

North Carolina Division of Water Resources Ambient Lakes Monitoring Assessment of the Little Tennessee River Basin Lakes and Reservoirs

North Carolina Department of Environmental Quality
Division of Water Resources
Water Science Section
Intensive Survey Branch

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TABLE OF CONTENTS

| | |
|---|-----------|
| GLOSSARY | 4 |
| PURPOSE AND SCOPE | 7 |
| OVERVIEW..... | 7 |
| ASSESSMENT METHODOLOGY | 7 |
| QUALITY ASSURANCE OF FIELD AND LABORATORY LAKES DATA | 9 |
| WEATHER OVERVIEW FOR SUMMER 2023..... | 9 |
| ASSESSMENT BY 8-DIGIT HUC | |
| HUC 06010202 | |
| Lake Sequoyah..... | 10 |
| Nantahala Lake..... | 11 |
| HUC 06010203 | |
| Bear Creek Reservoir..... | 12 |
| Thorpe Reservoir | 13 |
| Wolfe Creek Reservoir..... | 14 |
| HUC 06010204 | |
| Fontana Lake..... | 15 |
| Lake Cheoah..... | 16 |

Santeetlah Lake 17

Calderwood Lake 18

APPENDIX A. Little Tennessee River Basin Lakes Data

January 1, 2024 through December 31, 2024..... 19

APPENDIX B.

NC DEQ WSS Lab Data Qualifier Codes 22

Glossary

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| 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. |
| ALMP | Ambient Lake Monitoring Program |
| 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 <i>a</i> | Chlorophyll <i>a</i> is an algal pigment that is used as an approximate measure of algal biomass. The concentration of chlorophyll <i>a</i> 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 what's known as a clinograde curve. |
| Cocoid | 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 of oxygen 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 several parameters, the most important being temperature. Dissolved oxygen saturation is inversely proportional 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 nutrients, 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 <i>a</i> 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 water 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 or catchment 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.

Purpose and Scope

The North Carolina Ambient Lake Monitoring Program (ALMP) originated under the Environmental Protection Agency's (EPA) Clean Lakes Program and is designed to identify long term trends in water quality for lakes and reservoirs across North Carolina. The water quality data collected is used to calculate the state of nutrient enrichment (trophic state) and determine if lakes meet their designated use(s). Lakes are sampled by river basin on a five-year rotation according to the Division of Water Resources (DWR) basin sampling schedule. Lakes of 10 acres or greater, that have either public access and/or are used as a drinking supply, qualify for sampling metrics. An interactive map of the state showing the locations of the ALMP sampling locations by DWR may be found here (<https://www.deq.nc.gov/about/divisions/water-resources/water-sciences/intensive-survey-branch-isb/ambient-lakes-monitoring>)

Overview

The Little Tennessee River basin is located within the Blue Ridge Province of the Appalachian Mountains of western North Carolina. It encompasses about 1,800 mi² in Swain, Macon, Clay, Graham, Cherokee, and Jackson counties. Much of the land within the basin is federally owned (49%) and in the U.S. Forest Service's Nantahala National Forest (including the Joyce Kilmer/Slick Rock Wilderness Area) or the Great Smoky Mountains National Park. The basin also includes the Cherokee Indian Reservation. The North Carolina section of the Little Tennessee River is typical of many other mountain rivers. The gradient is relatively steep in most reaches of the river, and the substrate is dominated by riffle habitats. The headwater reaches of the Little Tennessee River begins in Georgia. Most tributaries are high gradient streams capable of supporting trout populations in the upper reaches. Most of the basin is forested. However, lower reaches of many tributary catchments are farmed or developed, resulting in the increased potential for nonpoint source problems. Nine lakes were sampled in this river basin by DWR staff in 2024.

A statewide fish consumption advisory for multiple fish species due to mercury contamination was issued by the NC Department of Health and Human Services, Division of Public Health. This advisory includes lakes in the Little Tennessee River Basin. Go to <https://epi.dph.ncdhhs.gov/oe/fish/advisories.html> for specific fish consumption advisory details.

Assessment Methodology

For this report, data from June 2024 through November 2024 were reviewed. Lake monitoring and sample collection activities performed by DWR field staff were in accordance with the Intensive Survey Branch (ISB) Standard Operating Procedures Manual (<https://www.deq.nc.gov/water-quality/environmental-sciences/isu/isb-sop-version2-1-final/download>).

Typically, lakes are sampled for ALMP during the growing season, defined as collection during the months of May through September. However, due to laboratory limitations associated with facility

construction at DWR Central Lab, the decision was made to postpone sampling until June. Additionally, due to these renovations, samples collected for Total Solids (TS) and Chlorophyll a (Chl a) were sent to a certified third-party laboratory to complete the analysis so that these data points would not be lost for June and July. In October, the planned sampling events for this basin were disrupted by the regional damage incurred by Hurricane Helene. Due to challenging and unknown site accessibility, and in an effort to conserve resources for residents and emergency personnel, the decision was made to delay sampling. As soon as the basin was deemed safe, field staff were able to sample in early November. Data were assessed for deviations from the state's Class C water quality standards for chlorophyll a, pH, dissolved oxygen, water temperature, and turbidity. 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, as well as determining the sampling depth or photic zone. 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.

Nutrient data is collected to determine the trophic status of a lake or reservoir and is calculated by the North Carolina Trophic State Index (NCTSI) score. The NCTSI score was specifically developed for North Carolina Lakes as part of the state's original Clean Lakes Classification Survey. It utilizes the nutrients present along with chlorophyll *a* and Secchi depth to calculate a lake's biological productivity. When an analyte was analyzed for but not detected above the PQL (Practical Quantitation Limit) this PQL was utilized in the NCTSI score calculation. It should be noted that prior to 2023 half of the PQL was utilized in this calculation when an analyte was not detected above the PQL. This decision to use the whole PQL came out of an abundance of caution to ensure the most conservative estimate of the NCTSI score. The ranges for classification are as follows:

| | |
|----------------|-------------|
| Oligotrophic | < -2.0 |
| Mesotrophic | -2.0 to 0.0 |
| Eutrophic | 0.0 to 5.0 |
| Hypereutrophic | > 5.0 |

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

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

Data collected in the field via multiparameter water quality meters were uploaded into the Labworks® database within a month of the sampling date.

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

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

The Ambient Lakes Monitoring Program (ALMP) Quality Assurance Project Plan can be found on the Intensive Survey Branch Website (<https://www.deq.nc.gov/about/divisions/water-resources/water-sciences/intensive-survey-branch-isb>).

Weather Overview for Summer 2024

Weather conditions were considered wet for the basin in the sampling season of June - November 2024, highlighted by Hurricane Helene passing through the Little Tennessee River basin. A dry and warm June started the delayed sampling season, with a minor drought occurring at the end of June. This minor drought ended in July with a statewide average precipitation of 8.29 inches for the month. August was an overall wet month as well, with Tropical Storm Debby being a large contributor to precipitation totals. Following that saturating month, Hurricane Helene occurred from September 25th – September 27th, hitting the western mountains of North Carolina the hardest. The Little Tennessee River basin received on average 6 to 12 inches of rain over the 3-day period. Access to sampling locations was disrupted by this hurricane, and therefore the October sampling event was postponed, and the final sampling event was conducted in early November. October and November weather brought general dryness and warm temperatures after the flooding that occurred in late September.

Detailed weather information can be found through the NC State Climate Office Blog (<https://climate.ncsu.edu/climateblog>) and the Southeast Regional Climate center (<https://sercc.com/periodic-reports-monthly>).

Lake and Reservoir Assessments HUC 06010202

Lake Sequoyah



Image Source: Timothy Wildey

Lake Sequoyah, located near the Town of Highlands, is an impoundment of the Cullasaja River and serves as a water supply source for the town. This shallow lake has a maximum depth of only 13 feet (four meters). The shoreline consists of residential homes and commercial businesses. The Highlands Country Club, which is comprised of a golf course and private homes, is also located in the watershed.

DWR staff sampled Lake Sequoyah five times from June through November 2024. Secchi depths ranged from 1.2 to 2.6 meters. Surface dissolved oxygen in 2024 ranged from 6.7 to 8.4 mg/L and surface water temperatures ranged from 13.9 °C to 24.1 °C (Appendix A). Surface pH values for Lake Sequoyah from June through November ranged from 5.3 to 7.2 s.u.

