# LAKE & RESERVOIR ASSESSMENTS
# YADKIN-PEE DEE RIVER BASIN

**Winston Lake**

Intensive Survey Branch
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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 Yadkin-Pee Dee River Basin covers 7,213 square miles within 21 counties in North Carolina in the mountain and piedmont regions. It is the second largest basin in the state. The river basin originates on the eastern slope of the Blue Ridge Mountains in Caldwell and Wilkes counties. The Yadkin River flows northeast for approximately 100 miles before turning southeast and joining with the Uwharrie River to form the Pee Dee River. The Pee Dee River continues southeast across the North Carolina-South Carolina state line into South Carolina and to Winyah Bay.

Twenty-five reservoirs were sampled in the Yadkin-Pee Dee River Basin between January 2017 and December 2021.

Following the description of the assessment methodology used for the Yadkin-Pee Dee River Basin, there are individual summaries for each of the lakes and Appendix A, a matrix that presents the information used to make the lakes use support assessments.

Thirteen lakes in the Yadkin-Pee Dee River Basin are on the USEPA's 2020 303(d) List of Impaired Waters (Table 1). A statewide fish consumption advisory from the North Carolina Department of Health and Human Resources, Division of Public Health is in place due to mercury contamination (https://epi.dph.ncdhhs.gov/oee/fish/advisories.html). Fish such as blackfish (bowfin), largemouth bass and chained pickerel (jack fish) have been found to have high mercury levels. High Rock Lake, Tuckertown Reservoir, Badin Lake, Falls Lake and Lake Tillery are listed for a fish consumption advisory related to PCB present in catfish.

**Table 1. Yadkin-Pee Dee Lakes on the USEPA 2020 303(d) List of Impaired Waters**

| LAKE | 303(d) Issue(s) |
|---|---|
| **W. Kerr Scott Lake** | Chla > 40 ug/L |
| **High Rock Lake** | pH > 9.0 s.u., Chla > 40 ug/L, Turbidity > 25 NTU |
| **Tuckertown Reservoir** | Chla > 40 ug/L, pH >9.0 s.u. |
| **Badin Lake** | Chla > 40 ug/L, pH >9.0 s.u. |
| **Lake Thom-A-Lex** | Chla > 40 ug/L |
| **Lake Tillery** | pH > 9.0 s.u. |
| **Lake Lee** | Water Temp > 32 C, DO < 4.0 mg/L, Chla > 40 ug/L |
| **Lake Monroe** | Water Temp > 32 C, pH > 9.0 s.u., Chla > 40 ug/L |
| **Lake Twitty (Stewart)** | Chla > 40 ug/L |
| **Coddle Creek Reservoir** | pH > 9.0 s.u. |
| **Lake Concord** | Chla > 40 ug/L |
| **Blewett Falls Lake** | Chla > 40 ug/L |
| **Hamlet City Lake** | DO < 4.0 mg/L |

## *Assessment Methodology*

For this report, data from January 1, 2017 through December 31, 2021 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 ($m^3/mm^3$). Results of algae analysis for the lakes sampled in the Yadkin-Pee Dee River Basin are provided in Appendix B. Brief discussions on the ecological implications of each dominant lake algal group is provided in Appendix C.

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://DWR.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/microbiology-inorganics-branch/methods-pqls-qa).

## *Weather Overview for Summer 2021*

Limited rainfall resulted in one of the driest Mays in recent years. The National Centers for Environmental Information (NCEI) rated the month at the state's 13th driest Mays since 1895. Preliminary rainfall totals for the state was 2.19 inches, or just 55% of the long-term state average rainfall for May. A cold front crossed the state during the Memorial Day weekend and brought hit-or-miss rainfall. The statewide average temperature was 65.9°F which was seasonable for May.

While May, statewide, was dry, June turned out to be the 20th wettest out of the past 127 years with an average state measurement of 6.04 inches of rain. However, the rain fall pattern across the state exhibited extremes from east to west. The first two weeks of June had heavy rains across the eastern half of the state. More rain came to the eastern North Carolina in the form of the tropical storm strength remnants of Hurricane Claudette on June 20-21. The northwestern Yadkin-Pee Dee River Basin missed most of the June rainfall while the southern portion of the river basin received a normal June rainfall. The statewide average temperature in June was 73.6°F, which was seasonable for June.

Seasonable summer temperatures continued through July, with a statewide average at 76.8°F. Tropical Storm Elsa tracked through the Coastal Plain region of the state on July 8, 2021. Dry conditions continued in the southern Yadkin-Pee Dee River Basin in July. The warmest weather of the summer arrived in August with the statewide temperature average for the month at 77.8°F. The statewide precipitation for August was 5.94 inches. Mixed rainfall conditions occurred within the Yadkin-Pee Dee River Basin associated with sporadic rain storms typical of summertime conditions within the Piedmont of the state.

September was slightly warmer than usual, with three weeks of warm weather followed by a late month cooldown. The state average temperature for this month was 71.0°F. September was generally dry with the statewide average precipitation at 2.99 inches, or the 39th driest September since 1895. Rain returned on September 21st due to a cold front from the west and a stalled boundary to the south. Three to six inches of rain fell across the central and northern Piedmont, including parts of the Yadkin-Pee Dee River Basin.

## LAKE & RESERVOIR ASSESSMENTS

## HUC 03040101

# Kerr Scott Reservoir

| *Ambient Lakes Program Name* | Kerr Scott Reservoir | | |
|---|---|---|---|
| *Trophic Status (NC TSI)* | No Score | | |
| *Mean Depth (meters)* | 12.0 | | |
| *Volume ($10^6 m^3$)* | 189.00 | | |
| *Watershed Area ($mi^2$)* | 347.5 | | |
| *Classification* | WS-IV B Tr | | |
| *Stations* | YAD007A | YAD008 | YAD008A |
| *Number of Times Sampled* | 5 | 5 | 5 |

Construction of W. Kerr Scott Reservoir (Kerr Scott Reservoir) took place between 1960 and 1962. The project was open for public use in 1963. Located in the foothills of the Blue Ridge Mountains, this reservoir is within the Mountain ecoregion of the state. The US Army Corps of Engineers manages the operation of the W. Kerr Scott Reservoir Dam.

Kerr Scott Reservoir was monitored monthly from May through September by DWR field staff. Secchi depths ranged from one to 1.0 to 2.0 meters and surface dissolved oxygen values ranged from 7.8 to 9.7 mg/L (Appendix A). Surface pH measurements ranged from 7.2 to 9.0 s.u. and surface conductivity in the reservoir ranged from 35 to 43 $\mu$mhos/cm.

Total phosphorus ranged from <0.02 to 0.03 mg/L. $NH_3$ values were consistently below the DWR laboratory detection level of <0.02 mg/L while $NO_2$+$NO_3$ ranged from <0.02 to 0.08 mg/L. Chlorophyll *a* in Kerr Scott reservoir ranged from 10 to 21 $\mu$g/L. Turbidity ranged from 1.9 to 4.4 NTUs.

Based on the calculated NCTSI score, W. Kerr Scott Reservoir was determined to exhibit very low biological productivity or oligotrophic conditions in May. Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from June through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Historically, this reservoir has ranged from oligotrophic (low biological productivity) to eutrophic (elevated biological productivity) since monitoring began by DWR staff in 1981.

# Lake Hampton

| *Ambient Lakes Program Name* | Lake Hampton | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | | |
| *Volume ($10^6 m^3$)* | | |
| *Watershed Area ($mi^2$)* | | |
| *Classification* | WS-III CA | |
| *Stations* | YADLH01 | YADLH04 |
| *Number of Times Sampled* | 5 | 5 |

Lake Hampton, located on South Deep Creek, is a 140 acre lake constructed in 2009 to 2010. The lake provide flood control and public recreation. As part of the Yadkin Memorial Park at Hamptonville, this reservoir is used for public fishing, kayaking and canoeing. In October 2011, Lake Hampton was stocked with 90,000 fish which included brim, bass and catfish by the NC Wildlife Service. Lake Hampton was also designed to be a future water supply and is classified as WS-III.

This lake was monitored by DWR field staff monthly from May through September 2021. Secchi depths in Lake Hampton ranged from 0.5 to 1.1 meters and surface dissolved oxygen ranged from 8.6 to 10.4 mg/L (Appendix A). Surface pH values ranged from 7.3 to 9.7 s.u., with two measurements (20%) greater than the state water quality standard of 9.0 s.u. Surface conductivity in this lake ranged from 59 to 72 $\mu$mhos/cm.

Total phosphorus ranged from 0.03 to 0.05 mg/L and $NH_3$ concentrations were consistently below the DWR laboratory detection limit of <0.02 mg/L. Turbidity in Lake Hampton ranged from 4.0 to 9.7 NTUs. Water samples collected on August 27, 2021 from each of the two lake sampling sites were sent to the EPA Region IV chemistry laboratory in Athens, GA for an Algal Growth Potential Test. The results of that test determined that nuisance algal growth in Lake Hampton was limited by the concentration of phosphorus (Table 2).

**Table 2. Algal Growth Potential Test Results for Lake Hampton, August 27, 2021.**

## Algal Growth Potential Test Results

Lake Hampton

August 27, 2021

| Station | Maximum Standing Crop, Dry Weight (mg/L) | | | Limiting Nutrient |
|---|---|---|---|---|
| | Control | C+N | C+P | |
| YADLH01 | 0.68 | 0.34 | 1.11 | Phosphorus |
| YADLH04 | 0.60 | 0.34 | 1.13 | 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

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined.

# Salem Lake

| Ambient Lakes Program Name | Salem Lake | | |
|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | |
| Mean Depth (meters) | 5.5 | | |
| Volume ($10^6 m^3$) | 4.40 | | |
| Watershed Area ($mi^2$) | 26.0 | | |
| Classification | WS-III CA | | |
| Stations | YAD077A | YAD077B | YAD077C |
| Number of Times Sampled | 4 | 4 | 4 |

Salem Lake is located in the municipality of Winston-Salem. Constructed in 1919, this small reservoir serves as the water supply source for the city. Salem Lake provides water to eastern and southeastern Winston-Salem in addition to serving as a reserve water basin for the Yadkin River.

Salem Lake was sampled monthly from May through September by DWR field staff. Secchi depths in 2021 ranged from 0.7 to 1.0 meter and surface dissolved oxygen concentrations ranged from 6.6 to 10.2 mg/L (Appendix A). Surface pH values in this lake ranged from 6.8 to 8.4 s.u. and surface conductivity ranged from 45 to 97 $\mu$mhos/cm.

Total phosphorus in Salem Lake ranged from <0.02 to 0.03 mg/L. NH3 values ranged from <0.02 to 0.09 mg/L while $NO_2$+$NO_3$ ranged from <0.02 to 0.42 mg/L. Chlorophyll *a* concentrations for July and August ranged from 22 to 42 $\mu$g/L, with the latter value greater than the state water quality standard of 40 $\mu$g/L. Turbidity in the lake ranged from 3.4 to 8.0 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Historically, Salem Lake has exhibited eutrophic conditions since it was first monitored by DWQ in 1981, with the exception of 1983 and July 2001 and July 2002 when the NCTSI scores indicated that biological productivity was moderate (mesotrophic conditions).

## LAKE & RESERVOIR ASSESSMENTS

## HUC 03040102

# High Rock Lake

| *Ambient Lakes Program Name* | High Rock Lake | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Trophic Status (NC TSI)* | No Score | | | | | | | |
| *Mean Depth (meters)* | 4.9 | | | | | | | |
| *Volume ($10^6$ $m^3$)* | 314.0 | | | | | | | |
| *Watershed Area ($mi^2$)* | 3975.3 | | | | | | | |
| *Classification* | WS-IV B CA, B, WS-V | | | | | | | |
| *Stations* | YADHRL051 | YAD152A | YAD152C | YAD156A | YAD169A | YAD169B | YAD169E | YAD169F |
| *Number of Times Sampled* | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

High Rock Lake, built in 1927, is in the Yadkin River chain of lakes located between W. Kerr Scott and Tuckertown Reservoirs. The lake's primary uses are hydroelectric power generation, water supply and public recreation. The surrounding watershed is composed of agricultural, forested, and urban areas. The lake receives drainage waters from nearby major urban areas including Winston-Salem, Salisbury, Lexington, and High Point. The immediate lakeside perimeter is highly developed with new homes under construction. Lake levels are highly variable in response to a nearly constant release rate needed for energy production and an inconsistent inflow. The soils in the watershed are described as reddish and brown in color, highly erodible, and have contributed to high sedimentation, which has filled in the upper section of the lake to the degree that some areas are no longer navigable by boat. High Rock Lake is currently under a fish consumption advisory for polychlorinated biphenyls (PCBs) in catfish (https://epi.dph.ncdhhs.gov/oee/fish/advisories.html).

Surface dissolved oxygen values ranged from 6.6 mg/L to 12.3 mg/L in 2021 (Appendix A). The surface pH values ranged from 6.4 s.u. in September to 9.4 s.u. in May. Of the 40 surface pH observations made in 2021, 11 (27.5%) were greater than the state water quality standard of not more than 9.0 s.u. Surface conductivity ranged from 72 to 100 $\mu$mhos/cm. Secchi depths, a measurement of water clarity and light penetration into the lake, ranged from 0.2 to 1.4 meters.

Nutrient concentrations in High Rock Lake were similar to those previously observed from previous DWR monitoring efforts. Total phosphorus in 2021 ranged from 0.03 to 0.15 mg/L and $NH_3$ ranged from <0.02 to 0.07 mg/L. The concentrations of NO2+NO3 ranged from 0.16 to 1.08 mg/L. Chlorophyll *a* values ranged from 1.5 to 65.0 µg/L. Of 28 observations for chlorophyll *a* recorded in 2021, 13 (46.4%) were greater than the state water quality standard of 40.0 µg/L.

Based on the calculated NCTSI score, High Rock Lake was determined to exhibit elevated biological productivity or eutrophic conditions in May. Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from June through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined.

This reservoir has previously been found to be eutrophic since monitoring by DWR began in 1981, with the exception of July, August and September 2011 when NCTSI scores indicted that the reservoir was exhibiting extremely elevated biological productivity (hypereutrophic conditions). High Rock Lake is currently on the 2020 303(d) List of Impaired Waters for elevated chlorophyll *a*, pH and turbidity values, which agrees with the monitoring results obtained for 2021 (https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2020/NC_2020_Category5_303dlist.pdf).

# Lake Thom-A-Lex

| *Ambient Lakes Program Name* | Lake Thom-A-Lex | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | | |
| *Volume ($10^6$ $m^3$)* | 7.80 | |
| *Watershed Area ($mi^2$)* | 39.4 | |
| *Classification* | WS-III CA | |
| *Stations* | YAD160B | YAD1611A |
| *Number of Times Sampled* | 5 | 5 |

Lake Thom-A-Lex is located near the Cities of Lexington and Thomasville and was built in 1957 as a drinking water supply for these two cities. The watershed draining to the lake is primarily composed of commercial and urban areas. An aeration unit in the lower end of the reservoir operates to reduce lake stratification and improve the quality of the raw drinking water.

Lake Thom-A-Lex was monitored by DWR field staff monthly, from May through September 2021. Secchi depths ranged from 0.4 to 1.2 meters and surface dissolved oxygen measurements ranged from 5.5 to 11.1 mg/L (Appendix A). Surface pH values ranged from 7.3 to 9.4 s.u. and surface conductivity ranged from 65 to 140 $\mu$mhos/cm.

Total phosphorus concentrations ranged from 0.04 to 0.07 mg/L in Lake Thom-A-Lex. $NH_3$ ranged from <0.02 to 0.03 mg/L and $NO_2$+$NO_3$ values were consistently below the DWR laboratory detection limit of <0.02 mg/L. Chlorophyll *a* in August and September ranged from 30 to 49 $\mu$g/L and of these four chlorophyll *a* values, two (50%) were greater than the state water quality standard of 40 $\mu$g/L. Turbidity in Lake Thom-A-Lex ranged from 3.6 to 14.0 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Lake Thom-A-Lex has previously been determined to be eutrophic since it was first monitored by DWR staff in 1981.

# Tuckertown Reservoir

| *Ambient Lakes Program Name* | Tuckertown Reservoir | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | 10.0 | |
| *Volume ($10^6 m^3$)* | 298.00 | |
| *Watershed Area ($mi^2$)* | 4080.3 | |
| *Classification* | WS-IV B CA | |
| *Stations* | YAD172C | YAD1780A |
| *Number of Times Sampled* | 5 | 5 |

Tuckertown Reservoir is a run-of-the-river reservoir located between High Rock Lake and Badin Lake on the Yadkin River. This lake's primary uses are hydroelectric power generation and public recreation. The watershed surrounding this lake is composed of forested, agricultural and urban areas.

This reservoir was monitored monthly by DWR field staff from May through September 2021. Surface dissolved oxygen concentrations ranged from 6.9 to 12.6 mg/L and surface pH ranged from 7.1 to 9.6 s.u. (Appendix A). Of the ten surface pH observations made in 2021, three (30%) were greater than the state water quality standard of 9.0 s.u. Surface conductivity ranged from 41 to 88 $\mu$mhos/cm. Secchi depths in Tuckertown Reservoir ranged from 0.5 to 1.4 meters.

Total phosphorus concentrations ranged from 0.04 to 0.08 mg/L. The concentration of $NH_3$ ranged from <0.02 to 0.21 mg/L while $NO_2$+$NO_3$ values ranged from 0.21 to 0.56 mg/L. Water samples collected on July 26, 2021 from each of the two lake sampling sites were sent to the EPA Region IV chemistry laboratory in Athens, GA for an Algal Growth Potential Test. The results of that test determined that sufficient nutrients are present in Tuckertown Reservoir to support nuisance algal growth, i.e., control values were greater than 5.0 mg/L dry weight (Table 3).

**Table 3. Algal Growth Potential Test Results for Tuckertown Reservoir, July 26, 2021**.

## Algal Growth Potential Test Results

Tuckertown Reservoir
July 26, 2021

| Station | Maximum Standing Crop, Dry Weight (mg/L) | | | Limiting Nutrient |
|---|---|---|---|---|
| | Control | C+N | C+P | |
| YAD172C | 16.81 | 24.66 | 18.47 | Nitrogen |
| YAD1780A | 11.69 | 10.19 | 14.98 | 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

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Tuckertown Reservoir has previously been determined to be very biologically productive or eutrophic since it was first monitored by DWR staff in 1982.

# Badin Lake

| Ambient Lakes Program Name | Badin Lake | | | |
|---|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | | |
| Mean Depth (meters) | 14.0 | | | |
| Volume ($10^6 m^3$) | 344.00 | | | |
| Watershed Area ($mi^2$) | 4168.0 | | | |
| Classification | WS-IV B CA | | | |
| Stations | YAD178E | YAD178E | YAD178F | YAD178F1 |
| Number of Times Sampled | 5 | 5 | 5 | 5 |

Badin Lake is located on the Yadkin River and is a chain lake downstream from Tuckertown Reservoir. The lake was filled in 1917 and is used for hydroelectric power generation, recreation and water supply. The watershed is primarily rural with some agricultural land use. Badin Lake is under a fish consumption for polychlorinated biphenyls (PCBs) and mercury in catfish and largemouth bass taken from the lake. (http://epi.publichealth.nc.gov/oee/programs/fish.html).

This reservoir was monitored monthly from May through September by DWR field staff in 2021. The secchi depths recorded during these sampling trips ranged from 1.0 to 2.0 meters (Appendix A). Surface dissolved oxygen concentrations ranged from 4.7 to 12.0 mg/L and surface pH values ranged from 6.7 to 9.4 s.u. Of the 20 surface pH measurements made in 2021, 8 (40%) were greater than the state water quality standard of 9.0 s.u. Surface conductivity values in this lake ranged from 31 to 91 $\mu$mhos/cm.

Total phosphorus concentrations ranged from <0.02 to 0.04 mg/L. The concentration of $NH_3$ ranged from <0.02 to 0.05 mg/L and $NO_2$+$NO_3$ ranged from 0.06 to 0.52 mg/L. Chlorophyll a values in July, August and September ranged from 4 to 30 $\mu$g/L. Turbidity values in Badin Lake were low, ranging from 1.5 to 3.8 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Based on previous sampling efforts, Badin Lake has been determined to be predominantly eutrophic since it was first monitored by DWR staff in 1981.

# Falls Lake

| *Ambient Lakes Program Name* | Falls Lake | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | 10.0 | |
| *Volume ($10^6 m^3$)* | 177.00 | |
| *Watershed Area ($mi^2$)* | 2552.0 | |
| *Classification* | WS-IV B CA | |
| *Stations* | YAD178F3 | YAD178F5 |
| *Number of Times Sampled* | 5 | 5 |

Falls Lake is a small run-of-the-river impoundment located between Badin Lake and Lake Tillery on the Yadkin River. The major inflow to Falls Lake is from the discharge of Badin Lake into the Yadkin River. The topography of the watershed is hilly with forests and some agriculture. Falls Lake is currently under a fish consumption for polychlorinated biphenyls (PCBs) in catfish (http://epi.publichealth.nc.gov/oee/programs/fish.html).

Falls Lake was monitored monthly from May through September, 2021. Secchi depths ranged from 1.7 to 2.5 meters (Appendix A). Surface dissolved oxygen concentrations ranged from 6.4 to 8.9 mg/L and surface pH ranged from 6.5 to 7.7 s.u. Surface conductivity values in Falls Lake ranged from 76 to 82 $\mu$mhos/cm.

Total phosphorus values ranged from <0.02 to 0.03 mg/L and $NH_3$ ranged from 0.02 to 0.05 mg/L. Nitrite plus nitrate ranged from 0.36 to 0.58 mg/L. Chlorophyll *a* values were low and ranged from 3.9 to 11.0 $\mu$g/L. Turbidity values were also low, ranging from 1.9 to 3.2 NTUs.

