LAKE & RESERVOIR ASSESSMENTS
CATAWBA RIVER BASIN

Lake Norman

Intensive Survey Branch
Water Sciences Section
Division of Environmental 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 may 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 Diatoms are photosynthetic algae that have a siliceous skeleton (frustule) found in almost every aquatic environment including fresh and marine waters, as well as moist soils. 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 dissolve 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 northern 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. DEQ 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.

Nine lakes were sampled in this river basin by DWR staff in 2022. Three lakes appear on the 2022 303(d) List of Impaired Waters (Table 1) (https://deq.nc.gov/about/divisions/water-resources/water-planning/modeling-assessment/water-quality-data-assessment/integrated-report-files). Current fish consumption advisories can be found at https://www.epi.state.nc.us/oee/fish/advisories.html

Table 1. Catawba River Basin Lakes on the 2022 303(d) List of Impaired Waters.

Lake	Location	Violation	303(d) Year
Lake Norman below elevation 76	From Lyle Creek to Cowan's Dam	PCB Fish Tissue Advisory Turbidity (>50 NTU)	2014 2020
Mountain Island Lake	From Water Intake at River Bend Steam Station to Mountain Island Dam (Town of Mount Holly water supply intake)	PCB Fish Tissue Advisory	2012
Lake Wylie below elevation 570	From Mountain Island Dam to NC/SC state line	PCB Fish Tissue Advisory	2014
Catawba River (Lake Wylie South Fork Catawba Arm)	South Fork Catawba River Arm of Lake Wylie	PCB Fish Tissue Advisory Turbidity (>25 NTU) Copper Level (>7 ug/L)	2014 2018 2008

On April 2, 2008, a state-wide fish consumption advisory was placed on fish caught in the state which may be high in mercury. These include largemouth bass, blackfish (bowfin), catfish, and jackfish (chain pickerel) See https://epi.dph.ncdhhs.gov/oee/fish/advisories.html for additional information on fish consumption advisories in the state.

Assessment Methodology

For this report, data from January 1, 2018 through December 31, 2022 were reviewed. Lake monitoring and sample collection activities performed by DWR field staff are in accordance with the Intensive Survey Unit Standard Operating Procedures Manual:(http://portal.ncdenr.org/c/document_library/get_file?uuid=522a90a4-b593-426f-8c11-21a35569dfd8&groupId=38364) An interactive map of the state showing the locations of lake sites sampled by DWR may be found at: http://www.arcgis.com/home/webmap/viewer.html?webmap=9dbc8edafb7743a9b7ef3f6fed5c4db0&extent=-87.8069,29.9342,-71.5801,38.7611.

All lakes were sampled during the growing season from May through September. Data were assessed for excursions of the state's Class C water quality standards for chlorophyll *a*, pH, dissolved oxygen, water temperature, turbidity, and surface metals. 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.

For algae collection and assessment, water samples are collected from the photic zone, preserved in the field and taken concurrently with chemical and physical parameters. Samples were quantitatively analyzed to determine assemblage structure, density (units/ml) and biovolume (m^3/mm^3).

For the purpose of reporting, algal blooms were determined by the measurement of unit density (units/ml). Unit density is a quantitative measurement of the number of filaments, colonies or single celled taxa in a waterbody. Blooms are considered mild if they are between 10,000 and 20,000 units/ml. Moderate blooms are those between 20,000 and 30,000 units/ml. Severe blooms are between 30,000 and 100,000 units/ml and extreme blooms are those 100,000 units/ml or greater.

An algal group is considered dominant when it comprises 40% or more of the total unit density or total biovolume. A genus is considered dominant when it comprises 30% or more of the total unit density or total biovolume.

Quality Assurance of Field and Laboratory Lakes Data

Data collected in the field via multiparameter water quality meters are uploaded into the Labworks® Database within five days of the sampling date.

Chemistry data from the DWR Water Quality Laboratory are uploaded into Labworks®. If there are data entry mistakes, possible equipment, sampling, and/or analysis errors, these are investigated and corrected, if possible. Chemistry results received from the laboratory that are given a qualification code are entered along with the assigned laboratory code.

Information regarding the WSS Chemistry Laboratory Quality Assurance Program is available on the ISB website (https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/microbiology-inorganics-branch/methods-pqls-qa).

Weather Overview for Summer 2022

Warm weather began in the state in May following a cool April. The first 90-degree days of the year for most of the state began this month. Raleigh finished May 2022 with six days at or above 90°F. After a dry start, increased rainfall near the end of May resulted in a preliminary average precipitation of 4.08 inches, making the month the 55th-wettest May in the past 128 years. The rainfall gradient in May was from west to east with some of the Mountain areas well above normal for rainfall and many southern Coastal areas experiencing dry conditions. In the Coastal Plains, dry conditions ranged from Abnormally Dry (D0) to Moderate (D1) and Sever Drought (D2).

June started with some much-needed rain on the 2nd and 3rd with more than two inches of rain in the southern Coastal Plains. However, after this promising start, rainfall became greatly reduced across the state despite strong thunderstorms which brough more winds than rain. This month was an historically dry June, particularly in the western Piedmont. Salisbury received 0.22 inches of rain in June, making it the driest June there since 1954. Hickory's total rainfall (1.22 inches) ranked as the 5th-driest June since 1959. Further east, Tarboro received only 0.86 inches of rain, making this June its driest in 130 years.

Coupled with the limited precipitation, the statewide average temperature of 75.2°F made June 2022 the 24th-warmest June in the past 128 years. On June 22nd, Charlotte, Fayetteville, and Laurinburg recorded temperature readings of 101°F while Raleigh recorded a temperature of 100°F. In June, Abnormally Dry conditions (D0) spread across the western part of the state. Drought conditions (D1 and D2) expanded from the eastern region of the state west into the Piedmont. June streamflows were mostly below normal across the eastern two-thirds of the state and many Coastal Plains streams were below their historical 10th percentile for the month. Most reservoirs in the Piedmont dipped approximately a foot below their seasonal target levels.

July turned out to be the 18th-warmest July since 1895 with a statewide average temperature of 78.8°F. This month was notable for several stretches of heat beginning just after July 4th. Temperatures in Raleigh reached 102°F on July 6th and 7th, tying the high temperature records in the city for these two dates. Smithfield recorded 104°F on July 6th, becoming the hottest site in the state for July 2022.

Rainfall in July was variable across the state with the wettest site being Newport in the eastern Coastal Plains. This town measured 16.57 inches of rain and making July 2022 its wettest July in 25 years. In the Piedmont, the City of Hickory had its 3rd wettest July with 10.18 inches of rain. In contrast, Elizabeth City in the northern Coastal Plains received 4.8 inches of rain. This was 0.9 inches below its usual rainfall amount, placing it 3.6 inches of rain below normal since the start of the summer. Drought conditions across the state improved in July with Abnormally Dry conditions (D0) in the western parts of the state eliminated but remaining in the in parts of the wester Piedmont and Coastal Plains. A strip of Moderate Drought (D1) was located in the western and northeastern Coastal Plains.

Early August 2022 started out hot and humid with high temperatures reaching the upper 90s on August 9th and 10th. Heat relief arrived on August 12th from a pair of cold fronts that moved in from the northwest and brought much needed rain and cooler, less humid air. August 14th was the first night with temperatures in the 50s in the eastern parts of the state. In the west, both Sparta and Mount Mitchell recorded a night low of 49°F on August 13th. August 2022 ended with temperatures once more in the 90s across the state.

A mixture of both wet and dry conditions occurred in the state in August. Parts of the Piedmont were notably dry. Raleigh saw 0.91 inches of rain for the month, making it the second driest August since 1887. Monroe had 2.33 inches of rain for its 20th driest August in 127 years. Hickory, on the other hand, received 3.45 inches of rain and finished August at 3.3 inches of rainfall above normal. By August 30th, much needed rainfall in the driest parts of the state resulted in the disappearance of areas of Moderate Drought (D1). Abnormally Dry Conditions (D0) remained in the northeastern Coastal Plains and in the southern and eastern Piedmont.

The first rain event for the month of September occurred in the southern Mountains on September 4 – 6, dropping more than six inches of rain in some areas. Following this event, the state continued to remain dry. By September 21st, Elizabeth City had received only 0.17 inches of rainfall for the month and Raleigh had received 0.78 inches of rain. On September 30th, Hurricane Ian broke the dry period in the state. The storm brought 5.92 inches of rain to Hatteras and Elizabeth City received 4.49 inches of rain. Despite the rain contribution from Hurricane Ian, the statewide average precipitation of 3.84 inches ranked this month as the 60th driest September since 1985.

Lake James

Ambient Lakes Program Name	Lake James					
Trophic Status (NC TSI)	Oligotrophic					
Mean Depth (meters)	14.0					
Volume ($10^6 m^3$)	36.9					
Watershed Area (mi^2)	380					
Classification	WS-IV B C					
Stations	CTB013B	CTB013C	CTB015A	CTB015C	CTB023A1	CTB023B
Number of Times Sampled	5	5	5	5	5	5

Lake James is formed by the impoundment of the Catawba and Linville Rivers and is the most upstream reservoir of the Catawba River 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 is trapped 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.

DWR staff monitored Lake James from May through September 2022. Surface dissolved oxygen ranged from 7.3 to 9.3 mg/L and surface water temperatures ranged from 21.2°C in May to 30.6°C in August

(Appendix A). Surface pH in Lake James ranged from 6.0 to 8.2 s.u. and surface conductivity ranged from 25 to 62 µmhos/cm. Secchi depths ranged from 0.3 to 3.9 meters, both of which were observed in the reservoir in September 2022. The lowest secchi depths for Lake James were measured at the lake site near Marion, CTB013B.

