	123.1%	15	1.3	1.8											5.7	16.3
Piedmont	C2030000	LAKE RHODHISS	11-(37)	May 16, 2007	CTB040A	11.5	22.6	8.9	133.1%	19	2.5	2.7											6.3	18.5
Piedmont	C2060000	LAKE RHODHISS	11-(37)	May 16, 2007	CTB040B	11.7	21.5	8.8	132.6%	13	8.0	8.4											3.8	16.4
						11.3	**22.1**	**8.7**	**129.6%**	**15.7**	**3.9**	**4.3**											**5.3**	**17.1**
Piedmont	C1780000	LAKE RHODHISS	11-(37)	June 5, 2007	CTB034A	7.6	20.9	6.8	85.1%	5	10.0	13.0											3.5	16.8
Piedmont	C2030000	LAKE RHODHISS	11-(37)	June 5, 2007	CTB040A	8.4	24.5	7.4	100.8%	12	3.1	3.2											5.1	16.6
Piedmont	C2060000	LAKE RHODHISS	11-(37)	June 5, 2007	CTB040B	10.3	25.5	8.9	125.8%	11	3.1	2.6											6.6	14.7
						8.8	**23.6**	**7.7**	**103.9%**	**9.3**	**5.4**	**6.3**											**5.1**	**16.0**
Piedmont	C1780000	LAKE RHODHISS	11-(37)	June 20, 2007	CTB034A	9.5	24.9	7.4	114.8%	19	7.0	9.4											4.2	15.4
Piedmont	C2030000	LAKE RHODHISS	11-(37)	June 20, 2007	CTB040A	10.4	26.4	8.9	129.2%	18	6.8	7.5											6.7	15.2
Piedmont	C2060000	LAKE RHODHISS	11-(37)	June 20, 2007	CTB040B	9.6	27.5	8.7	121.6%	13	3.1	3.4											7.2	13.9
						9.8	**26.3**	**8.3**	**121.9%**	**16.7**	**5.6**	**6.8**											**6.0**	**14.8**
Piedmont	C1780000	LAKE RHODHISS	11-(37)	July 11, 2007	CTB034A	8.7	26.9	7.6	109.0%	8	6.8	6.7											4.0	17.0
Piedmont	C2030000	LAKE RHODHISS	11-(37)	July 11, 2007	CTB040A	10.5	28.1	9.3	134.4%	16	3.1	3.8											5.8	15.2
Piedmont	C2060000	LAKE RHODHISS	11-(37)	July 11, 2007	CTB040B	10.0	28.6	9.4	129.2%	16	3.1	3.9											6.5	15.3
						9.7	**27.9**	**8.8**	**124.2%**	**13.3**	**4.3**	**4.8**											**5.4**	**15.8**
Piedmont	C1780000	LAKE RHODHISS	11-(37)	July 24, 2007	CTB034A	9.6	24.9	8.4	116.0%	25	7.2	7.5											6.0	16.3
Piedmont	C2030000	LAKE RHODHISS	11-(37)	July 24, 2007	CTB040A	9.0	25.7	8.8	110.4%	22	3.1	5.4											7.2	16.1
Piedmont	C2060000	LAKE RHODHISS	11-(37)	July 24, 2007	CTB040B	9.1	25.7	8.9	111.6%	21	3.1	3.6											6.6	15.2
						9.2	**25.4**	**8.7**	**112.7%**	**22.7**	**4.5**	**5.5**											**6.6**	**15.9**
Piedmont	C1780000	LAKE RHODHISS	11-(37)	August 7, 2007	CTB034A	11.6	27.3	9.1	146.4%	9	6.0	11.0											6.3	16.3
Piedmont	C2030000	LAKE RHODHISS	11-(37)	August 7, 2007	CTB040A	10.7	29.1	8.9	139.4%	22	3.1	4.0											8.1	15.4
Piedmont	C2060000	LAKE RHODHISS	11-(37)	August 7, 2007	CTB040B	10.6	30.1	9.2	140.5%	20	3.1	3.2											6.9	15.4
						11.0	**28.8**	**9.1**	**142.1%**	**17.0**	**4.1**	**6.1**											**7.1**	**15.7**
Piedmont	C1780000	LAKE RHODHISS	11-(37)	August 21, 2007	CTB034A	8.4	25.8	7.7	103.2%	15	3.1	7.4											5.9	16.1
Piedmont	C2030000	LAKE RHODHISS	11-(37)	August 21, 2007	CTB040A	8.8	27.6	8.4	111.7%	18	3.1	3.6											8.6	15.7
Piedmont	C2060000	LAKE RHODHISS	11-(37)	August 21, 2007	CTB040B	8.8	28.5	8.8	113.5%	14	6.0	3.1											7.9	15.4
						8.7	**27.3**	**8.3**	**109.5%**	**15.7**	**4.1**	**4.7**											**7.5**	**15.7**
Piedmont	C1780000	LAKE RHODHISS	11-(37)	September 26, 2007	CTB034A	10.2	24.8	8.4	123.0%	70	11.0	11.0											7.4	17.7
Piedmont	C2030000	LAKE RHODHISS	11-(37)	September 26, 2007	CTB040A	10.6	23.6	8.8	125.0%	19	3.1	3.9											12.0	16.3
Piedmont	C2060000	LAKE RHODHISS	11-(37)	September 26, 2007	CTB040B	9.7	25.2	8.7	117.9%	13	3.1	3.1											8.8	16.1
						10.2	**24.5**	**8.6**	**122.0%**	**34.0**	**5.7**	**6.0**												
					N=	9	9	9	9	9	9	9											9	9
		Class = WS-IV B CA			***% EXCEED =***	*NCE*	*NCE*	*E (11%)*	*E (56%)*	*NCE*	*NCE*	*NCE*											*NCE*	*NCE*