Issues with chlorophyll *a* and nutrient analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake in 2021. Based on previous monitoring efforts, Falls Lake has exhibited predominantly moderate biological productivity or mesotrophic conditions since it was first monitored by DWR staff in 1981.

# Lake Reese

| Ambient Lakes Program Name | Lake Reese | | |
|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | |
| Mean Depth (meters) | 5.0 | | |
| Volume ($10^6 m^3$) | 0.91 | | |
| Watershed Area ($mi^2$) | 100.0 | | |
| Classification | WS-III CA | | |
| Stations | YAD077A | YAD077B | YAD077C |
| Number of Times Sampled | 5 | 5 | 5 |

In 1983, the City of Asheboro impounded the Uwharrie River to form Lake Reese, a water supply that is also used for recreation. The lake is only used for drinking water after the water level of the primary water supply (Back Creek Lake) drops three feet below normal.

Lake Reese was monitored monthly from May through September 2021 by DWR field staff. Surface dissolved oxygen concentrations ranged from 6.2 to 11.3 mg/L and surface pH values ranged from 7.1 to 8.9 s.u. (Appendix A). Surface conductivities in this reservoir ranged from 86 to 114 µmhos/cm. Lake secchi depths in 2021 ranged from 0.3 meter in September to 1.1 meters in May.

Total phosphorus concentrations in Lake Reese ranged from 0.02 to 0.06 mg/L. $NH_3$ and $NO_2$+$NO_3$ concentrations were consistently below the DWR laboratory detection limit of <0.02 mg/L. Chlorophyll *a* values ranged from 18 to 49 µg/L. This latter value was greater than the state water quality standard of 40 µg/L for chlorophyll *a*. Turbidity in Lake Reese ranged from 4.5 to 10.0 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake in 2021. Previous monitoring efforts by DWR, which began in 1989, indicated that this reservoir has predominantly exhibited elevated biological productivity or eutrophic conditions.

# Lake Bunch

| *Ambient Lakes Program Name* | Lake Bunch |
|---|---|
| *Trophic Status (NC TSI)* | No Score |
| *Mean Depth (meters)* | 3.0 |
| *Volume ($10^6 m^3$)* | 0.04 |
| *Watershed Area ($mi^2$)* | 2.3 |
| *Classification* | WS-II HQW CA |
| *Stations* | YAD181G |
| *Number of Times Sampled* | 5 |

Lake Bunch was built by the City of Asheboro for use as a water supply reservoir in 1932. The lake is located on the west side of Asheboro on an unnamed tributary to Cedar Fork, upstream of Back Creek Lake. Lake Bunch is closed to the public.

This small reservoir was monitored by DWR staff monthly from May through September 2021. Secchi depths, a measurement of water clarity, ranged from 2.1 to 3.3 meters (Appendix A). Surface dissolved oxygen ranged from 7.8 mg/L in July to 10.1 mg/L in May and June. Surface pH values were fairly consistent and ranged from 7.5 to 7.9 s.u., and surface conductivity in Lake Bunch ranged from 82 to 87 *µ*mhos/cm.

Total phosphorus ranged from <0.02 to 0.02 mg/L and $NO_2$+$NO_3$ ranged from <0.02 to 0.07 mg/L. Total Kjeldahl nitrogen in both May and June was 0.35 mg/L and NH3 was <0.02 mg/L. Chlorophyll *a* in Lake Bunch for July through September ranged from 12 to 31 *µ*g/L.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake in 2021. Historically, the trophic state of Lake Bunch has ranged from very low biological productivity (oligotrophic conditions) to moderate biological productivity (mesotrophic conditions) since monitoring by DWR began in 1989.

# Back Creek Lake

| Ambient Lakes Program Name | Back Creek Lake | | |
|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | |
| Mean Depth (meters) | 4.0 | | |
| Volume ($10^6 m^3$) | 5.00 | | |
| Watershed Area ($mi^2$) | 15.7 | | |
| Classification | WS-II HQW CA | | |
| Stations | YAD181J | YAD181K | YAD181L |
| Number of Times Sampled | 5 | 5 | 5 |

Back Creek Lake (also called Lake Lucas) is the primary water supply for the City of Asheboro. The reservoir is part of a public park where fishing, boating, and swimming are permitted. The rolling, 15.7 square-mile watershed is drained by Back Creek and Greenes Branch. Approximately half of the drainage area is wooded and most of the remainder is agricultural. Hypolimnetic aerators have been installed near the water intake structure to improve the quality of the water before it is withdrawn for treatment.

Back Creek Lake was monitored monthly by DWR staff from May through September 2021. Secchi depths ranged from 0.7 to 1.5 meters and surface dissolved oxygen concentrations ranged from 7.5 to 10.4 mg/L (Appendix A). Surface pH values ranged from 7.1 to 8.6 s.u. and surface conductivity ranged from 82 to 96 $\mu$mhos/cm.

Total phosphorus ranged from 0.03 to 0.07 mg/L while both $NH_3$ and $NO_2$+$NO_3$ were below the DWR laboratory detection level of <0.02 mg/L. Total inorganic nitrogen was consistently 0.02 mg/L in 2021. Chlorophyll *a* concentrations from July through September ranged from 19 to 40 $\mu$g/L. Turbidity values ranged from 2.9 to 7.6 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake in 2021. Historically, the trophic state of this lake has been determined to be eutrophic since monitoring by DWR began in 1989.

## LAKE & RESERVOIR ASSESSMENTS

## HUC 03040104

# Lake Tillery

| Ambient Lakes Program Name | Lake Tillery | | | |
|---|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | | |
| Mean Depth (meters) | 9.7 | | | |
| Volume ($10^6 m^3$) | 207.00 | | | |
| Watershed Area ($mi^2$) | 4668.0 | | | |
| Classification | WS-IV B CA | | | |
| Stations | YAD1815A | YAD189 | YAD189B | YAD189C |
| Number of Times Sampled | 5 | 5 | 5 | 5 |

Lake Tillery was constructed in 1928 and is currently used for hydroelectric power and recreational purposes. It is one of the lower lakes within the Yadkin River chain, located between Falls Lake and Blewett Falls Lake. The surrounding watershed is comprised of rolling hills with a combination of mostly forest and agriculture. Lake Tillery is under a fish consumption for polychlorinated biphenyls (PCBs) in catfish (http://epi.publichealth.nc.gov/oee/programs/fish.html).

Lake Tillery was sampled by DWR once monthly from May and through September 2021 for a total of five sampling events. Secchi depths ranged from 1.0 to 2.8 meters, indicating that the clarity of the water in Lake Tillery on the days it was sampled was good (Appendix A). Surface dissolved oxygen ranged from 6.8 to 11.3 mg/L. Surface pH values ranged from 6.4 to 8.9 s.u. and surface conductivity ranged from 76 to 81 $\mu$mhos/cm. Lake Tillery is currently on the 2020 303(d) List of Impaired Waters for elevated pH (values greater than 9.0 s.u.) previously observed in this lake (https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2020/NC_2020_Category5_303dlist.pdf).

Total phosphorus ranged from <0.02 to 0.03 mg/L and $NH_3$ ranged from <0.02 to 0.04 mg/L. Concentrations of $NO_2$+$NO_3$ ranged from 0.16 to 0.39 mg/L. Chlorophyll *a* values from June through September ranged from 4.3 to 20.0 $\mu$g/L. Turbidity values in Lake Tillery ranged from 1.7 to 4.9 NTUs in 2021.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake in 2021. Historically, the trophic state of this reservoir has varied from very low biological productivity (oligotrophic conditions) to eutrophic conditions since 1981 when monitoring was first conducted by DWR staff.

# Blewett Falls Lake

| *Ambient Lakes Program Name* | Blewett Falls Lake |
|---|---|
| *Trophic Status (NC TSI)* | No Score |
| *Mean Depth (meters)* | 3.3 |
| *Volume ($10^6 m^3$)* | 120.00 |
| *Watershed Area ($mi^2$)* | 6866.0 |
| *Classification* | WS-IV B CA |
| *Stations* | YAD260B |
| *Number of Times Sampled* | 5 |

Blewett Falls Lake is a run-of-the-river reservoir located on the Yadkin River. It is the lowermost reservoir of the Yadkin-Pee Dee Chain of Lakes, a series of reservoirs constructed on the Yadkin River.

Secchi depths ranged from 0.5 to 0.7 meter (Appendix A). Surface dissolved oxygen ranged from 7.5 mg/L in September to 11.3 mg/L in July. Surface pH values ranged from 6.7 to 9.0 s.u. and surface conductivity ranged from 82 to 120 $\mu$mhos/cm.

Total phosphorus values ranged from 0.05 to 0.18 mg/L and $NH_3$ ranged from <0.02 to 0.03 mg/L. The concentration of $NO_2$+$NO_3$ ranged from 0.14 to 0.68 mg/L. Chlorophyll a values ranged from 12 to 28 $\mu$g/L and lake water turbidity ranged from 7.9 to 17.0 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake in 2021. Previous lake monitoring efforts have determined that Blewett Falls Lake has been predominantly eutrophic or very biologically productive since it was first monitored by DWR staff in 1981.

## LAKE & RESERVOIR ASSESSMENTS

## HUC 03040105

# Kannapolis Lake

| *Ambient Lakes Program Name* | Kannapolis Lake | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | 5.0 | |
| *Volume ($10^6 m^3$)* | 5.20 | |
| *Watershed Area ($mi^2$)* | 11.0 | |
| *Classification* | WS-III CA | |
| *Stations* | YAD207A | YAD207C |
| *Number of Times Sampled* | 5 | 5 |

Kannapolis Lake is the water supply source for the City of Kannapolis and access to the lake is not available to the public. Kannapolis Lake was sampled monthly from May through September by DWR staff.

This reservoir was monitored monthly from May through September 2021 by DWR field staff. Secchi depth ranged from 0.8 to 1.5 meters (Appendix A). Surface dissolved oxygen in 2021 ranged from 6.6 to 9.8 mg/L and surface pH ranged from 7.2 to 9.0 s.u. Surface conductivity ranged from 41 to 93 *µ*mhos/cm.

Total phosphorus concentrations in Kannapolis Lake ranged from <0.02 to 0.05 mg/L and $NH_3$ ranged from <0.02 to 0.02 mg/L. The values for $NO_2$+$NO_3$ ranged from <0.02 mg/L to 0.58 mg/L. Chlorophyll *a* values for this reservoir ranged from 5.7 *µ*g/L in May to 36.0 *µ*g/L in September. Turbidity values were low and ranged from 1.9 to 7.0 NTUs.

Based on the calculated NCTSI score, Kannapolis Lake was determined to exhibit elevated biological productivity or eutrophic conditions in May. Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from June through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined Kannapolis Lake has historically been determined to have moderate (mesotrophic) to eutrophic productivity based on the NCTSI scores which were recorded beginning in 1989 when DWR staff began monitoring efforts for this lake.

# Lake Fisher

| Ambient Lakes Program Name | Lake Fisher | | |
|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | |
| Mean Depth (meters) | 4.7 | | |
| Volume ($10^6 m^3$) | 3.20 | | |
| Watershed Area ($mi^2$) | 0.8 | | |
| Classification | WS-IV CA | | |
| Stations | YAD215R | YAD215T | YAD216A |
| Number of Times Sampled | 3 | 4 | 4 |

Located north of the City of Concord, Lake Fisher is the primary water supply source for the city. This lake is also part of a city park that is open to the public for fishing and boating (http://www.concordnc.gov/Departments/Parks-Recreation/Facilities/Lake-Fisher).

Lake Fisher was monitored monthly in May and June and twice in August 2021. Only the lower two lake sampling sites were monitored on August 30th due to low water levels in the reservoir which made sampling of the uppermost lake site (YAD215R) impossible. In 2021, secchi depths in this reservoir ranged from 0.3 to 1.2 meters. Surface dissolved oxygen ranged from 6.1 to 9.3 mg/L and surface pH values ranged from 7.1 to 8.6 s.u. Surface conductivity in Lake Fisher ranged from 114 to 179 *µ*mhos/cm.

Total phosphorus ranged from 0.03 to 0.10 mg/L and $NH_3$ values ranged from <0.02 to 0.10 mg/L. The values for $NO_2$+$NO_3$ ranged from <0.02 to 0.22 mg/L. Chlorophyll *a* values in Lake Fisher ranged from 6.9 to 30.0 *µ*g/L. Turbidity in this reservoir ranged from 3.6 to 26.0 NTUs, with the later value, which occurred at the upper end of Lake Fisher in May, exceeded the state water quality standard of 25 NTUs for a lake or reservoir.

Based on the calculated NCTSI score, Lake Fisher was determined to exhibit elevated biological productivity or eutrophic conditions in May. Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from June through August to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Based on previous DWR monitoring efforts, this reservoir has been determined to be consistently eutrophic since it was first monitored by DWR staff in 1989.

# Lake Concord

| Ambient Lakes Program Name | Lake Concord | | |
|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | |
| Mean Depth (meters) | 3.7 | | |
| Volume ($10^6 m^3$) | 1.29 | | |
| Watershed Area ($mi^2$) | 3.9 | | |
| Classification | WS-IV CA | | |
| Stations | YAD216C | YAD216E | YAD216G |
| Number of Times Sampled | 5 | 5 | 5 |

Lake Concord is a secondary water supply reservoir for the City of Concord. This lake was constructed in the 1930s and public access is prohibited. The drainage area surrounding this lake consists of the urban area associated with the City of Concord. There are also many houses along the immediate shoreline.

Lake Concord was sampled monthly from May through September by DWR field staff. Secchi depths in this reservoir ranged from 0.4 to 1.3 meters and surface dissolved oxygen ranged from 8.8 to 10.5 mg/L (Appendix A). Surface pH values ranged from 7.5 to 8.8 s.u. and surface conductivity ranged from 82 to 119 $\mu$mhos/cm.

Total phosphorus in Lake Concord ranged from 0.03 to 0.06 mg/L. Concentrations of $NH_3$ ranged from <0.02 to 0.03 mg/L while $NO_2$+$NO_3$ ranged from <0.02 to 0.32 mg/L. Of the nine chlorophyll *a* measurements recorded for 2021, values ranged from 26 to 65 $\mu$g/L, with the latter value (11%) greater than the state water quality standard of 40 $\mu$g/L. Turbidity for Lake Concord ranged from 3.7 to 15.0 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of Lake Concord in 2021 could not be accurately determined. Based on previous DWR monitoring efforts, this reservoir has been determined to consistently demonstrated eutrophic conditions since it was first monitored by DWR staff in 1989.

# Lake Monroe

| *Ambient Lakes Program Name* | Lake Monroe | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | 5.0 | |
| *Volume ($10^6 m^3$)* | 0.95 | |
| *Watershed Area ($mi^2$)* | 9.5 | |
| *Classification* | WS-IV CA | |
| *Stations* | YAD232F | YAD232D |
| *Number of Times Sampled* | 4 | 5 |

Lake Monroe, a secondary water supply reservoir built in 1955 for the City of Monroe, provides opportunities for public fishing and boating. The drainage area surrounding this lake consists of a mixture of urban and residential areas, with many houses and a cow pasture located on the immediate shoreline. Poultry operations are also located within the lake's watershed.

DWR field staff monitored Lake Monroe five times in 2021. In September, only one of the two lake sampling sites was sampled due to shallow water levels in the lake which made access by boat to the upper lake sampling site (YAD232D) impossible. Secchi depths in the reservoir ranged from 0.4 to 0.7 meter and the surface dissolved oxygen levels ranged from 6.6 to 19.4 mg/L (Appendix A). Surface pH values ranged from 6.6 to 10.4 s.u. Of the nine surface pH measurements made in 2021, five (56%) were greater than the state water quality standard of > 9.0 s.u. Surface conductivity in this lake ranged from 102 to 158 $\mu$mhos/cm.

Total phosphorus ranged from 0.09 to 0.23 mg/L and $NH_3$ ranged from <0.02 to 0.06 mg/L. The concentrations of $NO_2$+$NO_3$ were consistently below the DWR laboratory detection level of <0.02 mg/L. Only two chlorophyll *a* measurements were accurately determined by the DWR laboratory, one of which (98 $\mu$g/L at the sampling site near the dam in September) was greater than the state water quality standard of 40 $\mu$g/L. Lake turbidity values ranged from 4.7 to 8.5 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Historically, this lake's NCTSI scores have indicated that the trophic state has alternated between eutrophic and hypereutrophic since DWR monitoring began in 1989. Lake Monroe is listed in the 2020 303(d) List of Impaired Waters for elevated pH values and chlorophyll *a.*

# Lake Lee

| Ambient Lakes Program Name | Lake Lee | | |
|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | |
| Mean Depth (meters) | 1.5 | | |
| Volume ($10^6 m^3$) | 9.50 | | |
| Watershed Area ($mi^2$) | 51.4 | | |
| Classification | WS-IV CA | | |
| Stations | YAD232C | YAD232H | YAD233 |
| Number of Times Sampled | 5 | 5 | 5 |

Lake Lee is a small reservoir located within the municipality of Monroe. Constructed in 1927, this lake serves as an emergency or back-up water supply source for Monroe. Water from Lake Monroe flows into Lake Lee, and water from Lake Lee is pumped into a tributary of Lake Twitty (Lake Stewart) during periods of low flow.

Lake Lee was monitored five times in 2021 by DWR field staff. Secchi depths in this lake ranged from 0.2 to 0.7 meter and surface dissolved oxygen concentrations ranged from 5.3 to 12.8 mg/L. Surface pH values ranged from 6.7 t0 9.5 s.u., with three of the 15 observations (20%) greater than the state water quality standard of >9.0 s.u. Surface conductivities in Lake Lee ranged from 97 t0 148 $\mu$mhos/cm.

Total phosphorus in Lake Lee ranged from 0.16 to 0.36 mg/L and $NH_3$ ranged from <0.02 to 0.47 mg/L. The values for $NO_2$+$NO_3$ ranged from <0.02 to 0.15 mg/L. Only two chlorophyll *a* measurements in September 2021 (73 and 75 $\mu$g/L) were accurately determined by the DWR laboratory, both of which were greater than the state water quality standard of 40 $\mu$g/L. Turbidity values in Lake Lee ranged from 10 to 21 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Historically, Lake Lee's NCTSI scores have indicated that the trophic state of this reservoir has alternated between eutrophic and hypereutrophic since DWR monitoring began in 1989. Lake Lee is listed in the 2020 303(d) List of Impaired Waters for low dissolved oxygen values and elevated chlorophyll *a.*

# Lake Twitty (Lake Stewart)

| *Ambient Lakes Program Name* | Lake Twitty (Stewart) | | |
|---|---|---|---|
| *Trophic Status (NC TSI)* | No Score | | |
| *Mean Depth (meters)* | 10.0 | | |
| *Volume ($10^6 m^3$)* | 7.6 | | |
| *Watershed Area ($mi^2$)* | 36.0 | | |
| *Classification* | WS-III CA | | |
| *Stations* | YAD235F | YAD235D | YAD236 |
| *Number of Times Sampled* | 5 | 5 | 5 |

Lake Twitty (also called Lake Stewart) was impounded in 1972. Owned and operated by the City of Monroe, this reservoir is a water supply source for Monroe and is open to the public for recreation. Stewart Creek and Chinkapin Creek are the main tributaries to Lake Twitty. Land in the mainly flat upstream drainage area is forested and agricultural. A hypolimnetic aeration system is in operation at the lower end near the dam to improve the quality of raw drinking water drawn from this lake.

In 2021, secchi depths in Lake Twitty ranged from 0.5 to 0.9 meter and surface dissolved oxygen concentrations ranged from 4.0 to 11.2 mg/L (Appendix A). Surface pH values ranged from 6.7 to 9.3 s,u. with three of the 15 observations (20%) greater than the state water quality standard of >9.0 s.u. Surface conductivity in this reservoir ranged from 62 to 132 $\mu$mhos/cm.

Total phosphorus concentrations ranged from 0.07 to 0.11 mg/L. The values for $NH_3$ ranged from <0.02 to 0.13 mg/L while $NO_2$+$NO_3$ ranged from <0.02 to 0.51 mg/L. Chlorophyll *a* values ranged from 23 to 52 $\mu$g/L. Of six values for chlorophyll *a* recorded for Lake Twitty in 2021, two (33%) were greater than the state water quality standard of 40 $\mu$g/L. Turbidity in this reservoir ranged from 5.1 to 8.8 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Historically, the trophic state of Lake Twitty has varied between eutrophic and hypereutrophic since 1989 when monitoring by DWR began.

# Coddle Creek Reservoir (Lake Howell)

| Ambient Lakes Program Name | Coddle Creek Reservoir | | |
|---|---|---|---|
| Trophic Status (NC TSI) | No Score | | |
| Mean Depth (meters) | 2.0 | | |
| Volume ($10^6 m^3$) | 18.90 | | |
| Watershed Area ($mi^2$) | 47.0 | | |
| Classification | WS-II HQW | | |
| Stations | YADCCR01 | YADCCR02 | YADCCR03 |
| Number of Times Sampled | 5 | 5 | 5 |

This reservoir, constructed in 1993 as a water supply source for the Cities of Concord and Kannapolis, does not have public access. Coddle Creek Reservoir (Lake Howell) is owned, operated and maintained by the Water and Sewer Authority of Cabarrus County.

Surface dissolved oxygen in Coddle Creek Reservoir ranged from 7.9 to 12.7 mg/L and surface pH values ranged from 7.8 to 9.6 s.u. Out of the 15 surface pH observations, four (27%) were greater than the state water quality standard of >9.0 s.u. Surface conductivity ranged from 53 to 106 $\mu$mhos/cm. Secchi depths ranged from 0.4 to 1.8 meters in 2021.

