Study for the Ongoing Assessment of Falls of the Neuse Reservoir 2015 Results

Purpose

The objective of this study is to evaluate progress in attainment of water quality standards and use support in Falls of the Neuse Reservoir (Falls Lake) as required by the Falls water supply nutrient strategy (15A NCAC 02B.0275) (i.e. the "Falls Lake Rules"). This report summarizes sample results collected in 2015.

Methods

A detailed study plan can be found <u>here</u>. A total of 12 monitoring stations were sampled monthly for one year. Chemical samples were collected from the photic zone and analyzed for total phosphorus (TP), total nitrogen (TN), total organic carbon, ammonia (NH₃), nitrate + nitrite (NO₃+NO₂), total Kjeldahl nitrogen (TKN), turbidity, and chlorophyll a (Chla). Duplicate samples were collected at one station per sampling event on a rotating schedule for quality control. Physical measurements of dissolved oxygen (DO), temperature, pH, and conductivity were collected through the water column in one meter (m) increments with a mulitparameter meter.

Results

One year summary results are presented by station in the two management areas, Lower Falls Lake (Figure 1) and Upper Falls Lake (Figure 2). These figures show annual mean, minimum, and maximum concentrations for TP (mg/L), TN (mg/L), Chla (μ g/L), and turbidity (NTU) from the photic zone; DO (mg/L) and pH (s.u.) from a depth of 0.15 m (surface sample). Data summaries are calculated from twelve sampling events (n = 12). Percent exceedance of state water quality standards are shown for each station. Exceedance is defined by Chla >40 ug/L; Turbidity >25 NTU; DO <4 mg/L; pH >9 or <6 s.u. All nitrate + nitrite and ammonia data below detection (< 0.02 mg/L) were quantified as 0.01 mg/L to calculate TN values.