						SURFACE PHYSICAL DATA												SURFACE METALS						
Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Piedmont	C2330000	LAKE HICKORY	11-(53)	May 2, 2007	CTB048A	8.1	18.7	6.8	86.6%	1	4.8	6.5												
Piedmont	C2600000	LAKE HICKORY	11-(53)	May 2 2007	CTB056A	11.3	20.7	8.2	126.1%	10	3.0	2.9												
						9.7	**19.7**	**7.5**	**106.4%**	**5.5**	**3.9**	**4.7**												
Piedmont	C2330000	LAKE HICKORY	11-(53)	May 16, 2007	CTB048A	8.0	19.8	6.9	87.7%	5	2.8	4.1												
Piedmont	C2600000	LAKE HICKORY	11-(53)	May 16, 2007	CTB056A	9.6	21.5	7.4	108.8%	9	3.2	3.1												
						8.8	**20.7**	**7.2**	**98.3%**	**7.0**	**3.0**	**3.6**												
Piedmont	C2330000	LAKE HICKORY	11-(53)	June 5, 2007	CTB048A	7.5	23.6	7.0	88.5%	5	6.3	7.5												
Piedmont	C2600000	LAKE HICKORY	11-(53)	June 5, 2007	CTB056A	9.1	25.3	7.7	110.8%	14	3.1	2.8												
						8.3	**24.5**	**7.4**	**99.7%**	**9.5**	**4.7**	**5.2**												
Piedmont	C2330000	LAKE HICKORY	11-(53)	June 20, 2007	CTB048A	8.8	25.6	7.1	107.7%	31	3.1	4.4												
Piedmont	C2600000	LAKE HICKORY	11-(53)	June 20, 2007	CTB056A	9.7	27.0	8.3	121.8%	16		2.6												
						9.3	**26.3**	**7.7**	**114.8%**	**23.5**	**3.1**	**3.5**												

