FALLS LAKE ANNUAL REPORT
2022

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER RESOURCES
WATER SCIENCES SECTION

THIS REPORT HAS BEEN APPROVED FOR RELEASE

Christopher Johnson

Chris Johnson
Chief, Water Sciences Section

DATE: 11/03/2023

Division of Water Resources

Study for the Ongoing Assessment of Water Quality in Falls of the Neuse Reservoir: 2022 Results.

Purpose

The objective of this study is to evaluate progress in the attainment of water quality standards and use support in Falls of the Neuse Reservoir (WS-IV, B; NSW, CA) as required by the Falls Lake water supply nutrient strategy (15A NCAC 02B.0275) (i.e., the "Falls Lake Rules"). Station L101 was added in April of 2011. This report summarizes sample results collected in 2022.

Methods

Study Plan for the Ongoing Assessment of Falls of the Neuse Reservoir. A total of eleven monitoring stations on Falls Lake were sampled monthly in 2022 (Figure 1). All samples were collected in accordance with ISB's *Standard Operating Procedures Manual: Physical and Chemical Monitoring v2.1, Dec. 2013* and *Ambient Lakes Quality Assurance Project Plan v2.0, March 2014*. Chemical samples were collected as a composite from the photic zone, defined here as the range from the water surface to a depth equal to two times the secchi depth. Each composite sample was analyzed for total phosphorus (TP), total nitrogen (TN), ammonia (NH_3), nitrate + nitrite (NO_3+NO_2), total Kjeldahl nitrogen (TKN), turbidity, and chlorophyll *a* (Chl-α) except for NEU013, due to high turbidity interference at this location. Field duplicate samples were collected at one station per sampling event on a rotating schedule. Depth-stratified physical parameters were collected at the surface (0.15 m), then in one-meter (m) increments to a depth of 10.0 m, and every 5.0 m thereafter. Physical measurements of dissolved oxygen (DO), temperature, pH, and conductivity were collected with a multiparameter sonde. Surface readings (0.15m) for physical parameters were used in the following data analysis. Additional parameters collected at select sites include total residue, suspended residue, and phytoplankton.

Results

One-year summary results are presented by station for the two management areas: Lower Falls Lake (Figure 2) and Upper Falls Lake (Figure 3). The tables display annual mean, minimum, and maximum concentrations for TP (mg/L), TN (mg/L), Chl-α (µg/L), and turbidity (NTU) from the photic zone; DO (mg/L) and pH (s.u.) from surface readings. Data summaries are calculated from 12 sampling events (n) for all sites. Qualified data due to improper laboratory and/or field quality assurance protocols were excluded from this report. The removal of qualified Chl-α data resulted in a sample size (n) of 11 for NEU020D, 10 for NEU019E, NEU018E, LC01, NEU0171B, LLC01, and 9 for NEU019P, NEU019L and LI01. Percent exceedance of state surface water quality standards (freshwater) is represented for each station below. Exceedance is defined by Chl-α > 40 ug/L; turbidity ≥ 25 NTU; DO < 4 mg/L; pH ≥ 9 or ≤ 6 s.u. All nitrate + nitrite and ammonia data below analytical detection limit (≤ 0.02 mg/L) were quantified as 0.01 mg/L to calculate TN values. Results for additional parameters not provided in this report are available upon request. Please direct any question or comments to the Intensive Survey Branch Supervisor at 919-743-8496 or Email sean.buczek@deq.nc.gov.