Figure 1. Lower Falls Lake 2015 Results

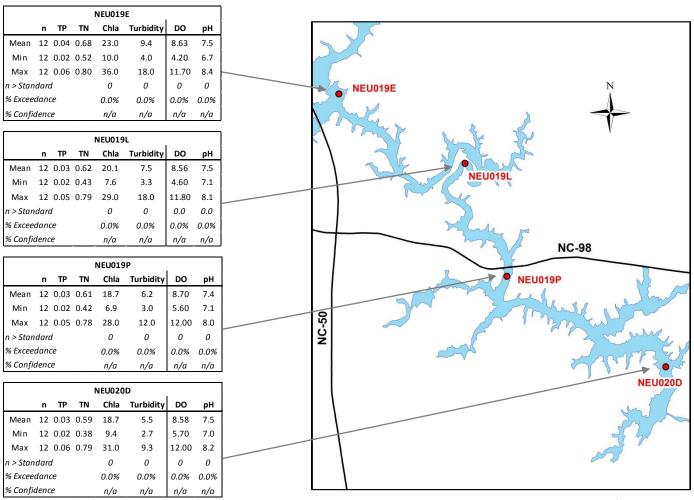


Figure 2. Upper Falls Lake 2015 Results

% Exceedance

% Confidence

0.0%

n/a

16.7%

65.9%

0.0% 0.0%

n/a

n/a

		NEU013B												
n TP TN	Chla Turbidity	DO pH		n TP	TN	Chla	Turbidity	DO	рН					
Mean 12 0.11 1.04	n/a 34.8	8.94 7.8	Mean	12 0.08	0.91	38.3	27.6	9.41	7.8					
Min 12 0.07 0.71	n/a 18.0	5.50 6.7	Min	12 0.05	0.74	23.0	11.0	5.90	7.2					
Max 12 0.20 1.61	n/a 65.0	13.60 9.0	Max	12 0.12	1.21	67.0	45.0	13.20	8.8					
n > Standard	n/a 9	0 0	n > Sta	ndard		3	8	0	0					
% Exceedance	n/a 75.0%	0.0% 0.0%	% Exce	edance		25.0%	66.7%	0.0%	0.0%					
% Confidence	n/a 100.0%	n/a n/a	% Conf	fidence		88.9%	100.0%	n/a	n/a					
											LC01		Ī	
			10						n TP	TN	Chla	Turbidity	DO	рН
132	/ //							Mean	12 0.05	0.73	24.8	11.6	8.67	7.6
1 m	/ //							Min	12 0.04	0.62	16.0	6.7	5.20	6.8
A RES		//						Max	12 0.06	0.82	39.0	17.0	12.70	8.3
	//							n > Star	ndard		0	0	0	0
50	H							% Excee			0.0%	0.0%	0.0%	0.0%
NEU	013							% Confi	dence		n/a	n/a	n/a	n/a
• /				4										
	•		1	The	X						NEU01	8C		
19	NEU013B		2	1					n TP	TN	Chla	Turbidity	DO	рН
85	1 255							Mean	12 0.05		26.1	11.0	8.90	7.6
1	Se The	S	7 7					Min	12 0.04		2.5	4.6	6.40	6.8
		wy.		ary)					12 0.06		43.0	17.0	12.40	8.4
	35		• 10	201				n > Star		0.03	1	0	0	0
		2	63	NC-50	Ш			% Excee			8.3%	0.0%	0.0%	0.0%
	3	J	1	Z	レ			% Confi			28.2%	n/a	n/a	n/a
N	{	1			П			70 00 mj.				.,,	, «	
A	2	C R	NEU018	A F	(,		ĺ				NEUGA	0.5		
	24		NEODIO	- E	\				TD		NEU018	8E Turbidity	DO	
														pН
V		2							n TP	TN		-		
V	L	LC01 NEU	0171B N	EU018E					12 0.08	0.72	27.4	10.5	9.35	7.8
V	L	LC01 NEU	0171B N	EU018E	\\			Min	12 0.08 12 0.04	0.72 0.61	27.4 9.9	10.5 5.3	9.35 6.60	7.8 7.1
V		LC01 NEU	0171B N	EU018E	1			Min Max	12 0.08 12 0.04 12 0.36	0.72 0.61	27.4 9.9 55.0	10.5 5.3 17.5	9.35 6.60 11.80	7.8 7.1 8.6
V		LC01 NEU	0171B N	EU018E	1			Min Max n > Stan	12 0.08 12 0.04 12 0.36 dard	0.72 0.61	27.4 9.9 55.0 1	10.5 5.3 17.5 0	9.35 6.60 11.80 <i>0</i>	7.8 7.1 8.6 <i>0</i>
V		LC01 NEU		2 hi	1			Min Max n > Stan % Excee	12 0.08 12 0.04 12 0.36 dard dance	0.72 0.61	27.4 9.9 55.0 1 8.3%	10.5 5.3 17.5 0 0.0%	9.35 6.60 11.80 0 0.0%	7.8 7.1 8.6 0 0.0%
V		LC01 NEU		EU018E				Min Max n > Stan	12 0.08 12 0.04 12 0.36 dard dance	0.72 0.61	27.4 9.9 55.0 1	10.5 5.3 17.5 0	9.35 6.60 11.80 <i>0</i>	7.8 7.1 8.6 <i>0</i>
V		LC01 NEU		2 hi				Min Max n > Stan % Excee	12 0.08 12 0.04 12 0.36 dard dance	0.72 0.61	27.4 9.9 55.0 1 8.3%	10.5 5.3 17.5 0 0.0%	9.35 6.60 11.80 0 0.0%	7.8 7.1 8.6 0 0.0%
V		LC01 NEU		2 hi				Min Max n > Stan % Excee	12 0.08 12 0.04 12 0.36 dard dance	0.72 0.61	27.4 9.9 55.0 1 8.3%	10.5 5.3 17.5 0 0.0% n/a	9.35 6.60 11.80 0 0.0%	7.8 7.1 8.6 0 0.0%
V		LC01 NEU		2 hi				Min Max n > Stan % Excee	12 0.08 12 0.04 12 0.36 dard dance	0.72 0.61 0.96	27.4 9.9 55.0 1 8.3% 28.2%	10.5 5.3 17.5 0 0.0% n/a	9.35 6.60 11.80 0 0.0%	7.8 7.1 8.6 0 0.0%
V		LC01 NEU		2 hi				Min Max n > Stan % Excee % Confid	12 0.08 12 0.04 12 0.36 dard dance dence	0.72 0.61 0.96	27.4 9.9 55.0 1 8.3% 28.2%	10.5 5.3 17.5 0 0.0% n/a	9.35 6.60 11.80 0 0.0% n/a	7.8 7.1 8.6 0 0.0% n/a