APPENDIX B

CATAWBA RIVER BASIN LAKES 2007 USE SUPPORT

						SURFACE PHYSICAL DATA							SURFACE METALS											
Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Piedmont	C2330000	LAKE HICKORY	11-(53)	July 11, 2007	CTB048A	6.9	25.7	7.2	84.6%	15	3.1	5.8												
Piedmont	C2600000	LAKE HICKORY	11-(53)	July 11, 2007	CTB056A	8.5	28.1	7.7	109.8%	15	3.1	4.0												
						7.7	**26.9**	**7.5**	**97.2%**	**15.0**	**3.1**	**4.9**												
Piedmont	C2330000	LAKE HICKORY	11-(53)	July 24, 2007	CTB048A	8.2	26.3	7.1	101.6%	17	3.1	5.4												
Piedmont	C2600000	LAKE HICKORY	11-(53)	July 24, 2007	CTB056A	7.7	26.6	7.1	96.0%	19	3.1	3.5												
						8.0	**26.5**	**7.1**	**98.8%**	**18.0**	**3.1**	**4.5**												
Piedmont	C2330000	LAKE HICKORY	11-(53)	August 7, 2007	CTB048A	8.1	28.0	7.4	103.5%	15	3.1	5.4												
Piedmont	C2600000	LAKE HICKORY	11-(53)	August 7, 2007	CTB056A	9.4	29.2	8.2	122.7%	19	3.1	3.2												
						8.8	**28.6**	**7.8**	**113.1%**	**17.0**	**3.1**	**4.3**												
Piedmont	C2330000	LAKE HICKORY	11-(53)	August 22, 2007	CTB048A	7.4	28.0	7.0	94.6%	18	3.1	3.5												
Piedmont	C2600000	LAKE HICKORY	11-(53)	August 22, 2007	CTB056A	8.0	28.9	7.5	103.9%	13	3.1	3.3												
						7.7	**28.5**	**7.3**	**99.3%**	**15.5**	**3.1**	**3.4**												
Piedmont	C2330000	LAKE HICKORY	11-(53)	September 26, 2007	CTB048A	8.4	27.7	8.2	106.8%	19	6.0	4.0												
Piedmont	C2600000	LAKE HICKORY	11-(53)	September 26, 2007	CTB056A	5.9	27.9	8.3	75.3%	27	3.1	2.8												
						7.2	**27.8**	**8.3**	**91.1%**	**23.0**	**4.6**	**3.4**												
					N=	9	9	9	9	9	9	9												
		Class = WS-IV B CA			*% EXCEED =*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*												

						SURFACE PHYSICAL DATA							SURFACE METALS											
Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	May 2, 2007	CTB058C	10.6	20.8	8.1	118.5%	12	2.5	2.2												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	May 2, 2007	CTB058D	10.1	22.2	7.9	116.0%	9	1.3	2.2											3.6	14.4
						10.4	**21.5**	**8.0**	**117.3%**	**10.5**	**1.9**	**2.2**											**3.6**	**14.4**
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	May 16, 2007	CTB058C	10.0	21.8	7.6	114.0%	8	1.3	2.3												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	May 16, 2007	CTB058D	10.6	21.7	7.6	120.6%	6	1.3	2.1											4.6	14.2
						10.3	**21.8**	**7.6**	**117.3%**	**7.0**	**1.3**	**2.2**											**4.6**	**14.2**
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	June 5, 2007	CTB058C	9.5	25.2	8.3	115.4%	18	3.1	2.5												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	June 5, 2007	CTB058D	9.6	25.2	8.5	116.6%	13	3.1	2.8											3.9	13.4
						9.6	**25.2**	**8.4**	**116.0%**	**15.5**	**3.1**	**2.7**											**3.9**	**13.4**
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	June 20, 2007	CTB058C	9.7	26.6	8.4	120.9%	20	3.1	3.2												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	June 20, 2007	CTB058D	9.3	26.7	8.0	116.1%	13	3.1	2.2											5.1	12.9
						9.5	**26.7**	**8.2**	**118.5%**	**16.5**	**3.1**	**2.7**											**5.1**	**12.9**
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	July 11, 2007	CTB058C	9.1	28.2	8.1	116.7%	14	3.1	2.7												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	July 11, 2007	CTB058D	8.5	27.9	7.8	108.4%	4	3.1	2.1											4.6	13.3
						8.8	**28.1**	**8.0**	**112.6%**	**9.0**	**3.1**	**2.4**											**4.6**	**13.3**
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	July 24, 2007	CTB058C	8.1	26.7	7.2	101.1%	6	3.1	5.1												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	July 24, 2007	CTB058D	7.4	26.7	7.1	92.4%	8	3.1	2.1											4.9	13.4
						7.8	**26.7**	**7.2**	**96.8%**	**7.0**	**3.1**	**3.6**											**4.9**	**13.4**
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	August 7, 2007	CTB058C	9.2	29.3	8.1	120.3%	15	3.1	2.7												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	August 7, 2007	CTB058D	8.7	29.5	7.8	114.1%	6	3.1	2.5											4.5	13.7
						9.0	**29.4**	**8.0**	**117.2%**	**10.5**	**3.1**	**2.6**											**4.5**	**13.7**
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	August 22, 2007	CTB058C	7.8	29.0	7.3	101.4%	12	3.1	2.0												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	August 22, 2007	CTB058D	8.0	29.2	7.4	104.4%	10	3.1	1.9											4.7	13.9
						7.9	**29.1**	**7.4**	**102.9%**	**11.0**	**3.1**	**2.0**											**4.7**	**13.9**
Piedmont	C2760000	LAKE HICKORY	11-(59.5)	September 26, 2007	CTB058C	5.3	27.3	8.2	66.9%	20	3.1	2.4												
Piedmont	C2790000	LAKE HICKORY	11-(59.5)	September 26, 2007	CTB058D	4.6	27.7	7.9	58.5%	16	3.1	1.8											5.9	15.6
						5.0	**27.5**	**8.1**	**62.7%**	**18.0**	**3.1**	**2.1**												
					N=	9	9	9	9	9	9	9											9	9
		Class = WS-V B			*% EXCEED =*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*											*NCE*	*NCE*