Total phosphorus concentrations ranged from <0.02 to 0.05 mg/L. The values for $NH_3$ ranged from <0.02 to 0.05 mg/L and $NO_2$+$NO_3$ ranged from <0.02 to 0.04 mg/L. Chlorophyll *a* concentrations in Coddle Creek Reservoir from July through September ranged from 29 to 41 $\mu$g/L, with the latter value greater than the state water quality standard of 40 $\mu$g/L. Turbidity ranged from 3.0 to 25.0 NTUs.

Water samples collected on July 7, 2021 was sent to the EPA Region IV chemistry laboratory in Athens, GA for an Algal Growth Potential Test. The purpose of this test is to determine which nutrient limits the potential growth of nuisance algae in the lake. Results of this test determined that nuisance algal growth in Coddle Creek Reservoir was limited by the nutrient, phosphorus (Table 4).

**Table 4. Algal Growth Potential Test Results for Coddle Creek Reservoir, July 7, 2021**.

## Algal Growth Potential Test Results

Coddle Creek Reservoir

July 7, 2021

| Station | Maximum Standing Crop, Dry Weight (mg/L) | | | Limiting Nutrient |
|---|---|---|---|---|
| | Control | C+N | C+P | |
| YADCCR01 | 0.33 | 0.42 | 2.32 | Phosphorus |
| YADCCR02 | 1.03 | 1.30 | 3.11 | Phosphorus |
| YADCCR03 | 0.28 | 0.42 | 3.02 | 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

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake in 2021. Historically, this reservoir has been predominantly eutrophic since monitoring by DWR staff began in 2006.

## LAKE & RESERVOIR ASSESSMENTS

## HUC 03040201

# Roberdel Lake

| *Ambient Lakes Program Name* | Roberdel Lake | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | 2.5 | |
| *Volume ($10^6 m^3$)* | 10.00 | |
| *Watershed Area ($mi^2$)* | 140.2 | |
| *Classification* | WS-III CA | |
| *Stations* | YAD262E | YAD263 |
| *Number of Times Sampled* | 5 | 5 |

Roberdel Lake, located near the City of Rockingham, is a water supply reservoir originally built as a millpond in the 1930's. Hitchcock Creek is the main tributary to this lake. The watershed has a mixture of forested and urban areas, which includes houses along the shore.

Surface dissolved oxygen concentrations ranged from 5.9 to 8.2 mg/L (Appendix A) and surface pH values ranged from 5.2 to 6.7 s.u. Of the ten surface pH values recorded in 2021, two (20%) were less than the state water quality standard of 6.0 s.u. for pH. Surface conductivity in Roberdel Lake ranged from 28 to 30 $\mu$mhos/cm and secchi depths ranged from 0.7 to 1.0 meter.

Total phosphorus ranged from 0.03 to 0.04 mg/L and $NH_3$ ranged from <0.02 to 0.04 mg/L. The concentrations of $NO_2$+$NO_3$ ranged from <0.02 to 0.46 mg/L. Chlorophyll *a* values ranged from 4.9 to 47.0 $\mu$g/L, with this latter value greater than the state water quality standard of 40 $\mu$g/L.

The trophic state index for Roberdel Lake was determined to be very biologically productive or eutrophic in May. Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from June through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. This reservoir has ranged from mesotrophic to eutrophic since 1981 when it was first monitored by DWR staff.

# Rockingham City Lake

| *Ambient Lakes Program Name* | Rockingham City Lake |
|---|---|
| *Trophic Status (NC TSI)* | No Score |
| *Mean Depth (meters)* | 0.7 |
| *Volume ($10^6 m^3$)* | 0.02 |
| *Watershed Area ($mi^2$)* | 20.1 |
| *Classification* | WS-III CA |
| *Stations* | YAD265C |
| *Number of Times Sampled* | 5 |

Rockingham City Lake is a secondary water supply reservoir for the City of Rockingham. The lake provides approximately one-third of the total water supply for the City. Observed land uses in the watershed include forested areas, agricultural areas consisting of crop production, and slight residential and urban development.

The secchi depths of Rockingham City Lake in 2021 ranged from 0.6 to 0.8 meter, suggesting poor water clarity for this lake (Appendix A). The surface dissolved oxygen values ranged from 0.6 to 3.7 mg/L and all five surface oxygen observations were less than the state water quality standard of 4.0 mg/L for an instantaneous reading. Surface pH ranged from 4.9 to 6.2 s.u. with four of the five pH observations (80%) below the state water quality standard of 6.0 s.u. for pH. Surface conductivities ranged from 24 to 30 $\mu$mhos/cm.

Total phosphorus ranged from <0.02 to 0.04 mg/L. Both $NH_3$ and $NO_2$+$NO_3$ were consistently less than the DWR laboratory detection level of <0.02 mg/L. Chlorophyll *a* ranged from 2.8 to 13.0 $\mu$g/L and turbidity ranged from 1.3 to 4.2 NTUs.

The trophic state of Rockingham City Lake in May was determined to be very biologically productive or eutrophic based on the calculated NCTSI score. Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from June through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Rockingham City Lake was determined to be oligotrophic when it was first monitored by DWR field staff in 1992 and eutrophic in when it was sampled again in 2011.

# Wadesboro City Pond

| *Ambient Lakes Program Name* | Wadesboro City Pond | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | 2.5 | |
| *Volume ($10^6$ $m^3$)* | 0.1 | |
| *Watershed Area ($mi^2$)* | 8.9 | |
| *Classification* | WS-II HQW CA | |
| *Stations* | YAD275H | YAD275J |
| *Number of Times Sampled* | 5 | 5 |

Wadesboro City Pond, built in 1938, is a water supply source and recreational lake for the City of Wadesboro. The watershed consists of a mixture of forested and agricultural areas.

DWR field staff monitored Wadesboro City Pond monthly from May through September, 2021. Secchi depths ranged from 0.7 to 1.0 meter and surface dissolved oxygen ranged from 6.1 to 10.8 mg/L (Appendix A). Surface pH values ranged from 6.6 to 9.4 s.u. Of the ten surface pH measurements made in 2021, two (20%) were greater than the state water quality standard of 9.0 s.u. Surface conductivities ranged from 62 to 67 $\mu$mhos/cm.

Total phosphorus in Wadesboro City Pond ranged from 0.03 to 0.06 mg/L. The concentration of $NH_3$ ranged from <0.02 to 0.04 mg/L and $NO_2$+$NO_3$ values were consistently below the DWR laboratory detection level of <0.02 mg/L. Chlorophyll *a* ranged from 14 to 33 $\mu$g/L and turbidity ranged from 4.8 to 14.0 NTUs.

Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from May through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Based on previous DWR monitoring efforts which began in 1989, this small reservoir has been determined to exhibit elevated biological productivity or eutrophic conditions based on the calculated NCTSI scores.

# Hamlet City Lake

| *Ambient Lakes Program Name* | Hamlet City Lake | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | 1.0 | |
| *Volume ($10^6 m^3$)* | 0.04 | |
| *Watershed Area ($mi^2$)* | 2.0 | |
| *Classification* | C | |
| *Stations* | YAD282A | YAD283 |
| *Number of Times Sampled* | 5 | 5 |

Hamlet City Lake is a small, shallow lake located in the Town of Hamlet. This lake is used for recreational fishing and boating and is part of a town park. Water lilies were observed along the shoreline and the upper end of the lake along with submerged macrophytes.

This small reservoir was monitored monthly from May through September 2021 by DWR field staff. Secchi depths in Hamlet City Lake ranged from 0.6 to 1.2 meters (Appendix A). Surface dissolved oxygen concentrations ranged from 2.4 to 7.0 mg/L with the two surface measurements (20%) observed in August below the state water quality standard of 4.0 mg/L for an instantaneous dissolved oxygen reading. Surface pH values ranged from 5.6 to 7.1 s.u. and surface conductivity ranged from 39 to 44 *µ*mhos/cm.

Total phosphorus in Hamlet City Lake ranged from <0.02 to 0.03 mg/L. Both $NH_3$ and $NO_2$+$NO_2$ concentrations were consistently below the DWR laboratory detection level of <0.02 mg/L. Chlorophyll *a* values ranged from 3.4 to 22.0 *µ*g/L and turbidity ranged from 2.1 to 13.0 NTUs.

The trophic state of Hamlet City Lake in May was determined to be exhibit moderate biological productivity or mesotrophic conditions based on the calculated NCTSI score. Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from June through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined.

# Water Lake

| *Ambient Lakes Program Name* | Water Lake | |
|---|---|---|
| *Trophic Status (NC TSI)* | No Score | |
| *Mean Depth (meters)* | 3.0 | |
| *Volume ($10^6 m^3$)* | 0.06 | |
| *Watershed Area ($mi^2$)* | 3.1 | |
| *Classification* | WS-II HQW CA | |
| *Stations* | YAD280C | YAD280E |
| *Number of Times Sampled* | 5 | 5 |

Water Lake is the main water supply reservoir for the City of Hamlet with Marks Creek as its primary tributary. There is no public access to the lake and its watershed is primarily undisturbed forest. The submerged aquatic macrophyte Water Bulrush (*Scirpus subterminalis*) was observed by DWR staff throughout the upper end of the lake along with fragrant water lily (*Nuphar odorata*).

Surface dissolved oxygen in Water Lake ranged from 3.7 to 8.1 mg/L, with the former value (10%) below the state water quality standard of 4.0 mg/L for an instantaneous dissolved oxygen reading. Surface pH values ranged from 5.5 to 7.0 s.u. and surface conductivity ranged from 45 to 57 *µ*mhos/cm. Secchi depths ranged from 1.0 to 2.7 meters.

Total phosphorus in Water Lake was consistently less than the DWR laboratory detection level of <0.02 mg/L. Concentrations of $NH_3$ ranged from <0.02 to 0.07 mg/L and $NO_2$+$NO_3$ ranged from 0.21 to 0.66 mg/L. Values for chlorophyll *a* ranged from 1.2 to 8.8 *µ*g/L and turbidity ranged from <1.0 to 2.7 NTUs.

The trophic state of Water Lake in May was determined to be exhibit low biological productivity or oligotrophic conditions based on the calculated NCTSI score. Issues with nutrient and chlorophyll *a* analysis by the DWR Chemistry Laboratory prevented the NCTSI scores for this lake from June through September to be calculated, and the overall trophic state of this reservoir in 2021 could not be accurately determined. Based on previous sampling efforts by DWR since 1989, this lake was found to have varied between low productivity (oligotrophic conditions) and elevated productivity (eutrophic conditions).

# Appendix A - Yadkin-Pee Dee River Basin Lakes Data

## January 1, 2016 through December 31, 2021

| | SURFACE PHYSICAL DATA | | | | | | | | PHOTIC ZONE DATA | | | | | | | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lake | Date | Sampling Station | DO mg/L | Temp Water C | pH s.u. | Cond. µmhos/cm | Depth Secchi 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 | Solids Total mg/L | Solids Suspended mg/L | Turbidity NTU | Total Hardnes mg/L |
| **KERR SCOTT RESERVOIR** | September 15, 2021 | YAD007A | 9.3 | 25.8 | 7.6 | 42 | 1.4 | 118.2% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 13.0 | 44 | | 2.2 | |
| | September 15, 2021 | YAD008 | 9.4 | 26.6 | 8.1 | 42 | 1.3 | 121.3% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 15.0 | 44 | | 1.9 | |
| | September 15, 2021 | YAD008A | 8.9 | 27.0 | 7.9 | 41 | 1.5 | 115.5% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 13.0 | 43 | | 2.0 | 11.0 |
| | August 10, 2021 | YAD007A | 9.0 | 26.4 | 8.7 | 44 | 1.6 | 115.6% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 14.0 | 42 | <6.2 | 2.5 | |
| | August 10, 2021 | YAD008 | 7.8 | 27.9 | 8.0 | 43 | 1.6 | 102.4% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 12.0 | 38 | <6.2 | 2.6 | |
| | August 10, 2021 | YAD008A | 8.5 | 28.6 | 8.1 | 42 | 1.6 | 112.9% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 10.0 | 40 | <6.2 | 2.2 | 11.0 |
| | July 26, 2021 | YAD007A | 9.6 | 29.2 | 9.0 | 42 | 1.1 | 130.1% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 17.0 | 42 | <6.2 | 3.0 | |
| | July 26, 2021 | YAD008 | 9.2 | 28.6 | 8.6 | 43 | 1.4 | 123.2% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 18.0 | 41 | <6.2 | 3.0 | |
| | July 26, 2021 | YAD008A | 9.3 | 30.2 | 9.0 | 42 | 1.3 | 127.4% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 17.0 | 41 | <6.2 | 2.4 | 9.0 |
| | June 23, 2021 | YAD007A | 9.5 | 26.1 | 8.7 | 40 | 1.0 | 121.1% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 18.0 | 45 | <6.2 | 4.4 | |
| | June 23, 2021 | YAD008 | 9.7 | 25.9 | 8.8 | 40 | 1.0 | 122.6% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 21.0 | 44 | <6.2 | 4.4 | |
| | June 23, 2021 | YAD008A | 9.6 | 26.3 | 8.7 | 41 | 1.1 | 122.7% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 19.0 | 44 | <6.2 | 3.9 | 15.0 |
| | May 18, 2021 | YAD007A | 9.4 | 21.4 | 7.3 | | 1.7 | 108.4% | <0.02 | <0.30 | <0.02 | 0.06 | 0.21 | 0.14 | 0.07 | 13.0 | 38 | <6.2 | 2.8 | |
| | May 18, 2021 | YAD008 | 9.2 | 21.8 | 7.2 | 36 | 1.7 | 107.4% | <0.02 | <0.30 | <0.02 | 0.07 | 0.22 | 0.14 | 0.08 | 11.0 | 39 | <6.2 | 2.2 | |
| | May 18, 2021 | YAD008A | 8.7 | 21.5 | 7.6 | 35 | 2.0 | 100.9% | <0.02 | <0.30 | <0.02 | 0.08 | 0.23 | 0.14 | 0.09 | 12.0 | 35 | <6.2 | 2.0 | 32.0 |
| **HAMPTON LAKE** | September 15, 2021 | YADLH01 | 10.2 | 29.1 | 8.8 | 66 | 0.7 | 137.0% | 0.03 | | <0.02 | <0.02 | | | 0.02 | | 59 | | 6.0 | |
| | September 15, 2021 | YADLH04 | 9.5 | 28.9 | 8.1 | 62 | 0.6 | 126.7% | 0.03 | | <0.02 | <0.02 | | | 0.02 | | 59 | | 6.9 | |
| | August 10, 2021 | YADLH01 | 8.6 | 30.9 | 8.9 | 67 | 0.6 | 117.6% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 32.0 | 52 | <6.2 | 7.1 | |
| | August 10, 2021 | YADLH04 | 9.9 | 31.2 | 8.6 | 68 | 0.5 | 136.6% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 33.0 | 53 | <6.2 | 9.7 | |
| | July 14, 2021 | YADLH01 | 10.4 | 29.2 | 9.7 | 72 | 0.6 | 137.9% | 0.04 | | <0.02 | 0.06 | | | 0.07 | | 54 | 7.8 | 5.7 | |
| | July 14, 2021 | YADLH04 | 9.9 | 28.1 | 9.0 | 68 | 0.6 | 129.5% | 0.05 | | <0.02 | 0.19 | | | 0.20 | | 55 | <12.0 | 8.1 | |
| | June 23, 2021 | YADLH01 | 10.2 | 27.5 | 9.4 | 71 | 0.8 | 131.8% | 0.04 | | <0.02 | 0.48 | | | 0.49 | | 58 | <6.2 | 5.8 | |
| | June 23, 2021 | YADLH04 | 10.0 | 27.9 | 8.7 | 66 | 0.6 | 130.1% | 0.05 | | <0.02 | 0.61 | | | 0.62 | | 63 | 11.0 | 9.2 | |
| | May 18, 2021 | YADLH01 | 10.3 | 21.0 | 8.7 | 59 | 1.1 | 116.9% | 0.03 | 0.53 | <0.02 | 1.10 | 1.63 | 0.52 | 1.11 | | 53 | <6.2 | 4.0 | |
| | May 18, 2021 | YADLH04 | 9.7 | 20.7 | 7.3 | 61 | 0.6 | 110.0% | 0.05 | 0.56 | <0.02 | 1.10 | 1.66 | 0.55 | 1.11 | | 60 | 7.8 | 9.0 | |
| **SALEM LAKE** | August 5, 2021 | YAD077A | 8.2 | 27.2 | 7.5 | 97 | 0.8 | 105.1% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 26.0 | | 6.2 | 6.4 | |
| | August 5, 2021 | YAD077B | 8.6 | 26.5 | 7.1 | 96 | 0.9 | 109.0% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 24.0 | | <6.2 | 5.1 | |
| | August 5, 2021 | YAD077C | 6.6 | 27.9 | 7.5 | 96 | 0.7 | 86.3% | 0.02 | | 0.09 | 0.05 | | | 0.14 | 22.0 | | <6.2 | 5.0 | 30.0 |
| | July 7, 2021 | YAD077A | 9.6 | 28.5 | 8.4 | 48 | 0.8 | 127.1% | 0.03 | | <0.02 | 0.04 | | | 0.05 | 42.0 | 72 | | 6.6 | |
| | July 7, 2021 | YAD077B | 8.8 | 27.5 | 7.2 | 95 | 0.9 | 114.2% | 0.03 | | <0.02 | 0.12 | | | 0.13 | 37.0 | 69 | | 6.1 | |
| | July 7, 2021 | YAD077C | 7.1 | 27.9 | 7.9 | 45 | 0.8 | 92.5% | 0.03 | | 0.04 | 0.20 | | | 0.24 | 27.0 | 66 | | 8.0 | 26.0 |
| | June 9, 2021 | YAD077A | 7.9 | 30.5 | 7.6 | 93 | 1.0 | 107.4% | 0.03 | 0.42 | <0.02 | 0.20 | 0.62 | 0.41 | 0.21 | | 74 | <6.2 | 5.7 | |
| | June 9, 2021 | YAD077B | 7.0 | 32.7 | 7.6 | 91 | 0.9 | 98.6% | 0.02 | 0.36 | <0.02 | 0.23 | 0.59 | 0.35 | 0.24 | | 74 | <6.2 | 5.6 | |
| | June 9, 2021 | YAD077C | 6.6 | 28.6 | 7.7 | 93 | 0.8 | 86.7% | 0.03 | 0.40 | 0.08 | 0.26 | 0.66 | 0.32 | 0.34 | | 74 | <6.2 | 7.0 | 29.0 |
| | May 19. 2021 | YAD077A | 10.2 | 20.8 | 7.1 | 91 | 0.9 | 115.0% | 0.02 | 0.36 | <0.02 | 0.40 | 0.76 | 0.35 | 0.41 | | 70 | <6.2 | 3.6 | |
| | May 19. 2021 | YAD077B | 9.6 | 21.4 | 7.3 | 88 | 0.8 | 110.1% | 0.02 | 0.36 | <0.02 | 0.38 | 0.74 | 0.35 | 0.39 | | 67 | <12.0 | 3.4 | |
| | May 19. 2021 | YAD077C | 8.8 | 20.7 | 6.8 | 86 | 1.0 | 99.7% | <0.02 | 0.32 | <0.02 | 0.42 | 0.74 | 0.31 | 0.43 | | 69 | <6.2 | 3.5 | 28.0 |
| **HIGH ROCK LAKE** | September 13, 2021 | YADHRL051 | 8.3 | 25.0 | 6.6 | 81 | 0.3 | 102.0% | 0.14 | | <0.02 | 0.56 | | | 0.57 | 64.0 | 92 | | 38.0 | |
| | September 13, 2021 | YAD152A | 11.3 | 26.4 | 8.8 | 85 | 0.8 | 141.6% | 0.07 | | <0.02 | 0.24 | | | 0.25 | | 72 | 7.0 | 8.9 | |
| | September 13, 2021 | YAD152C | 11.0 | 26.9 | 8.7 | 85 | 0.8 | 139.8% | 0.06 | | <0.02 | 0.20 | | | 0.21 | | 69 | | 6.0 | |
| | September 13, 2021 | YAD156A | 10.1 | 26.9 | 8.3 | 84 | 0.8 | 128.1% | 0.05 | | <0.02 | 0.24 | | | 0.25 | | 65 | | 4.1 | |
| | September 13, 2021 | YAD169A | 11.3 | 28.0 | 8.8 | 84 | 0.8 | 146.6% | 0.04 | | <0.02 | 0.16 | | | 0.17 | 46.0 | 69 | | 3.9 | |
| | September 13, 2021 | YAD169B | 9.0 | 27.2 | 6.7 | 83 | 0.9 | 114.4% | 0.05 | | <0.02 | 0.26 | | | 0.27 | 36.0 | 67 | | 4.2 | |
| | September 13, 2021 | YAD169E | 6.9 | 26.9 | 6.4 | 81 | 1.0 | 87.1% | 0.03 | | 0.06 | 0.25 | | | 0.31 | 22.0 | 66 | | 3.4 | |
| | September 13, 2021 | YAD169F | 6.6 | 27.1 | 6.6 | 80 | 1.0 | 90.2% | 0.04 | | 0.07 | 0.30 | | | 0.37 | 24.0 | 69 | | 4.0 | 22.0 |
| | August 11, 2021 | YADHRL051 | 11.1 | 28.8 | 9.0 | 96 | 0.4 | 145.9% | 0.11 | | <0.02 | 0.41 | | | 0.42 | 50.0 | 86 | 12.0 | 15.0 | |
| | August 11, 2021 | YAD152A | 10.3 | 28.9 | 9.0 | 90 | 0.8 | 136.0% | 0.08 | | <0.02 | 0.39 | | | 0.40 | 46.0 | 76 | 7.0 | 6.9 | |
| | August 11, 2021 | YAD152C | 10.4 | 29.3 | 9.1 | 87 | 0.8 | 138.3% | 0.05 | | <0.02 | 0.23 | | | 0.24 | 41.0 | 70 | <6.2 | 4.5 | |
| | August 11, 2021 | YAD156A | 10.1 | 28.9 | 9.0 | 87 | 0.8 | 132.7% | 0.06 | | <0.02 | 0.29 | | | 0.30 | 45.0 | 74 | <6.2 | 4.7 | |
| | August 11, 2021 | YAD169A | 11.0 | 30.3 | 9.2 | 87 | 1.0 | 147.9% | 0.04 | | <0.02 | 0.15 | | | 0.16 | | 71 | <6.2 | 4.1 | |
| | August 11, 2021 | YAD169B | 10.7 | 29.3 | 9.2 | 86 | 0.9 | 141.2% | 0.05 | | <0.02 | 0.20 | | | 0.21 | | 68 | <6.2 | 3.2 | |
| | August 11, 2021 | YAD169E | 8.8 | 28.9 | 8.4 | 82 | 1.2 | 115.8% | 0.05 | | <0.02 | 0.24 | | | 0.25 | 65.0 | 69 | <6.2 | 3.7 | |
| | August 11, 2021 | YAD169F | 10.5 | 29.4 | 9.1 | 86 | 1.0 | 139.5% | 0.05 | | <0.02 | 0.24 | | | 0.25 | 49.0 | 68 | <6.2 | 3.4 | 23.0 |
| | July 13, 2021 | YADHRL051 | 8.2 | 27.7 | 7.1 | 86 | 0.4 | 104.7% | 0.12 | | <0.02 | 0.83 | | | 0.84 | 1.5 | 87 | 22.0 | 24.0 | |
| | July 13, 2021 | YAD152A | 9.6 | 28.3 | 8.3 | 89 | 0.5 | 124.5% | 0.10 | | <0.02 | 0.66 | | | 0.67 | 32.0 | 80 | 11.0 | 14.0 | |
| | July 13, 2021 | YAD152C | 9.1 | 29.1 | 8.6 | 88 | 0.7 | 119.2% | 0.08 | | <0.02 | 0.47 | | | 0.48 | 46.0 | 79 | 7.5 | 8.6 | |
| | July 13, 2021 | YAD156A | 9.8 | 29.2 | 8.4 | 90 | 0.7 | 129.1% | 0.08 | | <0.02 | 0.56 | | | 0.57 | 46.0 | 77 | 7.8 | 7.4 | |
| | July 13, 2021 | YAD169A | 8.4 | 29.8 | 8.0 | 88 | 1.0 | 111.6% | 0.05 | | <0.02 | 0.25 | | | 0.26 | 43.0 | 75 | <6.2 | 4.6 | |
| | July 13, 2021 | YAD169B | 9.1 | 29.2 | 8.8 | 85 | 0.9 | 119.4% | 0.05 | | <0.02 | 0.31 | | | 0.32 | 34.0 | 64 | <6.2 | 3.7 | |
| | July 13, 2021 | YAD169E | 8.5 | 28.8 | 8.2 | 84 | 1.0 | 111.2% | 0.05 | | <0.02 | 0.31 | | | 0.32 | 46.0 | 68 | | 3.7 | |
| | July 13, 2021 | YAD169F | 9.0 | 28.7 | 8.4 | 84 | 1.0 | 117.7% | 0.05 | | <0.02 | 0.34 | | | 0.35 | 33.0 | 68 | <12.0 | 3.8 | 24.0 |