Total phosphorus, total Kjeldahl nitrogen, and ammonia were less than the DWR Laboratory detection levels for these nutrients (Appendix A). Nitrite plus nitrate values ranged from below detection levels up to 0.17 mg/L in June. Chlorophyll a values ranged from 1.7 to 14.0 µg/L. Based on the calculated NCTSI scores for 2024, Lake Sequoyah exhibited low biological productivity (mesotrophic conditions). The trophic state has varied from oligotrophic to eutrophic since 1988 when DWR began monitoring efforts on Lake Sequoyah. Starting in 2023, NCTSI scores are calculated using the more conservative whole PQL substitution method for values below the detection limit, aligning with other DWR branches. Before 2023, a less conservative half PQL substitution method was used. This shift to a more conservative approach may partly explain the change in trophic status.

| Ambient Lakes Program Name | Lake Sequoyah | |
|---|-----------------------------|----------------|
| Season Average Trophic Status (NC TSI) | Mesotrophic (-0.7**) | |
| Mean Depth (meters) | 2.1 | |
| Volume (10⁶m³) | 0.1 | |
| Watershed Area (m²) | 36 | |
| Classification | WS-III B Tr | |
| Stations | LTN006C | LTN008C |
| Number of Times Sampled | 5 | 5 |
| Stations Cont'd | LTN008E | -- |
| Number of Times Sampled | 5 | -- |

| Lake Sequoyah Monthly Snapshot | | |
|---------------------------------------|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -1.7 * | Mesotrophic |
| July | -0.03 ** | Mesotrophic |
| August | -0.6 ** | Mesotrophic |
| September | -0.4 | Mesotrophic |
| November | -1.0 | Mesotrophic |

*LTN008E TKN qualified with J6 – site excluded from this monthly average
 **LTN006 Nutrient data qualified with J6 - site excluded from this monthly average

Nantahala Lake

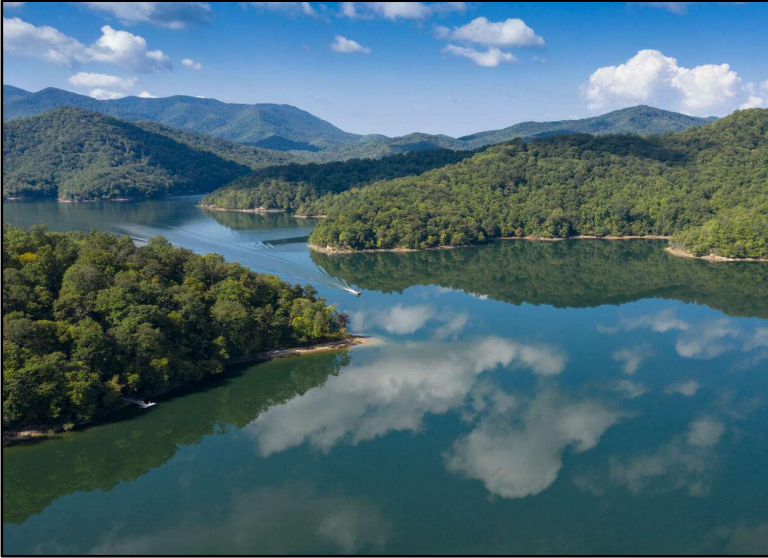


Image Source: Eric Haggart

| Ambient Lakes Program Name | Nantahala Lake | |
|---|----------------------------|----------------|
| Season Average Trophic Status (NC TSI) | Oligotrophic (-2.1) | |
| Mean Depth (meters) | 38.1 | |
| Volume (10⁶m³) | 160.0 | |
| Watershed Area (m²) | 280 | |
| Classification | B Tr | |
| Stations | LTN013B | LTN013C |
| Number of Times Sampled | 5 | 5 |
| Stations Cont'd | LTN013D | -- |
| Number of Times Sampled | 5 | -- |

| Nantahala Lake Monthly Snapshot | | |
|--|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -2.02* | Oligotrophic |
| July | -1.9** | Mesotrophic |
| August | -1.96 | Mesotrophic |
| September | -- | -- |
| November | -2.5 | Oligotrophic |

*LTN013C TKN qualified with J2 – site excluded from this monthly average

** Chl *a* values qualified – J4- marked by lab staff as having a dry blank filter, despite field staff documentation confirming DI was run through the blank filters. NC TSI calculated

-- Chl *a* values qualified with J4-data is questionable because of improper field or lab protocols – no further information was provided – no NC TSI calculated

Nantahala Lake lies in the western tip of North Carolina and is an impoundment of the Nantahala River. Duke Energy owns this reservoir, which was impounded in 1942 for hydroelectric power production. Nantahala Lake is 76 meters deep at the dam at maximum pool. The rugged, mountainous drainage area is primarily forested.

Nantahala Lake was monitored five times from June through November 2024 by DWR field staff. Secchi depths ranged from 3.3 to 6.0 meters, indicating very good water clarity (Appendix A). Surface dissolved oxygen ranged from 7.3 to 8.0 mg/L and surface water temperatures ranged from 17.7 °C to 27.2 °C. Surface pH values ranged from 6.5 to 7.4 s.u. and surface conductivity ranged from 9.0 to 18.0 µmhos/cm.

Nutrient concentrations were very low in Nantahala Lake in 2024; total phosphorus, total Kjeldahl nitrogen, ammonia, and nitrite plus nitrate were at or below DWR laboratory detection levels (Appendix A). Due to the limited availability of nutrients, chlorophyll *a* values were also low, ranging from 1.6 to 3.8 µg/L. Turbidity values ranged from <1.0 to 1.9 NTU. Based on the calculated NCTSI scores, Nantahala Lake was determined to have very low biological productivity (oligotrophic conditions). This lake has been consistently oligotrophic since monitoring by DWR began in 1981.

HUC 06010203

Bear Creek Reservoir



Image Source: Joe Mohn (ISB)

| | | |
|---|-----------------------------|----------------|
| Ambient Lakes Program Name | Bear Creek Reservoir | |
| Season Average Trophic Status (NC TSI) | Mesotrophic (-1.5) | |
| Mean Depth (meters) | 33.0 | |
| Volume (10⁶m³) | 5.60 | |
| Watershed Area (mi²) | 194 | |
| Classification | WS-III B Tr | |
| Stations | LTN015B | LTN015D |
| Number of Times Sampled | 5 | 5 |

| Bear Creek Reservoir Monthly Snapshot | | |
|--|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -1.6 | Mesotrophic |
| July | -1.2** | Mesotrophic |
| August | -1.5 | Mesotrophic |
| September | -1.0 | Mesotrophic |
| November | -2.2 | Oligotrophic |

** Chl a data marked by lab staff as having a dry blank filter, despite field staff documentation confirming DI was run through the blank filters.

Bear Creek Reservoir is a hydroelectric impoundment of the Tuckasegee River. Most of the 194 square kilometer upland drainage area is forested with steep slopes and clean, fast-moving streams. Bear Creek Reservoir was built in 1953 and is currently owned by Duke Energy.

DWR field staff monitored Bear Creek Reservoir five times from June through November in 2024. Surface dissolved oxygen ranged from 7.4 to 9.1 mg/L and surface water temperatures ranged from 16.2 °C to 27.3 °C (Appendix A). Surface pH values were consistent, varying between 6.0 and 6.9 s.u. and surface conductivity ranged from 14 to 16 µmhos/cm. Secchi depths for Bear Creek Reservoir ranged from 2.3 to 3.5 meters.

Nutrient concentrations were very low in Bear Creek Reservoir in 2024; total phosphorus, total Kjeldahl nitrogen, ammonia, and nitrite plus nitrate were at or below DWR laboratory detection levels (Appendix A). Chlorophyll *a* values were low ranging from 2.2 to 5.1 µg/L. The turbidity measurements ranged from <1.0 to 2.2 NTU. Based on the calculated NCTSI scores for 2024, Bear Creek Reservoir was determined to be mesotrophic. The trophic state of Bear Creek Reservoir had previously only been designated as oligotrophic since DWR first started monitoring it in 1988. Starting in 2023, NCTSI scores are calculated using the more conservative whole PQL substitution method for values below the detection limit, aligning with other DWR branches. Before 2023, a less conservative half PQL substitution method was used. This shift to a more conservative approach may partly explain the change in trophic status.

Thorpe Reservoir



Image Source: Frank Becerra

| | | |
|---|---------------------------|----------------|
| Ambient Lakes Program Name | Thorpe Reservoir | |
| Season Average Trophic Status (NC TSI) | Mesotrophic (-1.1) | |
| Mean Depth (meters) | 23.2 | |
| Volume (10⁶m³) | 82.6 | |
| Watershed Area (mi²) | 96.0 | |
| Classification | WS-III B Tr HQW | |
| Stations | LTN015L | LTN015N |
| Number of Times Sampled | 5 | 5 |
| Stations Cont'd | LTN015P | LTN015R |
| Number of Times Sampled | 5 | 5 |

| Thorpe Reservoir Monthly Snapshot | | |
|--|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -- | -- |
| July | -1.1 | Mesotrophic |
| August | -1.1 | Mesotrophic |
| September | -1.1* | Mesotrophic |
| November | -1.1 | Mesotrophic |

--All TKN values for June qualified with J2-reported value failed to meet established criteria for either precision or accuracy – no NC TSI calculated
 *LTN015L total phosphorous qualified with J2 – site excluded from the Sept. monthly average.

Thorpe Reservoir, also known as Glenville Lake, is a man-made impoundment on the Tuckaseegee River in Jackson County, NC. The lake is used for recreational fishing, swimming, and boating. Owned by Duke Energy, the reservoir also has been used for hydroelectric power generation since its construction in 1941. The reservoir has a mean retention time of 294 days. Most of the 95 km² drainage area is forested with scattered residences. Tributaries include West Fork Tuckaseegee River, Norton Creek, Hurricane Creek, Cedar Creek, Mill Creek, and Pine Creek.

Thorpe Reservoir was monitored five times from June through November 2024. Secchi depths for this reservoir ranged from 2.3 to 3.6 meters. Surface dissolved oxygen ranged from 7.2 to 8.8 mg/L and surface water temperatures ranged from 16.5 °C in November to 26.6 °C in August. Surface pH values ranged from 6.1 to 7.2 s.u. and surface conductivity ranged from 19 to 22 µmhos/cm. Nutrient concentrations were very low in Thorpe Reservoir in 2024; total phosphorus, total Kjeldahl nitrogen, ammonia, and nitrite plus nitrate were at or below DWR laboratory detection levels (Appendix A). Chlorophyll a values in 2024 ranged from 4.7 to 9.0 µg/L. Turbidity values were also well below the Trout Water standard of 10 NTU. Based on the calculated NCTSI scores for 2024, Thorpe Reservoir was determined to be mesotrophic. The trophic state of Thorpe Reservoir had previously only been oligotrophic since DWR first started monitoring it in 1988. Starting in 2023, NCTSI scores are calculated using the more conservative whole PQL substitution method for values below the detection limit, aligning with other DWR branches. Before 2023, a less conservative half PQL substitution method was used. This shift to a more conservative approach may partly explain the change in trophic status.

