FALLS LAKE ANNUAL REPORT

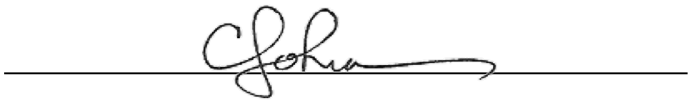
2024

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION OF WATER RESOURCES

WATER SCIENCES SECTION

THIS REPORT HAS BEEN APPROVED FOR RELEASE



Chris Johnson

Chief, Water Sciences Section

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Division of Water Resources

Study for the Ongoing Assessment of Water Quality in Falls of the Neuse Reservoir: 2024 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"). This report summarizes sample results collected in 2024.

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 2024 (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 (NH3), Nitrate + Nitrite (NO3+NO2), Total Kjeldahl Nitrogen (TKN), Turbidity, and Chlorophyll a (Chl-a) 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, Phytoplankton and Hardness.

Results

One-year summary results are presented by station for the three management areas: Upper Falls Lake (Figure 2), Mid/Upper Falls Lake (Figure 3) and Lower Falls Lake (Figure 4) and the entirety of the management areas (Figure 5). The tables display annual mean, minimum, and maximum concentrations for TP (mg/L), TN (mg/L), Chl-a (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 have been excluded from this report. Percent exceedance of state surface water quality standards (freshwater) is represented for each station below. Exceedance is defined by Chl-a > 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 Total Nitrogen (TN) values. Results for additional parameters not provided in this report is available upon request. Please direct any question or comments to the Intensive Survey Branch Supervisor, Jeff DeBerardinis at jeff.deberardinis@deq.nc.gov.

Falls Lake Monitoring Stations

Figure 1

Falls Lake, a 12,410-acre reservoir in Durham, Wake, and Granville counties, North Carolina, spans 28 miles along the Neuse River, originating from the Eno, Little, and Flat rivers, with a 175-mile shoreline. Named after the submerged Falls of the Neuse, it was formed by a U.S. Army Corps of Engineers dam, completed in 1981, to control flooding that once damaged roads, railroads, industries, and farms. The dam, an earthen structure 1,915 feet long and 92.5 feet high, sits at 291.5 feet above sea level. The lake supplies drinking water to Raleigh and nearby communities, manages floods, and offers recreation and wildlife habitat.

Upper Falls Lake Results

NEU013						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	N/A	12	12	12
Mean	0.07	0.97	N/A	30.70	8.42	6.16
Min	0.04	0.73	N/A	9.9	1.40	4.90
Max	0.12	1.23	N/A	75.00	10.90	7.40
n > Standard			N/A	7.00	1.00	5.00
% Exceedance			N/A	58.33%	8.33%	41.67%
% Confidence			N/A	99.99%	28.24%	99.57%

NEU013B						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	11	12	12	12
Mean	0.05	0.94	34.50	24.75	9.23	6.62
Min	0.03	0.68	12.00	10	4.20	5.20
Max	0.08	1.18	59.00	55.00	11.10	8.30
n > Standard			4.00	4.00	0.00	1.00
% Exceedance			36.36%	33.33%	0.00%	8.33%
% Confidence			98.15%	97.44%	N/A	28.24%

LLC01						
	TP	TN	Chl a	Turb	DO	pH
n	11	12	11	12	12	12
Mean	0.05	0.83	42.77	14.90	9.28	6.69
Min	0.03	0.73	13.00	6.50	5.70	5.70
Max	0.09	1.23	78.00	45.00	11.90	7.20
n > Standard			6.00	2.00	0.00	2.00
% Exceedance			54.55%	16.67%	0.00%	16.67%
% Confidence			99.97%	65.90%	N/A	65.90%

Figure 2

Key for tables:

- *n = number of sampling events*
- *n > Standard = number of times sample exceeds water quality standards: chl-a >40 ug/L; Turb > 25 NTU; DO < 4mg/L; Ph >9 or Ph <6 s.u*
- *% Exceedance = percentage of samples that were in exceedance of water quality standards.*
- *% Confidence = states the percents statistical 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%.*

