

# FALLS LAKE ANNUAL REPORT 2023

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

THIS REPORT HAS BEEN APPROVED FOR RELEASE

A handwritten signature in black ink, appearing to read "C. Johnson", is written over a horizontal line.

Chris Johnson  
Chief, Water Sciences Section

DATE: \_\_\_\_\_

# Division of Water Resources

## Study for the Ongoing Assessment of Water Quality in Falls of the Neuse Reservoir: 2023 Results.

### Purpose

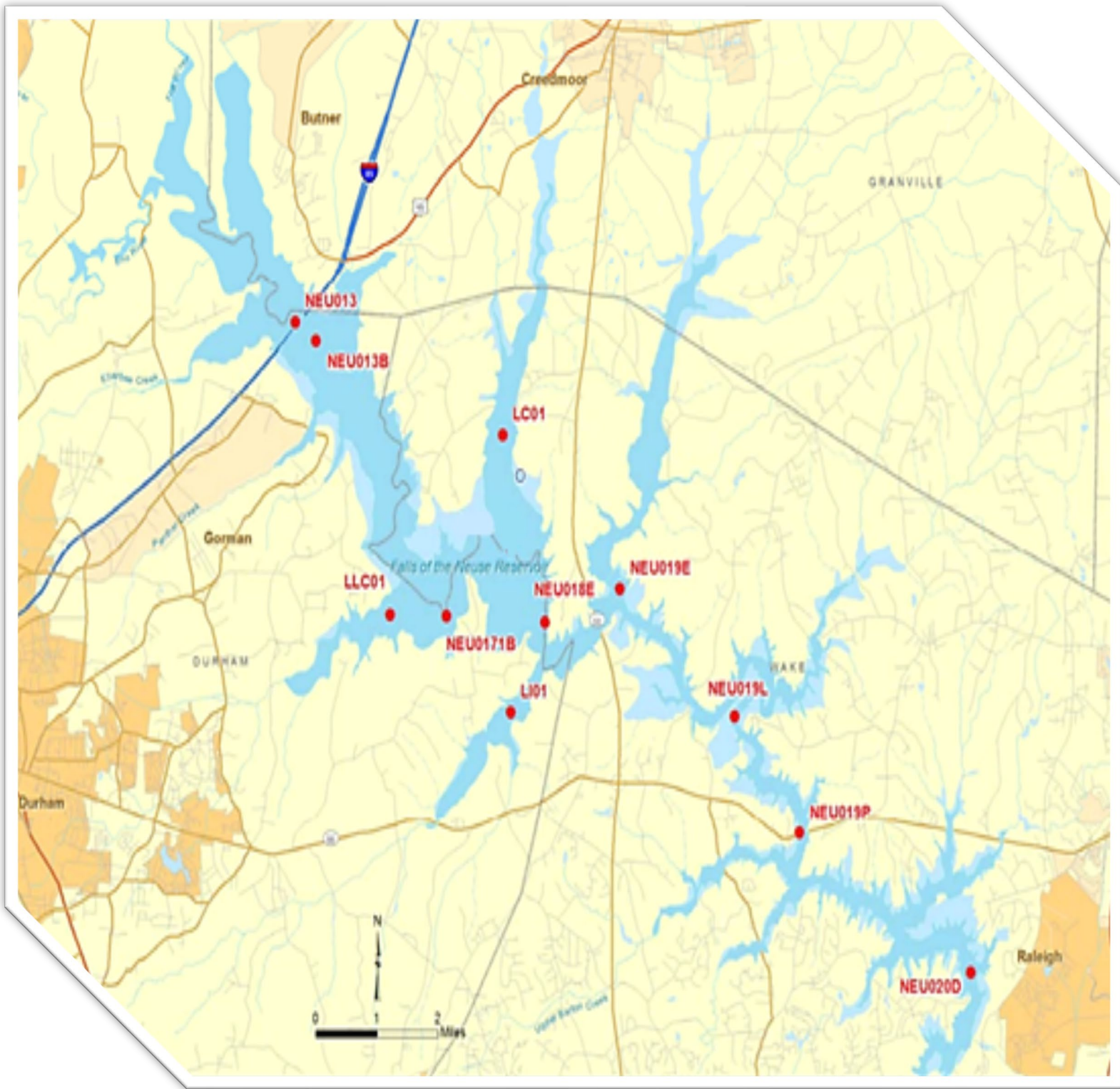
The objective of this study is to evaluate progress in the attainment of water quality standards and use support in Falls of the Neuse Reservoir (WS-IV, B; NSW, CA) as required by the Falls Lake water supply nutrient strategy (15A NCAC 02B.0275) (i.e., the “Falls Lake Rules”). This report summarizes sample results collected in 2023.