Total phosphorus concentrations in this reservoir were consistently greatest at site CTB013B (range: 0.03 to 0.06 mg/L) while total phosphorus at the other five monitoring sites was consistently below the DWR laboratory detection level of 0.02 mg/L. The concentration of NH_3 in Lake James ranged from <0.02 to 0.03 mg/L. Total Kjeldahl nitrogen ranged from <0.30 to 0.53 mg/L and total organic nitrogen ranged from 0.14 to 0.52 mg/L. Chlorophyll *a* values in 2022 ranged from 2.4 to 21.0 µg/L. The turbidity at site CTB013B in September (32.0 NTU) was greater than the state water quality standard of 25.0 NTU for a lake or reservoir. An Algal Growth Potential Test was conducted on water samples collected from Lake James in August 2022 (Table 2). Results indicated that the most upstream lake site (CTB013B) was limited by nitrogen for nuisance algal blooms. Three sites, CTB013C near Marion, NC, CTB015C near Bridgewater, NC and CTB023B near Glen Alpine, NC were co-limited for both nitrogen and phosphorus. Two sites, CTB015A near Nebo, NC and CTB023A1 at Longtown, NC were phosphorus limited.

Table 2. Algal Growth Potential Test Results for Lake James, August 2, 2022.

Station	Maximum Standing Crop, Dry Weight (mg/L)			Limiting Nutrient
	Control	C+N	C+P	
CTB013B	0.97	6.00	0.91	Nitrogen
CTB013C	0.23	0.08	0.17	Nitrogen + Phosphorus*
CTB015A	0.15	0.03	0.33	Phosphorus
CTB015C	0.26	0.07	0.22	Nitrogen + Phosphorus*
CTB023A1	0.58	0.14	0.68	Phosphorus*
CTB023B	0.20	0.09	0.13	Nitrogen + Phosphorus*

Freshwater AGPT using *Selenastrum capricornutum* as test alga

C+N = Control + 1.0 mg/L Nitrate-N

C+P = Control + 0.05 mg/L Phosphate-P

*Limiting nutrient(s) verified by reanalysis of sample; data not shown.

Lake James was determined to exhibit low biological productivity (oligotrophic conditions) in 2022 based on the lake wide calculated NCTSI scores for June, August, and September. This lake has been predominantly oligotrophic since monitoring by DWR began in 1981.

Lake Rhodhiss

Ambient Lakes Program Name	Lake Rhodhiss		
Trophic Status (NC TSI)	Mesotrophic		
Mean Depth (meters)	6.0		
Volume ($10^6 m^3$)	36.70		
Watershed Area (mi^2)	1090.0		
Classification	WS-IV CA		
Stations	CTB034A	CTB040A	CTB040B
Number of Times Sampled	5	5	5

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 Progress 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.

DWR staff monitored Lake Rhodhiss from May through September 2022. Surface water temperatures ranged from 18.1°C to 31.2°C and surface dissolved oxygen ranged from 7.3 to 10.7 mg/L (Appendix A). Surface pH ranged from 7.1 to 9.0 s.u. and surface conductivity ranged from 29 to 57 µmhos/cm. Secchi depths in Lake Rhodhiss ranged from 0.3 to 1.8 meters. The lowest secchi depths were observed at the sampling site located at SR 1501 near Drexel, NC (CTB034A).

Total phosphorus concentrations ranged from <0.02 to 0.07 mg/L and total Kjeldahl nitrogen ranged from <0.30 to 0.46 mg/L. The concentration of NH_3 in Lake Rhodhiss ranged from <0.02 to 0.04 mg/L and total organic nitrogen ranged from 0.11 to 0.45 mg/L. Chlorophyll *a* values ranged from 1.1 to 22.0 µg/L. The value for microcystins, toxins that may be present in the blue-green algae, were below the NCDWR laboratory detection level of 0.4 µg/L. The turbidity value at site CTB034A in September (38.0 NTU) was greater than the state water quality standard of 25 NTU for a lake or reservoir.

Based on the monthly calculated NCTSI scores for 2022, the trophic state of Lake Rhodhiss ranged from low biological productivity (oligotrophic) to elevated biological productivity (eutrophic) with the overall trophic state of this reservoir determined to be moderately productive or mesotrophic This lake has exhibited moderate (mesotrophic) to elevated biological productivity since DWR monitoring began in 1981.

Lake Hickory

Ambient Lakes Program Name	**Lake Hickory**			
Trophic Status (NC TSI)	**Mesotrophic**			
Mean Depth (meters)	**10.0**			
Volume ($10^6 m^3$)	**16.60**			
Watershed Area (mi^2)	**1310.0**			
Classification	**WS-IV B CA**			
Stations	**CTB048A**	**CTB056A**	**CTB058C**	**CTB058D**
Number of Times Sampled	**5**	**5**	**5**	**5**

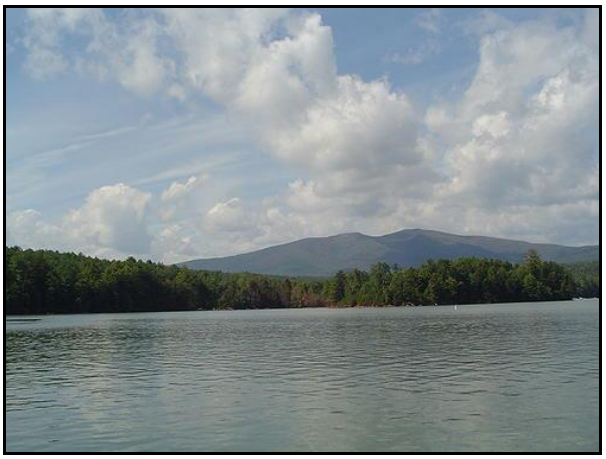
Lake Hickory is located immediately downstream of Lake Rhodhiss on the Catawba River. This reservoir, which is owned by Duke Progress Energy, has an average retention time of 33 days and a maximum depth of 18 meters.

DWR field staff monitored Lake Hickory from May through September 2022. Surface dissolved oxygen ranged from 6.4 mg/L in September to 9.8 mg/L in May and June (Appendix A). Surface water temperatures ranged from 18.1°C in May to 31.1°C in August 2022. Surface pH ranged from 5.5 to 8.2 s.u., with the lowest pH value below the state water quality standard of 6.0 s.u. Surface conductivity ranged from 25 to 57 µmhos/cm. Secchi depths in Lake Hickory ranged from 0.9 to 2.5 meters.

Total phosphorus values ranged from <0.02 to 0.04 mg/L and total Kjeldahl nitrogen ranged from <0.30 to 0.46 mg/L. The concentrations of NH_3 ranged from <0.02 to 0.11 mg/L and total organic nitrogen ranged from 0.14 to 0.45 mg/L. Chlorophyll *a* values ranged from 5.4 to 44.0 µg/L, which was greater than the state water quality standard of 40 µg/L.

Based on the calculated NCTSI scores, Lake Hickory exhibited low biological productivity (oligotrophic) in July, moderately productive (mesotrophic) in June and August, and very productive (eutrophic) in September. Overall, this reservoir was determined to be mesotrophic in 2022. Lake Hickory's trophic state has varied between eutrophic and mesotrophic since DWR monitoring began in 1981.

Lookout Shoals Lake



Ambient Lakes Program Name	Lookout Shoals Lake		
Trophic Status (NC TSI)	Oligotrophic		
Mean Depth (meters)	9.0		
Volume ($10^6 m^3$)	4.60		
Watershed Area (mi^2)	1450.0		
Classification	WS-IV B CA		
Stations	CTB0581F	CTB058F	CTB058G
Number of Times Sampled	5	5	5

Lookout Shoals Lake is one of the smaller Catawba chain lakes with a surface area of 1,270 acres and 39 miles of shoreline. The lake is owned by Duke Progress 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 by J. B. Duke. Lookout Shoals Lake has a maximum depth of 18.3 meters and a mean hydraulic retention time of nine days, the shortest of any lake in the Catawba River basin. The waters of the lake are used to generate electricity at the Lookout Shoals Hydroelectric plant as well as for public recreation.

Lookout Shoals Lake was monitored by DWR staff once a month from May through September 2022. Surface dissolved oxygen readings ranged from 6.3 to 10.5 mg/L and surface temperatures ranged from 18.3°C to 30.4°C (Appendix A). Surface pH values ranged from 5.1 to 8.4 s.u. and surface conductivity values ranged from 43 to 57 µmhos/cm. Secchi depths in Lookout Shoals Lake ranged from 1.3 meters on August 4, 2022, to 2.5 meters on May 12, 2022.

Total phosphorus was low, ranging from <0.002 to 0.02 mg/L. Total Kjeldahl nitrogen values ranged from <0.30 to 0.48 mg/L and NH_3 ranged from <0.02 to 0.08 mg/L. Total organic nitrogen ranged from 0.11 to 0.46 mg/L. Chlorophyll *a* values for this lake were low, ranging from 2.1 to 19.0 µg/L (mean value = 7.3 µg/L). The value for microcystins, toxins that may be present in the blue-green algae, were below the NCDWR laboratory detection level of 0.4 µg/L. An Algal Growth Potential Test was conducted on a water samples collected from site CTB058G located near the Lookout Shoals Lake dam in August 2022 (Table 3). Results indicated that potential nuisance algal blooms at that site were limited by the concentrations of nitrogen in the water sample.