Wolf Creek Reservoir



Wolf Creek Reservoir, a small hydroelectric reservoir built by Nantahala Power and Light Company in 1955 on the Tuckasegee River, is currently owned by Duke Energy. Wolf Creek Reservoir has a forested watershed. The shoreline of the lake has a relatively low density of private homes.

This reservoir was sampled five times in 2024 by DWR field staff. Secchi depths ranged from 3.6 to 8.7 meters, indicating very good water clarity. Surface dissolved oxygen ranged from 7.1 to 8.3 mg/L and surface water temperatures ranged from 16.7 °C to 26.4 °C. Surface conductivity ranged from 13 to 15 µmhos/cm and surface pH values ranged from 5.4 s.u. in November to 7.4 s.u. in June.

Nutrient concentrations were very low in Wolf Creek Reservoir in 2024; total phosphorus, total Kjeldahl nitrogen, ammonia, and nitrite plus nitrate were at or below DWR laboratory detection levels (Appendix A). Chlorophyll a values were low and ranged from undetected to 3.9 µg/L. Wolf Creek Reservoir was determined to have very low biological productivity (oligotrophic conditions) in 2024 based on the calculated NCTSI scores. This reservoir has been oligotrophic since it was first monitored by DWR in 1988.

| | | |
|---|-----------------------------|-----------------|
| Ambient Lakes Program Name | Wolf Creek Reservoir | |
| Season Average Trophic Status (NC TSI) | Oligotrophic (-2.9) | |
| Mean Depth (meters) | 27.1 | |
| Volume (10⁶ m³) | 2.10 | |
| Watershed Area (m²) | 104 | |
| Classification | WS-III B Tr | |
| Stations | LTN015A | LTN015A1 |
| Number of Times Sampled | 5 | 5 |

| Wolf Creek Reservoir Monthly Snapshot | | |
|--|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -3.0 | Oligotrophic |
| July | -2.4** | Oligotrophic |
| August | -2.9 | Oligotrophic |
| September | -3.5 | Oligotrophic |
| November | -2.5 | Oligotrophic |

** Chl a data marked by lab staff as having a dry blank filter, despite field staff documentation confirming DI was run through the blank filters.

HUC 06010204

Fontana Lake



Image Source: Explore Bryson City NC

| Ambient Lakes Program Name | Fontana Lake | |
|---|---------------------------|----------------|
| Season Average Trophic Status (NC TSI) | Mesotrophic (-1.9) | |
| Mean Depth (meters) | 41.2 | |
| Volume (10⁶m³) | 1782 | |
| Watershed Area (m²) | 4020 | |
| Classification | WS-IV B CA | |
| Stations | LTN031A | LTN031B |
| Number of Times Sampled | 5 | 5 |
| Stations Cont'd | LTN031D | LTN031H |
| Number of Times Sampled | 5 | 5 |
| Stations Cont'd | LTN031J | -- |
| Number of Times Sampled | 5 | -- |

| Fontana Lake Monthly Snapshot | | |
|--------------------------------------|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -- | -- |
| July | -1.7 | Mesotrophic |
| August | -1.7 | Mesotrophic |
| September | -2.0 | Mesotrophic |
| November | -2.2 | Oligotrophic |

--All TKN values for June qualified with J2-reported value failed to meet established criteria for either precision or accuracy – no NC TSI calculated

Fontana Lake, located along the southern boundary of the Great Smoky Mountain National Park, provides hydropower and flood control on the Little Tennessee River. This reservoir is owned by the Federal Government and operated by the Tennessee Valley Authority. Construction on the dam began in 1942 and was completed in 1944. At a height of over 480 feet, the Fontana Dam is the highest dam east of the Mississippi River.

Fontana Lake was sampled monthly from June through November 2024 by DWR field staff. Secchi depths ranged from 3.8 to 6.5 m. Surface dissolved oxygen ranged from 7.1 to 9.2 mg/L and surface water temperatures ranged from 19.6 °C to 29.5 °C. Surface conductivity ranged from 21 to 27 µmhos/cm and surface pH ranged from 6.7 to 8.7 s.u.

Total phosphorus, total Kjeldahl nitrogen, and ammonia were less than the DWR Laboratory detection levels for these nutrients (Appendix A). Nitrite plus nitrate values ranged from below detection levels up to 0.06 mg/L in November. Chlorophyll a values ranged from 1.7 to 14.0 µg/L. Based on the calculated NCTSI scores for 2024, Fontana Lake exhibited low biological productivity (mesotrophic conditions). The trophic state had previously only been oligotrophic since 1981 when DWR began monitoring efforts on Fontana Lake. Starting in 2023, NCTSI scores are calculated using the more conservative whole PQL substitution method for values below the detection limit, aligning with other DWR branches. Before 2023, a less conservative half PQL substitution method was used. This shift to a more conservative approach may partly explain the change in trophic status.

Lake Cheoah

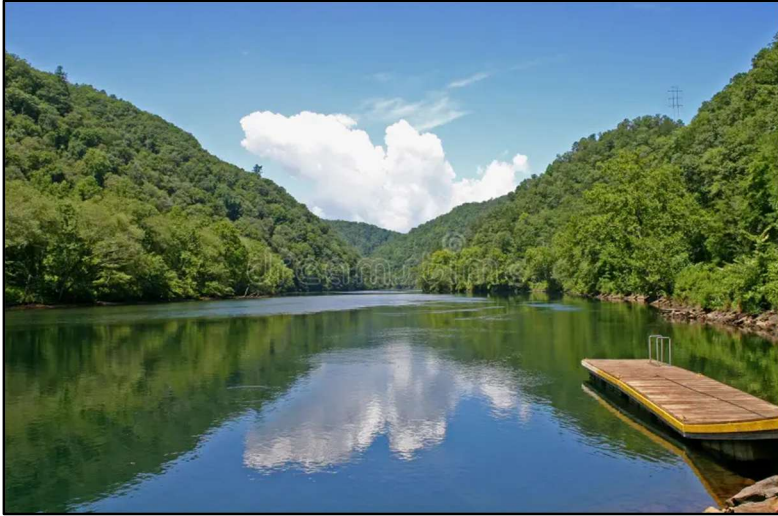


Image Source: Explore Bryson City NC

| Ambient Lakes Program Name | Lake Cheoah | |
|---|----------------------------|----------------|
| Season Average Trophic Status (NC TSI) | Oligotrophic (-2.7) | |
| Mean Depth (meters) | 40 | |
| Volume (10⁶m³) | 288 | |
| Watershed Area (m²) | 4165 | |
| Classification | C Tr | |
| Stations | LTN032B | LTN032D |
| Number of Times Sampled | 5 | 5 |
| Stations Cont'd | LTN032F | -- |
| Number of Times Sampled | 5 | -- |

| Lake Cheoah Monthly Snapshot | | |
|-------------------------------------|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -- | -- |
| July | -2.4 | Oligotrophic |
| August | -3.2 | Oligotrophic |
| September | -2.6 | Oligotrophic |
| November | -2.7 | Oligotrophic |

--All TKN values for June qualified with J2-reported value failed to meet established criteria for either precision or accuracy – no NC TSI calculated

Lake Cheoah was originally constructed by the Aluminum Company of America (ALCOA) and is currently owned by Tallassee Power Company (TAPOCO). This is a narrow and deep impoundment of the Little Tennessee River on the North Carolina/Tennessee border. Inflow to this lake is dominated by the hypolimnetic discharge from Fontana Lake, located directly upstream.

Lake Cheoah was monitored by DWR field staff five times in June through November 2024. Secchi depths were typically clear to bottom at LTN032B and maximized at 11 m in June at LTN032F. The greatest surface dissolved oxygen values were observed in June (range = 9.0 to 9.7 mg/L) and surface water temperatures across the sampling season ranged from 10.9 °C to 24.7 °C. Surface pH in Lake Cheoah ranged from 5.6 to 7.2 s.u. and surface conductivity ranged from 22 to 25 µmhos/cm.

Nutrient concentrations were low in Lake Cheoah in 2024. Total phosphorus, total Kjeldahl nitrogen, and ammonia were less than the DWR Laboratory detection levels for these nutrients (Appendix A). Nitrite plus nitrate values ranged from 0.07 up to 0.14 mg/L. In response to the low nutrient concentrations, chlorophyll a values were also low, ranging from <1.0 to 3.3 µg/L. Nutrient and chlorophyll a concentrations observed in 2024 were similar to those previously recorded for this lake by DWR. Based on the calculated NCTSI scores, Lake Cheoah was determined to have very low biological productivity (oligotrophic conditions). This reservoir has been oligotrophic since it was first monitored by DWR in 1988.

Lake Santeetlah



Image Source: Joe Mohn (ISB)

| | | |
|---|---------------------------|----------------|
| Ambient Lakes Program Name | Lake Santeetlah | |
| Season Average Trophic Status (NC TSI) | Mesotrophic (-1.9) | |
| Mean Depth (meters) | 17.1 | |
| Volume (10⁶m³) | 195 | |
| Watershed Area (mi²) | 451 | |
| Classification | B Tr | |
| Stations | LTN037B | LTN037D |
| Number of Times Sampled | 5 | 5 |
| Stations Cont'd | LTN037E | -- |
| Number of Times Sampled | 5 | -- |

| Lake Santeetlah Monthly Snapshot | | |
|---|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -2.0 | Mesotrophic |
| July | -1.6* | Mesotrophic |
| August | -2.0** | Mesotrophic |
| September | -- | -- |
| November | -1.9 | Mesotrophic |

* Chl *a* values qualified – J4- marked by lab staff as having a dry blank filter, despite field staff documentation confirming DI was run through the blank filters. NC TSI calculated

**LTN037 Chl *a* qualified with J4 – site excluded from this monthly average

-- Chl *a* values qualified with J4- no further information was provided – Total Phosphorous values qualified – Q2 - due to exceeded hold time - no NCTSI calculated for September

Santeetlah Lake is located on the Cheoah River in the mountains of western North Carolina and is owned by the Aluminum Company of America (ALCOA). Santeetlah Lake is a deep lake with a maximum depth of 213 feet (65 meters) and a mean hydraulic retention time of 161 days. Major tributaries to Santeetlah Lake include the Cheoah River, Santeetlah Creek, West Buffalo Creek and Snowbird Creek.