Mid/Upper Falls Lake Results

LC01						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	11	12	12	12
Mean	0.04	0.80	38.95	11.50	9.44	6.80
Min	0.03	0.56	18.00	4.20	4.40	5.80
Max	0.07	1.08	66.00	34.00	12.10	7.90
n > Standard			6.00	1.00	0.00	2.00
% Exceedance			54.55%	8.33%	0.00%	16.67%
% Confidence			99.97%	28.24%	N/A	65.90%

NEU0171B						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	11	12	12	12
Mean	0.05	0.83	38.75	15.38	9.33	6.74
Min	0.03	0.62	8.20	6.2	6.00	5.50
Max	0.08	1.12	69.00	45.00	12.00	7.30
n > Standard			4.00	2.00	0.00	1.00
% Exceedance			36.36%	16.67%	0.00%	8.33%
% Confidence			98.15%	65.90%	N/A	28.24%

NEU018E						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	10	12	12	12
Mean	0.04	0.80	36.45	11.82	9.26	6.81
Min	0.03	0.59	11.00	5.3	5.80	5.10
Max	0.08	0.98	59.00	40.00	11.70	8.50
n > Standard			4.00	2.00	0.00	0.00
% Exceedance			40.00%	16.67%	0.00%	0.00%
% Confidence			98.72%	65.90%	N/A	N/A

LI01						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	10	12	12	12
Mean	0.05	0.82	37.55	22.86	9.34	6.87
Min	0.03	0.66	16.00	6.90	7.00	4.90
Max	0.12	1.04	56.00	95.00	11.60	8.20
n > Standard			4.00	3.00	0.00	2.00
% Exceedance			40.00%	25.00%	0.00%	16.67%
% Confidence			98.72%	88.91%	N/A	65.90%

Figure 3

Key for tables:

- **n = number of sampling events**
- **n > Standard = number of times sample exceeds water quality standards: chl-a >40 ug/L; Turb > 25 NTU; DO < 4mg/L; Ph >9 or Ph <6 s.u**
- **% Exceedance = percentage of samples that were in exceedance of water quality standards.**
- **% Confidence = states the percents statistical 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%.**

Lower Falls Lake Results

NEU019E						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	10	12	12	12
Mean	0.04	0.81	36.70	12.23	8.96	7.04
Min	0.03	0.69	15.00	4.8	5.30	6.20
Max	0.07	0.99	61.00	37.00	11.50	7.90
n > Standard			4.00	2.00	0.00	0.00
% Exceedance			40.00%	16.67%	0.00%	0.00%
% Confidence			98.72%	65.90%	N/A	N/A

NEU019L						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	10	12	12	12
Mean	0.04	0.80	35.85	12.54	8.26	6.98
Min	0.03	0.55	13.00	4.3	3.10	6.40
Max	0.08	1.00	82.00	38.00	10.50	7.60
n > Standard			3.00	2.00	1.00	0.00
% Exceedance			30.00%	16.67%	8.33%	0.00%
% Confidence			92.98%	65.90%	28.24%	N/A

NEU019P						
	TP	TN	Chl a	Turb	DO	pH
n	12	12	10	12	12	12
Mean	0.04	0.77	37.35	11.28	8.12	6.94
Min	0.03	0.44	15.00	4.2	3.30	6.40
Max	0.07	1.10	85.00	34.00	10.20	7.40
n > Standard			2.00	2.00	1.00	0.00
% Exceedance			20.00%	16.67%	8.33%	0.00%
% Confidence			73.61%	65.90%	28.24%	N/A

NEU020D						
	TP	TN	Chl a	Turb	DO	pH
n	11	12	10	12	12	12
Mean	0.04	0.73	30.80	8.94	8.41	7.01
Min	0.03	0.55	14.00	3.5	4.70	6.50
Max	0.06	0.93	53.00	21.00	11.30	7.80
n > Standard			2.00	1.00	0.00	0.00
% Exceedance			20.00%	8.33%	0.00%	0.00%
% Confidence			73.61%	28.24%	N/A	N/A

