C

APPENDIX C

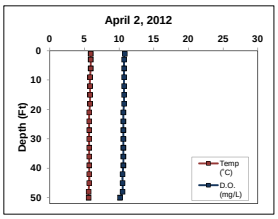
Water Quality Data

Rest Lake

Date: 4/2/2012
Time: 12:38
Weather: 90% sun, windy, 48°F
Entry: TWH

Max Depth: 50.9
RLS Depth (ft): 3.0
RLB Depth (ft): 48.0
Secchi Depth (ft): 8.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	5.9	10.8	8.5	100.0
3	5.9	10.7	8.4	99.0
6	5.9	10.7	8.4	99.0
9	5.8	10.7	8.4	100.0
12	5.8	10.7	8.3	99.0
15	5.8	10.7	8.3	99.0
18	5.8	10.7	8.3	100.0
21	5.7	10.6	8.3	100.0
24	5.7	10.6	8.3	100.0
27	5.7	10.6	8.3	99.0
30	5.7	10.6	8.3	100.0
33	5.7	10.6	8.3	100.0
36	5.7	10.6	8.3	100.0
39	5.7	10.6	8.3	100.0
42	5.7	10.5	8.3	100.0
45	5.7	10.5	8.3	100.0
48	5.6	10.5	8.3	100.0
50	5.6	10.1	8.3	100.0



Parameter	RLS	RLB
Total P (µg/L)	16.00	17.00
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	3.02	NA
TKN (µg/L)	ND	300.00
$NO_3 + NO_2$-N (µg/L)	144.00	147.00
NH_3-N (µg/L)	ND	624.00
Total N (µg/L)	144.00	447.00
Lab Cond. (µS/cm)	114.00	114.00
Lab pH	7.65	7.73
Alkalinity (mg/L $CaCO_3$)	47.30	48.30
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	14.20	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

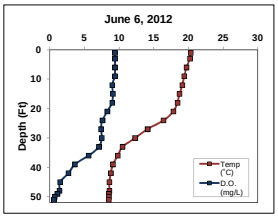
Data collected by TWH (Onterra)

Rest Lake

Date: 6/6/2012
Time: 9:20
Weather: 80% sun, light breeze, 70°F
Entry: TWH

Max Depth: 52.3
RLS Depth (ft): 3.0
RLB Depth (ft): 49.0
Secchi Depth (ft): 11.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	20.3	9.4		
3	20.2	9.4		
6	19.7	9.4		
9	19.4	9.4		
12	19.1	9.0		
15	18.7	9.1		
18	18.4	9.0		
21	17.8	8.3		
24	16.4	7.6		
27	14.1	7.4		
30	12.3	7.5		
33	10.5	7.1		
36	9.8	5.6		
39	9.1	3.6		
42	8.8	2.7		
45	8.6	1.5		
48	8.6	1.4		
49	8.5	1.1		
50	8.5	0.7		
51	8.5	0.6		



Parameter	RLS	RLB
Total P (µg/L)	10.00	33.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.05	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

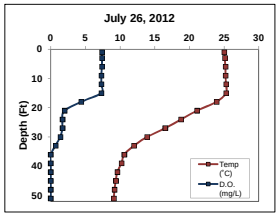
Data collected by TWH and EJG (Onterra)

Rest Lake

Date: 7/26/2012
Time: 11:00
Weather: Overcast, 62F, light drizzle
Entry: EEC

Max Depth: 52.1
RLS Depth (ft): 3.0
RLB Depth (ft): 50.0
Secchi Depth (ft): 8.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.0	7.4	7.2	
3	25.1	7.4	7.2	
6	25.2	7.4	7.5	
9	25.2	7.3	7.6	
12	25.3	7.3	7.6	
15	25.3	7.3	7.6	
18	23.9	4.4	7.5	
21	21.1	2.0	7.4	
24	18.8	1.7	7.3	
27	16.5	1.7	7.3	
30	13.9	1.4	7.2	
33	12.0	0.7	7.2	
36	10.6	0.0	7.2	
39	10.2	0.0	7.1	
42	9.6	0.0	7.0	
45	9.4	0.0	7.0	
48	9.2	0.0	6.9	
51	9.1	0.0	6.9	



Parameter	RLS	RLB
Total P (µg/L)	14.00	105.00
Dissolved P (µg/L)	ND	71.00
Chl-a (µg/L)	2.08	NA
TKN (µg/L)	330.00	1020.00
$NO_3 + NO_2$-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	ND
Total N (µg/L)	330.00	1020.00
Lab Cond. (µS/cm)	106.00	131.00
Lab pH	7.96	7.13
Alkalinity (mg/L $CaCO_3$)	47.00	62.00
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	12.70	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

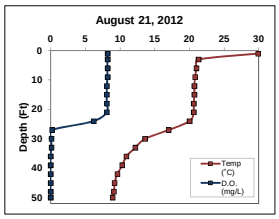
Data collected by BTB (Onterra)

Rest Lake

Date: 8/21/2012
Time: 11:00
Weather: 10% clouds, 70F, light breeze
Entry: EEC

Max Depth: 50.8
RLS Depth (ft): 3
RLB Depth (ft): 48
Secchi Depth (ft): 11.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	29.9	8.2		
3	21.3	8.2		
6	21	8.2		
9	20.8	8.2		
12	20.7	8.1		
15	20.7	8.1		
18	20.6	8.1		
21	20.6	8.1		
24	20	6.2		
27	17	0.2		
30	13.6	0.1		
33	12.2	0.1		
36	10.9	0		
39	10.3	0		
42	9.6	0		
45	9.2	0		
48	9.1	0		
50	8.9	0		



Parameter	RLS	RLB
Total P (µg/L)	19	219
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.67	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

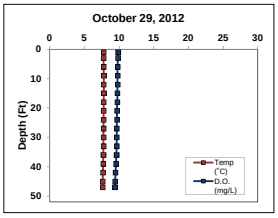
Data collected by TAH (Onterra), MJH and MKH

Rest Lake

Date: 10/29/2012
Time: 9:15
Weather: 15% clouds, 32F, windy, cold
Entry: EEC

Max Depth: 49.6
RLS Depth (ft): 3
RLB Depth (ft): 47
Secchi Depth (ft): 8.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	7.75	9.86	8.75	98
3	7.78	9.84	8.75	98
6	7.77	9.8	8.76	98
9	7.79	9.79	8.76	97.8
12	7.78	9.79	8.76	98
15	7.79	9.76	8.76	97.8
18	7.77	9.75	8.76	98
21	7.77	9.71	8.76	98
24	7.77	9.7	8.76	98
27	7.77	9.67	8.76	98
30	7.77	9.66	8.76	98
33	7.76	9.65	8.75	98
36	7.74	9.63	8.75	98
39	7.71	9.55	8.75	98
42	7.68	9.47	8.73	98
45	7.64	9.43	8.71	98
47	7.62	9.4	8.71	98



Parameter	RLS	RLB
Total P (µg/L)	21.00	22.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	5.10	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	2.00	2.00
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

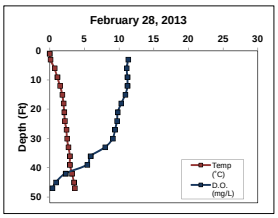
Data collected by EJG (Onterra)

Rest Lake

Date: 2/18/2013
Time: 9:46
Weather: 100% clouds, breezy, 10°F
Entry: TWH

Max Depth: 48.5
RLS Depth (ft): 3
RLB Depth (ft): 45
Secchi Depth (ft): 8.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0			
3	0.1	11.3		
6	0.7	11.1		
9	1.1	11.2		
12	1.5	11.2		
15	1.8	10.9		
18	2	10.3		
21	2.1	9.8		
24	2.2	9.7		
27	2.4	9.4		
30	2.5	9.1		
33	2.7	8		
36	2.9	5.9		
39	2.9	5.4		
42	3.2	2.3		
45	3.5	0.9		
47	3.6	0.4		



Parameter	RLS	RLB
Total P (µg/L)	**17.00**	**23.00**
Dissolved P (µg/L)	2.00	9.00
Chl-a (µg/L)	NA	NA
TKN (µg/L)	460.00	730.00
$NO_3 + NO_2$-N (µg/L)	67.00	304.00
NH_3-N (µg/L)	40.00	132.00
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and EJG (Onterra) Ice thickness: 1.4'

Water Quality Data

2012-2013	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	9.5	NA	NA
Total P (µg/L)	6	16.2	6	69.8
Dissolved P (µg/L)	3	2.0	3	40.0
Chl a (µg/L)	5	3.0	0	NA
TKN (µg/L	3	395.0	3	683.3
NO3+NO2-N (µg/L)	3	105.5	3	225.5
NH3-N (µg/L)	3	40.0	3	378.0
Total N (µg/L)	2	237.0	2	733.5
Lab Cond. (µS/cm)	2	110.0	2	122.5
Lab pH	2	7.8	2	7.4
Alkal (mg/l CaCO3)	2	47.2	2	55.2
Total Susp. Solids (mg/l)	1	2.0	1	2.0
Calcium (µg/L)	2	13.5	0	NA
Magnesium (mg/L)	0	NA	0	NA
Hardness (mg/L)	0	NA	0	NA
Color (SU)	0	NA	0	NA
Turbidity (NTU)	0	NA	0	NA