Santeetlah Lake was monitored five times in June through November in 2024 by DWR field staff. Secchi depths ranged from 2.8 to 5.7 meters, with the lowest Secchi depths observed in the Cheoah River arm of the lake in July (LTN037B; Appendix A). Surface dissolved oxygen ranged from 7.3 to 8.5 mg/L and surface water temperatures ranged from 19.4 °C to 28.6 °C. Surface pH values ranged from 6.1 to 7.5 s.u. and surface conductivity ranged from 20 to 27 µmhos/cm.

Total phosphorus, total Kjeldahl nitrogen, and ammonia were less than the DWR Laboratory detection levels for these nutrients (Appendix A). Nitrite plus nitrate values were also very low, with the highest detected value being 0.04 mg/L. Chlorophyll *a* values were low, ranging from undetected to 8.5 µg/L. Turbidity values were also low (<1.0 to 1.7 NTU).

Santeetlah Lake had low biological productivity or mesotrophic conditions in 2024. This reservoir had previously been consistently oligotrophic since it was first monitored by DWR in 1981. Starting in 2023, NCTSI scores are calculated using the more conservative whole PQL substitution method for values below the detection limit, aligning with other DWR branches. Before 2023, a less conservative half PQL substitution method was used. This shift to a more conservative approach may partly explain the change in trophic status.

Calderwood Lake



Calderwood Lake was completed in 1930 by the Aluminum Company of America (ALCOA) for hydropower production for their plant in Tennessee. This reservoir is currently owned by a subsidiary of ALCOA known as the Tallassee Power Company (TAPOCO). Located at the edge of the Great Smokey Mountains on the North Carolina/Tennessee border, Calderwood Lake is a narrow, but deeply channeled reservoir surrounded by forests. The Little Tennessee River (Lake Cheoah) is the major inflow to this reservoir.

DWR field staff sampled Calderwood Lake five times from June through November in 2024. Surface dissolved oxygen ranged from 5.9 to 9.9 mg/L and surface water temperature ranged from 14.4 °C to 25.1 °C (Appendix A). The lowest surface dissolved oxygen and water temperature readings were observed in June at the most upstream sampling site (LTN040). Surface pH values ranged from 5.1 to 6.9 s.u and surface conductivity ranged from 22 to 25 µmhos/cm. Secchi depths for Calderwood Lake ranged from 4.0 to 8.0 meters at LTN040.

Nutrient concentration in 2024 were low. Total phosphorus, total Kjeldahl nitrogen and ammonia were at or below DWR Laboratory detection levels (Appendix A). Total organic nitrogen ranged from 0.09 to 0.12 mg/L. Chlorophyll *a* values were low in response to the limited availability of nutrients and ranged from <1.0 to 3.7 µg/L. Based on the calculated NCTSI scores, Calderwood Lake was determined to be oligotrophic (i.e., exhibiting very low biological productivity). This reservoir has remained oligotrophic since monitoring by DWR staff began in 1981.

| | | |
|---|----------------------------|---------------|
| Ambient Lakes Program Name | Calderwood Lake | |
| Season Average Trophic Status (NC TSI) | Oligotrophic (-2.7) | |
| Mean Depth (meters) | 29.0 | |
| Volume (10⁶m³) | 1.6 | |
| Watershed Area (m²) | 4807 | |
| Classification | C Tr | |
| Stations | LTN040 | LTN041 |
| Number of Times Sampled | 5 | 5 |

| Calderwood Lake Monthly Snapshot | | |
|---|-----------------------------|----------------------|
| Sample Period | Monthly NC TSI Score | Trophic State |
| June | -- | -- |
| July | -2.1 | Oligotrophic |
| August | -2.6 | Oligotrophic |
| September | -2.8 | Oligotrophic |
| November | -3.1 | Oligotrophic |

--All TKN values for June qualified with J2-reported value failed to meet established criteria for either precision or accuracy – no NC TSI calculated

Appendix A - Little Tennessee River Basin Lake Data
January 1, 2024 Through December 31, 2024