						SURFACE PHYSICAL DATA							SURFACE METALS											
Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Piedmont	C3420000	LAKE NORMAN	11-(75)	May 17, 2007	CTB079A	7.9	21.1	7.1	88.2%	6	10.0	11.0											4.2	13.3
Piedmont	C3500100	LAKE NORMAN	11-(75)	May 17, 2007	CTB082A	8.8	22.4	7.6	101.5%	8	3.4	2.5											5.2	17.2
Piedmont	C3512600	LAKE NORMAN	11-(75)	May 17, 2007	CTB082AA	8.3	24.0	7.5	98.9%	3	3.5	3.2											4.9	15.1
Piedmont	C3500300	LAKE NORMAN	11-(75)	May 17, 2007	CTB082B	8.5	22.5	7.5	98.2%	8	3.5	2.8											5.2	16.2
Piedmont	C3512700	LAKE NORMAN	11-(75)	May 17, 2007	CTB082BB	8.6	23.1	7.4	100.5%	2	1.3	3.1											4.8	16.0
Piedmont	C3505000	LAKE NORMAN	11-(75)	May 17, 2007	CTB082M	9.0	23.4	7.6	105.7%	7	2.5	3.4											5.0	16.9
Piedmont	C3511600	LAKE NORMAN	11-(75)	May 17, 2007	CTB082Q	8.7	22.7	7.5	100.9%	3	1.3	3.0											4.9	15.1
Piedmont	C3511700	LAKE NORMAN	11-(75)	May 17, 2007	CTB082R	8.9	21.4	7.6	100.6%	3	1.3	4.5											4.9	15.7
						8.6	**22.6**	**7.5**	**99.3%**	**5.0**	**3.4**	**4.2**											**4.9**	**15.7**