Morphological / Geographical Data

Parameter	Value
Acreage	
Volume (acre-feet)	
Perimeter (miles)	
Shoreland Developmetnt Factor	
Maximum Depth (feet)	
County	
WBIC	
Lillie Mason Region (1983)	NLF Ecoregion
Nichols Ecoregion (1999)	NLFL

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			0.0
Open Water			0.0
Pasture/Grass			0.0
Row Crops			0.0
Urban - Rural Residential			0.0
Wetland			0.0
Watershed to Lake Area			

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1984		46.4	
1985			
1992			44.7
1994			
1995			43.0
1996			44.8
1997			42.9
1998			42.7
1999			41.3
2001			
2002			44.9
2003			43.2
2004			43.4
2006			44.7
2007	40.0	45.0	
2011			46.3
2012	42.5	38.6	43.2
All Years (Weighted)	41.9	40.6	43.7
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NLF Ecoregion	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1984					1	5.0	1	5.0				
1985									1	13.0		
1992	3	8.5	1	9.5								
1994	1	10.5	0									
1995	6	11.1	3	10.7								
1996	12	9.7	9	9.4								
1997	9	10.7	9	10.7								
1998	5	11.4	3	10.9								
1999	2	12.0	2	12.0								
2001	1	10.5	0									
2002	4	10.4	3	9.4								
2003	3	10.5	3	10.5								
2004	2	10.4	2	10.4								
2006	2	9.5	2	9.5								
2007					1	4.3	1	4.3	1	12.0	1	12.0
2011	4	7.3	3	8.5								
2012	6	8.7	3	10.5	5	3.0	3	2.3	5	16.0	3	14.3
All Years (Weighted)		10.0		10.1		3.2		2.8		15.3		13.8
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NLF Ecoregion				8.9				5.6				21.0

July 2012 N: 330.0
July 2012 P: 14.0

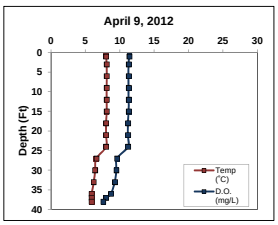
Summer 2012 N:P 24 :1

Spider Lake

Date: 4/9/2012
Time: 13:30
Weather: 100% clouds, sprinkles and flurries
Entry: TWH

Max Depth: 40.2
SLS Depth (ft): 3.0
SLB Depth (ft): 37.0
Secchi Depth (ft): 8.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	8.0	11.4	8.8	97.0
3	8.1	11.3	8.7	97.0
6	8.1	11.3	8.7	97.0
9	8.1	11.3	8.7	97.0
12	8.1	11.3	8.7	97.0
15	8.1	11.3	8.7	97.0
18	8.0	11.2	8.7	97.0
21	8.0	11.2	8.7	97.0
24	8.0	11.2	8.7	97.0
27	6.6	9.6	8.6	98.0
30	6.4	9.5	8.5	98.0
33	6.2	9.3	8.5	98.0
36	5.9	8.7	8.4	98.0
37	5.9	8.0	8.3	98.0
38	5.9	7.6	8.3	99.0



Parameter	SLS	SLB
Total P (µg/L)	17.00	19.00
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	4.31	NA
TKN (µg/L)	350.00	470.00
$NO_3 + NO_2$-N (µg/L)	116.00	142.00
NH_3-N (µg/L)	ND	953.00
Total N (µg/L)	466.00	612.00
Lab Cond. (µS/cm)	113.00	119.00
Lab pH	7.90	7.47
Alkalinity (mg/L $CaCO_3$)	47.70	48.60
Total Susp. Solids (mg/L)	2.00	ND
Calcium (mg/L)	12.90	NA
Magnesium (mg/L)	3.40	NA
Hardness (mg/L)	46.20	NA
Color (SU)	15.00	NA
Turbidity (NTU)	NA	NA

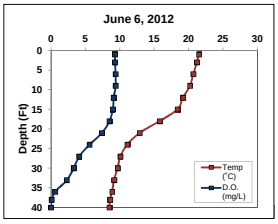
Data collected by TWH (Onterra)

Spider Lake

Date: 6/6/2012
Time: 10:35
Weather: 20% clouds, light breeze, 72˚F
Entry: TWH

Max Depth: 41.3
SLS Depth (ft): 3.0
SLB Depth (ft): 38.0
Secchi Depth (ft): 11.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	21.5	9.3		
3	21.2	9.3		
6	20.7	9.4		
9	20.2	9.4		
12	19.2	9.1		
15	18.4	9.0		
18	15.8	8.5		
21	12.9	7.4		
24	11.1	5.6		
27	10.1	4.1		
30	9.7	3.3		
33	9.2	2.3		
36	8.9	0.6		
38	8.6	0.1		
40	8.5	0.0		



Parameter	SLS	SLB
Total P (µg/L)	9.00	40.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	1.67	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

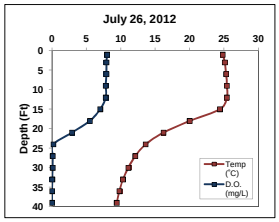
Data collected by TWH and EJG (Onterra)

Spider Lake

Date: 7/26/2012
Time: 9:00
Weather: Overcast, 62F, light drizzle
Entry: EEC

Max Depth: 40.9
SLS Depth (ft): 3.0
SLB Depth (ft): 38.0
Secchi Depth (ft): 8.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.8	8.0	7.7	
3	25.1	7.9	7.8	
6	25.3	7.9	7.9	
9	25.4	7.8	8.0	
12	25.4	7.8	8.0	
15	24.4	7.0	8.0	
18	20.0	5.5	7.7	
21	16.2	2.9	7.4	
24	13.6	0.2	7.3	
27	12.1	0.1	7.3	
30	11.1	0.1	7.2	
33	10.3	0.0	7.1	
36	9.8	0.0	7.1	
39	9.4	0.0	7.0	



Parameter	SLS	SLB
Total P (µg/L)	14.00	226.00
Dissolved P (µg/L)	ND	183.00
Chl-a (µg/L)	1.78	NA
TKN (µg/L)	320.00	1460.00
$NO_3 + NO_2$-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	80.00
Total N (µg/L)	320.00	1460.00
Lab Cond. (µS/cm)	96.00	124.00
Lab pH	8.02	7.03
Alkalinity (mg/L $CaCO_3$)	44.50	59.60
Total Susp. Solids (mg/L)	ND	4.00
Calcium (mg/L)	12.60	NA
Magnesium (mg/L)	3.50	NA
Hardness (mg/L)	45.60	NA
Color (SU)	10.00	NA
Turbidity (NTU)	NA	NA

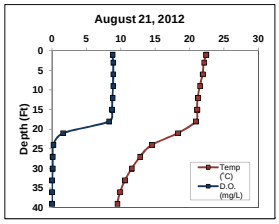
Data collected by BTB (Onterra)

Spider Lake

Date: 8/21/2012
Time: 13:45
Weather: 30% clouds, 70F, light breeze
Entry: EEC

Max Depth: 41
SLS Depth (ft): 3
SLB Depth (ft): 38
Secchi Depth (ft): 10.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.4	8.8		
3	22.1	8.9		
6	21.9	8.9		
9	21.5	8.9		
12	21.2	8.8		
15	21.1	8.7		
18	20.9	8.3		
21	18.3	1.6		
24	14.5	0.2		
27	12.8	0.1		
30	11.6	0.1		
33	10.6	0		
36	9.9	0		
39	9.5	0		



Parameter	SLS	SLB
Total P (µg/L)	12	368
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	5.69	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

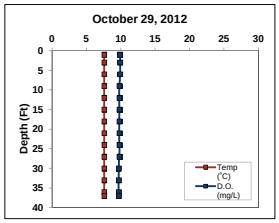
Data collected by TAH (Onterra), MJH, and MKH

Spider Lake

Date: 10/29/2012
Time: 14:00
Weather: 50% clouds, 37F, windy!
Entry: EEC

Max Depth: 38.6
SLS Depth (ft): 3
SLB Depth (ft): 35
Secchi Depth (ft): 8.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	7.6	9.9	8.8	97
3	7.6	9.9	8.7	97
6	7.6	9.9	8.7	97
9	7.6	9.8	8.7	97
12	7.6	9.8	8.7	97
15	7.6	9.8	8.7	97
18	7.6	9.8	8.7	97
21	7.6	9.8	8.7	97
24	7.6	9.8	8.7	97
27	7.6	9.8	8.7	97
30	7.6	9.7	8.7	97
33	7.6	9.7	8.7	97
36	7.6	9.7	8.7	97
37	7.6	9.7	8.7	97



Parameter	SLS	SLB
Total P (µg/L)	25.00	24.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	6.78	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	2.00	2.00
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

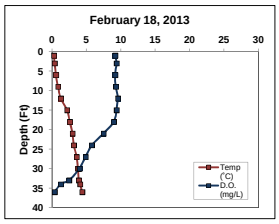
Data collected by EJG (Onterra)