| Lake | SURFACE PHYSICAL DATA | | | | | | | | PHOTIC ZONE DATA | | | | | | Total Suspended Solids mg/L | Turbidity NTU | Total Hardnes mg/L |
|----------------------|-----------------------|------------------|---------|--------------|---------|----------------|---------------------|-------------|------------------|----------|----------|----------|-----------|-------------------|-----------------------------|---------------|--------------------|
| | 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 | Chla µg/L | Total Solids mg/L | | | |
| HUC 06010202 | | | | | | | | | | | | | | | | | |
| LAKE SEQUOYAH | June 12, 2024 | LTN006C | 7.1 | 20.5 | 6.0 | 44.0 | 2.2 | 89.4% | 0.03 U | 0.4 U | 0.06 | 0.17 | 1.7 | 29.0 | 2.8 | 3.7 | |
| | June 12, 2024 | LTN008C | 7.3 | 20.8 | 5.9 | 39.0 | 2.0 | 92.8% | 0.03 U | 0.4 U | 0.05 U | 0.14 | 2.8 | 46.0 | 2.5 U | 2.3 | |
| | June 12, 2024 | LTN008E | 7.9 | 20.0 | 5.3 | 38.0 | 2.0 | 98.9% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.10 | 6.3 | 13.0 | 2.5 U | 2.1 | 6.0 |
| | July 11, 2024 | LTN006C | 6.6 | 23.1 | 7.2 | 43.0 | 1.2 | 87.7% | 0.03 UJ6 | 0.4 UJ6 | 0.05 UJ6 | 0.14 J6 | 13.0 | 34.0 | 4.9 | 3.6 | |
| | July 11, 2024 | LTN008C | 7.3 | 22.9 | 6.4 | 39.0 | 1.5 | 96.2% | 0.03 U | 0.4 U | 0.05 U | 0.12 | 14.0 | 33.0 | 4.0 | 3.3 | |
| | July 11, 2024 | LTN008E | 6.9 | 22.7 | 6.4 | 37.0 | 1.7 | 90.9% | 0.03 U | 0.4 U | 0.05 U | 0.12 | 8.2 | 23.0 | 2.5 U | 2.8 | 12.0 |
| | August 6, 2024 | LTN006C | 6.7 | 23.8 | 6.5 | 45.0 | 1.4 | 89.6% | 0.03 U | 0.4 U | 0.05 UJ6 | 0.10 J6 | 6.4 | 39.0 | 4.6 | 2.6 | |
| | August 6, 2024 | LTN008C | 7.4 | 24.1 | 6.7 | 40.0 | 1.6 | 99.6% | 0.03 U | 0.4 U | 0.05 U | 0.07 | 5.1 | 33.0 | 2.6 | 2.2 | |
| | August 6, 2024 | LTN008E | 7.3 | 24.0 | 6.1 | 39.0 | 2.0 | 98.6% | 0.03 U | 0.4 U | 0.05 U | 0.08 | 7.8 | 33.0 | 4.6 | 1.9 | 11.0 |
| | September 11, 2024 | LTN006C | 7.2 | 19.4 | 6.7 | 40.0 | 1.6 | 88.1% | 0.03 U | 0.4 U | 0.05 U | 0.04 | 5.3 | 40.0 | 2.7 | 1.9 | |
| | September 11, 2024 | LTN008C | 7.2 | 19.9 | 6.8 | 38.0 | 2.0 | 89.3% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 7.6 | 28.0 | 3.2 | 2.7 | |
| | September 11, 2024 | LTN008E | 7.4 | 20.2 | 7.2 | 37.0 | 1.6 | 92.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 9.9 | 42.2 | 2.7 | 2.0 | 22.0 |
| | November 4, 2024 | LTN006C | 6.8 | 13.9 | 6.3 | 38.0 | 1.7 | 73.9% | 0.03 U | 0.4 U | 0.06 | 0.08 | 3.0 | 12.0 | 13.0 | 6.8 | |
| | November 4, 2024 | LTN008C | 7.8 | 14.1 | 6.3 | 35.0 | 1.8 | 85.3% | 0.03 U | 0.4 U | 0.05 U | 0.06 | 4.5 | 43.0 | 6.0 | 3.4 | |
| | November 4, 2024 | LTN008E | 8.4 | 14.2 | 6.1 | 34.0 | 2.6 | 92.5% | 0.03 U | 0.4 U | 0.05 U | 0.06 | 6.2 | 34.0 | 2.8 | 1.4 | 7.7 |
| HUC 06010203 | | | | | | | | | | | | | | | | | |
| LAKE NANTAHALA | June 12, 2024 | LTN013B | 7.9 | 24.2 | 7.1 | 16.0 | 3.4 | 105.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.7 | 12 U | 2.5 U | 1.3 | |
| | June 12, 2024 | LTN013C | 7.8 | 23.6 | 7.3 | 9.0 | 3.5 | 102.3% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.03 U | 2.5 | 12 U | 2.5 U | 1.3 | |
| | June 12, 2024 | LTN013D | 7.9 | 24.0 | 7.3 | 9.0 | 3.4 | 104.8% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.5 | 17.0 | 2.5 U | 1.0 | |
| | July 10, 2024 | LTN013B | 7.6 | 26.9 | 6.8 | 16.0 | 3.8 | 105.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.3 J4 | 15.0 | 2.5 U | 1.1 | |
| | July 10, 2024 | LTN013C | 7.5 | 26.8 | 7.1 | 16.0 | 3.3 | 103.9% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.8 J4 | 23.0 | 2.5 U | 1.9 | |
| | July 10, 2024 | LTN013D | 7.3 | 27.2 | 7.4 | 16.0 | 4.0 | 102.7% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.7 J4 | 20.0 | 2.5 U | 1 U | |
| | August 15, 2024 | LTN013B | 7.6 | 26.5 | 6.7 | 16.0 | 4.0 | 105.0% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.8 | 15.0 | 2.5 UJ2 | 1 U | |
| | August 15, 2024 | LTN013C | 7.6 | 26.4 | 6.7 | 18.0 | 3.8 | 104.4% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.1 | 20.0 | 2.5 UJ2 | 1.1 | |
| | August 15, 2024 | LTN013D | 7.6 | 26.7 | 6.7 | 16.0 | 4.4 | 105.7% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.4 | 12 U | 2.5 UJ2 | 1 U | |
| | September 12, 2024 | LTN013B | 7.9 | 22.9 | 6.7 | 17.0 | 4.1 | 102.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 1.6 J4 | 22.0 | 2.8 UY | 1 U | |
| | September 12, 2024 | LTN013C | 7.9 | 23.2 | 6.6 | 17.0 | 3.5 | 103.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.6 J4 | 15.0 | 2.5 U | 1 U | |
| | September 12, 2024 | LTN013D | 7.9 | 23.4 | 7.1 | 17.0 | 4.1 | 103.4% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.4 J4 | 29.0 | 2.5 U | 1 U | |
| | November 7, 2024 | LTN013B | 7.9 | 17.7 | 6.5 | 13.0 | 5.8 | 91.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.1 | 21.0 | 2.5 U | 1 U | |
| | November 7, 2024 | LTN013C | 8.0 | 17.9 | 6.6 | 14.0 | 5.1 | 93.0% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.3 | 18.0 | 2.5 U | 1 U | |
| | November 7, 2024 | LTN013D | 8.0 | 17.8 | 6.8 | 14.0 | 6.0 | 92.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.6 | 17.0 | 2.5 U | 1 U | |
| HUC 06010203 | | | | | | | | | | | | | | | | | |
| BEAR CREEK RESERVOIR | June 13, 2024 | LTN015B | 8.3 | 23.1 | 6.6 | 14.0 | 2.7 | 105.5% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.9 | 20.0 | 2.5 U | 1 U | |
| | June 13, 2024 | LTN015D | 8.2 | 23.2 | 6.4 | 14.0 | 2.4 | 105.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.8 | 13.0 | 2.5 U | 1 U | 4.0 |
| | July 11, 2024 | LTN015B | 7.5 | 26.6 | 6.2 | 15.0 | 2.3 | 102.8% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.5 J4 | 31.0 | 2.5 U | 2.1 | |
| | July 11, 2024 | LTN015D | 7.4 | 26.2 | 6.6 | 15.0 | 2.3 | 100.7% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.1 J4 | 31.0 | 2.5 U | 2.2 | 7.0 |
| | August 14, 2024 | LTN015B | 8.0 | 27.2 | 6.6 | 16.0 | 3.0 | 109.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.0 | 21.0 | 2.5 UJ2 | 1.3 | |
| | August 14, 2024 | LTN015D | 7.7 | 27.3 | 6.7 | 16.0 | 3.0 | 105.5% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.8 | 12.0 | 2.5 UJ2 | 1.3 | 6.0 |
| | September 11, 2024 | LTN015B | 8.0 | 22.2 | 6.7 | 16.0 | 2.0 | 100.3% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.1 | 34.0 | 3.1 UY | 1.8 | |
| | September 11, 2024 | LTN015D | 7.9 | 23.3 | 6.9 | 16.0 | 2.1 | 101.4% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 5.1 | 30.0 | 2.5 U | 1.8 | 7.0 |
| | November 6, 2024 | LTN015B | 9.1 | 16.2 | 6.4 | J12 | 3.5 | 101.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.2 | 12.0 | 2.5 U | 1 U | |
| | November 6, 2024 | LTN015D | 9.1 | 16.9 | 6.0 | J12 | 3.5 | 102.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.3 | 19.0 | 2.5 U | 1 U | 11.0 |
| HUC 06010203 | | | | | | | | | | | | | | | | | |
| WOLF CREEK RESERVOIR | June 13, 2024 | LTN015A | 8.3 | 22.6 | 6.7 | 13.0 | 4.7 | 107.3% | 0.03U | 0.4U | 0.05U | 0.03U | 1.6 | 13.0 | 2.5U | 1.6 | |
| | June 13, 2024 | LTN015A1 | 8.2 | 22.5 | 7.4 | 14.0 | 7.0 | 104.6% | 0.03U | 0.4U | 0.05U | 0.03U | 1.6 | 12U | 2.5U | 1.5 | 4.0 |
| | July 11, 2024 | LTN015A | 7.6 | 26.2 | 6.5 | 14.0 | 6.8 | 105.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.9 J4 | 24.0 | 2.5 U | 1.3 | |
| | July 11, 2024 | LTN015A1 | 7.7 | 26.4 | 6.6 | 14.0 | 3.6 | 105.8% | 0.03U | 0.4U | 0.05U | 0.03U | 1.7J4 | 17.0 | 2.5U | 1U | 5.0 |
| | August 14, 2024 | LTN015A | 7.7 | 26.4 | 6.7 | 15.0 | 5.2 | 106.5% | 0.03U | 0.4U | 0.05U | 0.03U | 2.6 | 19.0 | 2.5UJ2 | 1U | |
| | August 14, 2024 | LTN015A1 | 7.6 | 26.1 | 6.4 | 14.0 | 8.0 | 104.0% | 0.03U | 0.4U | 0.05U | 0.03U | 1.2 | 12U | 2.5UJ2 | 1U | 6.0 |
| | September 11, 2024 | LTN015A | 7.1 | 23.0 | 7.0 | 15.0 | 5.0 | 91.4% | 0.03U | 0.4U | 0.05U | 0.03U | 1.0 U | 37.0 | 2.5U | 1.1 | |
| | September 11, 2024 | LTN015A1 | 7.3 | 23.0 | 7.3 | 15.0 | 8.7 | 94.7% | 0.03U | 0.4U | 0.05U | 0.03 | 1.0 | 44.0 | 2.5 U | 1U | 11.0 |
| November 6, 2024 | LTN015A | 8.2 | 16.7 | 6.0 | J12 | 5.0 | 93.7% | 0.03U | 0.4U | 0.05U | 0.03U | 2.2 | 23.0 | 2.5U | 1U | | |
| November 6, 2024 | LTN015A1 | 8.3 | 16.5 | 5.4 | J12 | 5.2 | 94.2% | 0.03U | 0.4U | 0.05U | 0.03U | 2.4 | 23.0 | 2.5U | 1U | 9.0 | |