# Appendix A - Yadkin-Pee Dee River Basin Lakes Data

## January 1, 2016 through December 31, 2021

| | | SURFACE PHYSICAL DATA | | | | | | | PHOTIC ZONE DATA | | | | | | | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lake | Date | Sampling Station | DO mg/L | Temp Water C | pH s.u. | Cond. µmhos/cm | Depth Secchi 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 | Solids Total mg/L | Solids Suspended mg/L | Turbidity NTU | Total Hardnes mg/L |
| **HIGH** | June 15, 2021 | YADHRL051 | 7.2 | 24.7 | 6.9 | 72 | 0.2 | 88.6% | 0.12 | 0.39 | 0.07 | 1.08 | 1.47 | 0.32 | 1.15 | | | 17.0 | 40.0 | |
| **ROCK** | June 15, 2021 | YAD152A | 12.1 | 21.6 | 9.2 | 85 | 0.6 | 138.3% | 0.07 | 0.56 | <0.02 | 0.61 | 1.17 | 0.55 | 0.62 | | 77 | <12.0 | 13.0 | |
| **LAKE** | June 15, 2021 | YAD152C | 9.5 | 27.9 | 8.7 | 82 | 1.0 | 123.8% | 0.05 | 0.56 | 0.02 | 0.42 | 0.98 | 0.54 | 0.44 | | 71 | <6.2 | 4.9 | |
| | June 15, 2021 | YAD156A | 11.5 | 21.6 | 9.1 | 83 | 1.0 | 131.8% | 0.05 | 0.48 | <0.02 | 0.39 | 0.87 | 0.47 | 0.40 | | 65 | <6.2 | 4.7 | |
| | June 15, 2021 | YAD169A | 10.4 | 28.5 | 9.0 | 84 | 1.1 | 137.9% | 0.04 | 0.47 | <0.02 | 0.21 | 0.68 | 0.46 | 0.22 | | 68 | <6.2 | 4.1 | |
| | June 15, 2021 | YAD169B | 11.0 | 28.2 | 9.1 | 84 | 1.0 | 144.2% | 0.04 | 0.51 | <0.02 | 0.31 | 0.82 | 0.50 | 0.32 | | 70 | <6.2 | 3.5 | |
| | June 15, 2021 | YAD169E | 10.8 | 21.8 | 8.7 | 75 | 1.2 | 124.2% | 0.04 | 0.50 | <0.02 | 0.26 | 0.76 | 0.49 | 0.27 | 31.0 | 74 | <6.2 | 4.0 | |
| | June 15, 2021 | YAD169F | 9.8 | 28.5 | 9.0 | 78 | 1.4 | 129.7% | 0.04 | 0.47 | <0.02 | 0.28 | 0.75 | 0.46 | 0.29 | | 90 | <6.2 | 3.7 | 24.0 |
| | May 18, 2021 | YADHRL051 | 8.7 | 18.7 | 7.8 | 79 | 0.6 | 93.8% | 0.15 | 0.44 | 0.05 | 0.95 | 1.39 | 0.39 | 1.00 | 7.6 | 131 | | 10.0 | |
| | May 18, 2021 | YAD152A | 12.1 | 21.6 | 9.2 | 85 | 0.8 | 138.3% | 0.07 | 0.56 | <0.02 | 0.58 | 1.14 | 0.55 | 0.59 | 35.0 | 67 | 6.5 | 7.3 | |
| | May 18, 2021 | YAD152C | 11.6 | 22.3 | 9.4 | 85 | 0.9 | 134.8% | 0.07 | 0.70 | <0.02 | 0.50 | 1.20 | 0.69 | 0.51 | 46.0 | 66 | <6.2 | 4.6 | |
| | May 18, 2021 | YAD156A | 11.5 | 21.6 | 9.1 | 83 | 1.0 | 131.8% | 0.05 | 0.53 | <0.02 | 0.53 | 1.06 | 0.52 | 0.54 | 38.0 | 62 | 7.0 | 4.8 | |
| | May 18, 2021 | YAD169A | 12.3 | 22.4 | 9.3 | 100 | 0.8 | 143.0% | 0.04 | 0.56 | <0.02 | 0.16 | 0.72 | 0.55 | 0.17 | 38.0 | 72 | <6.2 | 5.2 | |
| | May 18, 2021 | YAD169B | 11.2 | 21.4 | 8.9 | 82 | 0.9 | 127.3% | 0.04 | 0.52 | <0.02 | 0.52 | 1.04 | 0.51 | 0.53 | 33.0 | 66 | <12.0 | 4.6 | |
| | May 18, 2021 | YAD169E | 10.8 | 21.8 | 8.7 | 75 | 1.2 | 124.2% | 0.03 | 0.45 | <0.02 | 0.39 | 0.84 | 0.44 | 0.40 | 29.0 | 60 | <6.2 | 4.6 | |
| | May 18, 2021 | YAD169F | 11.0 | 21.5 | 8.8 | 76 | 1.1 | 125.7% | 0.04 | 0.48 | <0.02 | 0.44 | 0.92 | 0.47 | 0.45 | 39.0 | 73 | <6.2 | 3.9 | 23.0 |
| **LAKE** | September 28, 2021 | YAD160B | 9.8 | 22.0 | 7.3 | 117 | 0.5 | 114.6% | 0.07 | | <0.02 | <0.02 | | | 0.02 | 49.0 | 102 | 9.8 | 8.9 | |
| **THOM-A-LEX** | September 28, 2021 | YAD1611A | 5.5 | 24.3 | 7.3 | 65 | 0.7 | 67.0% | 0.05 | | 0.03 | <0.02 | | | 0.04 | 33.0 | 101 | 6.5 | 6.1 | 42.0 |
| | August 5, 2021 | YAD160B | 6.8 | 28.6 | 7.6 | 124 | 0.4 | 89.7% | 0.07 | | <0.02 | <0.02 | | | 0.02 | 47.0 | | 12.0 | 14.0 | |
| | August 5, 2021 | YAD1611A | 6.8 | 33.0 | 7.3 | | 0.6 | 96.0% | 0.05 | | <0.02 | <0.02 | | | 0.02 | 30.0 | | 7.0 | 6.8 | 42.0 |
| | July 7, 2021 | YAD160B | 10.1 | 30.3 | 9.0 | 121 | 0.6 | 137.1% | 0.06 | | <0.02 | <0.02 | | | 0.02 | | 101 | | 9.1 | |
| | July 7, 2021 | YAD1611A | 9.3 | 30.7 | 9.4 | 140 | 0.5 | 127.4% | 0.06 | | <0.02 | <0.02 | | | 0.02 | | 97 | | 9.9 | 41.0 |
| | June 9, 2021 | YAD160B | 8.6 | 27.3 | 7.8 | 119 | 0.7 | 110.8% | 0.05 | 0.47 | <0.02 | <0.02 | 0.48 | 0.46 | 0.02 | | 97 | <6.2 | 6.4 | |
| | June 9, 2021 | YAD1611A | 8.1 | 27.9 | 7.8 | 110 | 1.2 | 104.8% | 0.04 | 0.46 | <0.02 | <0.02 | 0.47 | 0.45 | 0.02 | | 91 | <6.2 | 3.6 | 38.0 |
| | May 19. 2021 | YAD160B | 11.1 | 23.4 | 8.8 | 109 | 0.8 | 131.4% | 0.05 | 0.61 | <0.02 | <0.02 | 0.62 | 0.60 | 0.02 | | 97 | <6.2 | 6.7 | |
| | May 19. 2021 | YAD1611A | 10.7 | 23.9 | 8.6 | 105 | 0.9 | 128.5% | 0.04 | 0.61 | <0.02 | <0.02 | 0.62 | 0.60 | 0.02 | | 92 | <6.2 | 4.8 | 37.0 |
| **TUCKERTOWN** | September 23, 2021 | YAD172C | 6.9 | 25.2 | 6.9 | 88 | 0.9 | 85.5% | 0.05 | | 0.08 | 0.37 | | | 0.45 | | 65 | 6.2 | 6.8 | |
| **RESERVOIR** | September 23, 2021 | YAD1780A | 7.2 | 26.1 | 7.1 | 84 | 1.0 | 90.0% | 0.04 | | 0.08 | 0.36 | | | 0.44 | 23.0 | 67 | | 5.2 | 22.0 |
| | August 25, 2021 | YAD172C | 7.0 | 30.1 | 7.1 | 74 | 0.5 | 94.5% | 0.08 | | 0.10 | 0.46 | | | 0.56 | 19.0 | 72 | 6.5 | 22.0 | |
| | August 25, 2021 | YAD1780A | 10.5 | 31.4 | 9.2 | 41 | 0.5 | 143.4% | 0.08 | | <0.02 | 0.21 | | | 0.22 | | 71 | 8.2 | 10.0 | 20.0 |
| | July 26, 2021 | YAD172C | 8.8 | 29.2 | 8.5 | 84 | 0.8 | 116.0% | 0.06 | | <0.02 | 0.41 | | | 0.42 | | 77 | <6.2 | 5.9 | |
| | July 26, 2021 | YAD1780A | 10.5 | 29.8 | 8.6 | 87 | 1.1 | 140.3% | 0.04 | | <0.02 | 0.36 | | | 0.37 | | 66 | | 2.6 | 24.0 |
| | June 15, 2021 | YAD172C | 12.6 | 27.6 | 9.6 | 88 | 0.8 | 161.8% | 0.05 | 0.50 | 0.21 | 0.44 | 0.94 | 0.29 | 0.65 | | 72 | 7.2 | 7.8 | |
| | June 15, 2021 | YAD1780A | 10.9 | 28.5 | 8.8 | 86 | 1.4 | 142.8% | 0.04 | 0.62 | <0.02 | 0.32 | 0.94 | 0.61 | 0.33 | | 67 | <6.2 | 3.2 | 24.0 |
| | May 24, 2021 | YAD172C | 7.5 | 24.2 | 7.2 | 81 | 1.1 | 89.9% | 0.04 | 0.44 | 0.12 | 0.56 | 1.00 | 0.32 | 0.68 | | 66 | | 6.0 | |
| | May 24, 2021 | YAD1780A | 12.6 | 27.6 | 9.6 | 88 | 1.0 | 161.8% | 0.05 | 0.67 | <0.02 | 0.31 | 0.98 | 0.66 | 0.32 | | 63 | | 3.1 | 25.0 |
| **BADIN** | September 23, 2021 | YAD178B | 6.8 | 26.6 | 7.0 | 81 | 1.5 | 86.0% | 0.03 | | 0.05 | 0.33 | | | 0.38 | 12.0 | 61 | | 2.8 | 22.0 |
| **LAKE** | September 23, 2021 | YAD178E | 3.9 | 25.6 | 6.8 | 83 | 1.8 | 48.8% | <0.02 | | 0.02 | 0.36 | | | 0.38 | 4.7 | 57 | | 1.9 | |
| | September 23, 2021 | YAD178F | 5.4 | 26.6 | 6.8 | 81 | 1.9 | 68.5% | 0.02 | | <0.02 | 0.39 | | | 0.40 | 6.0 | 57 | | 2.1 | |
| | September 23, 2021 | YAD178F1 | 4.3 | 26.5 | 6.7 | 82 | 1.4 | 53.8% | 0.02 | | 0.02 | 0.41 | | | 0.43 | 4.0 | 59 | | 2.8 | |
| | August 25, 2021 | YAD178B | 11.8 | 31.7 | 9.4 | 91 | 1.2 | 162.2% | 0.04 | | <0.02 | 0.09 | | | 0.10 | 28.0 | 65 | <6.2 | 2.3 | 21.0 |
| | August 25, 2021 | YAD178E | 10.1 | 31.1 | 8.8 | 83 | 1.4 | 136.9% | 0.02 | | <0.02 | 0.06 | | | 0.07 | 20.0 | 63 | <6.2 | 1.8 | |
| | August 25, 2021 | YAD178F | 10.6 | 31.2 | 9.0 | 86 | 1.6 | 143.9% | 0.03 | | <0.02 | 0.17 | | | 0.18 | 20.0 | 64 | <6.2 | 1.7 | |
| | August 25, 2021 | YAD178F1 | 10.2 | 31.4 | 9.2 | 87 | 1.1 | 139.4% | 0.03 | | <0.02 | 0.15 | | | 0.16 | 30.0 | 63 | <6.2 | 2.0 | |
| | July 26, 2021 | YAD178B | 9.7 | 29.5 | 8.8 | 86 | 1.6 | 128.6% | 0.03 | | <0.02 | 0.30 | | | 0.31 | 23.0 | 61 | <6.2 | 2.2 | 21.0 |
| | July 26, 2021 | YAD178E | 8.8 | 29.2 | 8.5 | 84 | 1.9 | 116.0% | <0.02 | | <0.02 | 0.23 | | | 0.24 | 15.0 | 57 | <6.2 | 1.7 | |
| | July 26, 2021 | YAD178F | 6.6 | 28.6 | 7.1 | 85 | 2.0 | 86.7% | <0.02 | | <0.02 | 0.45 | | | 0.46 | 14.0 | 61 | <6.2 | 1.7 | |
| | July 26, 2021 | YAD178F1 | 4.7 | 28.3 | 6.8 | 85 | 2.0 | 60.5% | <0.02 | | <0.02 | 0.52 | | | 0.53 | 10.0 | 59 | <6.2 | 1.5 | |
| | June 15, 2021 | YAD178B | 10.3 | 28.3 | 8.9 | 86 | 1.2 | 134.8% | 0.04 | 0.48 | <0.02 | 0.28 | 0.76 | 0.47 | 0.29 | | 66 | <6.2 | 3.3 | 26.0 |
| | June 15, 2021 | YAD178E | 10.4 | 28.3 | 9.2 | 83 | 1.0 | 136.7% | 0.03 | 0.48 | <0.02 | 0.18 | 0.66 | 0.47 | 0.19 | | 61 | <12.0 | 2.9 | |
| | June 15, 2021 | YAD178F | 10.2 | 27.7 | 9.1 | 85 | 1.3 | 132.0% | 0.03 | 0.46 | <0.02 | 0.22 | 0.68 | 0.45 | 0.23 | | 61 | <6.2 | 2.9 | |
| | June 15, 2021 | YAD178F1 | 9.3 | 27.0 | 9.0 | 31 | 1.1 | 119.4% | 0.03 | 0.46 | <0.02 | 0.25 | 0.71 | 0.45 | 0.26 | | 61 | <6.2 | 3.0 | |
| | May 24, 2021 | YAD178B | 11.2 | 26.5 | 9.1 | 81 | 1.4 | 140.5% | 0.03 | 0.44 | <0.02 | 0.47 | 0.91 | 0.43 | 0.48 | | 62 | | 3.8 | 22.0 |
| | May 24, 2021 | YAD178E | 11.6 | 25.2 | 9.2 | 78 | 1.5 | 141.9% | 0.03 | 0.45 | <0.02 | 0.34 | 0.79 | 0.44 | 0.35 | | 55 | | 3.0 | |
| | May 24, 2021 | YAD178F | 12.0 | 25.8 | 9.4 | 81 | 1.4 | 149.0% | 0.02 | 0.45 | <0.02 | 0.36 | 0.81 | 0.44 | 0.37 | | 57 | | 2.6 | |
| | May 24, 2021 | YAD178F1 | 11.5 | 26.5 | 9.3 | 81 | 1.5 | 143.8% | <0.02 | 0.36 | <0.02 | 0.34 | 0.70 | 0.35 | 0.35 | | 59 | | 2.5 | |
| **FALLS** | September 14, 2021 | YAD178F3 | 7.0 | 27.3 | 7.2 | 80 | 2.0 | 89.4% | <0.02 | | 0.05 | 0.36 | | | 0.41 | 7.2 | 60 | | 2.1 | |
| **LAKE** | September 14, 2021 | YAD178F5 | 7.0 | 27.6 | 7.2 | 80 | 1.8 | 89.2% | 0.03 | | 0.05 | 0.37 | | | 0.42 | 11.0 | 58 | | 2.0 | 21.0 |
| | August 19, 2021 | YAD178F3 | 7.3 | 28.3 | 7.7 | 82 | 1.7 | 94.2% | 0.02 | | 0.02 | 0.36 | | | 0.38 | 7.2 | 59 | | 3.1 | |
| | August 19, 2021 | YAD178F5 | 7.5 | 28.7 | 7.5 | 81 | 1.7 | 98.1% | 0.02 | | 0.02 | 0.38 | | | 0.40 | 7.4 | 59 | | 2.8 | 23.0 |
| | July 20, 2021 | YAD178F3 | 6.8 | 27.3 | 6.5 | 82 | 2.1 | 86.3% | <0.02 | | 0.04 | 0.42 | | | 0.46 | 9.0 | 57 | <6.2 | 2.0 | |
| | July 20, 2021 | YAD178F5 | 6.5 | 27.4 | 6.5 | 82 | 1.9 | 83.3% | <0.02 | | 0.04 | 0.44 | | | 0.48 | 11.0 | 59 | <12.0 | 2.3 | 22.0 |
| | June 30, 2021 | YAD178F3 | 6.4 | 25.7 | 7.1 | 81 | 2.2 | 78.4% | <0.02 | | 0.04 | 0.54 | | | 0.58 | 4.6 | 59 | | 1.9 | |
| | June 30, 2021 | YAD178F5 | 6.6 | 27.0 | 7.0 | 82 | 2.5 | 83.7% | <0.02 | | 0.04 | 0.55 | | | 0.59 | 3.9 | 57 | <6.2 | 2.4 | 24.0 |