Spider Lake

Date: 2/18/2013
Time: 12:49
Weather: 100% clouds, light breeze, 15°F
Entry: TWH

Max Depth: 37.5
SLS Depth (ft): 3
SLB Depth (ft): 34
Secchi Depth (ft): 7.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.3	9.2		
3	0.4	9.4		
6	0.6	9.2		
9	0.9	9.3		
12	1.3	9.6		
15	2.2	9.4		
18	2.6	9		
21	3	7.5		
24	3.2	5.8		
27	3.6	4.9		
30	3.8	4		
33	3.9	2.5		
34	4.1	1.3		
36	4.4	0.4		



Parameter	SLS	SLB
Total P (µg/L)	18.00	30.00
Dissolved P (µg/L)	ND	9.00
Chl-a (µg/L)	NA	NA
TKN (µg/L)	370.00	520.00
$NO_3 + NO_2$-N (µg/L)	66.00	125.00
NH_3-N (µg/L)	52.00	234.00
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and EJG (Onterra) Ice thickness: 1.5'

Water Quality Data

2012-2013	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	9.1	NA	NA
Total P (µg/L)	6	15.8	6	117.8
Dissolved P (µg/L)	3	ND	3	96.0
Chl a (µg/L)	5	4.0	0	NA
TKN (µg/L	3	346.7	3	816.7
NO3+NO2-N (µg/L)	3	91.0	3	133.5
NH3-N (µg/L)	3	52.0	3	422.3
Total N (µg/L)	2	393.0	2	1036.0
Lab Cond. (µS/cm)	2	104.5	2	121.5
Lab pH	2	8.0	2	7.3
Alkal (mg/l CaCO3)	2	46.1	2	54.1
Total Susp. Solids (mg/l)	3	2.0	3	3.0
Calcium (µg/L)	2	12.8	0	NA
Magnesium (mg/L)	2	3.5	0	NA
Hardness (mg/L)	2	45.9	0	NA
Color (SU)	2	12.5	0	NA
Turbidity (NTU)	0	NA	0	NA

Morphological / Geographical Data

Parameter	Value
Acreage	
Volume (acre-feet)	
Perimeter (miles)	
Shoreland Developmetnt Factor	
Maximum Depth (feet)	
County	
WBIC	
Lillie Mason Region (1983)	NLF Ecoregion
Nichols Ecoregion (1999)	NLFL

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			0.0
Open Water			0.0
Pasture/Grass			0.0
Row Crops			0.0
Urban - Rural Residential			0.0
Wetland			0.0
Watershed to Lake Area			

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1984		51.0	42.3
1985			
2006			41.9
2007			42.8
2008			42.8
2009			42.1
2010			41.7
2011			41.9
2012	39.6	41.5	43.7
All Years (Weighted)	39.6	44.9	42.5
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NLF Ecoregion	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1984	1	11.2	1	11.2	1	8.0	1	8.0				
1985	1	6.9	0						1	15.0	0.0	
2006	3	10.9	1	11.5								
2007	6	10.8	3	10.8								
2008	6	10.5	3	10.8								
2009	5	10.9	3	11.3								
2010	5	11.7	3	11.7								
2011	5	11.6	3	11.5								
2012	7	10.0	3	10.2	5	4.0	3	3.0	5	15.4	3.0	11.7
All Years (Weighted)		10.8		11.1		4.7		4.3		15.3		11.7
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NLF Ecoregion				8.9				5.6				21.0

July 2012 N: 320.0
July 2013 P: 14.0

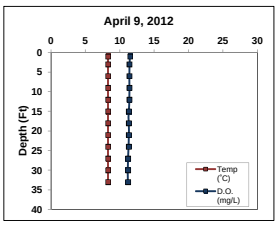
Summer 2012 N:P 23 :1

Island Lake

Date: 4/9/2012
Time: 14:15
Weather: 100% clouds, flurries, windy, 35°F
Entry: TWH

Max Depth: 35.6
ISLS Depth (ft): 3.0
ISLB Depth (ft): 32.0
Secchi Depth (ft): 7.1

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	8.3	11.5	8.6	93.0
3	8.3	11.4	8.7	93.0
6	8.3	11.4	8.7	93.0
9	8.3	11.4	8.8	93.0
12	8.3	11.4	8.8	94.0
15	8.3	11.3	8.8	93.0
18	8.3	11.3	8.8	94.0
21	8.3	11.3	8.9	93.0
24	8.3	11.3	8.9	94.0
27	8.3	11.2	8.8	93.0
30	8.3	11.2	8.9	93.0
33	8.3	11.2	8.9	93.0



Parameter	ISLS	ISLB
Total P (µg/L)	22.00	20.00
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	6.24	NA
TKN (µg/L)	410.00	490.00
$NO_3 + NO_2$-N (µg/L)	810.00	810.00
NH_3-N (µg/L)	ND	1030.00
Total N (µg/L)	1220.00	1300.00
Lab Cond. (µS/cm)	107.00	119.00
Lab pH	8.06	8.24
Alkalinity (mg/L $CaCO_3$)	46.90	48.20
Total Susp. Solids (mg/L)	2.00	2.00
Calcium (mg/L)	13.00	NA
Magnesium (mg/L)	3.50	NA
Hardness (mg/L)	46.80	NA
Color (SU)	20.00	NA
Turbidity (NTU)	NA	NA

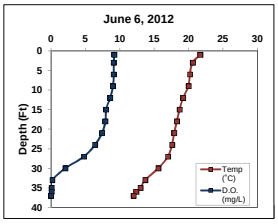
Data collected by TWH (Onterra)

Island Lake

Date: 6/6/2012
Time: 11:10
Weather: 50% clouds, light breeze, 72°F
Entry: TWH

Max Depth: 37.7
ISLS Depth (ft): 3.0
ISLB Depth (ft): 35.0
Secchi Depth (ft): 9.9

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	21.7	9.2		
3	20.6	9.1		
6	20.2	9.1		
9	20.0	9.0		
12	19.2	8.6		
15	18.7	8.0		
18	18.3	7.9		
21	17.9	7.4		
24	17.6	6.4		
27	17.0	4.8		
30	15.6	2.1		
33	13.7	0.2		
35	13.0	0.1		
36	12.4	0.1		
37	12.0	0.0		



Parameter	ISLS	ISLB
Total P (µg/L)	13.00	44.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.73	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

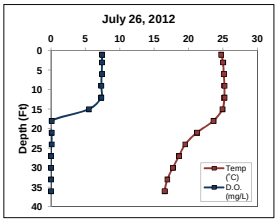
Data collected by TWH and EJG (Onterra)

Island Lake

Date: 7/26/2012
Time: 9:42
Weather: Overcast, 62F, light drizzle
Entry: EEC

Max Depth: 38.0
ISLS Depth (ft): 3.0
ISLB Depth (ft): 34.0
Secchi Depth (ft): 6.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.7	7.4	7.1	
3	25.0	7.4	7.1	
6	25.1	7.4	7.4	
9	25.2	7.3	7.4	
12	25.2	7.3	7.5	
15	24.9	5.5	7.4	
18	23.6	0.1	7.3	
21	21.2	0.1	7.1	
24	19.5	0.1	7.0	
27	18.6	0.0	7.0	
30	17.7	0.0	7.0	
33	16.9	0.0	7.1	
36	16.5	0.0	7.1	



Parameter	ISLS	ISLB
Total P (µg/L)	17.00	467.00
Dissolved P (µg/L)	ND	396.00
Chl-a (µg/L)	4.03	NA
TKN (µg/L)	530.00	1370.00
$NO_3 + NO_2$-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	ND
Total N (µg/L)	530.00	1370.00
Lab Cond. (µS/cm)	96.00	127.00
Lab pH	7.85	7.13
Alkalinity (mg/L $CaCO_3$)	45.10	63.80
Total Susp. Solids (mg/L)	2.00	5.00
Calcium (mg/L)	12.50	NA
Magnesium (mg/L)	3.50	NA
Hardness (mg/L)	45.50	NA
Color (SU)	15.00	NA
Turbidity (NTU)	NA	NA

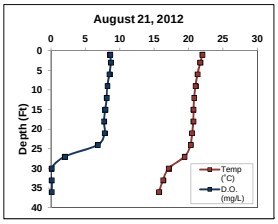
Data collected by BTB (Onterra)

Island Lake

Date: 8/21/2012
Time: 14:15
Weather: 30% clouds, 70F, light breeze
Entry: EEC

Max Depth: 37.1
ISLS Depth (ft): 3
ISLB Depth (ft): 34
Secchi Depth (ft): 5.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22	8.6		
3	21.7	8.7		
6	21.3	8.5		
9	21	8.2		
12	20.8	8.1		
15	20.7	7.9		
18	20.7	7.7		
21	20.5	7.8		
24	20.3	6.8		
27	19.4	2		
30	17.1	0.1		
33	16.3	0.1		
36	15.7	0.1		



Parameter	ISLS	ISLB
Total P (µg/L)	22	481
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	12.4	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

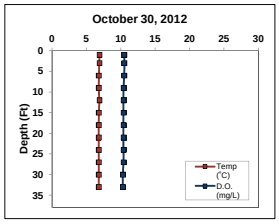
Data collected by TAH (Onterra), MJH, and MKH