Table 3. Algal Growth Potential Test Results for Lookout Shoals Lake, August 4, 2022.

Station	Maximum Standing Crop, Dry Weight (mg/L)			Limiting Nutrient
	Control	C+N	C+P	
CTB058G	0.57	1.44	0.53	Nitrogen

Freshwater AGPT using *Selenastrum capricornutum* as test alga

C+N = Control + 1.0 mg/L Nitrate-N

C+P = Control + 0.05 mg/L Phosphate-P

Based on the calculated NCTSI scores for 2022, Lookout Shoals Lake was determined to exhibit a trophic state indicative of moderate biological productivity (mesotrophic). Historically, this reservoir has been predominantly mesotrophic since monitoring began by DWR in 1981.

Lake Norman

Ambient Lakes Program Name	Lake Norman							
Trophic Status (NC TSI)	Oligotrophic							
Mean Depth (meters)	10.0							
Volume ($10^6 m^3$)	131.5							
Watershed Area (mi^2)	1790							
Classification	WS-IV B CA							
Stations	CTB079A	CTB082A	CTB082AA	CTB082B	CTB082BB	CTB082M	CTB082Q	CTB082R
Number of Times Sampled	5	5	5	5	5	5	5	5

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 Progress Energy, Lake Norman is used to generate electricity 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 from Lyle Creek to Cowan's Dam is on the 2022 303(d) List of Impaired Waters for a PCB Fish Consumption Advisory (Table 1) (http://epi.publichealth.nc.gov/oee/fish/advisories.html).

Lake Norman was monitored by DWR staff once a month from May through September 2022. Surface dissolved oxygen ranged from 5.8 to 9.1 mg/L and surface water temperatures ranged from 21.7°C to 33.4°C (Appendix A). Surface pH ranged from 6.1 to 8.2 s.u. and conductivities ranged from 49 to 62 µmhos/cm. Secchi depths for Lake Norman ranged from 0.8 to 4.3 meters.

Total phosphorus concentration ranged from <0.02 to 0.03 mg/L and total Kjeldahl nitrogen ranged from <0.30 to 0.74 mg/L. Concentrations of NH_3 ranged from <0.02 to 0.06 mg/L and total organic nitrogen ranged from 0.14 to 0.36 mg/L. Chlorophyll *a* values for this reservoir ranged from 1.1 to 27.0 µg/L and values for microcystins, toxins that may be present in the blue-green algae, were below the NCDWR laboratory detection level of 0.4 µg/L.

Based on the calculated NCTSI scores for 2022, Lake Norman was determined to exhibit low biological productivity or oligotrophic conditions. This reservoir has exhibited moderate (mesotrophic) to very low (oligotrophic) biological productivity since monitoring by DWR began in 1981.

Mountain Island Lake

Ambient Lakes Program Name	**Mountain Island Lake**					
Trophic Status (NC TSI)	**Oligotrophic**					
Mean Depth (meters)	**5.0**					
Volume ($10^6 m^3$)	**71.0**					
Watershed Area (mi^2)	**1860**					
Classification	**WS-IV B CA**					
Stations	**CTB083B**	**CTB086A**	**CTB086B**	**CTB086C**	**CTB087**	**CTB087A**
Number of Times Sampled	**5**	**5**	**5**	**5**	**5**	**5**

Mountain Island Lake is owned by Duke Progress Energy and receives the outflow of Lake Norman upstream. The lake was filled when construction on the Mountain Island Hydroelectric Station was completed in 1924. Mountain Island is a relatively small and narrow lake with a surface area of 3,235 acres and 61 miles of shoreline. The lake has a mean hydraulic retention time of only ten days. Mountain Island Lake is a water supply source for the City of Charlotte and is used by Duke Energy to generate electricity at both the Riverbend Steam Station and the Mountain Island Steam Station. Mountain Island Lake is currently listed on the 2022 303(d) List of Impaired Waters for a PCB Fish Consumption Advisory (Table 1).

Mountain Island Lake was monitored by DWR staff once a month from May through September 2022. Surface water temperatures ranged from 23.5°C in May to 30.6°C in July and surface dissolved oxygen ranged from 6.9 to 9.1 mg/L (Appendix A). Surface pH values ranged from 7.2 to 8.0 s.u. and surface conductivity ranged from 31 to 86 µmhos/cm. Secchi depths in Mountain Island Lake ranged from 1.1 to 2.8 meters, with the secchi depth readings at site CTB083B located in the lake below the Duke Energy Power Facility visible down to the lake's bottom.

Total phosphorus concentrations were low, ranging from <0.02 to 0.02 mg/L. Total Kjeldahl nitrogen ranged from <0.30 to 0.37 mg/L and NH_3 ranged from <0.03 to 0.03 mg/L. Total organic nitrogen concentrations ranged from 0.13 to 0.36 mg/L. Chlorophyll *a* values in Mountain Island Lake ranged from 1.0 to 14.0 µg/L (mean value = 6.5 µg/L). The value for microcystins, toxins that may be present in the

blue-green alga *Microcystin sp*., were below the NCDWR laboratory detection level of 0.4 µg/L. An Algal Growth Potential Test was conducted on water samples collected from Mountain Island Lake in July 2022 (Table 4). Results indicated that potential nuisance algal blooms in the lake were limited by the concentrations of phosphorus in four of the five lake sites sampled. Site CPF086C located in Gar Creek was determined to be algal growth limited by the nutrient, nitrogen.

Table 4. Algal Growth Potential Test Results for Mountain Island Lake, July 21, 2022.

	Maximum Standing Crop, Dry Weight (mg/L)			
Station	Control	C+N	C+P	Limiting Nutrient
CTB083B	0.24	0.12	3.27	Phosphorus
CTB086B	0.67	0.45	1.92	Phosphorus
CTB086C	0.76	1.32	0.68	Nitrogen
CTB087	0.39	0.14	2.95	Phosphorus
CTB087A	0.14	0.14	2.10	Phosphorus

Freshwater AGPT using *Selenastrum capricornutum* as test alga

C+N = Control + 1.0 mg/L Nitrate-N

C+P = Control + 0.05 mg/L Phosphate-P

Based on the calculated NCTSI scores for 2022, Mountain Island Lake was determined to exhibit a trophic state indicative of low biological productivity (oligotrophic). Historically, this reservoir has been predominantly oligotrophic since monitoring began by DWR in 1981.

Lake Wylie

Ambient Lakes Program Name	Lake Wylie							
Trophic Status (NC TSI)	Eutrophic							
Mean Depth (meters)	7.0							
Volume ($10^6 m^3$)	35.3							
Watershed Area (mi^2)	3020							
Classification	WS-IV, V B CA							
Stations	CTB103	CTB105B	CTB174	CTB177	CTB178	CTB198B5	CTB198C5	CTB198D
Number of Times Sampled	5	5	5	5	5	5	5	5

Lake Wylie is a man-made impoundment which was constructed in 1904 with a hydroelectric dam located near Fort Mills, South Carolina. The dam was rebuilt in 1924, creating the present shoreline with the upper portion of the lake in North Carolina and the majority of the lower portion in South Carolina. The lake is owned by Duke Progress Energy and is in Gaston and Mecklenburg Counties in North Carolina and York County in South Carolina. Major tributaries to Lake Wylie including the Catawba River, the South Fork Catawba River, Crowders Creek, Catawba Creek and Allison Creek. This lake is used to generate electricity and for public recreation. Lake Wylie is on the 2022 303(d) List of Impaired Waters for a PCB Fish Consumption Advisory (Table 1) (https://epi.dph.ncdhhs.gov/oee/fish/advisories.html) and for elevated levels of copper in the South Fork Catawba River arm.

Lake Wylie was monitored by DWR field staff once a month from May through September 2022. Surface dissolved oxygen ranged from 5.9 to 9.6 mg/L and surface water temperatures ranged from 20.8°C to 33.4°C Appendix A). Surface pH in this reservoir ranged from 6.9 to 8.8 s.u. and conductivities ranged from 65 to 131 µmhos/cm. Secchi depths ranged from 0.3 to 2.2 meters.

Total phosphorus ranged from <0.02 to 0.07 mg/L and total Kjeldahl nitrogen ranged from <0.30 to 0.75 mg/L. Concentrations of HN_3 ranged from <0.02 to 0.05 mg/L and total organic nitrogen ranged from 0.10 to 0.74 mg/L. Chlorophyll *a* values ranged from 1.6 to 38.0 µg/L. The value for microcystins, toxins that may be present in the blue-green algae, were below the NCDWR laboratory detection level of 0.4 µg/L. Lake Wylie turbidity measurements in 2022 did not exceed the state water quality standard of 25 NTU for lakes and reservoirs.

Lake Wylie was determined to have elevated biological productivity from based on the calculated NCTSI scores for each sampling trip in 2022. This reservoir has been predominantly eutrophic since DWR monitoring began in 1981.

Newton City Lake

Ambient Lakes Program Name	Newton City Lake
Trophic Status (NC TSI)	Oligotrophic
Mean Depth (meters)	2.5
Volume ($10^6 m^3$)	0.10
Watershed Area (mi^2)	100.0
Classification	WS-III CA
Stations	CTBNCL1
Number of Times Sampled	5

Newton City Lake is a small water supply reservoir located on an unnamed tributary of Clark Creek. Constructed in the 1930, the watershed is forested close to the lake with some residential development.