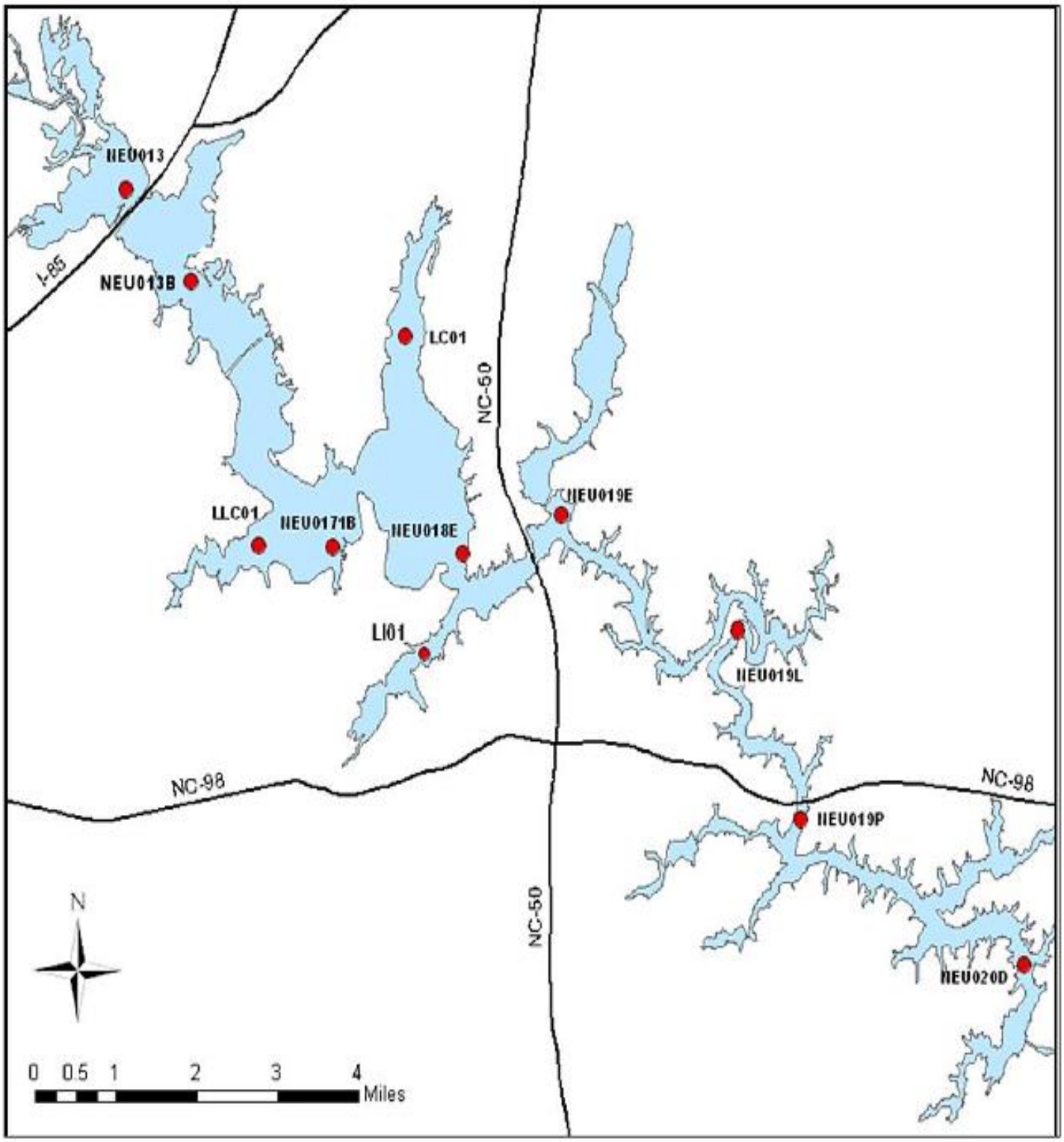

Figure 1: Falls Lake Monitoring Stations

NEU019E						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	10	12	12	12
Mean	0.04	0.83	37.0	7.01	9.07	7.16
Min	0.03	0.62	27.0	4.20	6.10	5.70
Max	0.06	1.01	56.0	10.00	13.00	7.90
n > Standard			2	0	0	1
% Exceedance			20.0%	0.0%	0.0%	8.3%
% Confidence			73.6%	n/a	n/a	28.2%

NEU019L						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	9	12	12	12
Mean	0.03	0.71	31.5	5.53	8.61	7.11
Min	0.02	0.40	15.0	3.00	5.90	5.90
Max	0.05	12.93	61.0	12.00	13.10	8.00
n > Standard			3	0	0	1
% Exceedance			33.3%	0.0%	0.0%	8.3%
% Confidence			94.7%	n/a	n/a	28.2%

NEU01P						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	9	12	12	12
Mean	0.03	0.71	33.1	5.23	8.78	7.10
Min	0.02	0.47	15.0	2.90	5.60	6.30
Max	0.04	0.92	67.0	9.10	12.60	7.80
n > Standard			3	0	0	0
% Exceedance			33.3%	0.0%	0.0%	0.0%
% Confidence			94.7%	n/a	n/a	n/a

NEU020D						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	11	12	12	12
Mean	0.03	0.67	21.8	4.49	8.27	7.05
Min	0.02	0.48	12.0	2.40	5.00	6.20
Max	0.04	0.89	50.0	7.90	12.40	7.80
n > Standard			1	0	0	0
% Exceedance			9.1%	0.0%	0.0%	0.0%
% Confidence			31.4%	n/a	n/a	n/a