APPENDIX B

CATAWBA RIVER BASIN LAKES 2007 USE SUPPORT

SURFACE PHYSICAL DATA / SURFACE METALS

Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Piedmont	C3420000	LAKE NORMAN	11-(75)	June 25, 2007	CTB079A	9.4	28.2	8.2	120.6%	15	3.1	5.3											4.9	13.8
Piedmont	C3512600	LAKE NORMAN	11-(75)	June 25, 2007	CTB082A	8.9	28.4	8.5	114.5%	9	3.1	2.9											5.5	17.2
Piedmont	C3500300	LAKE NORMAN	11-(75)	June 25, 2007	CTB082AA	8.3	31.0	7.5	111.7%	5	3.1	1.8											5.1	15.7
Piedmont	C3512700	LAKE NORMAN	11-(75)	June 25, 2007	CTB082B	8.2	28.6	7.5	105.9%	11	3.1	2.8											6.4	18.7
Piedmont	C3505000	LAKE NORMAN	11-(75)	June 25, 2007	CTB082BB	8.0	30.1	7.4	106.1%	4	3.1	2.2											5.1	15.7
Piedmont	C3511600	LAKE NORMAN	11-(75)	June 25, 2007	CTB082M	8.8	28.5	7.9	113.5%	7	3.1	2.2											5.8	17.2
Piedmont	C3511700	LAKE NORMAN	11-(75)	June 25, 2007	CTB082Q	8.5	29.0	7.8	110.6%	4	6.0	1.7											5.2	15.7
Piedmont	C3500100	LAKE NORMAN	11-(75)	June 25, 2007	CTB082R	8.3	29.9	7.4	109.7%	4	6.0	2.0											5.1	15.5
						8.6	**29.2**	**7.8**	**111.6%**	**7.4**	**3.8**	**2.6**											**5.4**	**16.2**
Piedmont	C3420000	LAKE NORMAN	11-(75)	July 18, 2007	CTB079A	7.2	28.6	7.3	93.0%	20	6.5	6.5											4.3	14.0
Piedmont	C3512600	LAKE NORMAN	11-(75)	July 18, 2007	CTB082A	8.0	29.0	7.9	104.0%	11	3.1	3.6											5.1	17.8
Piedmont	C3500300	LAKE NORMAN	11-(75)	July 18, 2007	CTB082AA	6.9	31.7	7.4	94.0%	8	3.1	1.9											4.4	15.7
Piedmont	C3512700	LAKE NORMAN	11-(75)	July 18, 2007	CTB082B	6.2	24.2	7.0	73.9%	6	3.1	2.5											6.3	20.3
Piedmont	C3505000	LAKE NORMAN	11-(75)	July 18, 2007	CTB082BB	6.7	31.1	7.2	90.4%	6	3.1	1.8											4.4	15.7
Piedmont	C3511600	LAKE NORMAN	11-(75)	July 18, 2007	CTB082M	7.8	28.0	7.8	99.7%	9	3.1	2.1											5.2	18.5
Piedmont	C3511700	LAKE NORMAN	11-(75)	July 18, 2007	CTB082Q	7.1	30.1	7.7	94.1%	6	3.1	1.9											4.4	15.7
Piedmont	C3500100	LAKE NORMAN	11-(75)	July 18, 2007	CTB082R	7.0	29.9	7.4	92.5%	6	3.1	1.4											4.4	15.7
						7.1	**29.1**	**7.5**	**92.7%**	**9.0**	**3.5**	**2.7**											**4.8**	**16.7**
Piedmont	C3420000	LAKE NORMAN	11-(75)	August 15, 2007	CTB079A	8.1	29.3	7.2	105.9%	17	6.0	7.4											4.7	14.2
Piedmont	C3512600	LAKE NORMAN	11-(75)	August 15, 2007	CTB082A	7.7	30.6	7.4	103.0%	9	3.1	3.2											5.4	18.2
Piedmont	C3500300	LAKE NORMAN	11-(75)	August 15, 2007	CTB082AA	7.5	33.8	7.5	105.8%	6	3.1	1.4											4.6	16.4
Piedmont	C3512700	LAKE NORMAN	11-(75)	August 15, 2007	CTB082B	7.8	30.8	7.0	104.7%	12	3.1	2.3											5.9	19.1
Piedmont	C3505000	LAKE NORMAN	11-(75)	August 15, 2007	CTB082BB	7.5	33.2	7.4	104.8%	6	3.1	1.5											4.6	16.0
Piedmont	C3511600	LAKE NORMAN	11-(75)	August 15, 2007	CTB082M	8.3	30.9	7.6	111.6%	10	3.1	1.9											6.0	18.7
Piedmont	C3511700	LAKE NORMAN	11-(75)	August 15, 2007	CTB082Q	7.8	31.9	7.7	106.6%	6	3.1	2.2											4.6	16.4
Piedmont	C3500100	LAKE NORMAN	11-(75)	August 15, 2007	CTB082R	7.7	32.1	7.4	105.6%	7	3.1	1.9											4.7	16.7
						7.8	**31.6**	**7.4**	**106.0%**	**9.1**	**3.5**	**2.7**											**5.1**	**17.0**
Piedmont	C3420000	LAKE NORMAN	11-(75)	September 24, 2007	CTB079A	8.1	27.0	7.3	101.7%	7.1	8.8	9.5											5.6	14.1
Piedmont	C3512600	LAKE NORMAN	11-(75)	September 24, 2007	CTB082A	8.6	27.1	7.9	108.2%	10.0	3.1	3.1											6.7	19.1
Piedmont	C3500300	LAKE NORMAN	11-(75)	September 24, 2007	CTB082AA	8.0	30.4	7.5	106.6%	6.5	3.1	3.8											5.4	17.3
Piedmont	C3512700	LAKE NORMAN	11-(75)	September 24, 2007	CTB082B	7.3	27.3	7.2	92.1%	5.8	3.1	2.1											7.0	20
Piedmont	C3505000	LAKE NORMAN	11-(75)	September 24, 2007	CTB082BB	6.8	30.5	7.2	90.8%	3.0	6.0	1.9											5.4	17.6
Piedmont	C3511600	LAKE NORMAN	11-(75)	September 24, 2007	CTB082M	8.4	28.6	7.9	108.5%	7.0	3.1	2.3											7.1	20
Piedmont	C3511700	LAKE NORMAN	11-(75)	September 24, 2007	CTB082Q	7.9	28.8	7.5	102.4%	4.1	3.1	2.0											5.6	17.6
Piedmont	C3500100	LAKE NORMAN	11-(75)	September 24, 2007	CTB082R	7.4	28.5	7.4	95.4%	3.9	3.1	1.8											5.5	17.6
						7.8	**28.5**	**7.5**	**100.7%**	**5.9**	**4.2**	**3.3**											**6.0**	**17.9**
					N=	5	5	5	5	5	5	5											5	5
		Class = WS-IV B CA			***% EXCEED =***	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*	*NCE*											*NCE*	*NCE*