This reservoir was monitored by DWQ field staff once a month from May through September 2022. Surface dissolved oxygen ranged from 7.9 to 8.0 mg/L and surface water temperatures ranged from 23.8°C to 29.0°C (Appendix A). Surface pH values ranged from 5.7 s.u in June to 7.5 s.u in July and surface conductivity was fairly consistent, ranging from 43 to 45 µmhos/cm. Secchi depths ranged from 1.0 to 2.0 meters.

Concentrations of total phosphorus in Newton City Lake were consistently below the DWR laboratory detection level of 0.02 mg/L. Total Kjeldahl nitrogen was also below the DWR laboratory detection level of 0.30 mg/L. Concentrations of NH_3 ranged from <0.02 to 0.03 mg/L and total organic nitrogen ranged from 0.13 to 0.14 mg/L. Chlorophyll *a* values ranged from 1.5 to 6.5 µg/L (mean = 4.8 µg/L). Concentrations of microcystins were below the DWR laboratory detection level of 0.40 µg/L. Based on the calculated NCTSI scores, Newton City Lake was determined to exhibit low biological productivity or oligotrophic conditions in 2022. This lake has been consistently oligotrophic since monitoring by DWR began in 1992.

Bessemer City Lake

Ambient Lakes Program Name	Bessemer City Lake
Trophic Status (NC TSI)	Mesotrophic
Mean Depth (meters)	3.0
Volume ($10^6 m^3$)	0.02
Watershed Area (mi^2)	0.4
Classification	WS-II HQW CA
Stations	CTBBCL1
Number of Times Sampled	5

This small impoundment is the water supply source for Bessemer City in Gaston County. The drainage area is approximately one square kilometer and is characterized by rolling hills. Land use in the watershed is mostly forest with small residential and agricultural areas. Public access to this lake is restricted.

Bessemer City Lake was monitored by DWQ staff once a month from May through September 2022. Surface dissolved oxygen ranged from 7.6 to 8.4 mg/L and surface water temperature ranged from 24.5°C to 29.1°C (Appendix A). Surface pH values ranged from 6.5 to 7.8 s.u. and surface conductivities ranged from 81 to 90 µmhos/cm. Secchi depth in Bessemer City Lake ranged from 0.8 to 2.0 meters.

Concentrations of total phosphorus ranged from <0.02 to 0.02 mg/L and total Kjeldahl nitrogen ranged from <0.30 to 0.49 mg/L. The values for NH_3 ranged from <0.02 to 0.03 mg/L and total organic nitrogen ranged from 0.14 to 0.48 mg/L. Chlorophyll *a* values ranged from 4.6 to 12.0 µg/L and concentrations of microcystins were below the DWR laboratory detection level of 0.40 µg/L.

Based on the calculated NCTSI scores, Bessemer City Lake had monthly biological productivity values that ranged from low to elevated for biological productivity. Overall, this lake exhibited moderate or mesotrophic productivity in 2022. Typically, the trophic state of this lake has varied between oligotrophic and mesotrophic since 1990 when it was first monitored by DWR.