# Appendix A - Yadkin-Pee Dee River Basin Lakes Data

## January 1, 2016 through December 31, 2021

| Lake | Date | Sampling Station | SURFACE PHYSICAL DATA DO mg/L | Temp Water C | pH s.u. | Cond. µmhos/cm | Depth Secchi meters | Percent SAT | PHOTIC ZONE DATA TP mg/L | TKN mg/L | NH3 mg/L | NOx mg/L | TN mg/L | TON mg/L | TIN mg/L | Chla µg/L | Solids Total mg/L | Total Solids Suspended mg/L | Turbidity NTU | Total Hardnes mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FALLS** | May 24, 2021 | YAD178F3 | 8.8 | 20.9 | 6.7 | 76 | 1.8 | 99.0% | <0.02 | 0.33 | 0.02 | 0.58 | 0.91 | 0.31 | 0.60 | | 59 | | 3.1 | |
| **LAKE** | May 24, 2021 | YAD178F5 | 8.9 | 21.5 | 6.7 | 77 | 1.7 | 101.1% | 0.02 | 0.31 | 0.03 | 0.52 | 0.83 | 0.28 | 0.55 | | 58 | | 3.2 | 22.0 |
| **LAKE** | September 8, 2021 | YAD179B | 8.3 | 28.4 | 7.8 | 100 | 0.3 | 108.8% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 40.0 | 80 | | 6.6 | |
| **REESE** | September 8, 2021 | YAD179D | 8.7 | 28.1 | 8.0 | 95 | 0.7 | 113.5% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 30.0 | 74 | | 5.3 | |
| | September 8, 2021 | YAD179F | 9.9 | 28.0 | 8.6 | 92 | 0.8 | 128.6% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 49.0 | 70 | | 5.4 | 31.0 |
| | August 4, 2021 | YAD179B | 6.2 | 28.3 | 7.1 | 99 | 0.6 | 80.6% | 0.05 | | <0.02 | <0.02 | | | 0.02 | 22.0 | | 8.5 | 8.7 | |
| | August 4, 2021 | YAD179D | 7.9 | 28.1 | 7.9 | 88 | 0.6 | 101.6% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 26.0 | | 6.8 | 6.1 | |
| | August 4, 2021 | YAD179F | 8.2 | 28.5 | 8.3 | 86 | 0.7 | 106.7% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 18.0 | | <6.2 | 5.3 | 31.0 |
| | July 13, 2021 | YAD179B | 8.5 | 31.2 | 7.9 | 102 | 0.8 | 112.8% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 40.0 | 75 | 7.8 | 7.4 | |
| | July 13, 2021 | YAD179D | 8.3 | 30.3 | 8.3 | 93 | 0.9 | 110.5% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 18.0 | 70 | <6.2 | 4.5 | |
| | July 13, 2021 | YAD179F | 8.9 | 30.3 | 8.7 | 89 | 1.0 | 118.9% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 31.0 | 67 | <6.2 | 5.1 | 34.0 |
| | June 29, 2021 | YAD179B | 10.9 | 30.4 | 8.7 | 96 | 0.9 | 145.4% | 0.06 | | <0.02 | <0.02 | | | 0.02 | | 78 | 7.0 | 10.0 | |
| | June 29, 2021 | YAD179D | 11.3 | 29.2 | 8.9 | 104 | 1.0 | 147.5% | 0.04 | | <0.02 | <0.02 | | | 0.02 | | 68 | <6.2 | 6.7 | |
| | June 29, 2021 | YAD179F | 10.8 | 28.7 | 8.6 | 87 | 1.0 | 139.5% | 0.04 | | <0.02 | <0.02 | | | 0.02 | | 61 | <6.2 | 5.7 | 29.0 |
| | May 20, 2021 | YAD179B | 10.8 | 26.2 | 8.7 | 114 | 0.9 | 133.3% | 0.04 | 0.55 | <0.02 | <0.02 | 0.56 | 0.54 | 0.02 | | 97 | | 6.4 | |
| | May 20, 2021 | YAD179D | 10.0 | 26.4 | 8.6 | 111 | 1.1 | 123.7% | 0.03 | 0.43 | <0.02 | <0.02 | 0.44 | 0.42 | 0.02 | | 84 | | 3.7 | |
| | May 20, 2021 | YAD179F | 9.6 | 25.9 | 8.2 | 106 | 0.9 | 118.4% | 0.02 | 0.40 | <0.02 | <0.02 | 0.41 | 0.39 | 0.02 | | 80 | | 4.5 | 37.0 |
| **BUNCH** | September 8, 2021 | YAD181G | 8.2 | 26.6 | 7.5 | 82 | 2.2 | 104.1% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 12.0 | 63 | | 3.9 | 26.0 |
| **LAKE** | August 4, 2021 | YAD181G | 8.3 | 28.1 | 7.7 | 83 | 2.1 | 108.2% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 18.0 | 65 | <6.2 | 2.8 | 28.0 |
| | July 13, 2021 | YAD181G | 7.8 | 29.4 | 7.6 | 84 | 2.5 | 103.3% | | | | | | | | 31.0 | 63 | <6.2 | 1.8 | 27.0 |
| | June 2, 2021 | YAD181G | 10.1 | 22.1 | 7.9 | 87 | 3.3 | 115.9% | 0.02 | 0.35 | <0.02 | 0.04 | 0.39 | 0.34 | 0.05 | | 69 | <6.2 | 3.6 | 27.0 |
| | May 20, 2021 | YAD181G | 10.1 | 22.1 | 7.9 | 87 | 3.0 | 115.9% | <0.02 | 0.35 | <0.02 | 0.07 | 0.42 | 0.34 | 0.08 | | 63 | | 4.0 | 28.0 |
| **BACK** | September 8, 2021 | YAD181J | 8.5 | 26.4 | 7.1 | 91 | 1.0 | 107.3% | 0.06 | | <0.02 | <0.02 | | | 0.02 | 35.0 | 75 | | 4.1 | |
| **CREEK** | September 8, 2021 | YAD181K | 8.2 | 26.6 | 7.5 | 82 | 1.2 | 104.1% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 40.0 | 71 | | 3.4 | |
| **LAKE** | September 8, 2021 | YAD181L | 7.9 | 26.7 | 7.2 | 89 | 1.4 | 100.5% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 26.0 | 69 | | 2.9 | 28.0 |
| | August 4, 2021 | YAD181J | 7.9 | 28.1 | 8.4 | 88 | 0.7 | 102.1% | 0.07 | | <0.02 | <0.02 | | | 0.02 | 33.0 | | 6.5 | 7.1 | |
| | August 4, 2021 | YAD181K | 7.5 | 28.3 | 7.9 | 86 | 0.7 | 97.2% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 36.0 | | <6.2 | 4.3 | |
| | August 4, 2021 | YAD181L | 8.3 | 28.1 | 7.7 | 83 | 0.8 | 108.2% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 30.0 | 71 | <6.2 | 4.5 | 29.0 |
| | July 13, 2021 | YAD181J | 9.1 | 30.1 | 8.5 | 92 | 0.7 | 120.8% | 0.06 | | <0.02 | <0.02 | | | 0.02 | 32.0 | 74 | 6.2 | 7.6 | |
| | July 13, 2021 | YAD181K | 9.2 | 29.2 | 8.4 | 90 | 0.9 | 120.7% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 25.0 | 72 | <6.2 | 4.3 | |
| | July 13, 2021 | YAD181L | 9.4 | 29.8 | 8.6 | 91 | 0.9 | 124.0% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 19.0 | 68 | <6.2 | 3.6 | 30.0 |
| | June 2, 2021 | YAD181J | 10.4 | 25.7 | 8.5 | 98 | 1.0 | 129.3% | 0.05 | 0.56 | <0.02 | <0.02 | 0.57 | 0.55 | 0.02 | | 80 | 6.2 | 5.8 | |
| | June 2, 2021 | YAD181K | 9.8 | 25.6 | 8.2 | 96 | 1.2 | 12.8% | 0.03 | 0.44 | <0.02 | <0.02 | 0.45 | 0.43 | 0.02 | | 75 | <6.2 | 3.3 | |
| | June 2, 2021 | YAD181L | 9.4 | 25.1 | 8.0 | 94 | 1.4 | 114.9% | 0.03 | 0.42 | <0.02 | <0.02 | 0.43 | 0.41 | 0.02 | | 73 | <6.2 | 3.4 | 32.0 |
| | May 20, 2021 | YAD181J | 10.3 | 22.4 | 8.5 | 94 | 1.0 | 118.7% | 0.04 | 0.54 | <0.02 | <0.02 | 0.55 | 0.53 | 0.02 | | 77 | | 4.1 | |
| | May 20, 2021 | YAD181K | 9.7 | 23.2 | 8.2 | 93 | 1.5 | 113.1% | 0.04 | 0.48 | <0.02 | <0.02 | 0.49 | 0.47 | 0.02 | | 73 | | 3.9 | |
| | May 20, 2021 | YAD181L | 8.8 | 23.0 | 7.6 | 94 | 1.5 | 101.9% | 0.04 | 0.49 | <0.02 | <0.02 | 0.50 | 0.48 | 0.02 | | 72 | | 3.9 | 33.0 |
| **LAKE** | September 14, 2021 | YAD185A | 7.8 | 26.6 | 6.8 | 80 | 1.0 | 98.0% | 0.03 | | <0.02 | 0.35 | | | 0.36 | 17.0 | 63 | | 4.0 | |
| **TILLERY** | September 14, 2021 | YAD189 | 9.1 | 27.7 | 7.5 | 80 | 1.8 | 115.4% | 0.03 | | <0.02 | 0.25 | | | 0.26 | 20.0 | 61 | | 2.3 | |
| | September 14, 2021 | YAD189B | 8.7 | 28.0 | 7.5 | 81 | 2.0 | 111.1% | 0.02 | | <0.02 | 0.23 | | | 0.24 | 18.0 | 63 | | 1.7 | |
| | September 14, 2021 | YAD189C | 7.8 | 27.8 | 7.4 | 81 | 2.1 | 99.2% | 0.02 | | <0.02 | 0.26 | | | 0.27 | 13.0 | 62 | | 1.9 | 21.0 |
| | August 19, 2021 | YAD185A | 6.8 | 28.1 | 6.9 | 81 | 1.2 | 87.3% | 0.02 | | 0.04 | 0.38 | | | 0.42 | 4.3 | 64 | | 4.4 | |
| | August 19, 2021 | YAD189 | 6.8 | 28.7 | 7.0 | 80 | 1.0 | 88.7% | 0.03 | | <0.02 | 0.38 | | | 0.39 | 16.0 | 62 | | 4.5 | |
| | August 19, 2021 | YAD189B | 8.0 | 30.0 | 7.7 | 76 | 2.0 | 106.0% | 0.02 | | 0.02 | 0.20 | | | 0.22 | 12.0 | 59 | | 2.0 | |
| | August 19, 2021 | YAD189C | 8.1 | 30.8 | 7.8 | 78 | 1.5 | 108.6% | 0.02 | | <0.02 | 0.20 | | | 0.21 | 10.0 | 51 | | 2.3 | 21.0 |
| | July 20, 2021 | YAD185A | 8.1 | 28.1 | 6.4 | 80 | 1.4 | 104.5% | 0.03 | | 0.02 | 0.39 | | | 0.41 | 15.0 | 57 | <6.2 | 4.3 | |
| | July 20, 2021 | YAD189 | 8.3 | 29.0 | 6.5 | 79 | 1.6 | 108.8% | 0.02 | | <0.02 | 0.30 | | | 0.31 | 15.0 | 59 | <6.2 | 2.9 | |
| | July 20, 2021 | YAD189B | 8.1 | 29.0 | 6.6 | 79 | 1.6 | 106.5% | <0.02 | | <0.02 | 0.27 | | | 0.28 | 13.0 | | <6.2 | 2.1 | |
| | July 20, 2021 | YAD189C | 8.0 | 29.1 | 6.8 | 78 | 1.9 | 104.4% | <0.02 | | <0.02 | 0.26 | | | 0.27 | 14.0 | | <6.2 | 1.7 | 21.0 |
| | June 30, 2021 | YAD185A | 9.9 | 29.6 | 8.3 | 79 | 1.6 | 129.5% | 0.03 | | <0.02 | 0.34 | | | 0.35 | 11.0 | 57 | <6.2 | 2.9 | |
| | June 30, 2021 | YAD189 | 9.9 | 29.8 | 8.7 | 77 | 1.8 | 131.1% | 0.03 | | 0.02 | 0.26 | | | 0.28 | 15.0 | 58 | <6.2 | 3.2 | |
| | June 30, 2021 | YAD189B | 10.0 | 29.6 | 8.9 | 77 | 1.8 | 131.8% | 0.02 | | <0.02 | 0.17 | | | 0.18 | 15.0 | 52 | <6.2 | 2.3 | |
| | June 30, 2021 | YAD189C | 10.0 | 29.2 | 8.7 | 77 | 1.8 | 131.1% | <0.02 | | <0.02 | 0.16 | | | 0.17 | 14.0 | 53 | <6.2 | 2.6 | 23.0 |
| | May 24, 2021 | YAD185A | 8.6 | 22.2 | 6.7 | 77 | 1.4 | 98.9% | 0.02 | 0.34 | 0.03 | 0.59 | 0.93 | 0.31 | 0.62 | | 64 | | 4.2 | |
| | May 24, 2021 | YAD189 | 11.3 | 24.2 | 7.5 | 76 | 1.3 | 134.5% | 0.02 | 0.36 | <0.02 | 0.50 | 0.86 | 0.35 | 0.51 | | 57 | | 4.9 | |
| | May 24, 2021 | YAD189B | 11.0 | 26.6 | 8.8 | 76 | 2.8 | 137.8% | 0.02 | 0.38 | <0.02 | 0.42 | 0.80 | 0.37 | 0.43 | | 50 | | 3.4 | |
| | May 24, 2021 | YAD189C | 11.1 | 26.1 | 8.6 | 76 | 2.4 | 137.1% | 0.02 | 0.42 | <0.02 | 0.39 | 0.81 | 0.41 | 0.40 | | 55 | | 2.6 | 22.0 |
| **BLEWETT** | Septembet 22, 2021 | YAD260B | 7.5 | 26.9 | 7.4 | 83 | 0.5 | 94.6% | 0.07 | | 0.03 | 0.35 | | | 0.38 | 12.0 | 76 | 16.0 | 17.0 | 23.0 |
| **FALLS** | August 25, 2021 | YAD260B | 10.7 | 31.7 | 9.0 | 82 | 0.5 | 145.0% | 0.06 | | <0.02 | 0.14 | | | 0.15 | | 71 | 9.2 | 9.1 | 23.0 |
| **LAKE** | July 22, 2021 | YAD260B | 11.3 | 29.7 | 7.7 | 96 | 0.6 | 148.1% | 0.10 | | <0.02 | 0.68 | | | 0.69 | 27.0 | 82 | 11.0 | 12.0 | 26.0 |
| | June 24, 2021 | YAD260B | 8.6 | 26.9 | 6.7 | 120 | 0.6 | 106.6% | 0.18 | | <0.02 | | | | | 28.0 | 100 | 12.0 | 14.0 | 35.0 |
| | May 26, 2021 | YAD260B | 11.2 | 27.9 | 8.9 | 85 | 0.7 | 142.9% | 0.05 | 0.45 | <0.02 | 0.43 | 0.88 | 0.44 | 0.44 | | 64 | 7.2 | 7.9 | 25.0 |
| **KANNAPOLIS** | September 21, 2021 | YAD207A | 6.6 | 25.6 | 7.2 | 92 | 0.8 | 82.4% | 0.05 | | <0.02 | <0.02 | | | 0.02 | 36.0 | 79 | 7.0 | 7.0 | |
| **LAKE** | September 21, 2021 | YAD207C | 8.4 | 25.9 | 8.0 | 91 | 1.1 | 105.0% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 24.0 | 70 | | 1.9 | 22.0 |