SURFACE PHYSICAL DATA / SURFACE METALS

Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	May 2, 2007	CTB105B	9.6	25.7	8.0	117.7%	21	6.0	10.0												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	May 2, 2007	CTB174	8.9	29.5	8.0	116.8%	19	7.7	10.0												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	May 2, 2007	CTB177	10.4	25.2	8.5	126.4%	32	6.8	7.7												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	May 2, 2007	CTB178	9.5	23.4	7.7	111.6%	12	4.5	2.6												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	May 2, 2007	CTB198B5	11.4	26.5	8.9	141.8%	44	9.0	8.4												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	May 2, 2007	CTB198C5	9.2	26.2	7.7	113.8%	14	7.8	8.8												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	May 2, 2007	CTB198D	9.1	25.1	7.8	110.4%	9	3.8	2.4											5.6	23.7
						9.7	**25.9**	**8.1**	**119.8%**	**21.6**	**6.5**	**7.1**											**5.6**	**23.7**
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	May 21, 2007	CTB105B	8.6	23.9	7.6	102.0%	11	6.5	8.1												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	May 21, 2007	CTB174	10.4	27.5	8.5	131.7%	32	7.5	10.0												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	May 21, 2007	CTB177	9.4	25.3	8.6	114.4%	28	9.5	7.7												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	May 21, 2007	CTB178	9.2	25.3	8.3	112.0%	14	4.7	4.1												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	May 21, 2007	CTB198B5	10.4	26.2	8.5	128.7%	33	8.5	7.1												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	May 21, 2007	CTB198C5	9.5	25.9	8.5	116.9%	12	7.2	8.8												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	May 21, 2007	CTB198D	9.6	25.6	8.7	117.5%	14	3.5	2.6											7.5	24.6
						9.6	**25.7**	**8.4**	**117.6%**	**21**	**6.8**	**6.9**											**7.5**	**24.6**
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	June 4, 2007	CTB105B	6.6	26.3	7.0	81.8%	10	6.5	7.5												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	June 4, 2007	CTB174	6.3	29.3	7.2	82.4%	14	7.5	9.3												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	June 4, 2007	CTB177	7.5	27.9	8.1	95.7%	13	3.1	4.8												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	June 4, 2007	CTB178	6.7	26.2	7.4	82.9%	16	3.1	4.9												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	June 4, 2007	CTB198B5	9.1	27.3	8.2	114.9%	41	10.0	10.0												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	June 4, 2007	CTB198C5	8.1	26.9	8.5	101.5%	18	6.5	7.1												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	June 4, 2007	CTB198D	8.5	25.0	7.9	102.9%	17	3.1	4.7											7.9	25.1