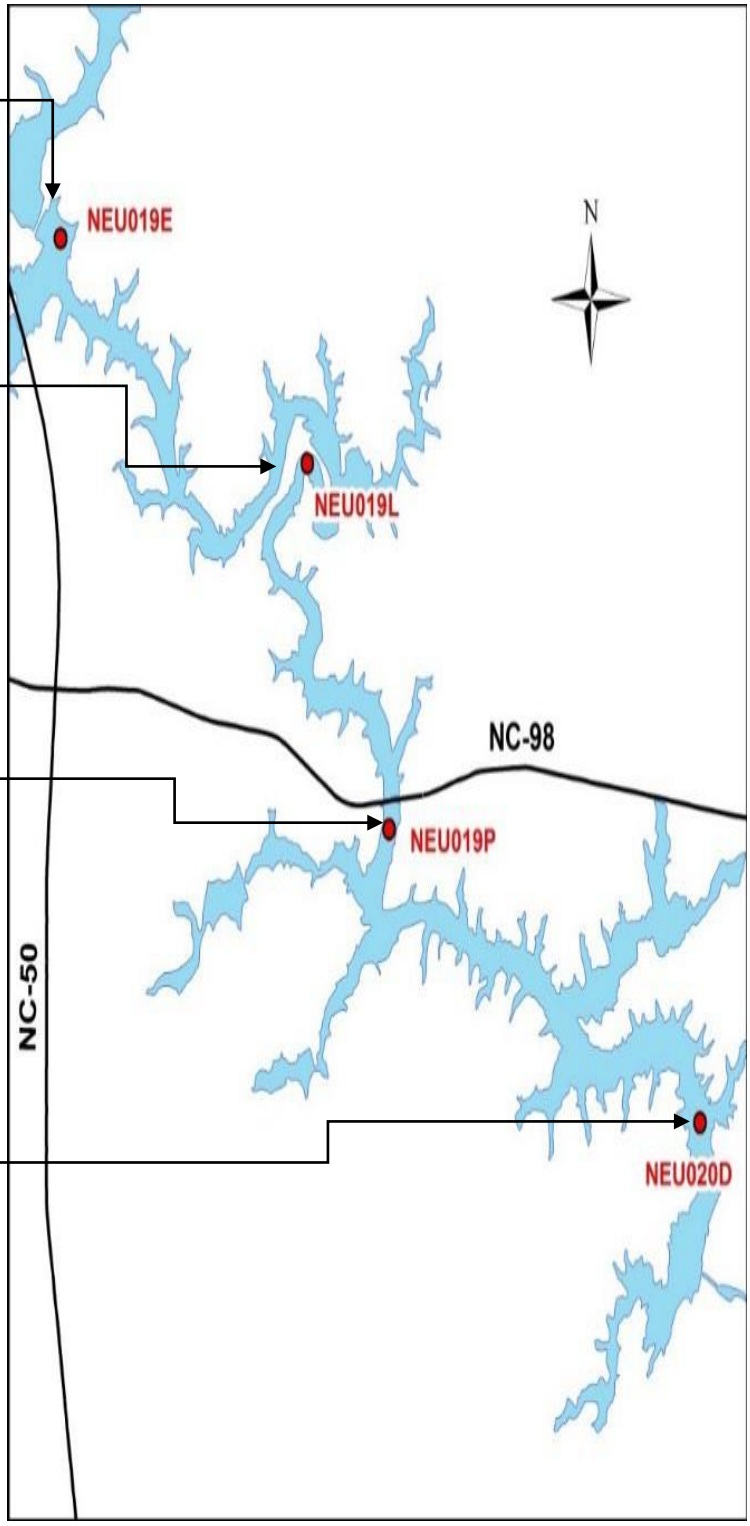

Figure 2: Lower Falls Lake Figure 3: Upper Falls Lake

Key for data tables:
n: number of sampling events
n>standard: number of times sample exceeds water quality standards chla >40 ug/L; turbidity >25 NTU; DO <4 mg/L; pH >9 or <6 s.u
% exceedance: percentage of samples that were in exceedance of water quality standards
% confidence: states the percent statistical confidence that the actual percentage of exceedances is greater than 10%. Low % confidence values are a result of a small sample size or exceedance values less than or equal to 10%.

NEU013						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	n/a	12	12	12
Mean	0.09	0.95	n/a	27.54	9.45	7.48
Min	0.07	0.49	n/a	21.00	5.80	6.80
Max	0.13	1.21	n/a	34.00	12.90	8.00
n > Standard			n/a	9	0	0
% Exceedance			n/a	75.0%	0.0%	0.0%
% Confidence			n/a	100.0%	n/a	n/a

NEU013B						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	10	12	12	12
Mean	0.05	0.81	33.8	8.62	9.16	7.47
Min	0.04	0.75	21.0	4.80	5.80	7.00
Max	0.06	0.92	51.0	13.00	12.50	8.00
n > Standard			3	0	0	0
% Exceedance			25.0%	0.0%	0.0%	0.0%
% Confidence			88.9%	n/a	n/a	n/a