Appendix A - Catawba River Basin Data
January 1, 2018 Through December 31, 2022

	SURFACE PHYSICAL DATA								PHOTIC ZONE DATA													
Lake	Date	Sampling Station	DO mg/L	Temp Water C	pH s.u.	Cond. µmhos/cm	Secchi Depth meters	Percent SAT	TP mg/L	TKN mg/L	NH3 mg/L	NOx mg/L	TN mg/L	TON mg/L	TIN mg/L	Chla µg/L	Microcystins µg/L	Solids Total mg/L	Total Solids Suspended mg/L	Turbidity NTU	Total Hardness mg/L
LAKE JAMES	September 6, 2022	CTB013B	7.5	24.3	7.2	36	0.3	92.9%	0.06	0.34	0.02	0.16	0.50	0.32	0.18	2.4	<0.4		24.0	32.0	
LAKE JAMES	September 6, 2022	CTB013C	8.1	27.9	7.6	62	3.0	107.2%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	7.6		35		1.7	
LAKE JAMES	September 6, 2022	CTB015A	7.6	28.3	7.3	60	3.6	101.7%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	5.1		33		1.2	
LAKE JAMES	September 6, 2022	CTB015C	7.6	28.4	7.4	54	3.5	102.1%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	3.8		32		1.2	16.0
LAKE JAMES	September 6, 2022	CTB023A1	8.0	28.5	7.0	52	3.5	107.0%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	5.8		12	<2.7	1.6	
LAKE JAMES	September 6, 2022	CTB023B	7.7	28.6	7.4	52	3.9	103.6%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	4.3		30		1.1	
LAKE JAMES	August 2, 2022	CTB013B	8.7	29.7	6.5	56	0.8	120.0%	0.04	0.36	0.01	0.01	0.37	0.35	0.02	21.0	<0.4	54	33.0	7.3	
LAKE JAMES	August 2, 2022	CTB013C	7.9	30.3	6.1	55	2.4	109.6%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	5.4		45		1.4	
LAKE JAMES	August 2, 2022	CTB015A	7.5	30.5	6.1	51	2.8	103.6%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	2.5		46		1.1	
LAKE JAMES	August 2, 2022	CTB015C	7.9	30.1	6.8	47	2.8	108.9%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	3.1		57		1.2	16.0
LAKE JAMES	August 2, 2022	CTB023A1	7.7	29.9	7.1	47	2.0	106.2%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	4.7		38		1.7	
LAKE JAMES	August 2, 2022	CTB023B	7.6	30.6	7.0	46	2.6	106.1%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	3.6		39		1.3	
LAKE JAMES	July 14, 2022	CTB013B	9.1	27.4	7.4	60	1.0	119.1%	0.04	0.53	<0.02	<0.02	0.54	0.52	0.02		<0.4	62		6.7	
LAKE JAMES	July 14, 2022	CTB013C	8.3	28.3	7.7	59	2.5	111.3%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02			51		1.7	
LAKE JAMES	July 14, 2022	CTB015A	7.9	28.2	7.4	55	2.9	104.5%	<0.02	0.31	<0.02	<0.02	0.16	0.32	0.30			53		1.1	
LAKE JAMES	July 14, 2022	CTB015C	8.1	28.3	7.4	51	3.1	107.3%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02			35		1.2	15.0
LAKE JAMES	July 14, 2022	CTB023A1	8.3	28.9	8.2	50	2.2	112.3%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02					1.4	
LAKE JAMES	July 14, 2022	CTB023B	8.2	28.5	7.8	50	2.8	109.3%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	3.6		43		1.0	
LAKE JAMES	June 14, 2022	CTB013B	8.3	27.2	6.3	59	1.1	108.9%	0.03	<0.30	0.03	0.04	0.19	0.14	0.05	9.5	<0.4	44	6.6		
LAKE JAMES	June 14, 2022	CTB013C	8.4	27.4	6.4	55	2.5	110.9%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	6.2		47			
LAKE JAMES	June 14, 2022	CTB015A	7.6	27.8	6.2	28	2.7	101.1%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	3.2		40		1.4	
LAKE JAMES	June 14, 2022	CTB015C	8.3	27.7	6.2	52	3.0	109.5%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	3.1		38			14.0
LAKE JAMES	June 14, 2022	CTB023A1	8.3	28.1	6.4	49	2.5	110.3%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	4.7		40			
LAKE JAMES	June 14, 2022	CTB023B	7.3	27.6	6.2	25	3.5	96.8%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	4.1		33			
LAKE JAMES	May 10, 2022	CTB013B	8.1	21.3	6.5	60	0.7	93.9%	0.03		<0.02	0.10			0.11	6.1		67	5.4	6.3	
LAKE JAMES	May 10, 2022	CTB013C	9.3	21.4	6.1	56	2.4	108.4%	<0.02		<0.02	<0.02			0.02	3.6		48		1.3	
LAKE JAMES	May 10, 2022	CTB015A	9.1	21.7	6.0	52	2.9	107.1%	<0.02		<0.02	<0.02			0.02	3.1		39		1.4	
LAKE JAMES	May 10, 2022	CTB015C	9.2	22.0	6.1	51	2.9	109.1%	<0.02		<0.02	<0.02			0.02	3.8		45		1.4	16.0
LAKE JAMES	May 10, 2022	CTB023A1	9.2	21.2	7.0	55	2.4	106.7%	<0.02		<0.02	<0.02			0.02	18.0		50		1.6	
LAKE JAMES	May 10, 2022	CTB023B	9.3	21.9	6.2	50	2.9	109.8%	<0.02		<0.02	<0.02			0.02	2.9		40		1.7	
LAKE RHODHISS	September 7, 2022	CTB034A	7.5	21.0	7.4	48	0.3	87.5%	0.07	<0.30	0.03	0.16	0.31	0.12	0.19	1.8		77	34.0	38.0	15.0
LAKE RHODHISS	September 7, 2022	CTB040A	9.7	27.4	8.8	56	1.2	127.1%	0.03	0.45	<0.02	0.02	0.47	0.44	0.03	22.0		44	4.0	4.4	16.0
LAKE RHODHISS	September 7, 2022	CTB040B	9.9	28.4	8.9	57	1.3	132.5%	0.03	0.45	<0.02	<0.02	0.46	0.44	0.02	18.0	<0.4	46	3.3	3.2	15.0
LAKE RHODHISS	August 3, 2022	CTB034A	7.4	26.3	7.5	54	0.5	94.4%	0.06	<0.30	0.04	0.23	0.38	0.11	0.27	1.4		61	9.5	12.0	17.0
LAKE RHODHISS	August 3, 2022	CTB040A	9.9	31.2	8.0	55	0.8	137.4%	0.03	0.42	<0.02	<0.02	0.43	0.41	0.02	21.0		46	4.8	4.2	16.0
LAKE RHODHISS	August 3, 2022	CTB040B	10.1	31.1	9.0	56	1.2	140.6%	0.03	0.46	<0.02	<0.02	0.47	0.45	0.02	17.0	<0.4	42	3.1	2.9	14.0
LAKE RHODHISS	July 13, 2022	CTB034A	7.3	23.9	7.3	51	0.7	89.4%	0.05	0.37	0.04	0.22	0.59	0.33	0.26	2.1		58		13.0	14.0
LAKE RHODHISS	July 13, 2022	CTB040A	9.8	28.5	8.6	29	1.4	130.8%	0.02	0.40	<0.02	<0.02	0.41	0.39	0.02	14.0		45		4.4	13.0
LAKE RHODHISS	July 13, 2022	CTB040B	9.0	29.5	8.8	54	1.8	121.4%	0.02	<0.30	<0.02	0.03	0.18	0.14	0.04	11.0	<0.4	46		3.8	13.0
LAKE RHODHISS	June 15, 2022	CTB034A	7.8	25.2	7.1	50	0.9	97.4%	0.02	<0.30	0.03	0.20	0.35	0.12	0.23	1.8		47	7.9	5.6	13.0
LAKE RHODHISS	June 15, 2022	CTB040A	9.9	29.4	8.3	50	1.7	134.3%	0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	13.0		37		2.9	13.0
LAKE RHODHISS	June 15, 2022	CTB040B	9.3	29.7	8.0	48	1.8	125.9%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	7.5	<0.4	35		2.3	12.0
LAKE RHODHISS	May 11, 2022	CTB034A	8.5	18.1	7.4	55	0.7	91.8%	0.05		0.04	0.20			0.24	1.1		51	21.0	10.0	16.0
LAKE RHODHISS	May 11, 2022	CTB040A	10.2	21.2	7.7	54	1.2	117.7%	0.02		<0.02	0.05			0.06	14.0		37	4.5	3.1	15.0
LAKE RHODHISS	May 11, 2022	CTB040B	10.7	20.3	7.8	54	1.4	121.6%	0.02		<0.02	<0.02			0.02	15.0		44	3.9	3.6	14.0
LAKE HICKORY	September 7, 2022	CTB048A	6.4	25.3	7.6	57	0.9	80.2%	0.04	0.39	0.11	0.160	0.55	0.28	0.27	6.4	<0.4	55	7.4	1.2	
LAKE HICKORY	September 7, 2022	CTB056A	9.1	28.0	8.0	53	1.7	120.6%	0.02	0.46	<0.02	<0.02	0.47	0.45	0.02	16.0		32		2.4	
LAKE HICKORY	September 7, 2022	CTB058C	8.6	28.1	8.2	53	1.8	113.3%	<0.02	0.42	<0.02	<0.02	0.43	0.41	0.02	17.0		30		2.4	
LAKE HICKORY	September 7, 2022	CTB058D	8.7	28.1	8.2	53	1.9	114.6%	<0.02	0.41	<0.02	<0.02	0.42	0.40	0.02	18.0		38		1.8	16.0
LAKE HICKORY	August 3, 2022	CTB048A	8.3	28.2	6.0	54	0.9	109.4%	0.03	0.34	0.03	0.08	0.42	0.31	0.11	44.0	<0.4	48	4.4	4.7	