Island Lake

Date: 10/30/2012
Time: 2:30
Weather: 50% clouds, 37F, windy!
Entry: EEC

Max Depth: 34.5
ISLS Depth (ft): 3
ISLB Depth (ft): 31
Secchi Depth (ft): 8.2

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	6.9	10.5	8.8	95
3	6.9	10.5	8.8	95
6	6.8	10.5	8.8	95
9	6.8	10.4	8.8	95
12	6.9	10.4	8.8	96
15	6.8	10.4	8.8	95
18	6.8	10.4	8.8	96
21	6.8	10.4	8.8	95
24	6.8	10.4	8.8	95
27	6.8	10.4	8.8	95
30	6.8	10.3	8.8	96
33	6.8	10.3	8.8	95



Parameter	ISLS	ISLB
Total P (µg/L)	43	36
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	9.52	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

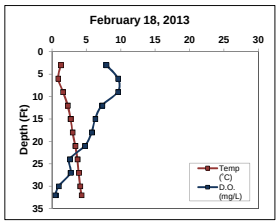
Data collected by EJG (Onterra)

Island Lake

Date: 2/18/2013
Time: 10:41
Weather: 100% clouds, breezy, 12°F
Entry: TWH

Max Depth: 33.5
ISLS Depth (ft): 3
ISLB Depth (ft): 30.5
Secchi Depth (ft): 7.7

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1				
3	1.3	7.9		
6	0.9	9.6		
9	1.6	9.6		
12	2.3	7.3		
15	2.7	6.3		
18	3	5.8		
21	3.4	4.8		
24	3.7	2.6		
27	3.9	2.7		
30	4.1	1		
32	4.3	0.5		



Parameter	ISLS	ISLB
Total P (µg/L)	14.00	53.00
Dissolved P (µg/L)	3.00	24.00
Chl-a (µg/L)	NA	NA
TKN (µg/L)	260.00	860.00
$NO_3 + NO_2$-N (µg/L)	97.00	66.00
NH_3-N (µg/L)	56.00	451.00
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and EJG (Onterra) Ice thickness: 1.5'

Water Quality Data

2012-2013	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	7.5	NA	NA
Total P (µg/L)	6	21.8	6	183.5
Dissolved P (µg/L)	3	3.0	3	210.0
Chl a (µg/L)	5	7.0	0	NA
TKN (µg/L	3	400.0	3	906.7
NO3+NO2-N (µg/L)	3	453.5	3	438.0
NH3-N (µg/L)	3	56.0	3	740.5
Total N (µg/L)	2	875.0	2	1335.0
Lab Cond. (µS/cm)	2	101.5	2	123.0
Lab pH	2	8.0	2	7.7
Alkal (mg/l CaCO3)	2	46.0	2	56.0
Total Susp. Solids (mg/l)	2	2.0	2	3.5
Calcium (µg/L)	2	12.8	0	NA
Magnesium (mg/L)	2	3.5	0	NA
Hardness (mg/L)	2	46.2	0	NA
Color (SU)	2	17.5	0	NA
Turbidity (NTU)	0	NA	0	NA

Morphological / Geographical Data

Parameter	Value
Acreage	
Volume (acre-feet)	
Perimeter (miles)	
Shoreland Developmetnt Factor	
Maximum Depth (feet)	
County	
WBIC	
Lillie Mason Region (1983)	NLF Ecoregion
Nichols Ecoregion (1999)	NLFL

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			0.0
Open Water			0.0
Pasture/Grass			0.0
Row Crops			0.0
Urban - Rural Residential			0.0
Wetland			0.0
Watershed to Lake Area			

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1993			48.3
1994			47.6
1995			46.2
1996			47.4
1997			48.1
1998			47.7
1999			48.8
2002			48.9
2003			43.4
2004			46.9
2005			46.6
2006			44.4
2007	53.2	37.1	47.6
2008			46.6
2009			45.0
2010			45.4
2011			44.7
2012	45.3	48.8	46.8
All Years (Weighted)	47.7	46.9	46.6
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NLF Ecoregion	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1993	17	6.9	12	7.4								
1994	7	7.3	5	7.8								
1995	10	7.9	7	8.5								
1996	8	7.6	7	7.9								
1997	3	7.1	1	7.5								
1998	7	7.7	6	7.7								
1999	2	7.1	2	7.1								
2002	10	7.1	8	7.1								
2003	6	9.6	3	10.4								
2004	11	7.6	6	8.2								
2005	11	8.3	7	8.3								
2006	11	10.0	7	9.7								
2007	11	7.6	8	7.8	1	1.9	1	1.9	1	30.0	1.0	30.0
2008	8	7.8	6	8.3								
2009	10	9.0	7	9.3								
2010	12	9.3	9	9.1								
2011	11	9.4	10	9.5								
2012	21	8.0	15	8.2	5	7.0	3	6.4	5	23.4	3.0	17.3
All Years (Weighted)		8.1		8.3		6.1		5.3		24.5		20.5
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NLF Ecoregion				8.9				5.6				21.0

July 2012 N: 530.0
July 2012 P: 17.0

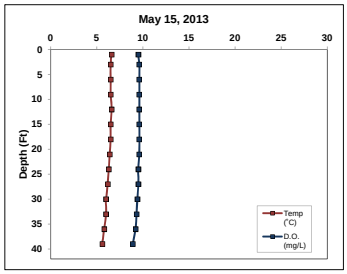
Summer 2012 N:P 31 :1

Clear Lake

Date: 5/15/2013
Time: 12:55
Weather: 10% clouds, breezy, 72F
Entry: EEC

Max Depth: 40.2
CLS Depth (ft): 3.0
CLB Depth (ft): 37.0
Secchi Depth (ft): 8.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	6.6	9.5	6.8	92.2
3	6.5	9.6	6.9	92.4
6	6.5	9.6	6.9	92.6
9	6.5	9.6	6.9	92.5
12	6.6	9.6	7.0	92.5
15	6.5	9.6	6.7	92.1
18	6.5	9.6	7.0	92.0
21	6.4	9.6	7.0	92.6
24	6.3	9.5	7.0	92.6
27	6.2	9.5	7.0	92.4
30	6.0	9.4	7.0	92.2
33	6.0	9.3	7.0	92.5
36	5.8	9.2	7.0	92.6
39	5.6	8.9	6.9	93.5



Parameter	CLS	CLB
Total P (µg/L)	27.00	26.50
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	4.70	NA
TKN (µg/L)	339.00	229.00
$NO_3 + NO_2$-N (µg/L)	144.00	145.00
NH_3-N (µg/L)	31.50	38.00
Total N (µg/L)	514.50	412.00
Lab Cond. (µS/cm)	96.70	97.00
Lab pH	7.51	7.46
Alkalinity (mg/L $CaCO_3$)	41.80	41.80
Total Susp. Solids (mg/L)	2.00	ND
Calcium (mg/L)	11.70	NA
Magnesium (mg/L)	3.20	NA
Hardness (mg/L)	42.40	NA
Color (SU)	20.00	NA
Turbidity (NTU)	NA	NA

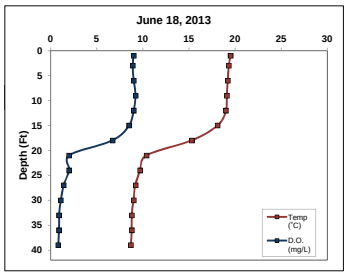
Data collected by TAH (Onterra)

Clear Lake

Date: 6/18/2013
Time: 10:50
Weather: Clear, light breeze, 57F
Entry: EEH

Max Depth: 40.6
CLS Depth (ft): 3.0
CLB Depth (ft): 37.0
Secchi Depth (ft): 14.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	19.5	9.0		
3	19.3	8.9		
6	19.2	9.0		
9	19.1	9.2		
12	19.0	9.0		
15	18.1	8.5		
18	15.3	6.7		
21	10.4	2.0		
24	9.7	2.0		
27	9.2	1.4		
30	9.0	1.1		
33	8.8	0.9		
36	8.8	0.9		
39	8.7	0.8		



Parameter	CLS	CLB
Total P (µg/L)	21.60	47.30
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	3.01	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	11.20	NA
Magnesium (mg/L)	3.18	NA
Hardness (mg/L)	41.20	NA
Color (SU)	NA	NA
Dissolved P (µg/L)	NA	NA

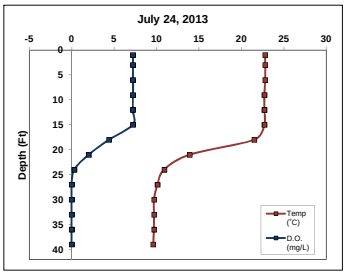
Data collected by TAH (Onterra)

Clear Lake

Date: 7/24/2013
Time: 9:15
Weather: 50% clouds, 65F, light breeze
Entry: EEH

Max Depth: 40.2
CLS Depth (ft): 3.0
CLB Depth (ft): 37.0
Secchi Depth (ft): 7.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.8	7.2	8.3	92.0
3	22.8	7.2	8.3	92.0
6	22.8	7.2	8.3	92.0
9	22.7	7.2	8.3	92.0
12	22.7	7.2	8.3	92.0
15	22.7	7.2	8.3	92.0
18	21.5	4.4	7.6	95.0
21	13.9	2.0	7.1	99.0
24	10.9	0.3	7.0	104.0
27	10.1	0.0	6.9	109.0
30	9.7	0.0	6.9	115.0
33	9.7	0.0	7.0	115.0
36	9.7	0.0	7.0	116.0
39	9.6	0.0	7.0	118.0