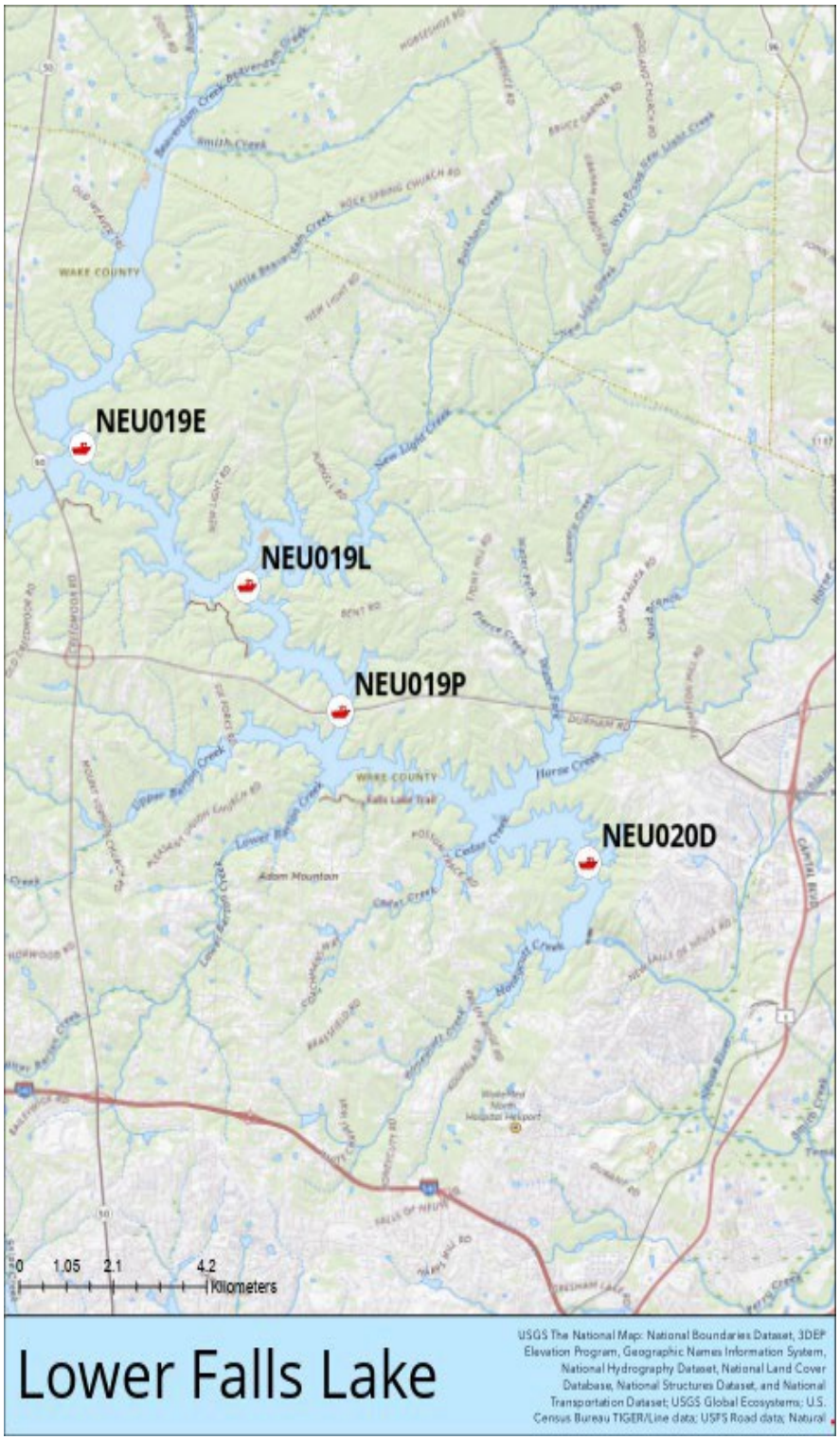

Figure 4

Key for tables:

- **n = number of sampling events**
- **n > Standard = number of times sample exceeds water quality standards: chl-a >40 ug/L; Turb > 25 NTU; DO < 4mg/L; Ph >9 or Ph <6 s.u**
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Falls Lake Results