LAKE HICKORY	August 3, 2022	CTB056A	9.0	29.4	6.2	52	1.3	121.9%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	17.0				2.6	
LAKE HICKORY	August 3, 2022	CTB058C	8.4	31.0	6.9	51	1.3	116.0%	<0.02	0.32	<0.02	<0.02	0.33	0.31	0.02	16.0		46	2.9	2.6	
LAKE HICKORY	August 3, 2022	CTB058D	7.4	31.1	5.5		1.6	102.5%	<0.02	0.32	<0.02	<0.02	0.33	0.31	0.02	12.0		44		2.2	14.0
LAKE HICKORY	July 13, 2022	CTB048A	6.6	25.8	7.1	53	1.0	83.6%	0.03	0.32	0.11	0.12	0.44	0.21	0.23	8.2	<0.4	51		6.5	
LAKE HICKORY	July 13, 2022	CTB056A	9.0	28.5	7.8	52	1.5	120.0%	<0.02	<0.30	<0.02	0.01	0.16	0.14	0.02	12.0		44			
LAKE HICKORY	July 13, 2022	CTB058C	9.1	28.4	7.8	52	1.6	120.7%	<0.02	<0.30	<0.02	0.01	0.16	0.14	0.02	11.0		45			
LAKE HICKORY	July 13, 2022	CTB058D	9.0	28.5	7.9	52	1.7	119.7%	<0.02	<0.30	<0.02	0.01	0.16	0.14	0.02	11.0		43			16.0
LAKE HICKORY	June 15, 2022	CTB048A	9.8	28.4	7.3	49	1.3	129.5%	0.02	0.31	<0.02	0.02	0.33	0.30	0.03	16.0	<0.4		4.6	4.0	
LAKE HICKORY	June 15, 2022	CTB056A	9.4	28.7	7.0	48	1.6	125.6%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	16.0		40	3.4		
LAKE HICKORY	June 15, 2022	CTB058C	9.3	28.5	6.5	25	1.5	123.0%	<0.02	0.32	<0.02	<0.02	0.33	0.31	0.02	10.0		38	3.2		
LAKE HICKORY	June 15, 2022	CTB058D	9.1	28.6	7.3	48	2.1	121.2%	<0.02	0.35	<0.02	<0.02	0.36	0.34	0.02	9.8		39			11.0
LAKE HICKORY	May 11, 2022	CTB048A	9.6	21.2	7.3	53	1.5	110.6%	<0.02		<0.02	0.12			0.13	5.4		43	3.1	3.2	
LAKE HICKORY	May 11, 2022	CTB056A	9.8	21.7	7.5	52	2.1	113.7%	<0.02		<0.02	0.09			0.10	9.4		36	2.9	1.8	
LAKE HICKORY	May 11, 2022	CTB058C	9.5	22.1	7.6	56	2.2	111.9%	<0.02		<0.02	0.09			0.10	6.9		34		1.9	
LAKE HICKORY	May 11, 2022	CTB058D	9.7	21.8	7.7	51	2.5	113.7%	<0.02		<0.02	0.08			0.09	6.1		31		1.4	15.0
LOOKOUT SHOALS LAKE	September 8, 2022	CTB0581F	6.4	26.5	7.1	43	1.8	82.1%	0.02	0.41	0.08	0.17	0.58	0.33	0.25	6.1		39	6.3	3.9	
LOOKOUT SHOALS LAKE	September 8, 2022	CTB058F	6.3	26.3	6.9	57	1.9	79.9%	<0.02	0.35	0.07	0.18	0.53	0.28	0.25	7.3		41	3.2	3.8	
LOOKOUT SHOALS LAKE	September 8, 2022	CTB058G	7.9	25.9	7.1	57	1.4	99.8%	0.02	0.48	0.02	0.15	0.63	0.46	0.17	19.0	<0.4	45	3.5	3.9	16.0
LOOKOUT SHOALS LAKE	August 4, 2022	CTB0581F	7.4	28.9	6.1	54	1.3	98.6%	0.02	0.35	0.06	0.17	0.52	0.29	0.23	4.4		47	3.2	4.6	
LOOKOUT SHOALS LAKE	August 4, 2022	CTB058F	8.2	29.0	6.2	54	1.3	108.6%	0.02	0.45	0.03	0.09	0.54	0.42	0.12	11.0		46	3.3	4.4	
LOOKOUT SHOALS LAKE	August 4, 2022	CTB058G	10.0	29.2	6.7	53	1.4	134.0%	0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	14.0	<0.4	23		2.2	15.0
LOOKOUT SHOALS LAKE	July 12, 2022	CTB0581F	8.5	28.4	7.3	48	1.5	112.6%	<0.02	<0.30	<0.02	0.07	0.22	0.14	0.08	8.3		43			
LOOKOUT SHOALS LAKE	July 12, 2022	CTB058F	7.4	27.0	7.3	50	1.5	95.6%	<0.02	<0.30	0.04	0.15	0.30	0.11	0.19	3.1		42			
LOOKOUT SHOALS LAKE	July 12, 2022	CTB058G	8.7	27.7	7.5	48	1.6	113.3%	<0.02	<0.30	0.02	0.10	0.25	0.13	0.12	7.7	<0.4	45			13.0
LOOKOUT SHOALS LAKE	June 15, 2022	CTB0581F	9.1	30.0	7.3	47	1.5	122.8%	0.02	<0.30	0.04	0.13	0.28	0.11	0.17	8.1		48	3.8	4.8	
LOOKOUT SHOALS LAKE	June 15, 2022	CTB058F	9.2	30.4	8.2	47	1.7	126.0%	<0.02	<0.30	<0.02	0.08	0.23	0.14	0.09	7.8		38		2.3	
LOOKOUT SHOALS LAKE	June 15, 2022	CTB058G	10.5	28.9	8.4	48	2.1	140.1%	<0.02	0.36	<0.02	0.12	0.48	0.35	0.13	12.0	<0.4	34		2.5	11.0
LOOKOUT SHOALS LAKE	May 12, 2022	CTB0581F	9.3	20.3	7.1	50	1.8	104.9%	<0.02		<0.02	0.21			0.22	3.4		37		10.0	
LOOKOUT SHOALS LAKE	May 12, 2022	CTB058F	9.4	20.5	7.1	50	1.8	106.7%	<0.02		<0.02	0.22			0.23	4.6		34		11.0	
LOOKOUT SHOALS LAKE	May 12, 2022	CTB058G	9.3	18.3	7.3		2.5	100.9%	<0.02		<0.02	0.20			0.21	6.2		27		13.0	14.0
																				13	
LAKE NORMAN	September 8, 2022	CTB079A	6.0	26.3	7.0	57	0.8	76.5%	0.03	0.39	0.060	0.20	0.59	0.33	0.26	5.0		56	9.0	9.0	16.0
LAKE NORMAN	September 8, 2022	CTB082A	8.1	28.6	7.4	58	2.0	107.6%	<0.02	0.36	<0.02	<0.02	0.37	0.35	0.02	11.0	<0.4	45		2.0	15.0
LAKE NORMAN	September 8, 2022	CTB082AA	7.3	30.4	7.2	61	2.8	100.6%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	6.5	<0.4	43		<1.0	17.0
LAKE NORMAN	September 8, 2022	CTB082B	7.1	28.6	7.3	58	1.9	93.8%	<0.02	0.34	<0.02	0.04	0.38	0.33	0.05	9.5		44		1.4	15.0
LAKE NORMAN	September 8, 2022	CTB082BB	7.1	31.1	7.2	61	3.1	97.9%	<0.02	0.32	<0.02	<0.02	0.33	0.31	0.02	4.6		43		1.3	18.0
LAKE NORMAN	September 8, 2022	CTB082M	7.1	28.6	7.2	59	1.4	93.7%	<0.02	0.32	<0.02	<0.02	0.33	0.31	0.02	6.7	<0.4	48		1.2	16.0
LAKE NORMAN	September 8, 2022	CTB082O	7.2	28.5	7.3	60	3.0	94.8%	<0.02	0.34	<0.02	<0.02	0.35	0.33	0.02	4.7		42		1.0	17.0
LAKE NORMAN	September 8, 2022	CTB082R	7.2	28.7	7.2	60	3.4	95.3%	<0.02	0.37	<0.02	<0.02	0.38	0.36	0.02	4.1		48		1.3	16.0
LAKE NORMAN	August 3, 2022	CTB079A	8.7	29.3	7.4	53	0.8	116.4%	0.03	<0.30	<0.02	0.05	0.20	0.14	0.06	27.0		48	6.0	7.0	14.0
LAKE NORMAN	August 3, 2022	CTB082A	7.5	30.6	7.5	60	1.6	102.1%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	9.3	<0.4	44	3.3	2.3	17.0
LAKE NORMAN	August 3, 2022	CTB082AA	7.2	33.4	7.2	59	3.0	103.5%	<0.02	0.74	<0.02	0.06	0.80	0.73	0.07	6.3	<0.4	42		1.5	16.0
LAKE NORMAN	August 3, 2022	CTB082B	7.6	30.3	7.2	58	2.0	103.4%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	15.0		45		2.0	16.0
LAKE NORMAN	August 3, 2022	CTB082BB	6.7	32.4	7.2	59	2.9	94.5%	<0.02	<0.30	<0.02	0.06	0.21	0.14	0.07	6.4		41		1.1	16.0
LAKE NORMAN	August 3, 2022	CTB082M	7.5	30.3	7.3	59	1.8	101.8%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	6.0	<0.4	45		1.5	16.0
LAKE NORMAN	August 3, 2022	CTB082O	7.7	30.9	7.5	59	2.8	105.5%	<0.02	<0.30	<0.02	0.03	0.18	0.14	0.04	5.7		44		1.1	17.0
LAKE NORMAN	August 3, 2022	CTB082R	7.5	31.1	7.2	59	2.9	103.8%	<0.02	<0.30	<0.02	0.03	0.18	0.14	0.04	5.6		42		1.2	16.0
LAKE NORMAN	July 11, 2022	CTB079A	5.8	25.6	6.1	49	0.9	49.0%	0.02	0.38	0.06	0.13	0.51	0.32	0.19	4.7		45	6.6	6.2	14.0
LAKE NORMAN	July 11, 2022	CTB082A	6.3	28.7	7.1	61	1.2	83.4%	<0.02	0.33	<0.02	<0.02	0.34	0.32	0.02	12.0	<0.4	47	3.8	4.3	16.0
LAKE NORMAN	July 11, 2022	CTB082AA	6.8	33.0	7.1	59	3.0	97.2%	<0.02	<0.30	<0.02	0.09	0.24	0.14	0.10	5.9	<0.4	43		1.1	14.0
LAKE NORMAN	July 11, 2022	CTB082B	7.0	28.7	7.1	53	1.7	93.0%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	14.0		40		2.6	13.0
LAKE NORMAN	July 11, 2022	CTB082BB	7.1	31.4	7.3	59	2.8	98.2%	<0.02	<0.30	<0.02	0.09	0.24	0.14	0.10	5.1		45		<1.0	14.0
LAKE NORMAN	July 11, 2022	CTB082M	7.7	29.3	7.4	59	2.4	103.4%	<0.02	0.34	<0.02	<0.02	0.35	0.33	0.02	7.6	<0.4	45		1.7	17.0
LAKE NORMAN	July 11, 2022	CTB082O	7.3	29.0	7.1	60	2.9	97.5%	<0.02	0.31	<0.02	0.05	0.36	0.30	0.06	5.4		43		1.8	15.0
LAKE NORMAN	July 11, 2022	CTB082R	7.2	29.4	7.3	59	3.0	96.8%	<0.02	<0.30	<0.02	0.06	0.21	0.14	0.07	7.1		46		1.2	16.0