APPENDIX B

CATAWBA RIVER BASIN LAKES 2007 USE SUPPORT

						SURFACE PHYSICAL DATA							SURFACE METALS											
Region	STORET	Lake	AU	Date m/d/yr	Sampling Station	DO mg/L	Water Temp C	pH s.u.	Percent DO SAT	Chla µg/L	TSS mg/L	Turbidity NTU	Hg µg/L	Zn µg/L	Pb µg/L	Ni µg/L	Cu µg/L	Cr µg/L	Cd µg/L	As µg/L	Mn µg/L	Fe µg/L	Chloride mg/L	Total Hardnes Calculated mg/L
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	June 18, 2007	CTB105B	9.1	29.8	8.4	120.0%	20	3.1	4.5												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	June 18, 2007	CTB174	9.7	33.6	8.5	136.4%	27	7.8	8.7												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	June 18, 2007	CTB177	9.9	29.7	8.7	130.3%	27	3.1	4.8												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	June 18, 2007	CTB178	9.7	29.1	8.5	126.4%	21	3.1	3.1												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	June 18, 2007	CTB198B5	10.9	29.9	9.0	144.0%	39	7.5	6.2												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	June 18, 2007	CTB198C5	10.1	30.5	8.8	134.8%	29	7.2	6.8												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	June 18, 2007	CTB198D	9.5	29.4	8.7	124.4%	19	3.1	2.8											8.2	24.6
						9.8	**30.3**	**8.7**	**130.9%**	**26.0**	**5.0**	**5.3**											**8.2**	**24.6**
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	July 9, 2007	CTB105B	7.8	31.5	7.6	105.9%	15	3.1	4.4												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	July 9, 2007	CTB174	8.5	36.1	7.9	124.6%	26	3.1	6.2												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	July 9, 2007	CTB177	9.4	31.4	8.5	127.4%	34	3.1	4.9												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	July 9, 2007	CTB178	8.8	30.0	8.3	116.5%	20	3.1	2.8												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	July 9, 2007	CTB198B5	9.2	30.2	8.5	122.2%	32	3.1	7.1												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	July 9, 2007	CTB198C5	9.8	31.1	8.8	132.2%	27	7.5	7.2												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	July 9, 2007	CTB198D	8.8	30.0	8.6	116.5%	19	3.1	4.5											8.0	25.5
						8.9	**31.5**	**8.3**	**120.8%**	**24.7**	**7.6**	**7.0**											**8.0**	**25.5**
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	July 23, 2007	CTB105B	7.3	29.3	7.4	95.4%	19	3.1	5.8												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	July 23, 2007	CTB174	8.4	32.4	7.7	115.8%	29	7.2	8.1												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	July 23, 2007	CTB177	8.4	30.6	8.0	112.3%	25	6.8	6.4												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	July 23, 2007	CTB178	7.7	30.2	7.6	102.3%	21	3.1	3.2												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	July 23, 2007	CTB198B5	8.6	29.6	7.9	113.0%	30	6.5	7.1												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	July 23, 2007	CTB198C5	8.3	29.0	8.1	107.9%	12	6.0	5.5												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	July 23, 2007	CTB198D	8.3	29.9	8.1	109.7%	14	3.1	3.2											9.6	25.6
						8.1	**30.1**	**7.8**	**108.1%**	**21.4**	**5.1**	**5.6**											**9.6**	**25.6**