Appendix A – Little Tennessee River Basin Data

January 1, 2024 Through December 31, 2024

| Lake | SURFACE PHYSICAL DATA | | | | | | | | PHOTIC ZONE DATA | | | | | | | Total Suspended Solids mg/L | Turbidity NTU | Total Hardness mg/L |
|--------------------|-----------------------|------------------|---------|---------------|---------|----------------|----------------|-------------|------------------|----------|----------|----------|-----------|-------------------|---------|-----------------------------|---------------|---------------------|
| | Date | Sampling Station | DO mg/L | Water Temp °C | pH s.u. | Cond. µmhos/cm | Secchi Depth m | Percent SAT | TP mg/L | TKN mg/L | NH3 mg/L | NOX mg/L | Chla µg/L | Total Solids mg/L | | | | |
| THORPE RESERVOIR | June 12, 2024 | LTN015L | 8.6 | 22.3 | 6.5 | 20.0 | 3.0 | 111.9% | 0.03 U | 0.4 U,J2 | 0.05 U | 0.03 U | 6.1 | 14.0 | 2.5 U | 1.5 | | |
| | June 12, 2024 | LTN015N | 8.8 | 21.7 | 7.1 | 21.0 | 2.5 | 112.9% | 0.03 U | 0.4 U,J2 | 0.05 U | 0.03 U | 7.3 | 12.0 | 2.5 U | 1.5 | | |
| | June 12, 2024 | LTN015P | 8.8 | 21.9 | 6.4 | 20.0 | 2.5 | 113.3% | 0.03 U | 0.4 U,J2 | 0.05 U | 0.03 U | 7.8 | 15.0 | 2.5 U | 1.8 | | |
| | June 12, 2024 | LTN015R | 8.5 | 22.8 | 6.3 | 20.0 | 2.5 | 112.2% | 0.03 U | 0.4 U,J2 | 0.05 U | 0.03 U | 6.1 | 15.0 | 2.5 U | 1.8 | 4.0 | |
| | July 11, 2024 | LTN015L | 7.8 | 26.0 | 6.4 | 22.0 | 2.6 | 108.5% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 5.1 | 18.0 | 2.5 U | 1.6 | | |
| | July 11, 2024 | LTN015N | 7.9 | 25.4 | 6.3 | 22.0 | 2.7 | 108.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 5.4 | 15.0 | 2.5 U | 1.7 | | |
| | July 11, 2024 | LTN015P | 7.7 | 25.9 | 6.7 | 22.0 | 2.8 | 107.0% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 6.4 | 18.0 | 2.5 U | 2.0 | | |
| | July 11, 2024 | LTN015R | 7.6 | 26.4 | 7.2 | 22.0 | 2.8 | 107.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 7.0 | 19.0 | 2.5 U | 1.8 | 5.0 | |
| | August 6, 2024 | LTN015L | 7.8 | 24.9 | 6.6 | 20.0 | 2.5 | 107.3% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 5.2 | 17.0 | 2.5 U | 1.2 | | |
| | August 6, 2024 | LTN015N | 7.7 | 26.6 | 6.6 | 22.0 | 2.5 | 109.4% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.7 | 19.0 | 2.5 U | 1.5 | | |
| | August 6, 2024 | LTN015P | 7.8 | 26.3 | 6.5 | 21.0 | 2.3 | 110.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.7 | 22.0 | 6.9 | 1.2 | | |
| | August 6, 2024 | LTN015R | 7.3 | 27.0 | 6.1 | 21.0 | 2.5 | 104.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 6.0 | 18.0 | 8.7 | 1.4 | 5.0 | |
| | September 12, 2024 | LTN015L | 7.4 | 22.8 | 6.9 | 20.0 | 3.0 | 96.6% | 0.03 UJ2 | 0.4 U | 0.05 U | 0.03 U | 6.4 | 31.0 | 2.5 U | 1.3 | | |
| | September 12, 2024 | LTN015N | 7.2 | 23.0 | 6.8 | 20.0 | 3.0 | 94.8% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 6.7 | 32.0 | 2.5 U | 1.2 | | |
| | September 12, 2024 | LTN015P | 7.2 | 23.1 | 6.8 | 20.0 | 3.0 | 95.5% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 6.9 | 32.0 | 2.5 U | 1.4 | | |
| | September 12, 2024 | LTN015R | 7.4 | 23.2 | 7.2 | 20.0 | 3.0 | 97.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 7.0 | 27.0 | 2.5 U | 1.3 | 10.0 | |
| | November 6, 2024 | LTN015L | 7.4 | 16.5 | 6.3 | 20.0 | 3.3 | 84.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 6.0 | 27.0 | 2.8 U,Y | 1.0 U | | |
| | November 6, 2024 | LTN015N | 7.7 | 16.7 | 6.3 | 18.0 | 3.6 | 88.8% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 6.0 | 31.0 | 2.5 U | 1.0 U | | |
| | November 6, 2024 | LTN015P | 8.1 | 16.6 | 6.4 | 19.0 | 3.6 | 93.5% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 9.0 | 25.0 | 2.5 U | 1.0 U | | |
| | November 6, 2024 | LTN015R | 8.3 | 18.0 | 7.2 | 19.0 | 3.2 | 98.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 8.4 | 22.0 | 2.5 U | 1.0 U | 6.5 | |
| | HUC 06010204 | | | | | | | | | | | | | | | | | |
| | LAKE FONTANA | June 11, 2024 | LTN031A | 9.2 | 25.4 | 8.4 | 25.0 | 4.0 | 119.2% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.03 U | 3.5 | 12 U | 2.5 U | 1.3 | |
| | | June 11, 2024 | LTN031B | 9.2 | 25.2 | 8.4 | 25.0 | 4.0 | 119.0% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.03 U | 5.2 | 12 U | 2.5 U | 1.2 | |
| | | June 11, 2024 | LTN031D | 9.1 | 24.6 | 8.3 | 24.6 | 4.0 | 117.1% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.03 U | 4.3 | 12 U | 2.5 U | 1.2 | |
| June 11, 2024 | | LTN031H | 8.9 | 24.6 | 7.9 | 23.0 | 4.0 | 114.2% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.03 U | 3.9 | 12 U | 2.5 U | 1 U | | |
| June 11, 2024 | | LTN031J | 9.1 | 23.6 | 7.6 | 23.0 | 4.0 | 114.5% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.03 U | 4.7 | 16.0 | 2.5 U | 1 U | 4.0 | |
| July 10, 2024 | | LTN031A | 9.0 | 28.6 | 7.7 | 27.0 | 3.8 | 122.9% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 6.0 | 27.0 | 2.5 U | 1.2 | | |
| July 10, 2024 | | LTN031B | 8.4 | 28.0 | 7.3 | 27.0 | 4.0 | 113.7% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 5.0 | 29.0 | 2.5 U | 1.1 | | |
| July 10, 2024 | | LTN031D | 8.0 | 28.5 | 7.2 | 25.0 | 3.9 | 109.3% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.5 | 20.0 | 2.5 U | 1 U | | |
| July 10, 2024 | | LTN031H | 8.0 | 28.3 | 7.3 | 24.0 | 4.2 | 109.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 5.5 | 21.0 | 2.5 U | 1 U | | |
| July 10, 2024 | | LTN031J | 7.9 | 28.6 | 6.9 | 23.0 | 4.6 | 108.4% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 5.6 | 21.0 | 2.5 U | 1 U | 6.0 | |
| August 8, 2024 | | LTN031A | 8.4 | 29.1 | 8.7 | 27.0 | 4.3 | 117.8% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 6.5 | 27.0 | 2.5 | 1.1 | | |
| August 8, 2024 | | LTN031B | 8.1 | 29.5 | 8.4 | 27.0 | 4.3 | 114.0% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 5.7 | 25.0 | 2.5 U | 1 U | | |
| August 8, 2024 | | LTN031D | 7.9 | 29.5 | 8.0 | 25.0 | 4.3 | 110.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.2 | 23.0 | 2.5 U | 1 U | | |
| August 8, 2024 | | LTN031H | 8.1 | 28.7 | 8.1 | 24.0 | 4.3 | 112.5% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.9 | 18.0 | 2.5 U | 1 U | | |
| August 8, 2024 | | LTN031J | 8.1 | 28.4 | 7.8 | 24.0 | 4.4 | 111.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.2 | 21.0 | 2.5 U | 1 U | 10.0 | |
| September 11, 2024 | | LTN031A | 7.8 | 26.2 | 7.6 | 24.0 | 4.3 | 101.1% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.9 | 31.0 | 2.5 U | 1 U | | |
| September 11, 2024 | | LTN031B | 7.9 | 26.2 | 7.6 | 24.0 | 4.4 | 102.7% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.4 | 33.0 | 2.5 U | 1 U | | |
| September 11, 2024 | | LTN031D | 7.9 | 26.2 | 7.6 | 23.0 | 4.3 | 103.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.9 | 25.0 | 2.5 U | 1 U | | |
| September 11, 2024 | | LTN031H | 8.0 | 25.8 | 7.3 | 22.0 | 4.3 | 103.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.2 | 34.0 | X3 | 1 U | | |
| September 11, 2024 | | LTN031J | 8.0 | 25.9 | 7.6 | 21.0 | 5.0 | 104.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.0 | 32.0 | X3 | 1 U | 12.0 | |
| November 5, 2024 | | LTN031A | 7.4 | 20.5 | 6.7 | 24.0 | 5.3 | 87.1% | 0.03 U | 0.4 U | 0.05 U | 0.04 | 4.1 | 14.0 | 2.5 U | 1 U | | |
| November 5, 2024 | | LTN031B | 7.4 | 20.1 | 6.7 | 24.0 | 4.8 | 86.0% | 0.03 U | 0.4 U | 0.05 U | 0.05 | 4.2 | 17.0 | 2.5 U | 1 U | | |
| November 5, 2024 | | LTN031D | 7.3 | 19.9 | 6.7 | 23.0 | 4.9 | 83.7% | 0.03 U | 0.4 U | 0.05 U | 0.06 | 3.4 | 13.0 | 2.5 U | 1 U | | |
| November 5, 2024 | | LTN031H | 7.4 | 19.6 | 6.7 | 23.0 | 5.6 | 85.1% | 0.03 U | 0.4 U | 0.05 U | 0.04 | 3.3 | 13.0 | 2.5 U | 1 U | | |
| November 5, 2024 | LTN031J | 7.1 | 19.6 | 6.7 | 23.0 | 6.5 | 81.2% | 0.03 U | 0.4 U | 0.05 U | 0.04 | 2.7 | 12 U | 2.5 U | 1.2 | 9.5 | | |
| LAKE CHEOAH | June 11, 2024 | LTN032B | 9.7 | 11.2 | 6.1 | 24.0 | >2.0 | 92.1% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.14 | 1.0 U | 16.0 | 2.5 U | 1 U | | |
| | June 11, 2024 | LTN032D | 9.0 | 11.2 | 6.6 | 22.0 | >6.5 | 85.9% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.13 | 1.0 U | 12.0 | 2.5 U | 1 U | | |
| | June 11, 2024 | LTN032F | 9.5 | 16.6 | 6.4 | 24.0 | 11.0 | 102.5% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.13 | 1.0 U | 20.0 | 2.5 U | 1 U | | |
| | July 9, 2024 | LTN032B | 9.3 | 10.9 | 6.3 | 24.0 | >3.0 | 88.0% | 0.03 U | 0.4 U | 0.05 U | 0.14 | 1.0 U | 23.0 | 2.5 U | 1 U | | |
| | July 9, 2024 | LTN032D | 9.5 | 18.1 | 6.0 | 23.0 | 4.0 | 105.0% | 0.03 U | 0.4 U | 0.05 U | 0.12 | 2.0 | 20.0 | 2.5 U | 1 U | | |
| | July 9, 2024 | LTN032F | 8.8 | 24.7 | 5.6 | 23.0 | 4.5 | 110.1% | 0.03 U | 0.4 U | 0.05 U | 0.11 | 2.6 | 20.0 | 2.5 U | 1 U | | |
| | August 7, 2024 | LTN032B | 8.7 | 11.6 | 6.7 | 25.0 | 3.0 | 84.1% | 0.03 U | 0.4 U | 0.05 U | 0.14 | 1.0 U | 21.0 | 2.5 U | 1 U | | |
| | August 7, 2024 | LTN032D | 8.9 | 18.4 | 6.7 | 24.0 | 7.5 | 100.1% | 0.03 U | 0.4 U | 0.05 U | 0.11 | 1.0 U | 22.0 | 2.5 U | 1 U | | |
| | August 7, 2024 | LTN032F | 8.9 | 18.1 | 7.2 | 24.0 | 5.7 | 99.3% | 0.03 U | 0.4 U | 0.05 U | 0.12 | 1.2 | 21.0 | 2.5 U | 1 U | | |
| | September 11, 2024 | LTN032B | 7.9 | 12.7 | 6.1 | 22.0 | >2.5 | 77.2% | 0.03 U | 0.4 U | 0.05 U | 0.13 | 1.0 U | 32.0 | 2.5 U | 1 U | | |
| | September 11, 2024 | LTN032D | 7.7 | 13.4 | 6.0 | 22.0 | >6.0 | 76.7% | 0.03 U | 0.4 U | 0.05 U | 0.13 | 1.0 U | 32.0 | 2.5 U | 1 U | | |
| | September 11, 2024 | LTN032F | 9.6 | 17.9 | 6.5 | 22.0 | 4.4 | 104.8% | 0.03 U | 0.4 UJ2 | 0.05 U | 0.10 | 3.3 | 34.0 | 2.5 U | 1 U | | |
| | November 5, 2024 | LTN032B | 8.7 | 19.2 | 6.7 | 23.0 | >2.5 | 98.7% | 0.03 U | 0.4 U | 0.05 U | 0.07 | 2.4 | 12 U | 2.5 U | 1 U | | |
| | November 5, 2024 | LTN032D | 5.9 | 17.8 | 6.4 | 24.0 | 5.0 | 64.3% | 0.03 U | 0.4 U | 0.05 U | 0.12 | 1.0 U | 12 U | 2.5 U | 1 U | | |
| | November 5, 2024 | LTN032F | 6.3 | 17.3 | 6.0 | 22.0 | 4.8 | 68.5% | 0.03 U | 0.4 U | 0.05 U | 0.12 | 1.0 U | 26.0 | 2.5 U | 1 U | | |