### 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 2023 (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<sub>3</sub>), nitrate + nitrite (NO<sub>3</sub>+NO<sub>2</sub>), 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, 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- $\alpha$  ( $\mu$ g/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. Percent exceedance of state surface water quality standards (freshwater) is represented for each station below. Exceedance is defined by Chl- $\alpha$  > 40  $\mu$ g/L; turbidity  $\geq$  25 NTU; DO < 4 mg/L; pH  $\geq$  9 or  $\leq$  6 s.u. All nitrate + nitrite and ammonia data below analytical detection limit ( $\leq$  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, Jeff Deberardinis at [jeff.deberardinis@deq.nc.gov](mailto:jeff.deberardinis@deq.nc.gov).



**Figure 1: Falls Lake Monitoring Stations**

Figure 2: Lower Falls Lake

NEU019E						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.04	0.88	32.8	6.35	9.05	7.60
Min	0.03	0.67	24.0	4.60	5.10	6.40
Max	0.06	1.13	44.0	12.00	11.60	8.70
n > Standard			1	0	0	0
% Exceedance			8.3%	0.0%	0.0%	0.0%
% Confidence			28.2%	N/A	N/A	N/A

NEU019L						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.04	0.83	30.9	5.85	8.51	7.48
Min	0.03	0.62	21.0	3.50	3.70	6.40
Max	0.05	1.03	40.0	9.90	11.70	8.20
n > Standard			0	0	1	0
% Exceedance			0.0%	0.0%	8.3%	0.0%
% Confidence			N/A	N/A	28.2%	N/A

NEU019P						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.04	0.86	30.5	5.43	8.52	7.45
Min	0.03	0.70	21.0	3.40	4.10	6.30
Max	0.06	1.23	43.0	8.60	11.50	8.50
n > Standard			1	0	0	0
% Exceedance			8.3%	0.0%	0.0%	0.0%
% Confidence			28.2%	N/A	N/A	N/A

NEU020D						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.03	0.79	25.3	4.76	8.70	7.46
Min	0.03	0.59	16.0	3.10	5.70	6.20
Max	0.05	1.23	47.0	7.90	11.10	8.60
n > Standard			1	0	0	0
% Exceedance			8.3%	0.0%	0.0%	0.0%
% Confidence			28.2%	N/A	N/A	N/A