Parameter	CLS	CLB
Total P (µg/L)	15.10	27.40
Dissolved P (µg/L)	ND	2.00
Chl-a (µg/L)	6.45	NA
TKN (µg/L)	625.00	613.00
NO_3 + NO_2-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	115.00
Total N (µg/L)	625.00	728.00
Lab Cond. (µS/cm)	94.00	110.00
Lab pH	7.87	7.24
Alkalinity (mg/L $CaCO_3$)	42.30	51.90
Total Susp. Solids (mg/L)	2.40	6.33
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	10.00	NA
Turbidity (NTU)	NA	NA

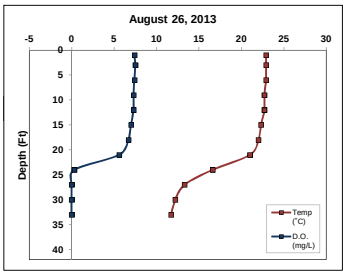
Data collected by TAH (Onterra)

Clear Lake

Date: 8/26/2013
Time:
Weather: 67F, light wind, 100% clouds
Entry: EEH

Max Depth: 33.1
CLS Depth (ft): 3.0
CLB Depth (ft): 30.0
Secchi Depth (ft): 11.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.9	7.4		
3	22.9	7.5		
6	22.9	7.4		
9	22.7	7.3		
12	22.7	7.3		
15	22.3	7.0		
18	22.0	6.7		
21	21.0	5.6		
24	16.6	0.3		
27	13.3	0.0		
30	12.2	0.0		
33	11.7	0.0		



Parameter	CLS	CLB
Total P (µg/L)	8.10	42.80
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.20	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	11.70	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

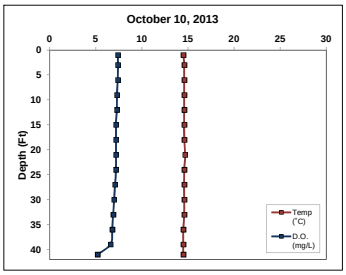
Data collected by MKH and TAH (Onterra)

Clear Lake

Date: 10/10/2013
Time: 9:35
Weather: Clear, 25% clouds, 49F, no wind
Entry: EEH

Max Depth: 42.0
CLS Depth (ft): 3.0
CLB Depth (ft): 39.0
Secchi Depth (ft): 8.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	14.5	7.4		
3	14.6	7.4		
6	14.6	7.4		
9	14.6	7.3		
12	14.6	7.3		
15	14.6	7.2		
18	14.6	7.2		
21	14.7	7.2		
24	14.6	7.2		
27	14.6	7.1		
30	14.6	7.0		
33	14.6	6.9		
36	14.5	6.8		
39	14.5	6.6		
41	14.5	5.2		



Parameter	CLS	CLB
Total P (µg/L)	27.50	33.20
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	8.50	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	2.00	2.20
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

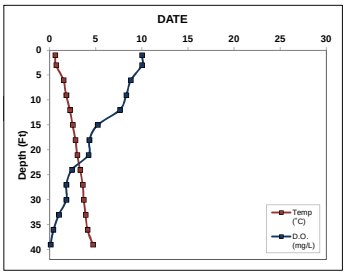
Data collected by TWH and TAH (Onterra)

Clear Lake

Date: 2/19/2014
Time: 12:20
Weather: 100% sun, southern wind 10-15 mph, 30F
Entry: EEH

Max Depth: 40.8
CLS Depth (ft): 3.0
CLB Depth (ft): 37.0
Secchi Depth (ft): 12.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.6	10.0		
3	0.7	10.0		
6	1.5	8.8		
9	1.8	8.3		
12	2.2	7.6		
15	2.5	5.2		
18	2.8	4.3		
21	3.0	4.2		
24	3.3	2.4		
27	3.6	1.8		
30	3.7	1.8		
33	3.9	1.0		
36	4.1	0.4		
39	4.7	0.1		



Parameter	CLS	CLB
Total P (µg/L)	13.50	42.40
Dissolved P (µg/L)	4.60	5.80
Chl-a (µg/L)	NA	NA
TKN (µg/L)	328.00	905.00
NO_3 + NO_2-N (µg/L)	72.60	ND
NH_3-N (µg/L)	34.80	600.00
Total N (µg/L)	435.40	1505.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and DAC. Ice Thickness: 1.8 ft

Water Quality Data

2013-2014	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	10.5	NA	NA
Total P (µg/L)	6	18.8	6	36.6
Dissolved P (µg/L)	3	4.6	3	3.9
Chl a (µg/L)	5	5.0	0	NA
TKN (µg/L	3	430.7	3	582.3
NO3+NO2-N (µg/L)	3	108.3	3	145.0
NH3-N (µg/L)	3	33.2	3	251.0
Total N (µg/L)	3	525.0	3	881.7
Lab Cond. (µS/cm)	2	95.4	2	103.5
Lab pH	2	7.7	2	7.4
Alkal (mg/l CaCO3)	2	42.1	2	46.9
Total Susp. Solids (mg/l)	3	2.1	3	4.3
Calcium (µg/L)	3	11.5	0	NA
Magnesium (mg/L)	2	3.2	0	NA
Hardness (mg/L)	2	41.8	0	NA
Color (SU)	2	15.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Morphological / Geographical Data

Parameter	Value
Acreage	
Volume (acre-feet)	
Perimeter (miles)	
Shoreland Developmetnt Factor	
Maximum Depth (feet)	
County	
WBIC	
Lillie Mason Region (1983)	NLF Ecoregion
Nichols Ecoregion (1999)	NLFL

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			0.0
Open Water			0.0
Pasture/Grass			0.0
Row Crops			0.0
Urban - Rural Residential			0.0
Wetland			0.0
Watershed to Lake Area			

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1994			44.1
1995			42.9
1996			45.9
1997	46.6	42.6	40.3
1998	47.6	44.7	42.0
1999	41.1	36.4	42.2
2000	45.8	47.6	43.9
2001	48.3	49.7	46.4
2002	42.9	46.9	40.0
2003	45.3	46.4	41.3
2004	47.6	45.2	40.8
2005	43.2	43.9	41.0
2006	48.9	46.5	40.2
2008	47.1	45.9	42.8
2009	46.9	44.8	40.8
2011	45.3	46.3	47.6
2013	43.1	43.9	42.4
All Years (Weighted)	45.8	45.4	42.2
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NLF Ecoregion	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1994	8	8.4	5	9.9								
1995	12	9.2	8	10.8								
1996	6	8.4	5	8.8								
1997	8	11.7	6	12.9	5	6.2	3	3.4	5	22.6	3.0	19.0
1998	13	10.2	10	11.4	6	7.3	4	4.2	5	27.6	3.0	20.3
1999	11	11.0	8	11.3	4	3.4	3	1.8	5	14.0	3.0	13.0
2000	5	9.2	4	10.1	4	6.5	3	5.7	4	19.5	3.0	18.0
2001	5	7.5	3	8.4	4	7.5	3	7.0	4	22.8	3.0	21.3
2002	8	12.9	5	13.1	4	6.7	3	5.3	5	16.6	3.0	14.7
2003	5	12.1	3	12.0	4	9.9	3	5.0	5	18.8	3.0	17.3
2004	5	10.5	3	12.4	4	7.9	3	4.4	4	20.5	3.0	20.3
2005	7	10.8	5	12.3	4	8.2	3	3.9	5	20.6	4.0	15.0
2006	8	11.5	6	13.0	3	5.1	3	5.1	3	22.3	3.0	22.3
2008	6	10.4	4	10.8	3	4.8	3	4.8	3	19.7	3.0	19.7
2009	5	12.5	5	12.5	3	4.3	3	4.3	3	19.3	3.0	19.3
2011	3	7.8	3	7.8	3	5.0	3	5.0	3	17.3	3.0	17.3
2013	5	10.0	3	11.2	5	5.0	3	3.9	5	19.9	3.0	14.9
All Years (Weighted)		10.3		11.3		6.4		4.5		20.1		18.0
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NLF Ecoregion				8.9				5.6				21.0

July 2013 N: 625.0
July 2013 P: 15.1

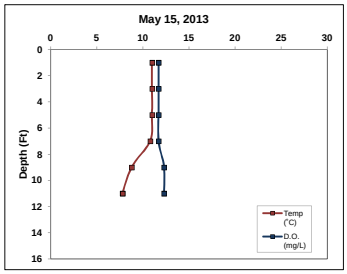
Summer 2013 N:P 41 :1

Fawn Lake

Date: 5/15/2013
Time: 12:10
Weather: clear, windy, 72F
Entry: EEC

Max Depth: 13.6
FLS Depth (ft): 3.0
FLB Depth (ft): 11.0
Secchi Depth (ft): 8.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	11.0	11.7	8.3	78.2
3	11.0	11.7	8.2	78.3
5	11.0	11.7	8.3	78.2
7	10.8	11.7	8.3	78.1
9	8.8	12.3	8.3	78.4
11	7.8	12.3	8.2	79.0