Appendix A – Little Tennessee River Basin Data

January 1, 2024 Through December 31, 2024

| Lake | SURFACE PHYSICAL DATA | | | | | | | | PHOTIC ZONE DATA | | | | | | Total Suspended Solids mg/L | Turbidity NTU | Total Hardness mg/L |
|-----------------|-----------------------|------------------|---------|---------------|---------|----------------|----------------|-------------|------------------|----------|----------|----------|-----------|-------------------|-----------------------------|---------------|---------------------|
| | Date | Sampling Station | DO mg/L | Water Temp °C | pH s.u. | Cond. µmhos/cm | Secchi Depth m | Percent SAT | TP mg/L | TKN mg/L | NH3 mg/L | NOX mg/L | Chla µg/L | Total Solids mg/L | | | |
| SANTEETLAH LAKE | June 12, 2024 | LTN037B | 8.3 | 25.1 | 7.1 | 27.0 | 4.0 | 107.7% | 0.03 U | 0.4 U | 0.05 U | 0.04 | 4.5 | 20.0 | 2.5 U | 1 U | |
| | June 12, 2024 | LTN037D | 8.2 | 24.7 | 7.1 | 23.0 | 4.2 | 106.0% | 0.03 U | 0.4 U | 0.05 U | 0.03 | 3.5 | 19.0 | 2.5 U | 1.3 | |
| | June 12, 2024 | LTN037E | 8.2 | 23.7 | 7.2 | 20.0 | 4.9 | 104.0% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.9 | 12 U | 2.5 U | 1.1 | |
| | July 10, 2024 | LTN037B | 7.7 | 28.0 | 6.8 | 24.0 | 3.6 | 105.8% | 0.03 U | 0.4 U | 0.05 U | 0.03 | 8.5 J4 | 26.0 | 2.5 U | 1.7 | |
| | July 10, 2024 | LTN037D | 7.3 | 28.6 | 6.9 | 22.0 | 4.2 | 101.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 | 5.5 J4 | 12 U | 2.5 U | 1 U | |
| | July 10, 2024 | LTN037E | 7.3 | 28.4 | 7.5 | 21.0 | 5.4 | 100.7% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 2.8 J4 | 18.0 | 2.5 U | 1 U | |
| | August 15, 2024 | LTN037B | 7.8 | 28.0 | 6.8 | 26.0 | 2.8 | 106.2% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.7 J4 | 23.0 | 2.5 U | 1.3 | |
| | August 15, 2024 | LTN037D | 7.7 | 27.5 | 6.7 | 23.0 | 4.5 | 103.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 4.4 | 20.0 | 2.5 U J2 | 1 U | |
| | August 15, 2024 | LTN037E | 7.6 | 27.2 | 6.7 | 21.0 | 5.0 | 101.6% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.6 | 14.0 | 2.5 U J2 | 1 U | |
| | September 12, 2024 | LTN037B | 7.6 | 24.6 | 6.3 | 27.0 | 3.6 | 96.9% | 0.03 U Q2 | 0.4 U | 0.05 U | 0.03 | 3.8 J4 | 30.0 | 2.5 U | 1 U | |
| | September 12, 2024 | LTN037D | 7.9 | 24.5 | 6.3 | 23.0 | 5.4 | 101.2% | 0.03 U Q2 | 0.4 U | 0.05 U | 0.03 U | 3.2 J4 | 30.0 | 2.5 U | 1 U | |
| | September 12, 2024 | LTN037E | 7.9 | 24.7 | 6.1 | 22.0 | 5.7 | 101.6% | 0.03 U Q2 | 0.4 U | 0.05 U | 0.03 U | 2.2 J4 | 24.0 | 2.5 U | 1.7 | |
| | November 7, 2024 | LTN037B | 8.5 | 19.6 | 6.6 | 23.0 | 3.6 | 98.8% | 0.03 U | 0.4 U | 0.05 U | 0.03 | 5.0 | 31.0 | 2.8 U Y | 1 U | |
| | November 7, 2024 | LTN037D | 8.3 | 19.6 | 6.9 | 21.0 | 4.4 | 96.7% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 1.0 U | 30.0 | 2.5 U | 1 U | |
| | November 7, 2024 | LTN037E | 8.4 | 19.4 | 6.6 | 20.0 | 5.0 | 96.9% | 0.03 U | 0.4 U | 0.05 U | 0.03 U | 3.4 | 26.0 | 2.5 U | 1 U | |
| CALDERWOOD LAKE | June 11, 2024 | LTN040 | 9.6 | 14.4 | 5.1 | 23.0 | 8.0 | 97.8% | 0.03 U | 0.4 U J2 | 0.05 U | 0.12 | 1.0 U | 22.0 | 2.5 U | 1 U | |
| | June 11, 2024 | LTN041 | 9.9 | 17.4 | 6.0 | 24.0 | 5.5 | 106.9% | 0.03 U | 0.4 U J2 | 0.05 U | 0.10 | 1.2 | 18.0 | 2.5 U | 1 U | |
| | July 9, 2024 | LTN040 | 9.0 | 20.1 | 5.6 | 23.0 | 4.6 | 102.9% | 0.03 U | 0.4 U | 0.05 U | 0.11 | 2.3 | 21.0 | 2.5 U | 1 U | |
| | July 9, 2024 | LTN041 | 9.1 | 23.8 | 6.1 | 24.0 | 4.0 | 111.5% | 0.03 U | 0.4 U | 0.05 U | 0.09 | 3.7 | 25.0 | 2.5 U | 1 U | |
| | August 7, 2024 | LTN040 | 8.8 | 20.7 | 6.7 | 24.0 | 5.0 | 102.2% | 0.03 U | 0.4 U | 0.05 U | 0.12 | 1.3 | 25.0 | 2.5 U | 1 U | |
| | August 7, 2024 | LTN041 | 8.6 | 25.1 | 6.9 | 25.0 | 5.0 | 108.8% | 0.03 U | 0.4 U | 0.05 U | 0.09 | 2.6 | 27.0 | 3.9 | 1 U | |
| | September 11, 2024 | LTN040 | 9.0 | 14.5 | 6.2 | 22.0 | 5.0 | 91.8% | 0.03 U Q2 | 0.4 U | 0.05 U | 0.12 | 1.2 | 23.0 | 2.5 U | 1 U | |
| | September 11, 2024 | LTN041 | 9.5 | 17.9 | 6.4 | 22.0 | 5.0 | 103.9% | 0.03 U Q2 | 0.4 U | 0.05 U | 0.10 | 2.0 | 32.0 | 2.5 U | 1 U | |
| | November 5, 2024 | LTN040 | 5.9 | 17.1 | 6.4 | 23.0 | 5.0 | 63.2% | 0.03 U | 0.4 U | 0.05 U | 0.11 | 1.0 U | 14.0 | 2.5 U | 1 U | |
| | November 5, 2024 | LTN041 | 7.3 | 17.3 | 6.2 | 23.0 | 4.8 | 79.0% | 0.03 U | 0.4 U | 0.05 U | 0.10 | 1.3 | 25.0 | 2.5 U | 1 U | |