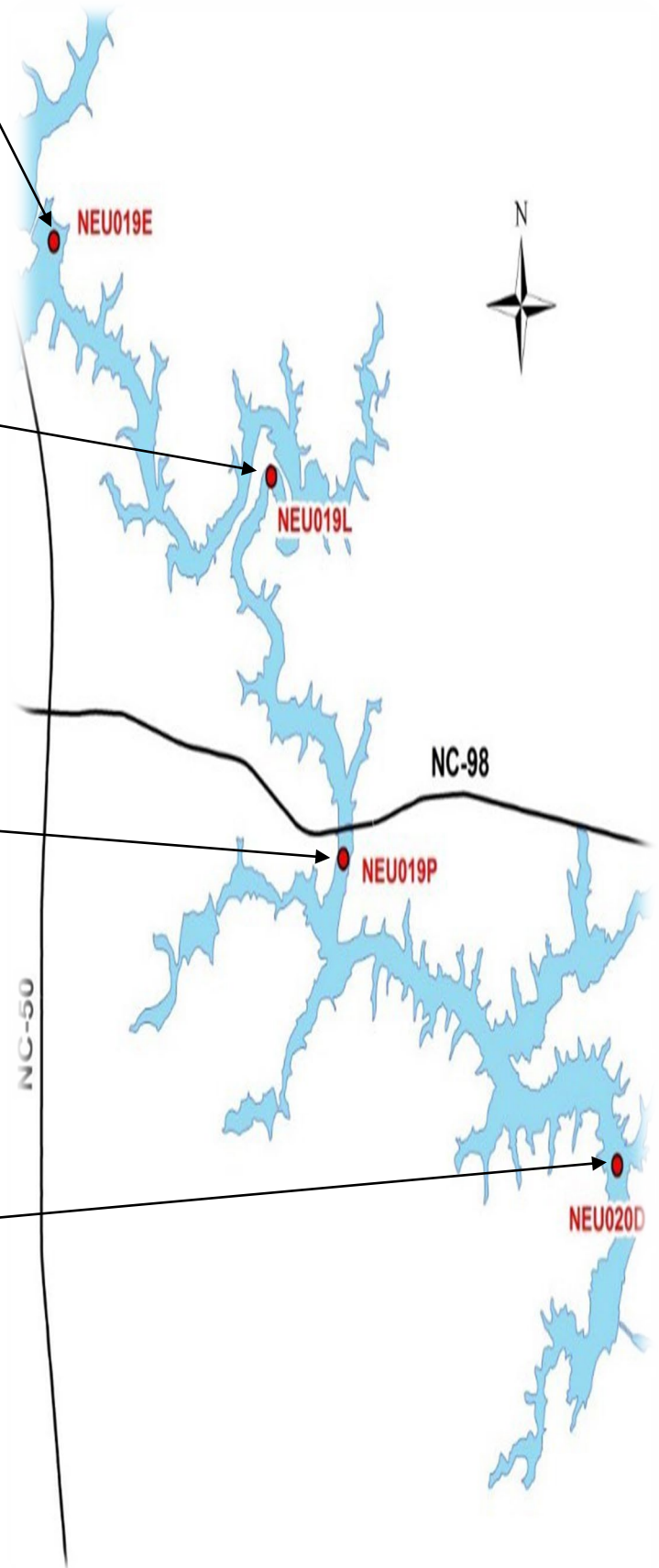


Figure 3: Upper Falls Lake

NEU013						
	TP	TN	Chl a	Turbidity	DO	pH
n	11	11	11	11	12	12
Mean	0.08	1.10	N/A	23.92	9.40	7.54
Min	0.04	0.77	N/A	15.00	6.90	6.60
Max	0.11	1.33	N/A	34.00	12.20	8.60
n > Standard			N/A	3	0	0
% Exceedance			N/A	27.3%	0.0%	0.0%
% Confidence			N/A	91.0%	N/A	N/A

NEU013B						
	TP	TN	Chl a	Turbidity	DO	pH
n	11	11	11	11	12	12
Mean	0.07	0.99	42.6	17.92	9.17	7.54
Min	0.06	0.78	19.0	14.00	6.40	6.60
Max	0.09	1.23	54.0	24.00	12.30	8.70
n > Standard			7	0	0	0
% Exceedance			63.6%	0.0%	0.0%	0.0%
% Confidence			100.0%	N/A	N/A	N/A

LLC01						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.05	0.93	41.4	11.16	9.58	7.59
Min	0.03	0.75	26.0	5.80	7.70	6.60
Max	0.07	1.23	66.0	17.00	11.70	8.60
n > Standard			7	0	0	0
% Exceedance			58.3%	0.0%	0.0%	0.0%
% Confidence			100.0%	N/A	N/A	N/A