Parameter	FLS	FLB
Total P (µg/L)	30.00	39.90
Dissolved P (µg/L)	2.20	ND
Chl-*a* (µg/L)	5.57	NA
TKN (µg/L)	205.00	391.00
NO_3 + NO_2-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	ND
Total N (µg/L)	205.00	391.00
Lab Cond. (µS/cm)	81.50	84.80
Lab pH	7.73	7.63
Alkalinity (mg/L $CaCO_3$)	35.80	37.00
Total Susp. Solids (mg/L)	2.20	2.40
Calcium (mg/L)	9.89	NA
Magnesium (mg/L)	2.73	NA
Hardness (mg/L)	35.90	NA
Color (SU)	15.00	NA
Turbidity (NTU)	NA	NA

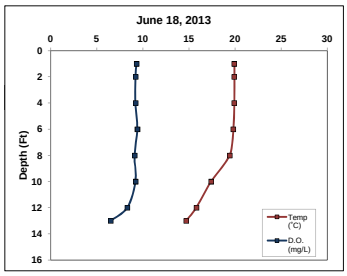
Data collected by TAH (Onterra)

Fawn Lake

Date: 6/18/2013
Time: 10:15
Weather: Clear, light breeze, 57F
Entry: EEH

Max Depth: 14.0
FLS Depth (ft): 3.0
FLB Depth (ft): 11.0
Secchi Depth (ft): 11.3

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	19.9	9.3		
2	19.9	9.2		
4	19.9	9.2		
6	19.8	9.4		
8	19.4	9.1		
10	17.4	9.2		
12	15.8	8.3		
13	14.7	6.5		



Parameter	FLS	FLB
Total P (µg/L)	28.70	17.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	3.20	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	11.00	NA
Magnesium (mg/L)	3.00	NA
Hardness (mg/L)	39.80	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

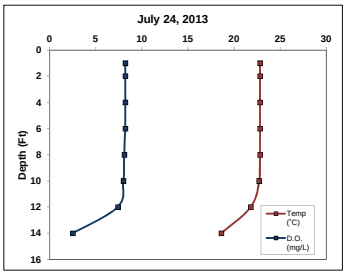
Data collected by TAH (Onterra)

Fawn Lake

Date: 7/24/2013
Time: 8:45
Weather: 50% clouds, 65F, light breeze
Entry: EEH

Max Depth: 15.0
FLS Depth (ft): 3.0
FLB Depth (ft): 12.0
Secchi Depth (ft): 7.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.8	8.2	9.1	85.0
2	22.8	8.2	9.1	85.0
4	22.8	8.2	9.0	85.0
6	22.8	8.2	9.0	85.0
8	22.8	8.1	9.0	85.0
10	22.7	8.0	9.0	85.0
12	21.8	7.4	8.0	90.0
14	18.6	2.5	7.2	107.0



Parameter	FLS	FLB
Total P (µg/L)	20.00	323.00
Dissolved P (µg/L)	ND	2.30
Chl-a (µg/L)	6.43	NA
TKN (µg/L)	636.00	578.00
$NO_3 + NO_2$-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	ND
Total N (µg/L)	636.00	578.00
Lab Cond. (µS/cm)	86.60	89.80
Lab pH	8.03	7.57
Alkalinity (mg/L $CaCO_3$)	39.20	41.80
Total Susp. Solids (mg/L)	2.60	2.80
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	15.00	NA
Turbidity (NTU)	NA	NA

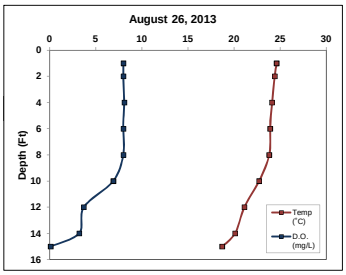
Data collected by TAH and DAC (Onterra)

Fawn Lake

Date: 8/26/2013
Time:
Weather: 67F, light wind, 100% clouds
Entry: EEH

Max Depth: 15.5
FLS Depth (ft): 3.0
FLB Depth (ft): 13.0
Secchi Depth (ft): 7.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.6	8.0		
2	24.4	8.0		
4	24.1	8.1		
6	23.9	8.0		
8	23.8	8.0		
10	22.7	6.9		
12	21.1	3.7		
14	20.1	3.2		
15	18.7	0.1		



Parameter	FLS	FLB
Total P (µg/L)	8.93	58.70
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	10.60	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	9.99	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

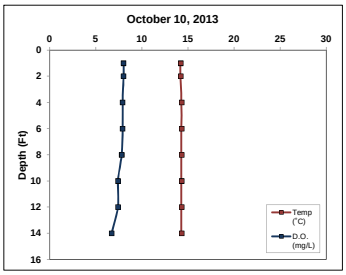
Data collected by MKH and TAH (Onterra)

Fawn Lake

Date: 10/10/2013
Time: 9:15
Weather: Clear, 25% clouds, 49F, no wind
Entry: EEH

Max Depth: 14.8
FLS Depth (ft): 3.0
FLB Depth (ft): 12.0
Secchi Depth (ft): 11.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	14.2	8.0		
2	14.2	8.0		
4	14.3	7.9		
6	14.3	7.9		
8	14.3	7.8		
10	14.3	7.4		
12	14.3	7.4		
14	14.3	6.7		



Parameter	FLS	FLB
Total P (µg/L)	26.40	26.90
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	6.41	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	ND	ND
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

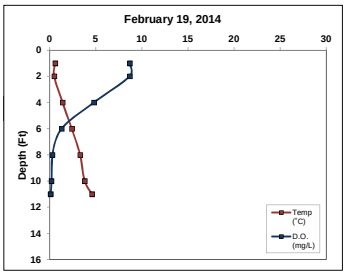
Data collected by TWH and TAH (Onterra)

Fawn Lake

Date: 2/19/2014
Time: 12:57
Weather: 100% sun, southern wind 10-15 mph, 30F
Entry: EEH

Max Depth: 12.2
FLS Depth (ft): 3.0
FLB Depth (ft): 10.0
Secchi Depth (ft): 7.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.6	8.7		
2	0.5	8.7		
4	1.4	4.8		
6	2.4	1.3		
8	3.3	0.3		
10	3.8	0.2		
11	4.6	0.1		



Parameter	FLS	FLB
Total P (µg/L)	29.90	296.00
Dissolved P (µg/L)	5.00	110.00
Chl-a (µg/L)	NA	NA
TKN (µg/L)	510.00	1020.00
NO_3 + NO_2-N (µg/L)	54.00	ND
NH_3-N (µg/L)	188.00	572.00
Total N (µg/L)	752.00	1592.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and DAC. Ice Thickness: 1.7 ft

Water Quality Data

2013-2014	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	8.9	NA	NA
Total P (µg/L)	6	24.0	6	126.9
Dissolved P (µg/L)	3	3.6	3	56.2
Chl a (µg/L)	5	6.4	0	NA
TKN (µg/L	3	450.3	3	663.0
NO3+NO2-N (µg/L)	3	54.0	3	ND
NH3-N (µg/L)	3	188.0	3	572.0
Total N (µg/L)	3	531.0	3	853.7
Lab Cond. (µS/cm)	2	84.1	2	87.3
Lab pH	2	7.9	2	7.6
Alkal (mg/l CaCO3)	2	37.5	2	39.4
Total Susp. Solids (mg/l)	3	2.4	3	2.6
Calcium (µg/L)	3	10.3	0	NA
Magnesium (mg/L)	2	2.9	0	NA
Hardness (mg/L)	2	37.9	0	NA
Color (SU)	2	15.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Morphological / Geographical Data

Parameter	Value
Acreage	
Volume (acre-feet)	
Perimeter (miles)	
Shoreland Developmetnt Factor	
Maximum Depth (feet)	
County	
WBIC	
Lillie Mason Region (1983)	NLF Ecoregion
Nichols Ecoregion (1999)	NLFL

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			0.0
Open Water			0.0
Pasture/Grass			0.0
Row Crops			0.0
Urban - Rural Residential			0.0
Wetland			0.0
Watershed to Lake Area			

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1985			
2013	46.8	49.3	45.7
All Years (Weighted)	46.8	49.3	45.7
Shallow, Lowland Drainage Lakes	54.6	52.6	52.4
NLF Ecoregion	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1985	1	8.9	0						1	27.0	0.0	
2013	5	9.2	3	8.8	5	6.4	3	6.7	5	22.8	3.0	19.2
All Years (Weighted)		9.1		8.8		6.4		6.7		23.5		19.2
Shallow, Lowland Drainage Lakes				5.6				9.4				33.0
NLF Ecoregion				8.9				5.6				21.0

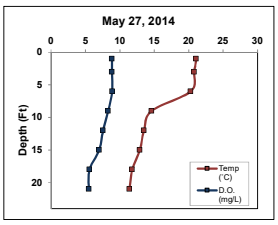
July 2013 N:	636.0
July 2013 P:	20.0
Summer 2013 N:P	32 :1

Wild Rice Lake

Date: 5/27/2014
Time: 13:50
Weather: 85% clouds, light breeze, 73F
Entry: EEH

Max Depth: 23.6
WRLS Depth (ft): 3.0
WRLB Depth (ft): 21.0
Secchi Depth (ft): 4.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	21.1	8.9		
3	20.8	8.8	7.9	
6	20.3	8.9		
9	14.6	8.3		
12	13.5	7.6	7.6	
15	12.9	7.0		
18	11.8	5.6		
21	11.4	5.5	7.3	