Appendix B - NC DEQ WSS Lab
Data Qualifier Codes

NC DEQ WSS LAB
DATA QUALIFIER CODES

| Symbol | Definition |
|--|---|
| A | Value reported is the mean (average) of two or more determinations. This code is to be used if the results of two or more discrete and separate samples are averaged. These samples shall have been processed and analyzed independently (e.g. field duplicates, different dilutions of the same sample). This code is not required for BOD, coliform or acute/chronic metals reporting since averaging multiple results for these parameters is fundamental to those methods or manner of reporting. |
| | 1 The reported value is an average, where at least one result is qualified with a "U". The PQL is used for the qualified result(s) to calculate the average. |
| B | Results based upon colony counts outside the acceptable range and should be used with caution. This code applies to microbiological tests and specifically to membrane filter (MF) colony counts. It is to be used if less than 100% sample was analyzed and the colony count is generated from a plate in which the number of colonies exceeds the ideal ranges indicated by the method. These ideal ranges are defined in the method as: <i>Fecal coliform or Enterococcus bacteria: 20-60 colonies Total coliform bacteria: 20-80 colonies</i> |
| | 1 Countable membranes with less than 20 colonies. Reported value is estimated or is a total of the counts on all filters reported per 100 ml. |
| | 2 Counts from all filters were zero. |
| | 3 Countable membranes with more than 60 or 80 colonies. The value reported is calculated using the count from the smallest volume filtered and reported as a greater than ">" value. |
| | 4 Filters have counts of both >60 or 80 and <20. Reported value is estimated or is a total of the counts on all filters reported per 100 ml. |
| | 5 Too many colonies were present; too numerous to count (TNTC). TNTC is generally defined as >150 colonies. The numeric value represents the maximum number of counts typically accepted on a filter membrane (60 for fecal or enterococcus and 80 for total), multiplied by 100 and then divided by the smallest filtration volume analyzed. This number is reported as a greater than value. |
| | 6 Estimated Value. Blank contamination evident. |
| | 7 Many non-coliform or non-enterococcus colonies or interfering non-coliform or non-enterococcus growth present. In this competitive situation, the reported value may under-represent actual density. |
| Note: A "B" value shall be accompanied by justification for its use denoted by the numbers listed above (e.g., B1, B2, etc.). Note: A "J2" should be used for spiking failures. | |
| C | Total residual chlorine was present in sample upon receipt in the laboratory; value is estimated . Generally applies to cyanide, phenol, NH3, TKN, coliform, and organics. |
| G | A <u>single</u> quality control failure occurred during biochemical oxygen demand (BOD) analysis. The sample results should be used with caution. |
| | 1 The dissolved oxygen (DO) depletion of the dilution water blank exceeded 0.2 mg/L. |
| | 2 The bacterial seed controls did not meet the requirement of a DO depletion of at least 2.0 mg/L and/or a DO residual of at least 1.0 mg/L. |
| | 3 No sample dilution met the requirement of a DO depletion of at least 2.0 mg/L and/or a DO residual of at least 1.0 mg/L. |
| | 4 Evidence of toxicity was present. This is generally characterized by a significant increase in the BOD value as the sample concentration decreases. The reported value is calculated from the highest dilution representing the maximum loading potential and should be considered an estimated value. |
| | 5 The glucose/ glutamic acid standard exceeded the range of 198 ± 30.5 mg/L. |
| | 7 Less than 1 mg/L DO remained for all dilutions set. The reported value is an estimated greater than value and is calculated for the dilution using the least amount of sample. |
| | 8 Oxygen usage is less than 2 mg/L for all dilutions set. The reported value is an estimated less than value and is calculated for the dilution using the most amount of sample. |
| | 9 The DO depletion of the dilution water blank produced a negative value. |
| | 10 The cBOD value is greater than the BOD value. |
| Note: A "G" value shall be accompanied by justification for its use denoted by the numbers listed above (e.g., G1, G2, etc.). | |

Appendix B - NC DEQ WSS Lab
Data Qualifier Codes

NC DEQ WSS LAB
DATA QUALIFIER CODES

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|--|--|
| J | Estimated value; value may not be accurate. This code is to be used in the following instances: |
| | 1 Surrogate recovery limits have been exceeded. |
| | 2 The reported value failed to meet the established quality control criteria for either precision or accuracy. |
| | 3 The sample matrix interfered with the ability to make any accurate determination. |
| | 4 The data is questionable because of improper laboratory or field protocols (e.g., composite sample was collected instead of grab, plastic instead of glass container, the sample's extraction batch did not include a LCS/MS/MSD, etc.). |
| | 5 Temperature limits exceeded (samples frozen or >6°C) during transport or not verifiable (e.g., no temperature blank provided): non-reportable for NPDES compliance monitoring. |
| | 6 The laboratory analysis was from an unpreserved or improperly chemically preserved sample. The data may not be accurate. |
| | 7 This qualifier is used to identify analyte concentration exceeding the upper calibration range of the analytical instrument/method. The reported value should be considered estimated. |
| | 8 Temperature limits exceeded (samples frozen or >6°C) during storage, the data may not be accurate. |
| | 9 The reported value is determined by a one-point estimation rather than against a regression equation. The estimated concentration is less than the laboratory PQL and greater than the laboratory method detection limit. |
| | 10 Unidentified peak; estimated value. |
| | 11 The reported value is determined by a one-point estimation rather than against a regression equation. The estimated concentration is less than the laboratory PQL and greater than the instrument noise level. This code is used when an MDL has not been established for the analyte in question. |
| | 12 The calibration verification did not meet the calibration acceptance criterion for field parameters. |
| | 13 Standards used for this analyte are from an uncertified source. These are the only standards currently available for the analyte. |
| | 14 Blank surrogate(s) percent recovery failed low. Potential contamination cannot be ruled out. This means associated sample results may be biased high. This qualifier is only to be used for samples which have target analyte results >PQL. |
| 15 This result has no supporting QA/QC data. | |
| <u>Note:</u> A "J" value shall be accompanied by justification for its use denoted by the numbers listed above (e.g., J1, J2, etc.). | |
| M | Sample and duplicate results are "out of control". The sample is non-homogenous (e.g., VOA soil). The reported value is the lower value of duplicate analyses of a sample. |
| N | Presumptive evidence of presence of material; estimated value. This code is to be used if: |
| | 1 The component has been tentatively identified based on mass spectral library search. 3 This code shall be used if the level is too low to permit accurate quantification, but the estimated concentration is less than the laboratory PQL and greater than the laboratory method detection limit. This code is not routinely used for most analyses. |
| P | Sample dilution occurred due to either matrix interference or target analytes being present at concentrations greater than the calibration curve. Reported target analyte values are obtained from results which were bracketed by the calibration curve. For example, "P10" in sample comments would indicate that a 10x dilution was performed to obtain the reported result. |
| Q | Holding time exceeded. These codes shall be used if the value is derived from a sample that was received, prepared and/or analyzed after the approved holding time restrictions for sample preparation and analysis. The value does not meet NPDES requirements. |
| | 1 Holding time exceeded prior to receipt by lab. 2 Holding time exceeded following receipt by lab. |
| S | Not enough sample provided to prepare and/or analyze a method-required matrix spike (MS) and/or matrix spike duplicate (MSD). |
| U | Indicates that the analyte was analyzed for, but not detected above the reported PQL. The number value reported with the "U" qualifier is equal to the laboratory's PQL*. If the "P" qualifier is reported with this "U" qualifier, then the reported PQL is elevated. |
| UU | Indicates that the analyte result was generated from a screen analysis (i.e., does not have supporting QA/QC data). The value reported with the "UU" qualifier is equal to the laboratory's PQL. The number value was determined by a one-point estimation at the PQL, rather than against a regression equation. |

Appendix B - NC DEQ WSS Lab
Data Qualifier Codes

**NC DEQ WSS LAB
DATA QUALIFIER CODES**

| | |
|---|---|
| V | Indicates the analyte was detected in both the sample and the associated blank. Note: The value in the blank shall not be subtracted from the associated samples. |
| | 1 The analyte was detected in both the sample and the method blank. |
| | 2 The analyte was detected in both the sample and the field blank. |
| X | Sample not analyzed for this constituent. This code is to be used if: |
| | 1 Sample not screened for this compound. |
| | 2 Sampled, but analysis lost or not performed-field error. |
| | 3 Sampled, but analysis lost or not performed-lab error. |
| | Note: an "X" value shall be accompanied by justification for its use by the numbers listed. |
| Y | Elevated PQL due to insufficient sample size. |
| Z | The sample analysis/results are not reported due to: |
| | 1 Inability to analyze the sample. |
| | 2 Questions concerning data reliability. |
| | Note: The presence or absence of the analyte cannot be verified. |

Supporting Definitions listed below

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| MDL | A Method Detection Limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the true value is greater than zero and is determined in accordance with 40 CFR Part 136, Appendix B. |
| ML | Minimum Levels are used in some EPA methods. A Minimum Level (ML) is the lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that all method - specified sample weights, volumes, and cleanup procedures have been employed. The ML is calculated by multiplying the MDL by 3.18 and rounding the result to the nearest factor of 10 multiple (i.e., 1, 2, or 5). For example, MDL = 1.4 mg/L; ML = 1.4 mg/L x 3.18 = 4.45 rounded to the nearest factor of 10 multiple (i.e., 5) = 5.0 mg/L |
| PQL | The Practical Quantitation Limit (PQL) is defined as the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. PQLs are subjectively set at some multiple of typical MDLs for reagent water (generally 3 to 10 times the MDL depending upon the parameter or analyte and based on the analyst's best professional judgement, the quality and age of the instrument and the nature of the samples) rather than explicitly determined. PQLs may be nominally chosen within these guidelines to simplify data reporting and, where applicable, are generally equal to the concentration of the lowest non-zero standard in the calibration curve. PQLs are adjusted for sample size, dilution and % moisture. For parameters that are not amenable to MDL studies, the PQL may be defined by the sample volume and buret graduations for titrations or by minimum measurement values set by the method for method-defined parameters (e.g., BOD requires a minimum DO depletion of 2.0 mg/L, fecal coliform requires a minimum plate count of 20 cfu, total suspended residue requires a minimum weight gain of 2.5 mg, etc.). Additionally, some EPA methods prescribe Minimum Levels (MLs) and the lab may set the PQL equal to this method-stated ML. Determination of PQL is fully described in the laboratory's analytical Standard Operating Procedure (SOP) document. |