Appendix A - Catawba River Basin Data
January 1, 2018 Through December 31, 2022

	SURFACE PHYSICAL DATA								PHOTIC ZONE DATA												
Lake	Date	Sampling Station	DO mg/L	Temp Water C	pH s.u.	Cond. µmhos/cm	Secchi Depth meters	Percent SAT	TP mg/L	TKN mg/L	NH3 mg/L	NOx mg/L	TN mg/L	TON mg/L	TIN mg/L	Chla µg/L	Microcystins µg/L	Solids Total mg/L	Total Solids Suspended mg/L	Turbidity NTU	Total Hardness mg/L
LAKE NORMAN	June 6, 2022	CTB079A	8.5	24.6	6.5	50	1.4	104.4%	0.02	0.34	<0.02	0.13	0.47	0.33	0.14	12.0		46	5.1	4.7	12.0
LAKE NORMAN	June 6, 2022	CTB082A	8.4	26.4	8.2	61	1.6	106.7%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	13.0	<0.4	53		2.6	26.0
LAKE NORMAN	June 6, 2022	CTB082AA	7.0	30.8	7.2	58	3.8	95.8%	<0.02	<0.30	<0.02	0.17	0.32	0.14	0.18	2.5	<0.4	38		2.1	17.0
LAKE NORMAN	June 6, 2022	CTB082B	8.4	26.5	7.8	55	2.1	106.8%	<0.02	<0.30	<0.02	0.09	0.24	0.14	0.10	11.0		48		1.8	15.0
LAKE NORMAN	June 6, 2022	CTB082BB	7.2	28.8	7.3	58	4.2	95.2%	<0.02	<0.30	<0.02	0.16	0.31	0.14	0.17	3.6		36		2.1	14.0
LAKE NORMAN	June 6, 2022	CTB082M	8.2	27.2	7.6	59	2.6	105.8%	<0.02	<0.30	<0.02	0.10	0.25	0.14	0.11	5.5	<0.4	47		2.1	16.0
LAKE NORMAN	June 6, 2022	CTB082Q	7.6	27.0	7.3	58	4.2	97.2%	<0.02	<0.30	<0.02	0.14	0.29	0.14	0.15	3.7		44		2.1	15.0
LAKE NORMAN	June 6, 2022	CTB082R	7.4	28.0	7.5	58	4.3	96.4%	<0.02	<0.30	<0.02	0.14	0.29	0.14	0.15	3.7		44		2.1	15.0
LAKE NORMAN	May 3, 2022	CTB079A	9.5	22.1	7.7	52	1.6	111.5%	<0.02		<0.02	0.22			0.23	5.2				3.2	14.0
LAKE NORMAN	May 3, 2022	CTB082A	9.4	23.6	7.9	62	1.5	112.7%	<0.02		<0.02	0.09			0.10	6.0	<0.4	45		2.2	15.0
LAKE NORMAN	May 3, 2022	CTB082AA	8.2	24.3	7.4	56	3.0	99.9%	<0.02		<0.02	0.18			0.19	1.1	<0.4	36		1.1	15.0
LAKE NORMAN	May 3, 2022	CTB082B	8.7	24.2	7.6	62	2.0	105.9%	<0.02		<0.02	0.24			0.25	4.6		49		1.7	16.0
LAKE NORMAN	May 3, 2022	CTB082BB	9.1	21.7	7.5	56	3.0	105.9%	<0.02		<0.02	0.18			0.19	1.8		44		<1.0	15.0
LAKE NORMAN	May 3, 2022	CTB082M	9.0	23.1	7.5	58	2.5	107.6%	<0.02		<0.02	0.20			0.21	2.4	<0.4	40		1.2	17.0
LAKE NORMAN	May 3, 2022	CTB082Q	9.0	22.1	7.5	56	3.0	105.4%	<0.02		<0.02	0.18			0.19	1.7		45		<1.0	15.0
LAKE NORMAN	May 3, 2022	CTB082R	8.9	22.3	7.5	56	3.0	105.0%	<0.02		<0.02	0.18			0.19	1.5		45		1.0	15.0
MOUNTAIN ISLAND LAKE	September 13, 2022	CTB083B	7.0	28.4	7.3	60	1.4	92.2%	<0.02	<0.30	<0.02	0.03	0.18	0.14	0.04	3.6		48		2.1	
MOUNTAIN ISLAND LAKE	September 13, 2022	CTB086A	8.1	29.3	7.5	75	1.2	92.2%	<0.02	<0.30	<0.02	0.04	0.19	0.14	0.05	7.4		52	3.4	4.2	
MOUNTAIN ISLAND LAKE	September 13, 2022	CTB086B	7.1	29.2	7.4	61	1.8	94.8%	<0.02	<0.30	<0.02	0.03	0.18	0.14	0.04	4.2		43		2.6	
MOUNTAIN ISLAND LAKE	September 13, 2022	CTB086C	7.8	28.9	7.5	62	1.4	102.9%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	9.8	<0.4	51		3.1	
MOUNTAIN ISLAND LAKE	September 13, 2022	CTB087	7.0	29.1	7.2	62	1.7	92.5%	<0.02	<0.30	<0.02	0.03	0.18	0.14	0.04	5.3		52		2.3	
MOUNTAIN ISLAND LAKE	September 13, 2022	CTB087A	7.2	28.8	7.4	62	1.8	95.0%	<0.02	<0.30	<0.02	0.03	0.18	0.14	0.04	7.6	<0.4	52	3.2	2.1	18.0
MOUNTAIN ISLAND LAKE	August 23, 2022	CTB083B	6.9	29.2	7.2	60	1.9	91.8%	<0.02	<0.30	<0.02	0.02	0.17	0.14	0.03	2.8		42			
MOUNTAIN ISLAND LAKE	August 23, 2022	CTB086A	9.1	29.3	7.5	70	1.1	121.5%	0.02	0.31	<0.02	0.05	0.36	0.30	0.06	13.0		55	4.3		
MOUNTAIN ISLAND LAKE	August 23, 2022	CTB086B	7.3	29.5	7.3	62	1.6	97.2%	<0.02	0.37	<0.02	0.04	0.41	0.36	0.05	6.4		54	2.8		
MOUNTAIN ISLAND LAKE	August 23, 2022	CTB086C	8.2	29.4	7.5	64	1.6	110.1%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	12.0	<0.4	51	3.2		
MOUNTAIN ISLAND LAKE	August 23, 2022	CTB087	7.3	28.9	7.4	63	2.1	97.0%	<0.02	<0.30	<0.02	0.03	0.18	0.14	0.04	6.2		39			
MOUNTAIN ISLAND LAKE	August 23, 2022	CTB087A	7.8	28.8	7.4	31	2.2	103.7%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	13.0	<0.4	56			18.0
MOUNTAIN ISLAND LAKE	July 21, 2022	CTB083B	6.9	29.6	7.3	58	1.7	92.4%	<0.02	<0.30	<0.02	<0.02	0.25	0.14	0.11	3.4		46		1.6	
MOUNTAIN ISLAND LAKE	July 21, 2022	CTB086A	8.4	30.3	7.8	86	1.2	114.8%	<0.02	0.32	<0.02	0.17	0.49	0.31	0.18	14.0		62	3.0	3.0	
MOUNTAIN ISLAND LAKE	July 21, 2022	CTB086B	7.9	30.4	7.6	61	1.7	107.9%	<0.02	<0.30	<0.02	0.05	0.20	0.14	0.06	8.8		52	3.1	2.8	
MOUNTAIN ISLAND LAKE	July 21, 2022	CTB086C	8.2	30.6	8.0	63	1.4	111.9%	<0.02	0.30	<0.02	<0.02	0.31	0.29	0.02	13.0	<0.4	51	3.6	3.0	
MOUNTAIN ISLAND LAKE	July 21, 2022	CTB087	7.8	30.1	7.5	61	2.0	105.9%	<0.02	<0.30	<0.02	0.04	0.19	0.14	0.05	9.7		54		2.1	
MOUNTAIN ISLAND LAKE	July 21, 2022	CTB087A	7.5	30.0	7.5	62	1.8	102.1%	<0.02	<0.30	<0.02	0.05	0.20	0.14	0.06	6.6	<0.4	54		1.4	18.0
MOUNTAIN ISLAND LAKE	June 9, 2022	CTB083B	7.4	27.1	7.4	58	1.8	95.2%	<0.02	<0.30	0.020	0.18	0.33	0.13	0.20	1.7		44		1.3	
MOUNTAIN ISLAND LAKE	June 9, 2022	CTB086A	8.8	28.9	8.0	82	1.5	117.0%	<0.02	<0.30	0.020	0.28	0.43	0.13	0.30	9.3		66	4.6	4.2	
MOUNTAIN ISLAND LAKE	June 9, 2022	CTB086B	7.6	28.5	7.6	60	1.9	100.9%	<0.02	<0.30	<0.02	0.14	0.29	0.14	0.15	4.3		47		3.0	
MOUNTAIN ISLAND LAKE	June 9, 2022	CTB086C	8.3	28.7	7.9	61	2.6	110.0%	<0.02	0.33	<0.02	0.03	0.36	0.32	0.04	12.0	<0.4	50	3.2	2.8	
MOUNTAIN ISLAND LAKE	June 9, 2022	CTB087	7.8	28.5	7.3	59	1.9	102.7%	<0.02	<0.30	<0.02	0.14	0.29	0.14	0.15	4.3		49		2.1	
MOUNTAIN ISLAND LAKE	June 9, 2022	CTB087A	7.9	28.3	7.4	59	2.6	104.2%	<0.02	<0.30	<0.02	0.15	0.30	0.14	0.16	3.5	<0.4	47		1.6	16.0
MOUNTAIN ISLAND LAKE	May 5, 2022	CTB083B	8.6	23.6	7.5	56	2.4	103.1%	<0.02		<0.02	0.19			0.20	1.0		40		<1.0	
MOUNTAIN ISLAND LAKE	May 5, 2022	CTB086A	8.9	24.1	7.3	63	2.1	107.5%	<0.02		<0.02	0.23			0.24	2.7		53		2.3	
MOUNTAIN ISLAND LAKE	May 5, 2022	CTB086B	8.5	23.5	7.6	33	2.1	101.5%	<0.02		<0.02	0.18			0.19	1.7		42		2.1	
MOUNTAIN ISLAND LAKE	May 5, 2022	CTB086C	9.0	25.6	7.5	65	1.8	111.5%	<0.02		<0.02	0.11			0.12	3.9		46		2.3	
MOUNTAIN ISLAND LAKE	May 5, 2022	CTB087	8.6	24.2	7.4	59	2.8	104.5%	<0.02		0.03	0.18			0.21	1.8		46		2.2	