# Appendix A - Yadkin-Pee Dee River Basin Lakes Data

## January 1, 2016 through December 31, 2021

| Lake | Date | Sampling Station | SURFACE PHYSICAL DATA DO mg/L | Temp Water C | pH s.u. | Cond. µmhos/cm | Depth Secchi meters | Percent SAT | PHOTIC ZONE DATA TP mg/L | TKN mg/L | NH3 mg/L | NOx mg/L | TN mg/L | TON mg/L | TIN mg/L | Chla µg/L | Solids Total mg/L | Total Solids Suspended mg/L | Turbidity NTU | Total Hardnes mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **KANNAPOLIS** | August 30, 2021 | YAD207A | 9.2 | 31.6 | 8.5 | 93 | 1.0 | 127.6% | 0.04 | | 0.02 | <0.02 | | | 0.03 | 27.0 | 79 | <6.2 | 4.2 | |
| **LAKE** | August 30. 2021 | YAD207C | 9.0 | 30.8 | 8.5 | 93 | 1.4 | 123.4% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 18.0 | 71 | <6.2 | 2.6 | 24.0 |
| | August 2, 2021 | YAD207A | 9.5 | 30.5 | 9.0 | 93 | 1.0 | 129.6% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 22.0 | 70 | <6.2 | 3.9 | |
| | August 2, 2021 | YAD207C | 9.6 | 30.2 | 9.0 | 92 | 1.0 | 130.1% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 16.0 | 63 | <6.2 | 2.3 | 23.0 |
| | June 9, 2021 | YAD207A | 9.8 | 29.3 | 8.2 | 90 | 1.1 | 130.9% | 0.03 | 0.41 | 0.02 | 0.34 | 0.75 | 0.39 | 0.36 | | 69 | <6.2 | 5.2 | |
| | June 9, 2021 | YAD207C | 9.8 | 28.9 | 8.4 | 86 | 1.5 | 129.7% | <0.02 | 0.36 | <0.02 | 0.31 | 0.67 | 0.35 | 0.32 | | 63 | <6.2 | 2.7 | 24.0 |
| | May 11, 2021 | YAD207A | 8.0 | 22.6 | 8.0 | 41 | 1.0 | 94.5% | 0.04 | 0.45 | <0.02 | 0.58 | 1.03 | 0.44 | 0.59 | 11.0 | 71 | 6.5 | 7.0 | |
| | May 11, 2021 | YAD207C | 8.7 | 23.4 | 7.4 | 81 | 1.5 | 103.8% | 0.03 | 0.48 | <0.02 | 0.58 | 1.06 | 0.47 | 0.59 | 5.7 | 66 | <6.2 | 4.5 | 25.0 |
| **LAKE** | August 30, 2021 | YAD215T | 8.0 | 30.6 | 8.2 | 130 | 1.0 | 108.7% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 29.0 | 95 | <6.2 | 5.5 | |
| **FISHER** | August 30, 2021 | YAD216A | 8.4 | 30.0 | 8.4 | 129 | 1.2 | 114.0% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 29.0 | 94 | <6.2 | 4.0 | 50.0 |
| | August 2, 2021 | YAD215R | 6.1 | 24.8 | 7.1 | 179 | 0.6 | 75.2% | 0.05 | | 0.10 | 0.40 | | | 0.50 | 6.9 | 125 | 6.5 | 10.0 | |
| | August 2, 2021 | YAD215T | 7.6 | 29.5 | 8.2 | 134 | 0.6 | 101.0% | 0.05 | | <0.02 | <0.02 | | | 0.02 | 17.0 | 96 | 9.8 | 7.7 | |
| | August 2, 2021 | YAD216A | 7.7 | 29.6 | 8.3 | 133 | 1.0 | 103.3% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 11.0 | 91 | <6.2 | 3.6 | 47.0 |
| | June 10, 2021 | YAD215R | 7.6 | 27.7 | 7.4 | 142 | 0.5 | 98.4% | 0.08 | 0.63 | <0.02 | 0.04 | 0.67 | 0.62 | 0.05 | | 111 | 12.0 | 13.0 | |
| | June 10, 2021 | YAD215T | 8.3 | 28.0 | 8.4 | 132 | 0.7 | 108.7% | 0.04 | 0.44 | <0.02 | <0.02 | 0.45 | 0.43 | 0.02 | | 99 | <12.0 | 7.1 | |
| | June 10, 2021 | YAD216A | 9.0 | 28.0 | 8.6 | 130 | 0.8 | 130.0% | 0.03 | 0.46 | <0.02 | <0.02 | 0.47 | 0.45 | 0.02 | | 93 | <6.2 | 4.6 | 46.0 |
| | May 11, 2021 | YAD215R | 9.3 | 22.8 | 7.4 | 134 | 0.3 | 110.3% | 0.10 | 0.71 | <0.02 | 0.22 | 0.93 | 0.70 | 0.23 | 18.0 | 121 | 21.0 | 26.0 | |
| | May 11, 2021 | YAD215T | 9.1 | 23.2 | 7.9 | 119 | 0.7 | 107.8% | 0.06 | 0.66 | <0.02 | <0.02 | 0.67 | 0.65 | 0.02 | 12.0 | 90 | 7.8 | 7.0 | |
| | May 11, 2021 | YAD216A | 8.6 | 23.1 | 7.8 | 114 | 1.0 | 101.7% | 0.03 | 0.52 | <0.02 | <0.02 | 0.53 | 0.51 | 0.02 | 30.0 | 82 | <6.2 | 5.2 | 43.0 |
| **LAKE** | September 14, 2021 | YAD216C | 8.9 | 27.8 | 7.8 | 112 | 0.9 | 114.9% | 0.05 | | 0.03 | <0.02 | | | 0.04 | 29.0 | 95 | 7.5 | 7.0 | |
| **CONCORD** | September 14, 2021 | YAD216E | 10.0 | 28.2 | 8.1 | 115 | 0.5 | 131.2% | 0.06 | | <0.02 | <0.02 | | | 0.02 | 34.0 | 100 | 8.6 | 9.0 | |
| | September 14, 2021 | YAD216G | 8.9 | 28.0 | 7.8 | 113 | 0.9 | 115.7% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 26.0 | 90 | | 4.5 | 32.0 |
| | August 11, 2021 | YAD216C | 10.1 | 32.2 | 8.4 | 119 | 0.4 | 141.2% | 0.05 | | <0.02 | <0.02 | | | 0.02 | 36.0 | 91 | 6.8 | 6.9 | |
| | August 11, 2021 | YAD216E | 8.8 | 28.9 | 8.4 | 82 | 1.2 | 115.8% | 0.05 | | <0.02 | 0.24 | | | 0.25 | 65.0 | 69 | <6.2 | 3.7 | |
| | August 11, 2021 | YAD216G | 10.1 | 30.5 | 8.6 | 117 | 0.6 | 137.2% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 36.0 | 94 | 7.2 | 7.3 | 34.0 |
| | July 7, 2021 | YAD216C | 10.4 | 30.0 | 8.7 | 117 | 0.7 | 139.5% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 30.0 | 88 | | 8.3 | |
| | July 7, 2021 | YAD216E | 10.2 | 30.1 | 8.6 | 118 | 0.5 | 138.5% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 33.0 | 89 | | 8.2 | |
| | July 7, 2021 | YAD216G | 10.5 | 29.7 | 8.8 | 116 | 0.7 | 141.3% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 28.0 | 87 | | 5.7 | 34.0 |
| | June 9, 2021 | YAD216C | 9.3 | 29.5 | 8.2 | 115 | 0.8 | 124.8% | 0.03 | 0.45 | <0.02 | <0.02 | 0.46 | 0.44 | 0.02 | | 81 | <6.2 | 4.9 | |
| | June 9, 2021 | YAD216E | 10.5 | 30.5 | 8.1 | 118 | 0.6 | 142.5% | 0.05 | 0.47 | <0.02 | 0.05 | 0.52 | 0.46 | 0.06 | | 97 | 7.2 | 10.0 | |
| | June 9, 2021 | YAD216G | 9.3 | 29.4 | 8.2 | 115 | 1.0 | 123.7% | 0.03 | 0.44 | <0.02 | <0.02 | 0.45 | 0.43 | 0.02 | | 83 | <6.2 | 4.6 | 34.0 |
| | May 20, 2021 | YAD216C | 9.9 | 26.0 | 7.9 | 104 | 1.2 | 123.4% | 0.04 | 0.46 | <0.02 | 0.22 | 0.68 | 0.45 | 0.23 | | 91 | | 7.4 | |
| | May 20, 2021 | YAD216E | 10.0 | 26.9 | 7.5 | 112 | 0.8 | 125.8% | 0.05 | 0.46 | <0.02 | 0.32 | 0.78 | 0.45 | 0.33 | | 103 | | 15.0 | |
| | May 20, 2021 | YAD216G | 9.7 | 26.5 | 7.8 | 103 | 1.3 | 121.1% | 0.03 | 0.39 | <0.02 | 0.24 | 0.63 | 0.38 | 0.25 | | 86 | 85.0 | 4.7 | 33.0 |
| **LAKE MONROE** | September 29, 2021 | YAD232F | 8.0 | 25.7 | 7.8 | 102 | 0.4 | 99.8% | 0.23 | | <0.02 | <0.02 | | | 0.02 | 98.0 | 89 | 11.0 | 6.7 | 31.0 |
| | August 25, 2021 | YAD232D | 12.5 | 32.9 | 9.5 | 114 | 0.6 | 176.4% | 0.11 | | <0.02 | <0.02 | | | 0.02 | | 92 | 8.5 | 8.5 | |
| | August 25, 2021 | YAD232F | 12.1 | 33.2 | 9.8 | 114 | 0.7 | 171.9% | 0.11 | | <0.02 | <0.02 | | | 0.02 | | 87 | 7.5 | 7.5 | 32.0 |
| | July 14, 2021 | YAD232D | 10.7 | 30.5 | 8.9 | 118 | 0.6 | 143.6% | 0.14 | | <0.02 | <0.02 | | | 0.02 | | 90 | 8.0 | 6.7 | |
| | July 14, 2021 | YAD232F | 10.5 | 31.6 | 9.1 | 118 | 0.6 | 144.4% | 0.10 | | <0.02 | <0.02 | | | 0.02 | 32.0 | 88 | <6.2 | 4.7 | 34.0 |
| | June 23, 2021 | YAD232D | 9.6 | 28.8 | 8.4 | 116 | 0.6 | 125.7% | 0.11 | | <0.02 | <0.02 | | | 0.02 | | 89 | 8.2 | 7.2 | |
| | June 23, 2021 | YAD232F | 6.6 | 28.0 | 6.8 | 114 | 0.7 | 85.1% | 0.09 | | 0.06 | <0.02 | | | 0.07 | | 95 | <6.2 | 5.1 | 32.0 |
| | May 25, 2021 | YAD232D | 17.0 | 28.7 | 10.4 | 148 | 0.4 | 222.4% | 0.14 | 1.70 | <0.02 | <0.02 | 1.71 | 1.69 | 0.02 | | 114 | 18.0 | 7.8 | |
| | May 25, 2021 | YAD232F | 19.4 | 26.4 | 10.3 | 158 | 0.4 | 243.4% | 0.14 | 1.60 | <0.02 | <0.02 | 1.61 | 1.59 | 0.02 | | 110 | 22.0 | 6.9 | 34.0 |
| **LAKE** | September 29, 2021 | YAD232C | 10.4 | 24.7 | 7.9 | 101 | 0.2 | 126.7% | 0.19 | | <0.02 | <0.02 | | | 0.02 | | 100 | 16.0 | 16.0 | |
| **LEE** | September 29, 2021 | YAD232H | 10.7 | 24.6 | 8.4 | 100 | 0.2 | 131.0% | 0.19 | | <0.02 | <0.02 | | | 0.02 | 73.0 | 100 | 16.0 | 15.0 | |
| | September 29, 2021 | YAD233 | 7.6 | 24.1 | 7.2 | 101 | 0.2 | 92.4% | 0.19 | | 0.03 | <0.02 | | | 0.04 | 75.0 | 98 | 14.0 | 14.0 | 33.0 |
| | August 25, 2021 | YAD232C | 12.8 | 32.2 | 9.5 | 100 | 0.4 | 178.9% | 0.22 | | <0.02 | <0.02 | | | 0.02 | | 101 | 16.0 | 15.0 | |
| | August 25, 2021 | YAD232H | 12.4 | 32.0 | 9.5 | 102 | 0.4 | 172.1% | 0.24 | | <0.02 | <0.02 | | | 0.02 | | 101 | 16.0 | 14.0 | |
| | August 25, 2021 | YAD233 | 10.4 | 30.0 | 8.6 | 97 | 0.4 | 139.3% | 0.22 | | <0.02 | <0.02 | | | 0.02 | | 96 | 15.0 | 11.0 | 31.0 |
| | July 14, 2021 | YAD232C | 10.6 | 29.7 | 8.6 | 124 | 0.3 | 141.1% | 0.21 | | <0.02 | 0.13 | | | 0.14 | | 115 | 18.0 | 14.0 | |
| | July 14, 2021 | YAD232H | 11.4 | 29.7 | 9.0 | 129 | 0.3 | 151.6% | 0.21 | | <0.02 | <0.02 | | | 0.02 | | 107 | 14.0 | 10.0 | |
| | July 14, 2021 | YAD233 | 11.7 | 30.6 | 9.2 | 129 | 0.4 | 157.8% | 0.25 | | <0.02 | 0.15 | | | 0.16 | | 109 | 14.0 | 12.0 | 44.0 |
| | June 23, 2021 | YAD232C | 9.0 | 28.4 | 6.7 | 144 | 0.3 | 117.2% | 0.19 | | <0.02 | <0.02 | | | 0.02 | | 118 | 19.0 | 18.0 | |
| | June 23, 2021 | YAD232H | 9.7 | 28.5 | 7.0 | 143 | 0.5 | 125.8% | 0.22 | | <0.02 | <0.02 | | | 0.02 | | 115 | 17.0 | 15.0 | |
| | June 23, 2021 | YAD233 | 5.3 | 27.5 | 6.7 | 144 | 0.5 | 68.1% | 0.16 | | 0.07 | <0.02 | | | 0.08 | | 116 | 13.0 | 15.0 | 50.0 |
| | May 25, 2021 | YAD232C | 12.7 | 25.9 | 8.8 | 147 | 0.4 | 157.4% | 0.28 | 1.90 | 0.23 | <0.02 | 1.91 | 1.67 | 0.24 | | 132 | 18.0 | 21.0 | |
| | May 25, 2021 | YAD232H | 9.7 | 26.8 | 8.7 | 144 | 0.6 | 121.9% | 0.24 | 1.80 | 0.13 | <0.02 | 1.81 | 1.67 | 0.14 | | 118 | 11.0 | 13.0 | |
| | May 25, 2021 | YAD233 | 6.6 | 26.1 | 7.7 | 148 | 0.7 | 82.7% | 0.36 | 2.00 | 0.47 | <0.02 | 2.01 | 1.53 | 0.48 | | 129 | 12.0 | 10.0 | 48.0 |

# Appendix A - Yadkin-Pee Dee River Basin Lakes Data

## January 1, 2016 through December 31, 2021

| Lake | Date | Sampling Station | SURFACE PHYSICAL DATA DO mg/L | Temp Water C | pH s.u. | Cond. µmhos/cm | Depth Secchi meters | Percent SAT | PHOTIC ZONE DATA TP mg/L | TKN mg/L | NH3 mg/L | NOx mg/L | TN mg/L | TON mg/L | TIN mg/L | Chla µg/L | Solids Total mg/L | Total Solids Suspended mg/L | Turbidity NTU | Total Hardnes mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LAKE** | September 29, 2021 | YAD235D | 9.2 | 25.6 | 8.2 | 124 | 0.6 | 114.3% | 0.11 | | <0.02 | 0.03 | | | 0.04 | | 111 | 7.5 | 7.2 | |
| **TWITTY** | September 29, 2021 | YAD235F | 8.1 | 25.3 | 7.8 | 124 | 0.6 | 99.2% | 0.09 | | <0.02 | 0.05 | | | 0.06 | 52.0 | 99 | 7.5 | 5.9 | |
| **(STEWART)** | September 29, 2021 | YAD236 | 4.7 | 25.0 | 7.1 | 125 | 0.6 | 57.8% | 0.08 | | 0.09 | 0.14 | | | 0.23 | 31.0 | 88 | 7.0 | 6.4 | 41.0 |
| | August 25, 2021 | YAD235D | 10.9 | 31.5 | 9.2 | 129 | 0.7 | 150.6% | 0.08 | | <0.02 | <0.02 | | | 0.02 | | 8 | 99.0 | 5.2 | |
| | August 25, 2021 | YAD235F | 10.7 | 31.6 | 9.2 | 129 | 0.7 | 147.3% | 0.08 | | <0.02 | <0.02 | | | 0.02 | | 96 | 7.2 | 5.4 | |
| | August 25, 2021 | YAD236 | 11.2 | 31.2 | 9.3 | 129 | 0.7 | 153.9% | 0.07 | | <0.02 | <0.02 | | | 0.02 | 49.0 | 121 | <6.2 | 5.1 | 25.0 |
| | July 14, 2021 | YAD235D | 8.6 | 29.7 | 7.0 | 132 | 0.5 | 113.3% | 0.10 | | <0.02 | <0.02 | | | 0.02 | | 92 | 9.2 | 8.8 | |
| | July 14, 2021 | YAD235F | 8.4 | 29.5 | 6.9 | 131 | 0.5 | 110.2% | 0.09 | | <0.02 | <0.02 | | | 0.02 | | 91 | 8.2 | 6.9 | |
| | July 14, 2021 | YAD236 | 5.9 | 29.3 | 6.7 | 132 | 0.5 | 76.9% | 0.10 | | 0.05 | 0.08 | | | 0.13 | | 89 | 9.8 | 7.4 | 43.0 |
| | June 23, 2021 | YAD235D | 5.9 | 27.3 | 7.0 | 62 | 0.9 | 74.9% | 0.08 | | 0.07 | 0.19 | | | 0.26 | 29.0 | 91 | | 5.7 | |
| | June 23, 2021 | YAD235F | 6.2 | 27.4 | 6.9 | 128 | 0.9 | 79.2% | 0.08 | | 0.03 | 0.19 | | | 0.22 | 23.0 | 91 | 7.2 | 5.6 | |
| | June 23, 2021 | YAD236 | 4.0 | 27.4 | 6.7 | 129 | 0.9 | 50.9% | 0.09 | | 0.13 | 0.26 | | | 0.39 | 25.0 | 90 | 7.2 | 6.0 | 42.0 |
| | May 25, 2021 | YAD235D | 8.9 | 24.3 | 7.5 | 126 | 0.7 | 106.9% | 0.10 | 1.00 | <0.02 | 0.44 | 1.44 | 0.99 | 0.45 | | 96 | <8.3 | 7.3 | |
| | May 25, 2021 | YAD235F | 10.9 | 24.9 | 9.0 | 127 | 0.7 | 131.9% | 0.09 | 1.10 | <0.02 | 0.32 | 1.42 | 1.09 | 0.33 | | 94 | <10.0 | 6.7 | |
| | May 25, 2021 | YAD236 | 8.0 | 24.2 | 7.6 | 126 | 0.7 | 96.1% | 0.08 | 0.92 | 0.03 | 0.51 | 1.43 | 0.89 | 0.54 | | 93 | <10.0 | 7.7 | 40.0 |
| **CODDLE** | September 14, 2021 | YADCCR01 | 10.4 | 26.8 | 8.8 | 105 | 0.7 | 132.3% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 38.0 | 83 | | 7.0 | 34.0 |
| **CREEK** | September 14, 2021 | YADCCR02 | 10.2 | 27.2 | 8.7 | 105 | 0.7 | 130.6% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 41.0 | 85 | | 7.6 | |
| **RESERVOIR** | September 14, 2021 | YADCCR03 | 9.6 | 27.3 | 8.5 | 106 | 0.5 | 123.3% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 39.0 | 87 | 7.2 | 14.0 | |
| | August 11, 2021 | YADCCR01 | 8.5 | 28.8 | 8.8 | 103 | 0.8 | 112.0% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 31.0 | 78 | <6.2 | 7.1 | 33.0 |
| | August 11, 2021 | YADCCR02 | 8.8 | 29.9 | 8.7 | 104 | 0.7 | 117.6% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 29.0 | 76 | <6.2 | 7.7 | |
| | August 11, 2021 | YADCCR03 | 8.4 | 30.4 | 8.6 | 106 | 0.7 | 113.2% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 31.0 | 79 | <6.2 | 11.0 | |
| | July 7, 2021 | YADCCR01 | 11.6 | 28.3 | 9.1 | 106 | 0.9 | 152.0% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 38.0 | 72 | | 7.6 | 33.0 |
| | July 7, 2021 | YADCCR02 | 8.3 | 28.3 | 8.9 | 53 | 0.8 | 108.8% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 33.0 | 74 | | 8.2 | |
| | July 7, 2021 | YADCCR03 | 10.5 | 30.5 | 9.0 | 105 | 0.8 | 142.3% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 35.0 | 76 | | 11.0 | |
| | June 9, 2021 | YADCCR01 | 8.0 | 26.6 | 8.3 | 94 | 1.8 | 100.9% | <0.02 | 0.53 | 0.02 | <0.02 | 0.54 | 0.51 | 0.03 | | 67 | <6.2 | 3.0 | 31.0 |
| | June 9, 2021 | YADCCR02 | 7.9 | 27.7 | 8.0 | 95 | 1.8 | 101.5% | 0.02 | 0.53 | 0.05 | 0.03 | 0.56 | 0.48 | 0.08 | | 70 | <6.2 | 3.8 | |
| | June 9, 2021 | YADCCR03 | 7.9 | 28.2 | 7.8 | 97 | 1.0 | 103.4% | 0.03 | 0.47 | 0.04 | 0.04 | 0.51 | 0.43 | 0.08 | | 74 | <6.2 | 6.8 | |
| | May 20, 2021 | YADCCR01 | 12.6 | 24.0 | 9.6 | 96 | 0.7 | 150.1% | 0.03 | 0.90 | <0.02 | <0.02 | 0.91 | 0.89 | 0.02 | | 76 | | 15.0 | 32.0 |
| | May 20, 2021 | YADCCR02 | 12.7 | 25.9 | 9.4 | 97 | 0.6 | 157.2% | 0.03 | 0.88 | <0.02 | <0.02 | 0.89 | 0.87 | 0.02 | | 81 | | 16.0 | |
| | May 20, 2021 | YADCCR03 | 11.8 | 26.5 | 9.1 | 96 | 0.4 | 147.4% | 0.05 | 1.00 | <0.02 | <0.02 | 1.01 | 0.99 | 0.02 | | 83 | | 25.0 | |
| **ROBERDEL** | September 30, 2021 | YAD262E | 6.5 | 23.3 | 6.3 | 29 | 0.8 | 76.0% | 0.04 | | 0.04 | 0.10 | | | 0.14 | 7.7 | 56 | 12.0 | 11.0 | |
| **LAKE** | September 30, 2021 | YAD263 | 7.8 | 23.3 | 6.4 | 29 | 0.9 | 91.0% | 0.03 | | <0.02 | 0.08 | | | 0.09 | 13.0 | 44 | | 3.1 | 8.0 |
| | August 30, 2021 | YAD262E | 7.1 | 30.4 | 6.4 | 28 | 0.7 | 94.4% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 38.0 | 65 | 30.0 | 10.0 | |
| | August 30, 2021 | YAD263 | 7.6 | 31.0 | 6.6 | 28 | 0.7 | 103.0% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 47.0 | 48 | <6.2 | 3.6 | 8.0 |
| | July 28, 2021 | YAD262E | 5.9 | 30.1 | 6.2 | 28 | 0.8 | 78.4% | 0.04 | | <0.02 | <0.02 | | | 0.02 | 26.0 | 48 | 12.0 | 6.2 | |
| | July 28, 2021 | YAD263 | 7.6 | 30.2 | 6.7 | 28 | 0.8 | 101.0% | 0.03 | | <0.02 | <0.02 | | | 0.02 | | 44 | 7.0 | 4.3 | 7.6 |
| | June 2, 2021 | YAD262E | 7.8 | 24.3 | 5.2 | 30 | 1.0 | 92.5% | 0.04 | 0.56 | <0.02 | 0.36 | 0.92 | 0.55 | 0.37 | | 55 | 20.0 | 8.9 | |
| | June 2, 2021 | YAD263 | 7.9 | 24.1 | 5.3 | 29 | 1.0 | 93.8% | 0.03 | 0.47 | <0.02 | 0.31 | 0.78 | 0.46 | 0.32 | | 40 | <12.0 | 3.7 | 9.9 |
| | May 11, 2021 | YAD262E | 7.5 | 21.9 | 6.2 | 29 | 0.8 | 85.4% | 0.03 | 0.49 | 0.03 | 0.46 | 0.95 | 0.46 | 0.49 | 4.9 | 36 | <6.2 | 3.5 | |
| | May 11, 2021 | YAD263 | 8.2 | 22.4 | 6.3 | 29 | 0.8 | 94.0% | 0.03 | 0.48 | <0.02 | 0.46 | 0.94 | 0.47 | 0.47 | 12.0 | 34 | <6.2 | 3.2 | 7.8 |
| **ROCKINGHAM** | September 23, 202 | YAD265C | 1.3 | 24.4 | 5.2 | 27 | 0.7 | 15.4% | <002 | | <0.02 | <0.02 | | | 0.02 | 2.8 | 38 | 8.3 | 1.3 | 6.0 |
| **CITY** | August 26, 2021 | YAD265C | 0.9 | 28.4 | 5.0 | 30 | 0.7 | 12.0% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 13.0 | 50 | | 1.8 | 11.0 |
| **LAKE** | August 4, 2021 | YAD265C | 0.6 | 24.8 | 4.9 | 28 | 0.6 | 7.5% | 0.03 | | <0.02 | | | | | 8.0 | | <6.2 | 1.9 | 2.6 |
| | June 30, 2021 | YAD265C | 1.8 | 28.5 | 5.8 | 26 | 0.8 | 22.7% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 4.4 | 43 | | 1.5 | 7.0 |
| | May 5, 2021 | YAD265C | 3.7 | 22.9 | 6.2 | 24 | 0.8 | 43.4% | 0.04 | 0.63 | <0.02 | <0.02 | 0.64 | 0.62 | 0.02 | 3.0 | 42 | <6.2 | 4.2 | 9.1 |
| **WADESBORO** | September 22, 2021 | YAD275H | 7.3 | 25.9 | 7.3 | 62 | 0.7 | 90.6% | 0.04 | | 0.02 | <0.02 | | | 0.03 | 23.0 | 61 | 6.2 | 11.0 | |
| **CITY POND** | September 22, 2021 | YAD275J | 6.1 | 25.8 | 7.1 | 62 | 0.7 | 75.3% | 0.06 | | 0.04 | <0.02 | | | 0.05 | 33.0 | 60 | 8.2 | 8.3 | 20.0 |
| | August 25, 2021 | YAD275H | 10.7 | 31.3 | 9.4 | 67 | 0.9 | 145.4% | 0.05 | | <0.02 | <0.02 | | | 0.02 | | 57 | <6.2 | 7.9 | |
| | August 25, 2021 | YAD275J | 10.8 | 31.2 | 9.4 | 66 | 1.0 | 145.6% | 0.04 | | <0.02 | <0.02 | | | 0.02 | | 57 | <6.2 | 6.0 | 19.0 |
| | July 22, 2021 | YAD275H | 8.8 | 29.7 | 6.8 | 63 | 0.8 | 116.5% | 0.05 | | <0.02 | <0.02 | | | 0.02 | 14.0 | 103 | 54.0 | 14.0 | |
| | July 22, 2021 | YAD275J | 8.8 | 30.0 | 6.9 | 63 | 0.9 | 116.7% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 19.0 | 59 | <6.2 | 4.8 | 17.0 |
| | June 24, 2021 | YAD275H | 7.9 | 27.4 | 6.6 | 63 | 0.7 | 99.9% | 0.05 | | <0.02 | <0.02 | | | 0.02 | 27.0 | 57 | 8.2 | 8.6 | |
| | June 24, 2021 | YAD275J | 8.1 | 27.3 | 6.8 | 63 | 0.7 | 101.5% | 0.05 | | <0.02 | <0.02 | | | 0.02 | 24.0 | 61 | 8.8 | 9.1 | 19.0 |
| | May 26, 2021 | YAD275H | 7.1 | 25.8 | 6.8 | 63 | 0.7 | 88.3% | 0.04 | 0.94 | 0.04 | <0.02 | 0.95 | 0.90 | 0.05 | | 63 | 9.0 | 14.0 | |
| | May 26, 2021 | YAD275J | 9.4 | 28.5 | 8.5 | 63 | 0.7 | 122.2% | 0.04 | 0.94 | <0.02 | <0.02 | 0.95 | 0.93 | 0.02 | | 66 | 6.5 | 11.0 | 19.0 |
| **HAMLET** | September 23, 2021 | YAD282A | 4.0 | 25.4 | 5.9 | 42 | 0.7 | 48.7% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 4.9 | 45 | | 2.7 | |
| **CITY LAKE** | September 23, 2021 | YAD283 | 4.5 | 25.1 | 6.7 | 43 | 0.7 | 54.6% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 4.4 | 42 | | 3.1 | |
| | August 26, 2021 | YAD282A | 4.4 | 29.8 | 5.8 | 44 | 0.8 | 58.0% | <0.02 | | <0.02 | <0.02 | | | 0.02 | 13.0 | 42 | | 2.3 | |
| | August 26, 2021 | YAD283 | 4.4 | 29.6 | 5.8 | 44 | 0.8 | 58.0% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 22.0 | 44 | | 3.5 | |
| | August 4, 2021 | YAD282A | 2.4 | 26.0 | 5.6 | 43 | 0.6 | 29.8% | 0.03 | | <0.02 | | | | | 13.0 | | | 13.0 | |
| | August 4, 2021 | YAD283 | 3.8 | 26.2 | 5.8 | 43 | 0.6 | 47.4% | 0.02 | | <0.02 | | | | | 17.0 | | <6.2 | 10.0 | |
| | June 30, 2021 | YAD282A | 6.4 | 29.2 | 6.6 | 43 | 1.2 | 82.9% | 0.02 | | <0.02 | <0.02 | | | 0.02 | 8.0 | 44 | | 2.5 | |
| | June 30, 2021 | YAD283 | 6.0 | 29.0 | 5.9 | 43 | 1.1 | 78.2% | 0.03 | | <0.02 | <0.02 | | | 0.02 | 8.5 | 40 | <6.2 | 2.4 | |