Parameter	WRLS	WRLB
Total P (µg/L)	21.40	18.50
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	10.00	NA
TKN (µg/L)	390.00	308.00
NO_3 + NO_2-N (µg/L)	ND	42.70
NH_3-N (µg/L)	ND	18.40
Total N (µg/L)	390.00	350.70
Lab Cond. (µS/cm)	82.60	80.10
Lab pH	7.54	7.28
Alkalinity (mg/L $CaCO_3$)	36.80	35.60
Total Susp. Solids (mg/L)	2.60	ND
Calcium (mg/L)	11.10	NA
Magnesium (mg/L)	2.76	NA
Hardness (mg/L)	39.00	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

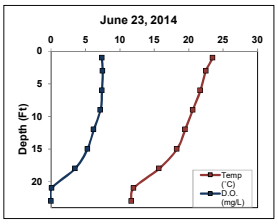
Data collected by EAT, SDF, and EEH (Onterra)

Wild Rice Lake

Date: 6/23/2014
Time: 13:30
Weather: 72F, 100% clouds, breezy
Entry: EEH

Max Depth: 24.0
WRLS Depth (ft): 3.0
WRLB Depth (ft): 21.0
Secchi Depth (ft): 7.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.5	7.4		
3	22.5	7.5		
6	21.7	7.4		
9	20.6	7.2		
12	19.5	6.2		
15	18.3	5.3		
18	15.7	3.5		
21	12.0	0.1		
23	11.7	0.0		



Parameter	WRLS	WRLB
Total P (µg/L)	21.20	22.60
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	4.49	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Dissolved P (µg/L)	NA	NA

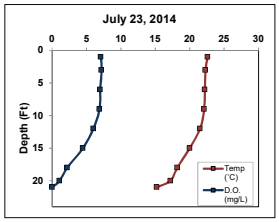
Data collected by TAH (Onterra)

Wild Rice Lake

Date: 7/23/2014
Time: 11:35
Weather: 70% clouds, 68F
Entry: EEH

Max Depth: 22.6
WRLS Depth (ft): 3.0
WRLB Depth (ft): 20.0
Secchi Depth (ft): 6.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.6	7.1		
3	22.3	7.2		
6	22.2	7.0		
9	22.1	6.9		
12	21.5	6.0		
15	20.0	4.5		
18	18.2	2.2		
20	17.2	1.1		
21	15.2	0.0		



Parameter	WRLS	WRLB
Total P (µg/L)	18.20	20.20
Dissolved P (µg/L)	ND	2.50
Chl-a (µg/L)	6.45	NA
TKN (µg/L)	434.00	407.00
NO_3 + NO_2-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	118.00
Total N (µg/L)	434.00	407.00
Lab Cond. (µS/cm)	94.60	99.60
Lab pH	7.62	7.29
Alkalinity (mg/L $CaCO_3$)	43.00	45.50
Total Susp. Solids (mg/L)	2.80	3.20
Calcium (mg/L)	11.50	NA
Magnesium (mg/L)	2.86	NA
Hardness (mg/L)	40.50	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

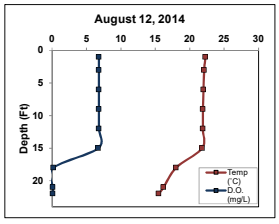
Data collected by TWH and SDF (Onterra)

Wild Rice Lake

Date: 8/12/2014
Time: 12:30
Weather: 65F, 1% clouds
Entry: EEH

Max Depth: 24.3
WRLS Depth (ft): 3.0
WRLB Depth (ft): 21.0
Secchi Depth (ft): 6.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.3	6.8		
3	22.1	6.8		
6	22.0	6.8		
9	21.9	6.8		
12	21.9	6.8		
15	21.8	6.7		
18	18.0	0.2		
21	16.2	0.1		
22	15.5	0.1		



Parameter	WRLS	WRLB
Total P (µg/L)	16.70	18.70
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	4.15	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

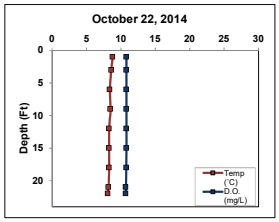
Data collected by TWH and JLW (Onterra)

Wild Rice Lake

Date: 10/22/2014
Time: 14:20
Weather: 50F, slight wind, 30% clouds
Entry: EEH

Max Depth: 22.9
WRLS Depth (ft): 3.0
WRLB Depth (ft): 21.0
Secchi Depth (ft): 8.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	8.8	10.8		
3	8.6	10.8		
6	8.4	10.8		
9	8.5	10.8		
12	8.3	10.8		
15	8.3	10.8		
18	8.3	10.8		
21	8.2	10.7		
22	8.1	10.7		



Parameter	WRLS	WRLB
Total P (µg/L)	14.90	13.30
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	4.92	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	ND	ND
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

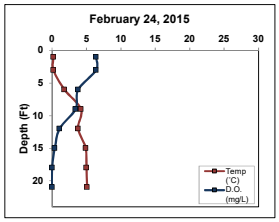
Data collected by TAH and DAC (Onterra)

Wild Rice Lake

Date: 2/24/2015
Time: 11:02
Weather: 20F, very windy, 80% clouds
Entry: EEH

Max Depth: 22.5
WRLS Depth (ft): 3.0
WRLB Depth (ft): 20.0
Secchi Depth (ft): 5.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.2	6.4		
3	0.2	6.4		
6	1.8	3.8		
9	4.2	3.4		
12	3.8	1.1		
15	4.9	0.4		
18	5.0	0.0		
21	5.1	0.0		



Parameter	WRLS	WRLB
Total P (µg/L)	13.80	18.30
Dissolved P (µg/L)	ND	3.30
Chl-a (µg/L)	NA	NA
TKN (µg/L)	304.00	453.00
NO_3 + NO_2-N (µg/L)	82.00	108.00
NH_3-N (µg/L)	49.70	131.00
Total N (µg/L)	386.00	561.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by DAC and TAH (Onterra). Ice thickness: 1.7 feet

Water Quality Data

2014-2015	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	6.3	NA	NA
Total P (µg/L)	6	17.7	6	18.6
Dissolved P (µg/L)	3	ND	3	2.9
Chl a (µg/L)	5	6.0	0	NA
TKN (µg/L	3	376.0	3	389.3
NO3+NO2-N (µg/L)	3	82.0	3	75.4
NH3-N (µg/L)	3	49.7	3	89.1
Total N (µg/L)	3	403.3	3	439.6
Lab Cond. (µS/cm)	2	88.6	2	89.9
Lab pH	2	7.6	2	7.3
Alkal (mg/l CaCO3)	2	39.9	2	40.6
Total Susp. Solids (mg/l)	3	2.7	3	3.2
Calcium (µg/L)	2	11.3	0	NA
Magnesium (mg/L)	2	2.8	0	NA
Hardness (mg/L)	2	39.8	0	NA
Color (SU)	2	45.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Morphological / Geographical Data

Parameter	Value
Acreage	
Volume (acre-feet)	
Perimeter (miles)	
Shoreland Developmetnt Factor	
Maximum Depth (feet)	
County	
WBIC	
Lillie Mason Region (1983)	NLF Ecoregion
Nichols Ecoregion (1999)	NLFL

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			0.0
Open Water			0.0
Pasture/Grass			0.0
Row Crops			0.0
Urban - Rural Residential			0.0
Wetland			0.0
Watershed to Lake Area			

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1971			
1975	51.7		53.2
1976	53.2		
1984		53.2	46.8
1985			
1993			41.6
1999			50.4
2000			48.2
2001			46.4
2002			48.1
2003			46.4
2004			46.6
2005			44.7
2006			47.2
2014	46.4	46.4	49.5
All Years (Weighted)	49.1	48.6	47.2
Shallow, Lowland Drainage Lakes	54.6	52.6	52.4
NLF Ecoregion	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1971									1	28.0	0.0	
1975	1	5.2	1	5.2					2	23.5	1.0	27.0
1976									4	26.3	1.0	30.0
1984	1	8.2	1	8.2	1	10.0	1	10.0				
1985									1	17.0	0.0	
1993	2	11.8	2	11.8								
1999	7	6.1	6	6.4								
2000	8	7.4	4	7.4								
2001	8	8.1	6	8.5								
2002	3	7.8	2	7.5								
2003	8	7.9	6	8.4								
2004	5	8.3	5	8.3								
2005	3	9.5	3	9.5								
2006	3	8.0	3	8.0								
2014	5	6.5	3	6.8	5	6.0	3	5.0	5	18.5	3.0	18.7
All Years (Weighted)		7.7		8.0		6.7		6.3		22.3		22.6
Shallow, Lowland Drainage Lakes				5.6				9.4				33.0
NLF Ecoregion				8.9				5.6				21.0

July 2014 N: 434.0
July 2014 P: 18.2

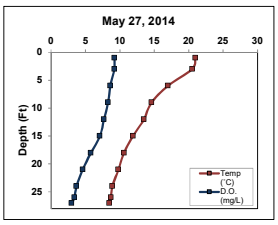
Summer 2014 N:P 24 :1

Alder Lake

Date: 5/27/2014
Time: 14:44
Weather: 85% clouds, light breeze, 73F
Entry: EEH

Max Depth: 27.8
ALS Depth (ft): 3.0
ALB Depth (ft): 26.0
Secchi Depth (ft): 5.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	21.0	9.2		
3	20.5	9.2	7.9	
6	17.0	8.6		
9	14.6	8.3		
12	13.5	7.7		
15	11.9	7.1	7.5	
18	10.6	5.8		
21	9.8	4.6		
24	8.9	3.7		
26	8.7	3.4	7.2	
27	8.5	3.0		