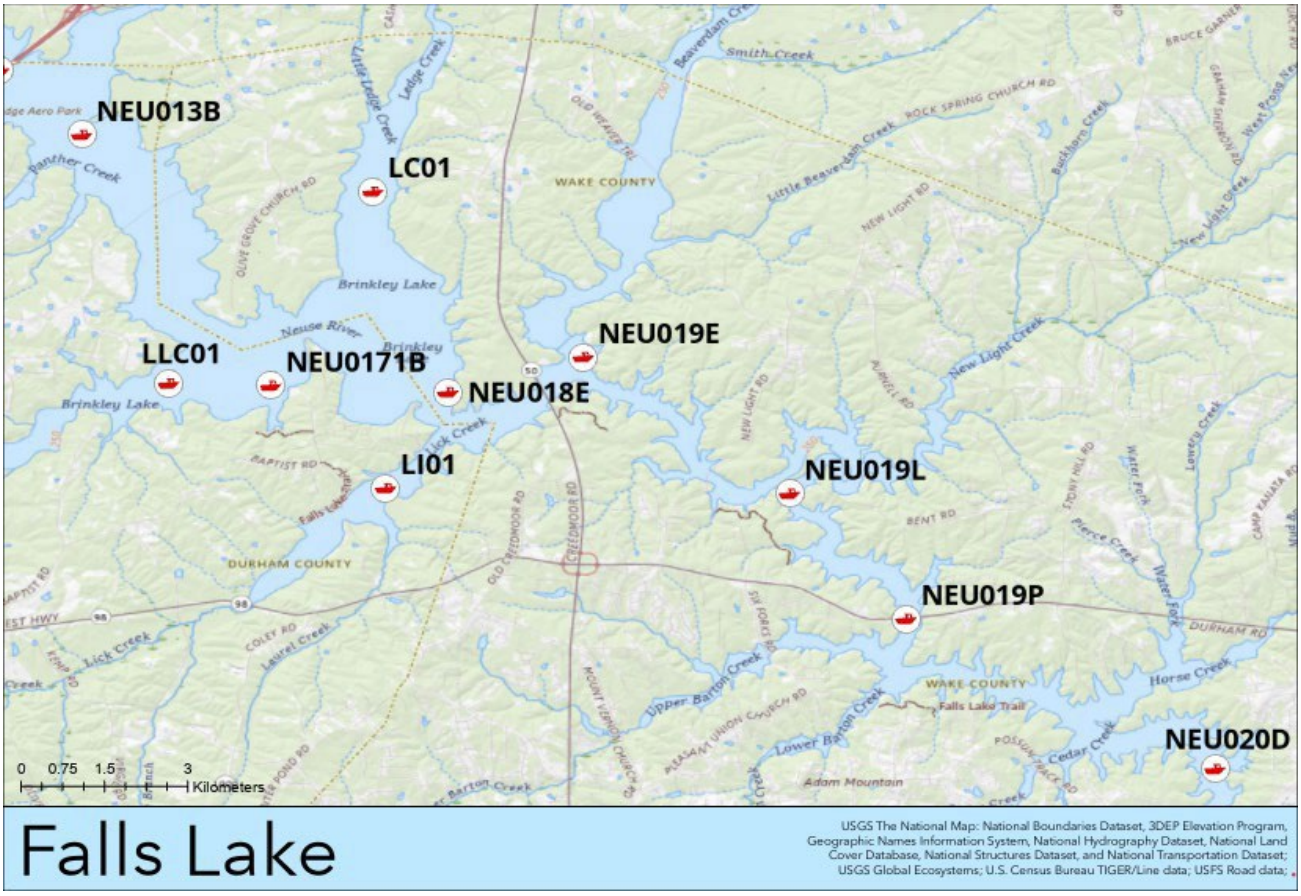

Figure 5

FALLS LAKE						
	TP	TN	Chl a	Turb	DO	pH
n	130	132	105	132	132	132
Mean	0.05	0.83	37.37	16.08	8.91	6.79
Min	0.03	0.44	8.20	3.5	1.40	4.90
Max	0.12	1.23	85.00	95.00	12.10	8.50
n > Standard			16.00	27.00	3.00	14.00
% Exceedance			15.24%	20.45%	2.27%	10.61%
% Confidence			94.18%	99.97%	0.01%	54.98%

Key for tables:

- **n = number of sampling events**
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