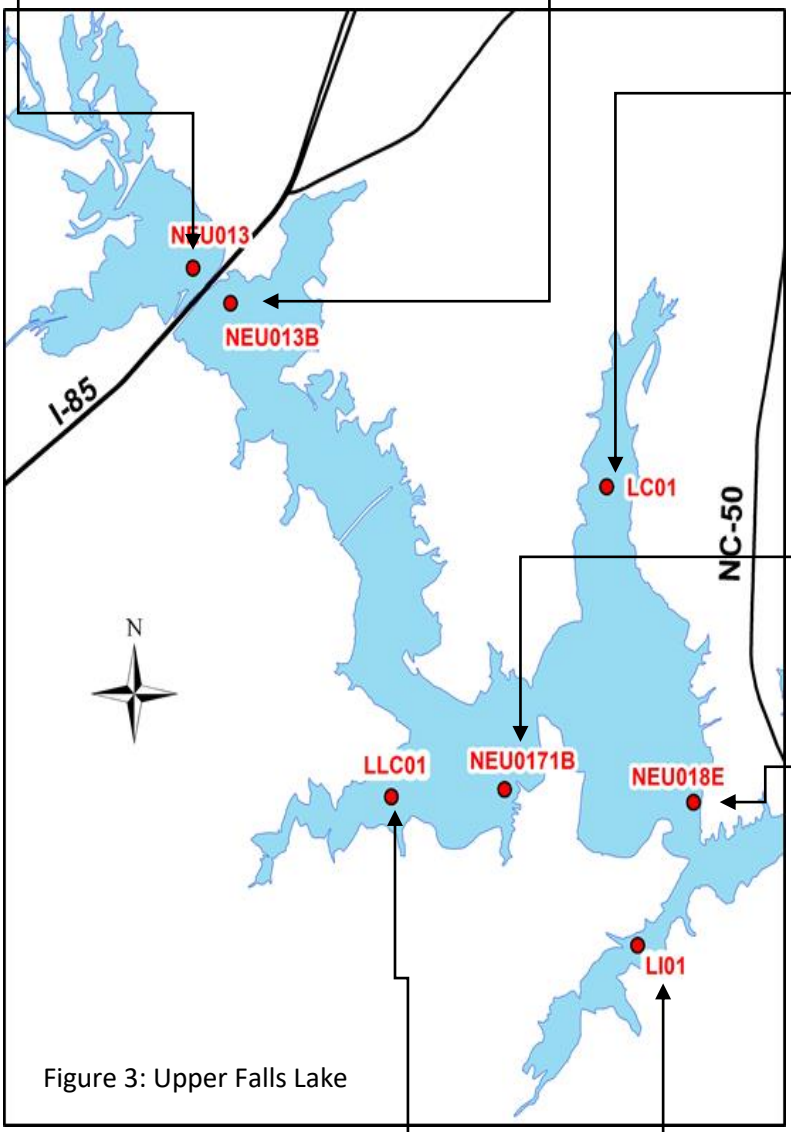

Figure 3: Upper Falls Lake

LC01						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	10	12	12	12
Mean	0.08	0.99	33.1	24.69	9.17	7.47
Min	0.06	0.66	21.0	16.00	5.30	6.90
Max	0.09	1.21	51.0	34.00	12.50	7.70
n > Standard			3	5	0	0
% Exceedance			30.0%	41.7%	0.0%	0.0%
% Confidence			93.0%	99.6%	n/a	n/a

NEU0171B						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	9	12	12	12
Mean	0.06	0.83	36.5	10.34	9.47	7.48
Min	0.05	0.67	21.0	4.90	6.10	7.00
Max	0.07	1.01	54.0	14.00	12.60	7.90
n > Standard			5	0.00	0.00	0.00
% Exceedance			50.0%	0.0%	0.0%	0.0%
% Confidence			100.0%	n/a	n/a	n/a

NUE018E						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	10	12	12	12
Mean	0.05	0.82	38.9	8.66	9.36	7.06
Min	0.03	0.49	22.0	4.40	6.60	5.10
Max	0.06	1.01	58.0	11.00	12.20	7.90
n > Standard			4	0	0	1
% Exceedance			40.0%	0.0%	0.0%	8.3%
% Confidence			98.7%	n/a	n/a	28.2%

LLC01						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	10	12	12	12
Mean	0.06	0.83	38.4	11.55	9.36	7.44
Min	0.05	0.71	25.0	6.70	5.50	7.00
Max	0.07	1.01	52.0	17.00	12.70	7.90
n > Standard			6	0	0	0
% Exceedance			60.0%	0.0%	0.0%	0.0%
% Confidence			100.0%	n/a	n/a	n/a

LI01						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	9	12	12	12
Mean	0.05	0.05	33.9	10.85	9.24	6.96
Min	0.04	0.04	25.0	6.40	5.10	5.10
Max	0.06	0.06	48.0	18.00	12.30	7.70
n > Standard			3	0	0	1
% Exceedance			33.3%	0.0%	0.0%	8.3%
% Confidence			94.7%	n/a	n/a	28.2%