MOUNTAIN ISLAND LAKE	May 5, 2022	CTB087A	8.7	23.6	7.4	59	2.8	105.1%	0.03		<0.02	0.17			0.18	1.9	<0.4	39		1.5	16.0
LAKE WYLIE	September 14, 2022	CTB103	6.6	27.1	7.2	65	0.9	84.0%	0.02	<0.30	0.02	0.05	0.20	0.13	0.07	3.9		54	4.4	6.1	
LAKE WYLIE	September 14, 2022	CTB105B	6.3	27.1	7.5	67	0.7	79.9%	0.02	<0.30	<0.02	0.06	0.21	0.14	0.07	6.3		58	7.3	10.0	
LAKE WYLIE	September 14, 2022	CTB174	8.8	28.2	7.3	74	0.8	114.6%	0.04	<0.30	<0.02	0.17	0.32	0.14	0.18	20.0		66	5.0	8.0	
LAKE WYLIE	September 14, 2022	CTB177	7.4	27.0	7.2	72	0.9	93.9%	0.03	0.36	<0.02	0.03	0.39	0.35	0.04	26.0		64	5.8	5.9	
LAKE WYLIE	September 14, 2022	CTB178	7.6	27.0	7.2	70	1.0	96.2%	0.02	0.15	<0.02	0.08	0.23	0.14	0.09	17.0	<0.4	61	3.4	4.0	
LAKE WYLIE	September 14, 2022	CTB198B5	5.9	27.3	7.0	126	0.5	75.4%	0.06	0.68	<0.02	<0.02	0.69	0.67	0.02	38.0		87	11.0	8.3	
LAKE WYLIE	September 14, 2022	CTB198C5	8.4	27.7	7.5	92	1.0	108.3%	0.03	0.33	<0.02	<0.02	0.34	0.32	0.02	23.0		78	4.4	5.1	
LAKE WYLIE	September 14, 2022	CTB198D	7.7	27.9	7.3	77	1.4	99.2%	0.02	0.39	<0.02	<0.02	0.40	0.38	0.02	14.0	<0.4	59		2.2	20.0
LAKE WYLIE	August 16, 2022	CTB103	6.0	28.5	7.1	66	0.7	79.0%	0.03	<0.30	0.05	0.07	0.22	0.10	0.12			59	6.8	13.0	
LAKE WYLIE	August 16, 2022	CTB105B	6.7	28.8	7.1	69	0.9	87.8%	0.03	<0.30	<0.02	0.03	0.18	0.14	0.04			56	7.0	8.1	
LAKE WYLIE	August 16, 2022	CTB174	7.3	28.8	7.2	82	1.0	96.0%	0.04	0.38	0.04	0.30	0.68	0.34	0.34			61	4.4	5.0	
LAKE WYLIE	August 16, 2022	CTB177	5.9	28.5	7.1	78	1.0	76.8%	0.04	0.41	0.03	<0.02	0.42	0.38	0.04			64	7.1	6.2	
LAKE WYLIE	August 16, 2022	CTB178	6.7	29.2	7.2	73	1.1	89.6%	0.03	0.36	0.02	<0.02	0.37	0.34	0.03		<0.4		5.9	5.9	
LAKE WYLIE	August 16, 2022	CTB198B5	5.9	27.3	7.0	126	0.4	75.4%	0.07	0.68	<0.02	<0.02	0.69	0.67	0.02			105	18.0	14.0	
LAKE WYLIE	August 16, 2022	CTB198C5	6.5	28.5	7.1	86	1.1	84.8%	0.03	0.32	<0.02	<0.02	0.33	0.31	0.02			63	4.9	3.9	
LAKE WYLIE	August 16, 2022	CTB198D	6.4	29.0	7.1	80	1.5	84.9%	<0.02	0.33	<0.02	<0.02	0.34	0.32	0.02		<0.4	56		2.2	20.0
LAKE WYLIE	July 19, 2022	CTB103	7.2	30.1	7.4	66	1.1	97.5%	<0.02	<0.30	<0.02	0.08	0.23	0.14	0.09	5.1		48		3.3	
LAKE WYLIE	July 19, 2022	CTB105B	7.5	30.1	7.4	68	1.0	100.6%	0.02	0.30	<0.02	0.04	0.34	0.29	0.05	8.7		57	5.0	5.3	
LAKE WYLIE	July 19, 2022	CTB174	8.9	30.7	8.2	87	0.9	120.7%	0.04	0.49	<0.02	0.22	0.71	0.48	0.23	18.0		74	4.4	5.5	
LAKE WYLIE	July 19, 2022	CTB177	7.8	31.0	8.0	80	0.9	107.2%	0.04	0.49	<0.02	<0.02	0.50	0.48	0.02	25.0		64	5.7	5.0	
LAKE WYLIE	July 19, 2022	CTB178	7.5	30.4	7.5	75	1.3	101.6%	0.02	0.32	<0.02	<0.02	0.33	0.31	0.02	14.0	<0.4	60	3.5	3.0	
LAKE WYLIE	July 19, 2022	CTB198B5	7.1	29.6	7.0	58	0.3	94.9%	0.06	0.33	<0.02	<0.02	0.34	0.32	0.02	20.0		91	13.0	13.0	
LAKE WYLIE	July 19, 2022	CTB198C5	8.0	31.6	7.6	89	1.1	110.4%	0.03	0.49	<0.02	<0.02	0.50	0.48	0.02	16.0		67	4.1	4.1	
LAKE WYLIE	July 19, 2022	CTB198D	8.1	30.8	7.9	77	2.2	110.6%	<0.02	<0.30	<0.02	<0.02	0.16	0.14	0.02	8.1	<0.4	63		1.6	22.0
LAKE WYLIE	June 16, 2022	CTB103	7.5	29.4	7.2	66	1.2	99.4%	0.03	<0.30	<0.02	0.10	0.25	0.14	0.11	7.9		67	5.1	5.6	
LAKE WYLIE	June 16, 2022	CTB105B	8.4	29.9	6.9	67	1.2	112.0%	<0.02	<0.30	<0.02	0.02	0.17	0.14	0.03	9.6		51	3.1	3.8	
LAKE WYLIE	June 16, 2022	CTB174	8.5	32.2	8.3	82	1.2	117.7%	0.04	0.39	<0.02	0.29	0.68	0.38	0.30	18.0		66	4.0	4.8	
LAKE WYLIE	June 16, 2022	CTB177	8.9	31.1	8.4	70	1.2	121.3%	0.03	0.41	<0.02	<0.02	0.42	0.40	0.02	27.0		63	4.3	4.1	
LAKE WYLIE	June 16, 2022	CTB178	8.7	30.0	8.3	68	1.6	117.1%	<0.02	0.32	<0.02	<0.02	0.33	0.31	0.02	13.0	<0.4	52	2.8	2.4	
LAKE WYLIE	June 16, 2022	CTB198B5	8.1	33.4	7.5	131	0.4	114.8%	0.07	0.75	<0.02	<0.02	0.76	0.74	0.02	32.0		108	13.0	13.0	
LAKE WYLIE	June 16, 2022	CTB198C5	8.9	32.3	8.5	90	0.9	123.4%	0.03	0.42	<0.02	<0.02	0.43	0.41	0.02	25.0		76	6.4	5.2	
LAKE WYLIE	June 16, 2022	CTB198D	9.1	31.1	8.8	78	1.6	123.8%	0.02	0.35	<0.02	<0.02	0.36	0.34	0.02	20.0	<0.4	60	3.6	3.0	20.0
LAKE WYLIE	May 11, 2022	CTB103	8.0	21.2	7.6	67	1.0	90.9%	0.04		0.04	0.19			0.23	1.6		36	5.4	6.7	
LAKE WYLIE	May 11, 2022	CTB105B	8.5	20.8	7.7	68	0.9	95.8%	0.03		<0.02	0.16			0.17	7.5		51	6.5	6.2	
LAKE WYLIE	May 11, 2022	CTB174	8.4	21.7	7.5	86	0.6	96.7%	0.05		<0.02	0.51			0.52	12.0		91	7.5	11.0	
LAKE WYLIE	May 11, 2022	CTB177	8.8	21.9	7.6	80	0.8	101.6%	0.04		<0.02	0.09			0.10	22.0		59	6.9	7.4	
LAKE WYLIE	May 11, 2022	CTB178	8.6	21.8	7.5	74	1.0	98.5%	0.02		<0.02	0.19			0.20	12.0	<0.4	77	4.2	4.2	
LAKE WYLIE	May 11, 2022	CTB198B5	9.0	21.2	7.5	130	0.6	102.6%	0.05		<0.02	0.22			0.23	17.0		104	8.5	10.0	
LAKE WYLIE	May 11, 2022	CTB198C5	9.6	22.4	8.3	85	1.2	112.1%	0.03		<0.02	0.03			0.04	14.0		69	4.9	4.3	
LAKE WYLIE	May 11, 2022	CTB198D	9.5	22.3	8.2	73	1.7	110.0%	0.02		<0.02	0.07			0.08	14.0	<0.4	62	2.9	2.7	19.0
NEWTON CITY LAKE	September 13, 2022	CTBNCL1	8.0	25.0	7.3	45	1.5	99.2%	<0.02	<0.30	0.02	0.30	0.45	0.13	0.32	5.6	<0.4	42		6.0	15.0
NEWTON CITY LAKE	August 23, 2022	CTBNCL1	8.5	26.0	7.4	45	1.4	107.2%	<0.02	<0.30	<0.02	0.27	0.42	0.14	0.28	6.3	<0.4	49	3.0		15.0
NEWTON CITY LAKE	July 21, 2022	CTBNCL1	8.5	29.0	7.5	45	1.0	113.6%	<0.02	<0.30	<0.02	0.26	0.41	0.14	0.27	6.5	<0.4	39	5.1	7.5	16.0
NEWTON CITY LAKE	June 9, 2022	CTBNCL1	7.9	26.7	5.7	43	1.8	102.2%	<0.02	<0.30	0.02	0.38	0.53	0.13	0.40	3.9	<0.4	34	2.9	6.6	12.0
NEWTON CITY LAKE	May 5, 2022	CTBNCL1	8.0	23.8	7.4	43	2.0	97.0%	<0.02		0.02	0.36			0.38	1.5	<0.4	41	2.8	4.3	14.0
BESSEMER CITY LAKE	September 13, 2022	CTBBCL1	8.1	26.4	7.3	90	1.6	103.7%	0.02	0.45	0.03	0.02	0.47	0.42	0.05		<0.4	71	3.2	3.4	31.0
BESSEMER CITY LAKE	August 23, 2022	CTBBCL1	7.9	26.5	7.4	89	1.5	100.8%	<0.02	0.49	<0.02	0.06	0.55	0.48	0.07	7.9	<0.4	65	3.3		32.0
BESSEMER CITY LAKE	July 21, 2022	CTBBCL1	8.1	29.1	7.8	84	0.8	108.5%	0.02	0.35	<0.02	0.08	0.36	0.34	0.02	12.0	<0.4	70	5.8	9.3	29.0
BESSEMER CITY LAKE	June 9, 2022	CTBBCL1	7.6	28.3	6.5	85	1.7	100.1%	<0.02	<0.30	<0.02	0.08	0.23	0.14	0.09	6.2	<0.4	63		2.7	30.0
BESSEMER CITY LAKE	May 5, 2022	CTBBCL1	8.4	24.5	7.1	81	2.0	103.1%	<0.02		<0.02	0.14			0.15	4.6	<0.4	63	3.1	2.5	28.0