V		LC01 NEU		2 hi				Min Max n > Stan % Excee % Confid	12 0.08 12 0.04 12 0.36 dard dance dence	0.72 0.61 0.96 TN 0.73	27.4 9.9 55.0 1 8.3% 28.2% LI01 Chla	10.5 5.3 17.5 0 0.0% n/a	9.35 6.60 11.80 0 0.0% n/a	7.8 7.1 8.6 0 0.0% n/a
V		LC01 NEU		2 hi				Min Max n > Stan % Excee % Confid	12 0.08 12 0.04 12 0.36 dard dance dence	0.72 0.61 0.96 TN 0.73 0.59	27.4 9.9 55.0 1 8.3% 28.2% LI01 Chla 29.1	10.5 5.3 17.5 0 0.0% n/a Turbidity	9.35 6.60 11.80 0 0.0% n/a DO	7.8 7.1 8.6 0 0.0% n/a pH 7.7
V		LC01 NEU		2 hi				Min Max n > Stan % Excee % Confid	12 0.08 12 0.04 12 0.36 dard dance dence n TP 12 0.06 12 0.03 12 0.08	0.72 0.61 0.96 TN 0.73 0.59	27.4 9.9 55.0 1 8.3% 28.2% LI01 Chla 29.1 15.0	10.5 5.3 17.5 0 0.0% n/a Turbidity 18.1 7.0	9.35 6.60 11.80 0 0.0% n/a DO 9.10 6.80	7.8 7.1 8.6 0 0.0% n/a pH 7.7 6.8
V		LC01 NEU		2 hi				Min Max n > Stan % Excee % Confid	12 0.08 12 0.04 12 0.36 dard dance dence n TP 12 0.06 12 0.03 12 0.08	0.72 0.61 0.96 TN 0.73 0.59	27.4 9.9 55.0 1 8.3% 28.2% LI01 Chla 29.1 15.0 48.5	10.5 5.3 17.5 0 0.0% n/a Turbidity 18.1 7.0 36.0	9.35 6.60 11.80 0 0.0% n/a DO 9.10 6.80 11.60	7.8 7.1 8.6 0 0.0% n/a pH 7.7 6.8 8.4
V		LC01 NEU		2 hi				Min Max n > Stan % Excee % Confid Mean Min Max n > Stan	12 0.08 12 0.04 12 0.36 dard dance dence n TP 12 0.06 12 0.03 12 0.08 adard dance	0.72 0.61 0.96 TN 0.73 0.59	27.4 9.9 55.0 1 8.3% 28.2% LI01 Chla 29.1 15.0 48.5 2	10.5 5.3 17.5 0 0.0% n/a Turbidity 18.1 7.0 36.0 3	9.35 6.60 11.80 0 0.0% n/a DO 9.10 6.80 11.60 0	7.8 7.1 8.6 0 0.0% n/a pH 7.7 6.8 8.4 0
V		LC01 NEU		2 hi				Min Max n > Stan % Excee % Confid Mean Min Max n > Stan % Excee	12 0.08 12 0.04 12 0.36 dard dance dence n TP 12 0.06 12 0.03 12 0.08 adard dance	0.72 0.61 0.96 TN 0.73 0.59	27.4 9.9 55.0 1 8.3% 28.2% LIO1 Chla 29.1 15.0 48.5 2 16.7%	10.5 5.3 17.5 0 0.0% n/a Turbidity 18.1 7.0 36.0 3 25.0%	9.35 6.60 11.80 0 0.0% n/a DO 9.10 6.80 11.60 0	7.8 7.1 8.6 0 0.0% n/a pH 7.7 6.8 8.4 0 0.0%
V	LLCO1	LC01 NEU		2 hi		NEU017		Min Max n > Stan % Excee % Confid Mean Min Max n > Stan % Excee	12 0.08 12 0.04 12 0.36 dard dance dence n TP 12 0.06 12 0.03 12 0.08 adard dance	0.72 0.61 0.96 TN 0.73 0.59	27.4 9.9 55.0 1 8.3% 28.2% LIO1 Chla 29.1 15.0 48.5 2 16.7%	10.5 5.3 17.5 0 0.0% n/a Turbidity 18.1 7.0 36.0 3 25.0%	9.35 6.60 11.80 0 0.0% n/a DO 9.10 6.80 11.60 0	7.8 7.1 8.6 0 0.0% n/a pH 7.7 6.8 8.4 0 0.0%
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	LLC01 Chla Turbidity	DO pH	Mea	LIO1	TN 0.81	Chla	1B Turbidit	Min Max n > Stan % Excee % Confid Mean Min Max n > Stan % Excee % Confi	12 0.08 12 0.04 12 0.36 dard dance dence n TP 12 0.06 12 0.03 12 0.08 dard dance dence pH	0.72 0.61 0.96 TN 0.73 0.59	27.4 9.9 55.0 1 8.3% 28.2% LIO1 Chla 29.1 15.0 48.5 2 16.7%	10.5 5.3 17.5 0 0.0% n/a Turbidity 18.1 7.0 36.0 3 25.0%	9.35 6.60 11.80 0 0.0% n/a DO 9.10 6.80 11.60 0	7.8 7.1 8.6 0 0.0% n/a pH 7.7 6.8 8.4 0 0.0%
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16.7% 0.0%

n/a

65.9%

0.0% 0.0%

n/a

n/a

% Exceedance

% Confidence