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	August 6, 2007	CTB105B	8.5	33.0	8.3	118.4%	17	3.1	5.1												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	August 6, 2007	CTB174	7.9	36.7	8.0	116.9%	18	3.1	6.4												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	August 6, 2007	CTB177	8.3	33.0	8.4	115.6%	21	3.1	6.2												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	August 6, 2007	CTB178	8.6	33.2	8.2	120.2%	18	3.1	3.8												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	August 6, 2007	CTB198B5	10.7	32.6	8.7	148.0%	34	6.0	8.8												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	August 6, 2007	CTB198C5	9.5	33.0	8.7	132.3%	28	9.8	9.6												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	August 6, 2007	CTB198D	9.2	31.6	8.7	125.1%	11	3.1	3.0											8.3	26.8
						8.9	**32.9**	**8.4**	**123.1%**	**21.1**	**4.5**	**6.1**											**8.3**	**26.8**
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	August 20, 2007	CTB105B	7.4	31.5	7.7	100.5%	19	<6.2	5.4												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	August 20, 2007	CTB174					25	3.1	4.6												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	August 20, 2007	CTB177					23	6.2	5.5												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	August 20, 2007	CTB178	7.2	30.8	7.7	96.6%	20	3.1	3.7												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	August 20, 2007	CTB198B5	9.6	32.3	8.4	132.1%	42	11.0	11.0												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	August 20, 2007	CTB198C5	8.7	31.7	8.7	118.5%	19	20.0	12.0												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	August 20, 2007	CTB198D	8.2	31.0	8.7	110.4%	14	3.1	2.8											10	25.9
						8.2	**31.5**	**8.2**	**111.6%**	**23.1**	**7.8**	**6.4**											**10**	**25.9**
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	September 12, 2007	CTB105B	6.1	29.5	7.3	80.0%															
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	September 12, 2007	CTB174	5.6	34.1	7.1	79.4%	15	3.1	5.4												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	September 12, 2007	CTB177	4.4	29.1	7.0	57.3%	14	9.0	9.9												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	September 12, 2007	CTB178	5.0	28.7	7.1	64.7%	13		4.0												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	September 12, 2007	CTB198B5	7.3	28.3	7.4	93.8%	35	9.2	8.5												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	September 12, 2007	CTB198C5	6.0	28.0	7.3	76.7%	21	12.0	11.0												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	September 12, 2007	CTB198D	6.8	28.5	7.5	87.7%	16	3.1	2.8											9.6	26.8
						5.9	**29.5**	**7.2**	**77.1%**	**19.0**	**7.3**	**6.9**											**9.6**	**26.8**
Piedmont	C4272000	LAKE WYLIE	11-(123.5)	September 26, 2007	CTB105B	9.1	28.3	8.8	116.9%	22	6.0	4.5												
Piedmont	C7000000	LAKE WYLIE	11-(123.5)	September 26, 2007	CTB174	7.4	33.8	7.8	104.4%	18	7.8	7.4												
Piedmont	C7400000	LAKE WYLIE	11-(123.5)	September 26, 2007	CTB177	10.2	29.4	9.1	133.6%	27	3.1	4.5												
Piedmont	C7500000	LAKE WYLIE	11-(123.5)	September 26, 2007	CTB178	9.4	27.8	8.8	119.7%	18	3.1	2.5												
Piedmont	C8695000	LAKE WYLIE	11-(123.5)	September 26, 2007	CTB198B5	9.6	28.7	8.7	124.2%	21	3.1	7.4												
Piedmont	C8707000	LAKE WYLIE	11-(123.5)	September 26, 2007	CTB198C5	9.5	28.6	8.8	122.7%	29	9.5	11.0												
Piedmont	C8710000	LAKE WYLIE	11-(123.5)	September 26, 2007	CTB198D	9.2	28.0	8.8	117.6%	15	3.1												11	26.8
						9.2	**29.2**	**8.7**	**119.9%**	**21.4**	**5.1**	**6.2**												
					N=	10	10	10	10	10	10	10											10	10
		Class = WS-V B			***% EXCEED =***	*NCE*	*E (10%)*	*NCE*	*E (40%)*	*NCE*	*NCE*	*NCE*											*NCE*	*NCE*