# Appendix A - Yadkin-Pee Dee River Basin Lakes Data

## January 1, 2016 through December 31, 2021

| Lake | Date | Sampling Station | SURFACE PHYSICAL DATA DO mg/L | Temp Water C | pH s.u. | Cond. µmhos/cm | Depth Secchi meters | Percent SAT | PHOTIC ZONE DATA TP mg/L | TKN mg/L | NH3 mg/L | NOx mg/L | TN mg/L | TON mg/L | TIN mg/L | Chla µg/L | Solids Total mg/L | Total Solids Suspended mg/L | Turbidity NTU | Total Hardnes mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HAMLET** | May 5, 2021 | YAD282A | 6.9 | 24.6 | 7.1 | 39 | 1.1 | 84.0% | 0.02 | 0.47 | <0.02 | <0.02 | 0.48 | 0.46 | 0.02 | 5.6 | 39 | <6.2 | 2.1 | |
| **CITY LAKE** | May 5, 2021 | YAD283 | 7.0 | 24.2 | 7.0 | 39 | 1.1 | 84.4% | 0.02 | 0.44 | <0.02 | <0.02 | 0.45 | 0.43 | 0.02 | 3.4 | 41 | <6.2 | 2.4 | |
| **WATER** | September 23, 2021 | YAD280C | 5.9 | 24.5 | 6.4 | 51 | 1.0 | 71.7% | <0.02 | | 0.02 | 0.54 | | | 0.56 | 1.2 | 50 | | 1.0 | |
| **LAKE** | September 23, 2021 | YAD280E | 6.6 | 25.6 | 6.6 | 52 | 2.2 | 82.0% | <0.02 | | 0.06 | 0.24 | | | 0.30 | 3.0 | 40 | | <1.0 | 5.0 |
| | August 26, 2021 | YAD280C | 7.0 | 29.2 | 6.0 | 52 | 1.1 | 92.1% | <0.02 | | <0.02 | 0.25 | | | 0.26 | 6.2 | 45 | | <1.0 | |
| | August 26, 2021 | YAD280E | 7.0 | 30.0 | 6.7 | 50 | 1.2 | 92.4% | <0.02 | | 0.04 | 0.21 | | | 0.25 | 8.8 | 41 | | 1.2 | 5.0 |
| | August 4, 2021 | YAD280C | 3.7 | 24.3 | 5.5 | 57 | 1.2 | 44.2% | <0.02 | | 0.06 | 0.49 | | | 0.55 | 2.6 | | <6.2 | <1.0 | |
| | August 4, 2021 | YAD280E | 6.4 | 27.2 | 5.9 | 49 | 1.8 | 81.3% | <0.02 | | 0.05 | 0.21 | | | 0.26 | 5.8 | | <6.2 | <1.0 | 6.0 |
| | June 30, 2021 | YAD280C | 7.9 | 28.0 | 6.7 | 53 | 1.4 | 101.4% | <0.02 | | <0.02 | 0.50 | | | 0.51 | 2.6 | 44 | <6.2 | <1.0 | |
| | June 30, 2021 | YAD280E | 6.5 | 23.6 | 6.5 | 47 | 2.7 | 78.0% | <0.02 | | 0.07 | 0.28 | | | 0.35 | 3.5 | 37 | <6.2 | 1.0 | 5.0 |
| | May 5, 2021 | YAD280C | 6.5 | 23.6 | 6.5 | 47 | 1.2 | 78.0% | <0.02 | 0.42 | <0.02 | 0.66 | 1.08 | 0.41 | 0.67 | | 53 | <6.2 | 2.7 | |
| | May 5, 2021 | YAD280E | 8.1 | 23.9 | 7.0 | 45 | 2.4 | 97.1% | <0.02 | 0.32 | 0.03 | 0.54 | 0.86 | 0.29 | 0.57 | 1.4 | 37 | <6.2 | <1.0 | 5.2 |

# Appendix B - Yadkin-Pee Dee Lakes
# Phytoplankton Analysis for 2021

Algal densities and dominance at Stations YAD007A and YAD008A at **W. Kerr Scott Lake**

| Date | Station | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|---|
| 5/18/21 | YAD007A | 5,100 | n/a | Chrysophytes | 82% | *Ochromonas* | 78% |
| 5/18/21 | YAD008A | 4,900 | n/a | Chrysophytes | 48% | *Dinobryon* | 38% |
| 6/23/21 | YAD007A | 13,000 | mild | Greens | 87% | *Eudorina* | 82% |
| 6/23/21 | YAD008A | 15,200 | mild | Greens | 75% | *Eudorina* | 74% |
| 7/26/21 | YAD007A | 25,400 | moderate | Cyanobacteria | 58% | *Cylindrospermopsis* | 46% |
| 8/10/21 | YAD007A | 22,500 | moderate | Cyanobacteria | 40% | *Ochromonas/ Cylindrospermopsis* | 36%/30% |
| 8/10/21 | YAD008A | 16,900 | mild | Chrysophytes | 49% | *Ochromonas* | 49% |
| 9/15/21 | YAD007A | 59,700 | severe | Cyanobacteria | 42% | no dominant | n/a |
| 9/15/21 | YAD008A | 43,300 | severe | Cyanobacteria | 46% | *Eudorina* | 36% |

Algal biovolumes and dominance at Stations YAD007A and YAD008A at **W. Kerr Scott Lake**

| Date | Station | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/18/21 | YAD007A | 300 | Chrysophytes | 79% | *Ochromonas* | 74% |
| 5/18/21 | YAD008A | 500 | no dominant | n/a | *Dinobryon* | 30% |
| 6/23/21 | YAD007A | 6,800 | Greens | 95% | *Eudorina* | 94% |
| 6/23/21 | YAD008A | 7,600 | Greens | 90% | *Eudorina* | 90% |
| 7/26/21 | YAD007A | 2,400 | no dominant | n/a | no dominant | n/a |
| 8/10/21 | YAD007A | 2,600 | no dominant | n/a | no dominant | n/a |
| 8/10/21 | YAD008A | 1,200 | Chrysophytes | 42% | *Ochromonas* | 42% |
| 9/15/21 | YAD007A | 13,700 | Greens | 56% | *Eudorina* | 55% |
| 9/15/21 | YAD008A | 11,500 | Greens | 82% | *Eudorina* | 81% |

Algal densities and dominance at Stations YADLH01 and YADLH04 at **Lake Hampton**

| Date | Station | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|---|
| 5/18/21 | YADLH01 | 24,000 | moderate | Chrysophytes | 88% | *Ochromonas* | 86% |
| 5/18/21 | YADLH04 | 12,700 | mild | Chrysophytes | 90% | Ochromonas | 83% |
| 6/23/21 | YADLH01 | 23,500 | moderate | no dominant | n/a | no dominant | n/a |
| 6/23/21 | YADLH04 | 11,300 | mild | Diatoms | 40% | no dominant | n/a |
| 7/14/21 | YADLH01 | 26,200 | moderate | no dominant | n/a | no dominant | n/a |
| 7/14/21 | YADLH04 | 22,200 | moderate | Diatoms | 52% | *no dominant* | n/a |
| 8/10/21 | YADLH01 | 23,400 | moderate | Cyanobacteria | 88% | *Cylindrospermopsis* | 81% |
| 8/10/21 | YADLH04 | 47,200 | severe | Cyanobacteria | 96% | *Cylindrospermopsis* | 92% |
| 9/15/21 | YADLH01 | 119,800 | extreme | Cyanobacteria | 86% | *Cylindrospermopsis* | 84% |
| 9/15/21 | YADLH04 | 57,600 | severe | Cyanobacteria | 95% | *Cylindrospermopsis* | 92% |

Algal biovolumes and dominance at Stations YADLH01 and YADLH04 at **Lake Hampton**

| Date | Station | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/18/21 | YADLH01 | 1,500 | Chrysophytes | 84% | *Ochromonas* | 82% |
| 5/18/21 | YADLH04 | 800 | Chrysophytes | 88% | Ochromonas | 79% |
| 6/23/21 | YADLH01 | 5,800 | no dominant | n/a | *Trachelomonas* | 35% |
| 6/23/21 | YADLH04 | 2,600 | no dominant | n/a | no dominant | n/a |
| 7/14/21 | YADLH01 | 2,800 | no dominant | n/a | no dominant | n/a |
| 7/14/21 | YADLH04 | 2,200 | no dominant | n/a | *no dominant* | n/a |
| 8/10/21 | YADLH01 | 2,600 | no dominant | n/a | *Cylindrospermopsis/ Trachelomonas* | 36%/ 32% |
| 8/10/21 | YADLH04 | 2,300 | Cyanobacteria | 96 | *Cylindrospermopsis* | 92% |
| 9/15/21 | YADLH01 | 8,300 | Cyanobacteria | 62% | *Cylindrospermopsis* | 60% |
| 9/15/21 | YADLH04 | 3,900 | Cyanobacteria | 68% | *Cylindrospermopsis* | 66% |

Algal densities and dominance at Station YAD077C at **Salem Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 11,100 | mild | Chrysophytes | 41% | no dominant | n/a |
| 6/9/21 | 10,900 | mild | Chrysophytes | 50% | *Dinobryon* | 40% |
| 7/7/21 | 9,700 | n/a | no dominant | n/a | no dominant | n/a |
| 8/5/21 | 12,100 | mild | no dominant | n/a | no dominant | n/a |

Algal biovolumes and dominance at Station YAD077C at **Salem Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 2,200 | Diatoms | 55% | *Asterionella* | 49% |
| 6/9/21 | 1,800 | no dominant | n/a | no dominant | n/a |
| 7/7/21 | 3,900 | Dinoflagellates | 43% | *Peridinium* | 41% |
| 8/5/21 | 3,000 | no dominant | n/a | no dominant | n/a |

Algal densities and dominance at Stations YAD152C and YAD169F at **High Rock Lake**

| Date | Station | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|---|
| 5/18/21 | YAD152C | 43,900 | severe | Cyanobacteria | 77% | *Cylindrospermopsis* | 46% |
| 5/18/21 | YAD169F | 18,800 | mild | Cyanobacteria | 59% | no dominant | n/a |
| 6/15/21 | YAD152C | 33,000 | severe | no dominant | n/a | no dominant | n/a |
| 6/15/21 | YAD169F | 17,100 | mild | no dominant | n/a | no dominant | n/a |
| 7/13/21 | YAD152C | 35,700 | severe | Cyanobacteria | 79% | *Chroococcus* | 35% |
| 7/13/21 | YAD169F | 67,300 | severe | Cyanobacteria | 74% | *Chroococcus* | 41% |
| 8/11/21 | YAD152C | 55,800 | severe | Cyanobacteria | 78% | *Pseudanabaena* | 32% |
| 8/11/21 | YAD169F | 75,000 | severe | Cyanobacteria | 66% | *Pseudanabaena* | 34% |
| 9/13/21 | YAD152C | 118,400 | extreme | Cyanobacteria | 83% | *Pseudanabaena* | 64% |
| 9/13/21 | YAD169F | 23,300 | moderate | Cyanobacteria | 78% | *Pseudanabaena* | 37% |

Algal biovolumes and dominance at Stations YAD152C and YAD169F at **High Rock Lake**

| Date | Station | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/18/21 | YAD152C | 2,600 | Cyanobacteria/ Diatoms | 48%/ 43% | *Cylindrospermopsis/ round diatoms* | 38%/ 38% |
| 5/18/21 | YAD169F | 1,500 | Diatoms | 45% | no dominant | n/a |
| 6/15/21 | YAD152C | 10,200 | Euglenoids | 42% | *Cylindrospermopsis* | 37% |
| 6/15/21 | YAD169F | 2,700 | no dominant | n/a | no dominant | n/a |
| 7/13/21 | YAD152C | 3,200 | no dominant | n/a | *Chrysochromulina* | 30% |
| 7/13/21 | YAD169F | 7,100 | Dinoflagellates | 49% | *Peridinium* | 31% |
| 8/11/21 | YAD152C | 7,000 | no dominant | n/a | no dominant | n/a |
| 8/11/21 | YAD169F | 11,300 | no dominant | n/a | no dominant | n/a |
| 9/13/21 | YAD152C | 13,000 | Cyanobacteria | 48% | *Pseudanabaena* | 43% |
| 9/13/21 | YAD169F | 2,700 | Cyanobacteria | 44% | *Gonyostomum/ Pseudanabaena* | 35%/ 32% |

Algal densities and dominance at Station YAD1611A at **Lake Thom-a-Lex**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 41,100 | severe | Cyanobacteria | 54% | *Cylindrospermopsis* | 35% |
| 6/9/21 | 14,400 | mild | no dominant | n/a | no dominant | n/a |
| 7/7/21 | 98,400 | severe | Cyanobacteria | 80% | *Cylindrospermopsis* | 42% |
| 8/5/21 | 51,400 | severe | Cyanobacteria | 74% | *Cylindrospermopsis/ Chroococcus* | 36%/30% |
| ######### | 67,400 | severe | Cyanobacteria | 73% | *Cylindrospermopsis* | 48% |

Algal biovolumes and dominance at Station YAD1611A at **Lake Thom-a-Lex**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 5,000 | no dominant | n/a | no dominant | n/a |
| 6/9/21 | 4,200 | no dominant | n/a | *Gonyostomum* | 34% |
| 7/7/21 | 5,300 | Cyanobacteria | 61% | *Cylindrospermopsis* | 39% |
| 8/5/21 | 2,300 | Cyanobacteria | 65% | *Cylindrospermopsis* | 39% |
| ######### | 5,700 | Cyanobacteria | 41% | no dominant | n/a |

Algal densities and dominance at Stations YAD172C and YAD1780A at **Tuckertown Reservoir**

| Date | Station | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|---|
| 5/24/21 | YAD172C | 15,800 | mild | Cyanobacteria | 77% | *Cylindrospermopsis* | 47% |
| 5/24/21 | YAD1780A | 28,600 | moderate | Cyanobacteria/ Chrysophytes | 52%/41% | *Cylindrospermopsis* | 38% |
| 6/15/21 | YAD172C | 5,700 | n/a | no dominant | n/a | no dominant | n/a |
| 6/15/21 | YAD1780A | 24,000 | moderate | Cyanobacteria | 49% | *Pseudanabaena* | 34% |
| 7/26/21 | YAD172C | 46,900 | severe | Cyanobacteria | 54% | *Chroococcus* | 34% |
| 7/26/21 | YAD1780A | 43,000 | severe | Cyanobacteria | 57% | *Chroococcus* | 31% |
| 8/25/21 | YAD172C | 15,900 | mild | Cyanobacteria | 53% | *Pseudanabaena* | 36% |
| 8/25/21 | YAD1780A | 46,900 | severe | Cyanobacteria | 57% | no dominant | n/a |
| 9/23/21 | YAD172C | 18,800 | mild | Cyanobacteria | 77% | *Pseudanabaena* | 38% |
| 9/23/21 | YAD1780A | 33,700 | severe | Cyanobacteria | 69% | *Pseudanabaena* | 34% |

Algal biovolumes and dominance at Stations YAD172C and YAD1780A at **Tuckertown Reservoir**

| Date | Station | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/24/21 | YAD172C | 800 | Cyanobacteria | 62% | *Cylindrospermopsis* | 43% |
| 5/24/21 | YAD1780A | 3,100 | no dominant | n/a | no dominant | n/a |
| 6/15/21 | YAD172C | 1,300 | Euglenoids | 40% | *Trachelomonas* | 40% |
| 6/15/21 | YAD1780A | 3,600 | no dominant | n/a | no dominant | n/a |
| 7/26/21 | YAD172C | 6,200 | no dominant | n/a | no dominant | n/a |
| 7/26/21 | YAD1780A | 4,200 | no dominant | n/a | *no dominant* | n/a |
| 8/25/21 | YAD172C | 1,700 | no dominant | n/a | no dominant | n/a |
| 8/25/21 | YAD1780A | 3,000 | Cyanobacteria | 49% | *Pseudanabaena* | 39% |
| 9/23/21 | YAD172C | 1,500 | Cyanobacteria | 43% | no dominant | n/a |
| 9/23/21 | YAD1780A | 5,000 | Cryptomonads | 44% | *Cryptomonas* | 41% |

# Appendix B - Yadkin-Pee Dee Lakes
# Phytoplankton Analysis for 2021

Algal densities and dominance at Station YAD178F at **Badin Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/24/21 | 28,000 | moderate | Chrysophytes | 56% | *Ochromonas* | 44% |
| 6/15/21 | 22,100 | moderate | no dominant | n/a | *Synedra* | 32% |
| 7/26/21 | 18,600 | mild | Cyanobacteria | 42% | no dominant | n/a |
| 8/25/21 | 74,100 | severe | Cyanobacteria | 50% | no dominant | n/a |
| 9/23/21 | 13,100 | mild | Cyanobacteria | 75% | *Cylindrospermopsis* | 46% |

Algal biovolumes and dominance at Station YAD178F at **Badin Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/24/21 | 3,400 | no dominant | n/a | *Trachelomonas* | 30% |
| 6/15/21 | 3,000 | no dominant | n/a | no dominant | n/a |
| 7/26/21 | 2,100 | no dominant | n/a | no dominant | n/a |
| 8/25/21 | 6,800 | no dominant | n/a | no dominant | n/a |
| 9/23/21 | 900 | Cyanobacteria | 47% | *Cylindrospermopsis* | 34% |

Algal densities and dominance at Station YAD178F5 at **Falls Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/24/21 | 8,500 | n/a | Chrysophytes | 41% | *Ochromonas* | 30% |
| 6/30/21 | 2,000 | n/a | Cyanobacteria | 40% | no dominant | n/a |
| 7/20/21 | 11,600 | mild | Cyanobacteria | 41% | no dominant | n/a |
| 8/19/21 | 16,000 | mild | Cyanobacteria | 58% | no dominant | n/a |
| 9/14/21 | 11,300 | mild | Cryptomonads | 44% | *Komma* | 43% |

Algal biovolumes and dominance at Station YAD178F5 at **Falls Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/24/21 | 1,400 | Euglenoids | 41% | *Trachelomonas* | 41% |
| 6/30/21 | 300 | Euglenoids | 61% | *Trachelomonas* | 61% |
| 7/20/21 | 2,100 | Euglenoids | 49% | *Trachelomonas* | 49% |
| 8/19/21 | 1,500 | no dominant | n/a | *Peridinium* | 32% |
| 9/14/21 | 3,000 | no dominant | n/a | *Trachelomonas* | 34% |

Algal densities and dominance at Station YAD179F at **Lake Reese**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 13,000 | mild | Cyanobacteria | 42% | *Cylindrospermopsis* | 38% |
| ######### | 34,500 | severe | no dominant | n/a | *Ochromonas* | 33% |
| ######### | 51,800 | severe | no dominant | n/a | no dominant | n/a |
| ######### | 139,400 | extreme | Cyanobacteria | 65% | *Cylindrospermopsis* | 55% |
| 9/8/21 | 37,600 | severe | Greens | 53% | *Ankistrodesmus* | 51% |

Algal biovolumes and dominance at Station YAD179F at **Lake Reese**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 2,500 | Euglenoids | 57% | *Trachelomonas* | 57% |
| ######### | 3,100 | no dominant | n/a | no dominant | n/a |
| ######### | 7,700 | no dominant | n/a | no dominant | n/a |
| ######### | 11,600 | no dominant | n/a | *Cylindrospermopsis* | 33% |
| 9/8/21 | 2,700 | no dominant | n/a | no dominant | n/a |

Algal densities and dominance at Station YAD181G at **Bunch Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/20/21 | 11,700 | mild | Cyanobacteria | 44% | no dominant | n/a |
| 6/2/21 | 5,700 | n/a | no dominant | n/a | no dominant | n/a |
| 7/13/21 | 20,500 | moderate | Greens | 44% | no dominant | n/a |
| 8/4/21 | 28,400 | moderate | no dominant | n/a | no dominant | n/a |
| 9/8/21 | 10,900 | mild | Cyanobacteria | 56% | no dominant | n/a |