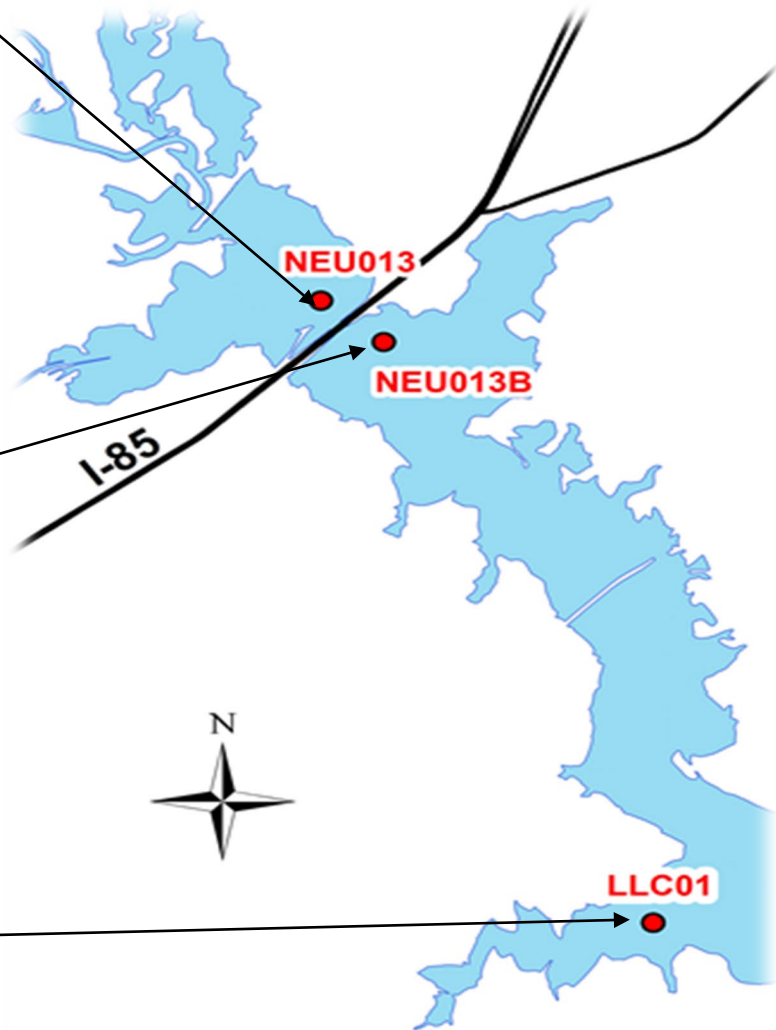


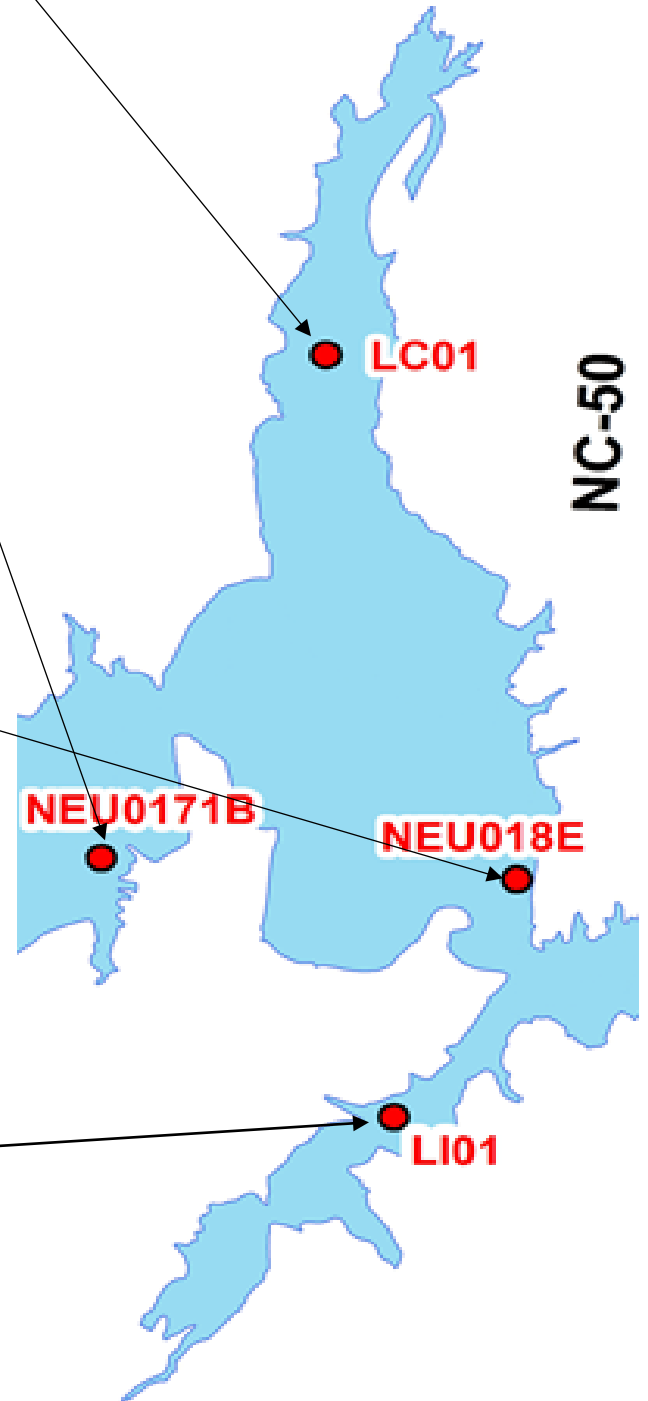
Figure 4: Mid/Upper Falls Lake

LC01						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.04	0.85	36.2	8.26	9.25	7.26
Min	0.03	0.67	24.0	4.30	5.70	5.70
Max	0.06	1.13	64.0	15.00	11.90	8.70
n > Standard			4	0	0	1
% Exceedance			33.3%	0.0%	0.0%	8.3%
% Confidence			97.4%	N/A	N/A	28.2%

NEU0171B						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.05	0.89	37.8	9.80	9.51	7.48
Min	0.03	0.60	22.0	5.70	7.60	6.40
Max	0.07	1.13	58.0	16.00	12.10	8.60
n > Standard			4	0	0	0
% Exceedance			33.3%	0.0%	0.0%	0.0%
% Confidence			97.4%	N/A	N/A	N/A

NEU018E						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.05	0.84	38.0	7.16	9.69	7.59
Min	0.03	0.73	24.0	4.80	7.00	6.30
Max	0.06	1.03	63.0	12.00	12.30	8.80
n > Standard			4	0	0	0
% Exceedance			33.3%	0.0%	0.0%	0.0%
% Confidence			97.4%	N/A	N/A	N/A

LI01						
	TP	TN	Chl a	Turbidity	DO	pH
n	12	12	12	12	12	12
Mean	0.05	0.85	36.5	17.76	9.31	7.60
Min	0.03	0.46	22.0	5.60	6.60	6.20
Max	0.08	1.03	49.0	95.00	11.90	8.90
n > Standard			4	2	0	0
% Exceedance			33.3%	16.7%	0.0%	0.0%