Algal biovolumes and dominance at Station YAD181G at **Bunch Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/20/21 | 4,000 | Euglenoids | 42% | *Trachelomonas* | 42% |
| 6/2/21 | 2,900 | no dominant | n/a | no dominant | n/a |
| 7/13/21 | 4,400 | Prymnesiophytes | 40% | *Chrysochromulina* | 40% |
| 8/4/21 | 5,100 | Cyanobacteria | 52% | *Aphanizomenon* | 51% |
| 9/8/21 | 2,900 | Cyanobacteria | 65% | *Oscillatoria* | 46% |

Algal densities and dominance at Station YAD181L at **Back Creek Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/20/21 | 19,800 | mild | Cyanobacteria | 53% | *Cylindrospermopsis* | 30% |
| 6/2/21 | 17,500 | mild | no dominant | n/a | no dominant | n/a |
| 7/13/21 | 134,300 | extreme | Cyanobacteria | 61% | no dominant | n/a |
| 8/4/21 | 126,300 | extreme | Cyanobacteria/ Greens | 49%/44% | *Ankistrodesmus* | 41% |
| 9/8/21 | 51,100 | extreme | Cyanobacteria | 60% | *Cylindrospermopsis* | 55% |

Algal biovolumes and dominance at Station YAD181L at **Back Creek Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/20/21 | 5,100 | no dominant | n/a | no dominant | n/a |
| 6/2/21 | 4,600 | Prymnesiophytes | 44% | *Chrysochromulina* | 44% |
| 7/13/21 | 14,400 | no dominant | n/a | no dominant | n/a |
| 8/4/21 | 6,700 | Cyanobacteria | 68% | *Pseudanabaena* | 54% |
| 9/8/21 | 5,200 | no dominant | n/a | *Trachelomonas* | 32% |

Algal densities and dominance at Station YAD189C at **Lake Tillery**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 12,600 | mild | Cyanobacteria/ Chrysophytes | 48%/ 40% | no dominant | n/a |
| ######### | 19,400 | mild | Chysophytes | 42% | *Ochromonas* | 31% |
| ######### | 16,900 | mild | no dominant | n/a | no dominant | n/a |
| ######### | 27,100 | moderate | Cyanobacteria | 69% | no dominant | n/a |
| ######### | 21,900 | moderate | Cyanobacteria | 44% | no dominant | n/a |

Algal biovolumes and dominance at Station YAD189C at **Lake Tillery**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 1,700 | no dominant | n/a | *Cryptomonas* | 33% |
| ######### | 3,300 | no dominant | n/a | no dominant | n/a |
| ######### | 3,500 | Cryptomonads | 46% | *Cryptomonas* | 38% |
| ######### | 4,000 | no dominant | n/a | *Trachelomonas* | 35% |
| ######### | 2,400 | no dominant | n/a | no dominant | n/a |

Algal densities and dominance at Station YAD260B at **Blewett Falls**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/26/21 | 18,000 | mild | Chrysophytes | 46% | no dominant | n/a |
| 6/24/21 | 12,100 | mild | no dominant | n/a | *Dinobryon* | 38% |
| 7/22/21 | 12,100 | mild | no dominant | n/a | no dominant | n/a |
| 8/25/21 | 11,500 | mild | Cyanobacteria | 49% | no dominant | n/a |
| 9/22/21 | 7,200 | n/a | no dominant | n/a | no dominant | n/a |

Algal biovolumes and dominance at Station YAD260B at **Blewett Falls**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/26/21 | 4,500 | Diatoms | 55% | *Aulacoseira* | 48% |
| 6/24/21 | 4,300 | no dominant | n/a | *Trachelomonas* | 36% |
| 7/22/21 | 2,200 | no dominant | n/a | *Trachelomonas* | 33% |
| 8/25/21 | 2,000 | Euglenoids | 41% | *Trachelomonas* | 31% |
| 9/22/21 | 2,400 | Euglenoids | 68% | *Trachelomonas/ Euglena* | 38%/ 31% |

Algal densities and dominance at Station YAD207C at **Kannanpolis Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/11/21 | 5,700 | n/a | Cyanobacteria | 56% | no dominant | n/a |
| 6/9/21 | 10,900 | mild | Chrysophytes | 40% | *Dinobryon* | 38% |
| 8/2/21 | 41,300 | severe | Cyanobacteria | 94% | *Cylindrospermopsis* | 64% |
| 8/30/21 | 28,000 | moderate | Cyanobacteria | 84% | no dominant | n/a |
| 9/21/21 | 51,000 | severe | Cyanobacteria | 84% | *Chroococcus* | 41% |

Algal biovolumes and dominance at Station YAD207C at **Kannanpolis Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/11/21 | 1,100 | no dominant | n/a | *Aulacoseira* | 35% |
| 6/9/21 | 3,000 | no dominant | n/a | *Chrysochromulina* | 32% |
| 8/2/21 | 2,700 | Cyanobacteria | 62% | *Cylindrospermopsis/ Peridinium* | 47%/ 34% |
| 8/30/21 | 1,700 | Cyanobacteria | 63% | *Pseudanabaena* | 35% |
| 9/21/21 | 3,000 | no dominant | n/a | *Peridinium* | 31% |

# Appendix B - Yadkin-Pee Dee Lakes
# Phytoplankton Analysis for 2021

Algal densities and dominance at Station YAD216A at **Lake Fisher**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 18,700 | mild | Cyanobacteria | 49% | *Ochromonas* | 30% |
| ######### | 21,500 | moderate | no dominant | n/a | *Ochromonas* | 38% |
| 8/2/21 | 41,900 | severe | Greens/ Cyanobacteria | 51%/ 40% | *Ankistodesmus* | 48% |
| ######### | 45,000 | severe | Cyanobacteria | 92% | *Cylindrospermopsis* | 73% |

Algal biovolumes and dominance at Station YAD216A at **Lake Fisher**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 1,600 | no dominant | n/a | no dominant | n/a |
| ######### | 5,600 | Raphidophytes | 52% | *Gonyostomum* | 52% |
| 8/2/21 | 1,500 | Greens | 50% | *Ankistrodesmus* | 41% |
| ######### | 2,200 | Cyanobacteria | 79% | *Cylindrospermopsis* | 73% |

Algal densities and dominance at Station YAD216G at **Lake Concord**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 14,700 | mild | Cyanobacteria | 74% | no dominant | n/a |
| 6/9/21 | 10,600 | mild | Chrysophytes | 60% | *Ochromonas* | 58% |
| 7/7/21 | 166,300 | extreme | Cyanobacteria | 78% | *Planktolyngbya* | 49% |
| ######### | 125,600 | extreme | Cyanobacteria | 87% | *Cylindrospermopsis* | 71% |
| ######### | 50,300 | severe | Cyanobacteria | 75% | *Cylindrospermopsis* | 41% |

Algal biovolumes and dominance at Station YAD216G at **Lake Concord**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 1,100 | no dominant | n/a | *Trachelomonas* | 39% |
| 6/9/21 | 1,100 | no dominant | n/a | *Chrysochromulina/ Ochromonas* | 39%/ 33% |
| 7/7/21 | 6,400 | Cyanobacteria | 50% | no dominant | n/a |
| ######### | 6,400 | Cyanobacteria | 74% | *Cylindrospermopsis* | 68% |
| ######### | 2,900 | no dominant | n/a | *Cylindrospermopsis* | 35% |

Algal densities and dominance at Stations YAD232D and YAD232F at **Lake Monroe**

| Date | Station | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|---|
| 5/25/21 | YAD232D | 110,500 | extreme | Cyanobacteria | 99% | *Chroococcus* | 96% |
| 5/25/21 | YAD232F | 5,300 | n/a | Cyanobacteria | 66% | no dominant | n/a |
| 6/23/21 | YAD232F | 29,600 | moderate | Cyanobacteria | 48% | no dominant | n/a |
| 7/14/21 | YAD232F | 110,000 | extreme | Cyanobacteria | 41% | no dominant | n/a |
| 8/24/21 | YAD232F | 98,800 | severe | Cyanobacteria | 69% | *Cylindrospermopsis* | 33% |
| 9/29/21 | YAD232F | 70,700 | severe | Cyanobacteria | 61% | *Cylindrospermopsis* | 33% |

Algal biovolumes and dominance at Stations YAD232D and YAD232F at **Lake Monroe**

| Date | Station | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/25/21 | YAD232D | 6,200 | Cyanobacteria | 99% | *Anabaena* | 88% |
| 5/25/21 | YAD232F | 3,000 | Cyanobacteria | 63% | *Anabaena* | 53% |
| 6/23/21 | YAD232F | 4,400 | no dominant | n/a | *Cryptomonas* | 37% |
| 7/14/21 | YAD232F | 8,400 | Diatoms | 57% | round diatoms | 54% |
| 8/24/21 | YAD232F | 7,500 | Cyanobacteria | 63% | no dominant | n/a |
| 9/29/21 | YAD232F | 5,000 | no dominant | n/a | no dominant | n/a |

Algal densities and dominance at Stations YAD232H and YAD233 at **Lake Lee**

| Date | Station | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|---|
| 5/25/21 | YAD232H | 13,300 | mild | Cyanobacteria | 71% | *Aphanizomenon* | 50% |
| 5/25/21 | YAD233 | 8,200 | n/a | Euglenoids | 54% | *Trachelomonas* | 53% |
| 6/23/21 | YAD233 | 26,600 | moderate | Cyanobacteria | 40% | *Chroococcus* | 30% |
| 7/14/21 | YAD233 | 77,200 | severe | no dominant | n/a | no dominant | n/a |
| 8/24/21 | YAD233 | 52,400 | severe | Cyanobacteria | 42% | no dominant | n/a |
| 9/29/21 | YAD233 | 44,700 | severe | Cyanobacteria | 50% | *Chroococcus* | 42% |

Algal biovolumes and dominance at Stations YAD232H and YAD233 at **Lake Lee**

| Date | Station | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/25/21 | YAD232H | 11,100 | Cyanobacteria | 86% | *Anabaena* | 55% |
| 5/25/21 | YAD233 | 11,700 | Euglenoids | 88% | *Trachelomonas* | 86% |
| 6/23/21 | YAD233 | 9,600 | Euglenoids | 76% | *Trachelomonas* | 76% |
| 7/14/21 | YAD233 | 18,000 | Euglenoids | 53% | Trachelomonas | 46% |
| 8/24/21 | YAD233 | 4,100 | Diatoms | 49% | round diatoms | 34% |
| 9/29/21 | YAD233 | 4,600 | no dominant | n/a | *Trachelomonas* | 36% |

Algal densities and dominance at Station YAD236 at **Lake Twitty**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 29,300 | moderate | no dominant | n/a | no dominant | n/a |
| ######### | 8,000 | n/a | Greens | 49% | no dominant | n/a |
| ######### | 19,600 | mild | Cyanobacteria | 45% | no dominant | n/a |
| ######### | 85,700 | severe | Cyanobacteria | 78% | *Pseudanabaena* | 50% |
| ######### | 15,800 | mild | Cyanobacteria | 49% | *Pseudanabaena* | 36% |

Algal biovolumes and dominance at Station YAD236 at **Lake Twitty**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 7,200 | no dominant | n/a | no dominant | n/a |
| ######### | 3,900 | no dominant | n/a | no dominant | n/a |
| ######### | 4,200 | no dominant | n/a | no dominant | n/a |
| ######### | 8,600 | Cyanobacteria | 55% | *Pseudanabaena* | 46% |
| ######### | 1,900 | no dominant | n/a | *Pseudanabaena* | 32% |

Algal densities and dominance at Station YADCCR01 at **Coddle Creek Reservoir**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/20/21 | 18,600 | mild | Cyanobacteria | 98% | *Aphanizomenon* | 97% |
| 6/9/21 | 13,500 | mild | Cyanobacteria | 79% | *Aphanizomenon* | 76% |
| 7/7/21 | 21,600 | moderate | Cyanobacteria | 84% | *Aphanizomenon/ Cylindrospermopsis* | 45%/ 39% |
| 8/11/21 | 27,000 | moderate | Cyanobacteria | 92% | *Cylindrospermopsis* | 91% |
| 9/14/21 | 30,000 | moderate | Cyanobacteria | 87% | *Cylindrospermopsis* | 84% |

Algal biovolumes and dominance at Station YADCCR01 at **Coddle Creek Reservoir**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/20/21 | 6,200 | Cyanobacteria | 97% | *Aphanizomenon* | 92% |
| 6/9/21 | 3,800 | Cyanobacteria | 71% | *Aphanizomenon* | 59% |
| 7/7/21 | 4,000 | Cyanobacteria | 91% | *Aphanizomenon* | 80% |
| 8/11/21 | 2,000 | Cyanobacteria | 63% | *Cylindrospermopsis* | 59% |
| 9/14/21 | 2,200 | Cyanobacteria | 62% | *Cylindrospermopsis* | 55% |

Algal densities and dominance at Station YAD263 at **Roberdel Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 14,300 | mild | Chrysophytes/ Cyanobacteria | 50%/40% | *Cylindrospermopsis* | 38% |
| 6/2/21 | 10,200 | mild | no dominant | n/a | no dominant | n/a |
| ######### | 30,900 | severe | Diatoms | 48% | *Asterionella* | 40% |
| ######### | 32,000 | severe | Cyanobacteria | 47% | *Planktolyngbya* | 44% |
| ######### | 19,800 | mild | no dominant | n/a | no dominant | n/a |

Algal biovolumes and dominance at Station YAD263 at **Roberdel Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 1,500 | no dominant | n/a | *Chrysochromulina* | 37% |
| 6/2/21 | 2,700 | no dominant | n/a | no dominant | n/a |
| ######### | 32,000 | Diatoms | 84% | *Asterionella* | 84% |
| ######### | 7,200 | Diatoms | 61% | *Asterionella* | 55% |
| ######### | 6,200 | no dominant | n/a | no dominant | n/a |

Algal densities and dominance at Station YAD265C at **Rockingham City Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/5/21 | 1,400 | n/a | Chrysophytes | 87% | *Dinobryon* | 59% |
| ######### | 1,500 | n/a | no dominant | n/a | no dominant | n/a |
| 8/4/21 | 1,100 | n/a | Greens | 40% | *Coelastrum* | 40% |
| ######### | 2,200 | n/a | Cyanobacteria | 53% | *Microcystis* | 38% |
| ######### | 1,500 | n/a | Cyanobacteria | 55% | Chroococcus | 38% |

Algal biovolumes and dominance at Station YAD265C at **Rockingham City Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/5/21 | 100 | Chrysophytes | 60% | *Dinobryon/ Microcystis* | 44%/34% |
| ######### | 1,200 | Raphidophytes | 73% | *Gonyostomum* | 73% |
| 8/4/21 | 2,300 | Raphidophytes | 97% | *Gonyostomum* | 97% |
| ######### | 2,700 | Euglenoids | 45% | *Gonyostomum* | 32% |
| ######### | 200 | Cryptomonads | 51% | *Cryptomonas* | 49% |

# Appendix B - Yadkin-Pee Dee Lakes
# Phytoplankton Analysis for 2021

Algal densities and dominance at Station YAD275J at **Wadesboro City Pond**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| ######### | 59,000 | severe | Chrysophytes | 55% | *Ochromonas/ Aphanizomenon* | 53%/33% |
| ######### | 16,400 | mild | Cyanobacteria | 76% | *Chroococcus* | 53% |
| ######### | 23,600 | moderate | Cyanobacteria | 85% | *Cylindrospermopsis* | 76% |
| ######### | 13,700 | mild | Cyanobacteria | 52% | no dominant | n/a |
| ######### | 20,000 | mild | Cyanobacteria | 71% | *Aphanizomenon* | 32% |

Algal biovolumes and dominance at Station YAD275J at **Wadesboro City Pond**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| ######### | 12,400 | Cyanobacteria | 73% | *Aphanizomenon* | 72% |
| ######### | 1,500 | Cyanobacteria/ Greens | 58%/30% | *Aphanizomenon* | 50% |
| ######### | 1,200 | Cyanobacteria | 81% | *Cylindrospermopsis* | 73% |
| ######### | 2,400 | Cyanobacteria | 53% | no dominant | n/a |
| ######### | 4,000 | Euglenoids/ Cyanobacteria | 45%/40% | *Trachelomonas/ Aphanizomenon* | 45%/33% |

Algal densities and dominance at Station YAD283 at **Hamlet City Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/5/21 | 6,000 | n/a | Chrysophytes | 84% | *Ochromonas* | 65% |
| 6/30/21 | 2,800 | n/a | no dominant | n/a | no dominant | n/a |
| 8/4/21 | 3,400 | n/a | Greens | 47% | no dominant | n/a |
| 8/26/21 | 6,600 | n/a | Greens | 60% | *Coelastrum* | 45% |
| 9/23/21 | 6,100 | n/a | Greens | 61% | *Coelastrum* | 44% |

Algal biovolumes and dominance at Station YAD283 at **Hamlet City Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/5/21 | 600 | Chrysophytes | 81% | *Ochromonas* | 40% |
| 6/30/21 | 2,500 | Euglenoids | 72% | *Euglena/ Trachelomonas* | 38%/ 34% |
| 8/4/21 | 1,800 | Euglenoids | 53% | *Trachelomonas* | 42% |
| 8/26/21 | 3,100 | Euglenoids | 65% | *Trachelomonas* | 37% |
| 9/23/21 | 3,000 | Euglenoids/ Greens | 47%/ 41% | *Trachelomonas* | 33% |

Algal densities and dominance at Station YAD280E at **Water Lake**

| Date | Density (units/ml) | Bloom magnitude | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|---|
| 5/5/21 | 2,300 | n/a | Chrysophytes | 84% | *Ochromonas* | 75% |
| ######### | 3,100 | n/a | no dominant | n/a | no dominant | n/a |
| 8/4/21 | 9,100 | n/a | Chrysophytes | 63% | *Ochromonas* | 43% |
| ######### | 7,500 | n/a | Chrysophytes | 65% | Ochromonas | 37% |
| ######### | 4,000 | n/a | Chrysophytes | 45% | no dominant | n/a |

Algal biovolumes and dominance at Station YAD280E at **Water Lake**

| Date | Biovolume ($mm^3/m^3$) | Dominant Group | Group % Dominance | Dominant Taxa | Taxa % Dominance |
|---|---|---|---|---|---|
| 5/5/21 | 200 | Chrysophytes | 64% | *Ochromonas* | 43% |
| ######### | 800 | no dominant | n/a | *Chrysochromulina* | 38% |
| 8/4/21 | 2,700 | Chrysophytes | 41% | no dominant | n/a |
| ######### | 1,500 | Chrysophytes | 68% | *Synura* | 55% |
| ######### | 1,500 | no dominant | n/a | *Peridinium* | 33% |

# Appendix C – Ecological Implications of Dominant Lake Algal Groups

## Cyanobacteria (Blue-greens):

Cyanobacteria (also known as blue-green algae) are common indicators of nutrient enrichment. Cyanobacteria blooms can cause unsightly water discoloration, surface films, flecks, mats, taste and odor problems, and some, such as *Cylindrospermopsis*, are known to produce toxins (Wehr and Sheath 2003). Historically, there have been no documented cases of health problems caused by cyanobacteria in North Carolina.

## Diatoms:

Diatoms are generally considered beneficial as a food source for small crustaceans, fish, and other aquatic life. They are well adapted to lower light intensities and tend to be more prevalent in freshwater systems during cooler months. Diatom blooms are known to cause taste and odor problems, and their silica cell walls are notorious for clogging water treatment plant intake filters (Wehr and Sheath 2003).

## Euglenoids:

Euglenoids tend to be found in waters rich in organic matter and frequently associated with animal wastes. Euglenoid blooms can discolor water, ranging from red or brown to green (Wehr and Sheath 2003).

## Greens:

Green algae are generally beneficial and provide food and shelter for many aquatic insects and fish. They may bloom when environmental conditions are conducive for excessive growth. Blooms are usually an indication of elevated nutrients. Some algal blooms can discolor the water and cause changes in the amount of oxygen in the water. This in turn can affect fish and other aquatic life. Filamentous greens can form large unsightly mats which can hamper boating, fishing, and swimming (Wehr and Sheath 2003).

## Cryptomonads:

Cryptomonads are some of the most common algae in North Carolina. They are an important food source for many aquatic organisms (Wehr and Sheath 2003).

## Dinoflagellates:

Dinoflagellates are known to form blooms which are generally a response to nutrient enrichment (Wehr and Sheath 2003).

## Prymnesiophytes and Chrysochromulina:

Several species of the prymnesiophyte *Chrysochromulina* are common in North Carolina. They are known to form blooms and are common in eutrophic waters (Wehr and Sheath 2003). These blooms are more likely to occur during summer and fall. Blooms may discolor the water and are often associated with elevated levels of chlorophyll *a*.

**Gonyostomum** is common in bogs, lakes, and ponds that are generally of low pH (< 6). It is indicative of dystrophic and eutrophic conditions (Wehr and Sheath 2003). Although usually in low numbers, *Gonyostomum* is known to form nuisance blooms in the summer.

## Chrysophytes:

Chrysophytes are generally an indicator of clean, low nutrient, waters (Wehr and Sheath 2003). They can be found throughout North Carolina but are rarely abundant. Some chrysophytes can cause tastes and odors in drinking water (Palmer, C. M. 1977).

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Palmer, C. M. 1977. Algae and water pollution. EPA-600/9-77-036. National Technical Information Service, Sprinfield, VA).

Wehr, J. D. and R. G. Sheath (Eds). 2003. Freshwater algae of North America: ecology and classification. Academic Press, San Diego, CA.