% Confidence			97.4%	N/A	N/A	N/A





FALLS LALKE						
	TP	TN	Chl a	Turbidity	DO	pH
<b>n</b>	<b>132</b>	<b>132</b>	<b>132</b>	<b>132</b>	<b>132</b>	<b>132</b>
<b>Mean</b>	<b>0.05</b>	<b>0.89</b>	<b>36.3</b>	<b>10.58</b>	<b>9.15</b>	<b>7.51</b>
<b>Min</b>	<b>0.03</b>	<b>0.46</b>	<b>16.0</b>	<b>3.10</b>	<b>3.70</b>	<b>5.70</b>
<b>Max</b>	<b>0.11</b>	<b>1.33</b>	<b>66.0</b>	<b>95.00</b>	<b>12.30</b>	<b>8.90</b>
<b>n &gt; Standard</b>			<b>33</b>	<b>5</b>	<b>1</b>	<b>1</b>
<b>% Exceedance</b>			<b>25.2%</b>	<b>3.5%</b>	<b>0.8%</b>	<b>0.8%</b>
<b>% Confidence</b>			<b>100.0%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>

Key for tables:

- n: number of sampling events
- n>standard: number of times sample exceeds water quality standards chl a > 40ug/L; Turbidity > 25NTU; DO < 4mg/L; Ph > 9 or < 6 S.U.
- % Exeedence: Percentage of samples that were in exeedence of water quality standards
- % Confidence: States the percent statistical cofidence that the actual percentage of exeedences is greater than 10%. Low % confidence values are a result of a small sample size or exeedence values less than 10%