Parameter	ALS	ALB
Total P (µg/L)	20.20	19.90
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	9.17	NA
TKN (µg/L)	379.00	519.00
NO_3 + NO_2-N (µg/L)	ND	79.90
NH_3-N (µg/L)	ND	121.00
Total N (µg/L)	379.00	598.90
Lab Cond. (µS/cm)	75.20	85.00
Lab pH	7.59	7.08
Alkalinity (mg/L $CaCO_3$)	33.20	38.10
Total Susp. Solids (mg/L)	2.80	ND
Calcium (mg/L)	9.72	NA
Magnesium (mg/L)	2.37	NA
Hardness (mg/L)	34.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

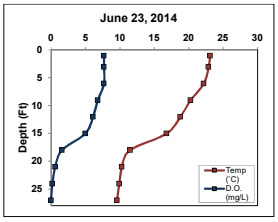
Data collected by EAT, SDF, and EEH (Onterra)

Alder Lake

Date: 6/23/2014
Time: 12:45
Weather: 72F, 100% clouds, breezy
Entry: EEH

Max Depth: 28.4
ALS Depth (ft): 3.0
ALB Depth (ft): 26.0
Secchi Depth (ft): 6.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.1	7.7		
3	22.9	7.7		
6	22.2	7.7		
9	20.3	6.8		
12	18.8	6.1		
15	16.8	5.0		
18	11.5	1.6		
21	10.3	0.6		
24	9.9	0.2		
27	9.6	0.0		



Parameter	ALS	ALB
Total P (µg/L)	18.40	22.80
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	3.65	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Dissolved P (µg/L)	NA	NA

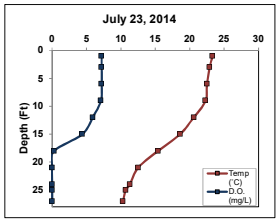
Data collected by TAH (Onterra)

Alder Lake

Date: 7/23/2014
Time: 12:25
Weather: 75% clouds
Entry: EEH

Max Depth: 27.5
ALS Depth (ft): 3.0
ALB Depth (ft): 25.0
Secchi Depth (ft): 6.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.3	7.2		
3	22.9	7.2		
6	22.5	7.2		
9	22.3	7.1		
12	20.6	5.9		
15	18.6	4.4		
18	15.4	0.3		
21	12.5	0.0		
24	11.3	0.0		
25	10.7	0.0		
27	10.3	0.0		



Parameter	ALS	ALB
Total P (µg/L)	14.30	19.70
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	4.78	NA
TKN (µg/L)	368.00	739.00
NO_3 + NO_2-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	456.00
Total N (µg/L)	368.00	739.00
Lab Cond. (µS/cm)	89.90	102.00
Lab pH	7.65	7.12
Alkalinity (mg/L $CaCO_3$)	40.20	48.00
Total Susp. Solids (mg/L)	3.33	6.40
Calcium (mg/L)	11.00	NA
Magnesium (mg/L)	2.77	NA
Hardness (mg/L)	38.90	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

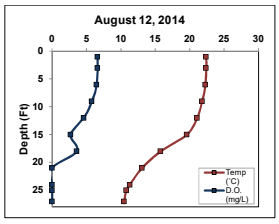
Data collected by TWH and SDF (Onterra)

Alder Lake

Date: 8/12/2014
Time: 13:36
Weather: 65F, 0% clouds
Entry: EEH

Max Depth: 27.9
ALS Depth (ft): 3.0
ALB Depth (ft): 25.0
Secchi Depth (ft): 8.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.4	6.6		
3	22.4	6.6		
6	22.3	6.5		
9	21.8	5.8		
12	21.1	4.6		
15	19.6	2.7		
18	15.8	3.6		
21	13.1	0.0		
24	11.3	0.0		
25	10.8	0.0		
27	10.5	0.0		



Parameter	ALS	ALB
Total P (µg/L)	13.50	20.10
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.19	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

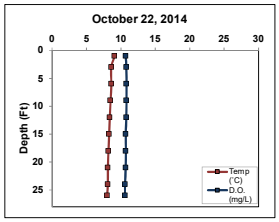
Data collected by TWH and JLW (Onterra)

Alder Lake

Date: 10/22/2014
Time: 13:40
Weather: 50F, slight wind, 30% clouds
EEH

Max Depth: 27.0
ALS Depth (ft): 3.0
ALB Depth (ft): 25.0
Secchi Depth (ft): 7.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	9.1	10.7		
3	8.6	10.8		
6	8.6	10.8		
9	8.5	10.8		
12	8.4	10.8		
15	8.3	10.7		
18	8.2	10.7		
21	8.1	10.7		
24	8.1	10.6		
26	8.0	10.6		



Parameter	ALS	ALB
Total P (µg/L)	14.60	14.90
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	8.17	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	ND	ND
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

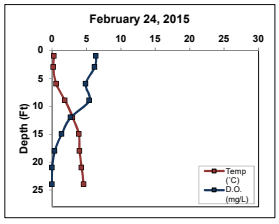
Data collected by TAH and DAC (Onterra)

Alder Lake

Date: 2/24/2015
Time: 9:30
Weather: 20F, windy, snowing
Entry: EEH

Max Depth: 25.6
ALS Depth (ft): 3.0
ALB Depth (ft): 23.0
Secchi Depth (ft): 4.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.3	6.4		
3	0.2	6.2		
6	0.6	4.9		
9	1.9	5.4		
12	3.0	2.7		
15	3.9	1.4		
18	4.0	0.4		
21	4.3	0.0		
24	4.6	0.0		



Parameter	ALS	ALB
Total P (µg/L)	12.00	26.80
Dissolved P (µg/L)	1.80	6.30
Chl-a (µg/L)	NA	NA
TKN (µg/L)	291.00	711.00
NO_3 + NO_2-N (µg/L)	82.10	59.20
NH_3-N (µg/L)	42.40	351.00
Total N (µg/L)	373.10	770.20
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by DAC and TAH (Onterra).

Water Quality Data

2014-2015	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	6.5	NA	NA
Total P (µg/L)	6	15.5	6	20.7
Dissolved P (µg/L)	3	1.8	3	6.3
Chl a (µg/L)	5	5.6	0	NA
TKN (µg/L	3	346.0	3	656.3
NO3+NO2-N (µg/L)	3	82.1	3	69.6
NH3-N (µg/L)	3	42.4	3	309.3
Total N (µg/L)	3	373.4	3	702.7
Lab Cond. (µS/cm)	2	82.6	2	93.5
Lab pH	2	7.6	2	7.1
Alkal (mg/l CaCO3)	2	36.7	2	43.1
Total Susp. Solids (mg/l)	3	3.1	3	6.4
Calcium (µg/L)	2	10.4	0	NA
Magnesium (mg/L)	2	2.6	0	NA
Hardness (mg/L)	2	36.5	0	NA
Color (SU)	2	45.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Morphological / Geographical Data

Parameter	Value
Acreage	
Volume (acre-feet)	
Perimeter (miles)	
Shoreland Developmetnt Factor	
Maximum Depth (feet)	
County	
WBIC	
Lillie Mason Region (1983)	NLF Ecoregion
Nichols Ecoregion (1999)	NLFL

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			0.0
Open Water			0.0
Pasture/Grass			0.0
Row Crops			0.0
Urban - Rural Residential			0.0
Wetland			0.0
Watershed to Lake Area			

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1971			
1975	47.3		52.9
1976	47.3		
1984		49.7	45.7
1985			
1990			45.6
1991			45.9
1993			44.7
1994			45.5
1995			44.2
1996			47.8
1997			40.7
1998			46.7
1999			45.5
2000	46.6	46.4	45.5
2001	48.3	44.3	46.0
2002	43.5	39.4	44.2
2003	46.0	42.9	44.4
2004	51.4	43.7	44.9
2005	44.1	39.2	43.7
2006	45.8	39.7	
2014	43.6	43.0	48.7
All Years (Weighted)	46.7	42.8	45.2
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NLF Ecoregion	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1971									2	29.0	0.0	
1975	3	5.4	3	5.4					2	20.0	1.0	20.0
1976									3	27.7	1.0	20.0
1984	1	8.9	1	8.9	1	7.0	1	7.0				
1985	1	4.9	0						1	20.0	0.0	
1990	5	9.2	4	8.9								
1991	3	10.1	1	8.8								
1993	7	9.5	7	9.5								
1994	4	9.0	4	9.0								
1995	7	9.5	6	9.8								
1996	6	7.9	5	7.7								
1997	4	12.5	4	12.5								
1998	5	8.7	4	8.3								
1999	7	9.0	7	9.0								
2000	12	9.2	9	9.0	2	6.0	1	5.0	2	19.0	1.0	19.0
2001	6	8.6	3	8.7	5	5.4	3	4.0	6	21.5	3.0	21.3
2002	8	9.9	6	9.8	4	3.4	3	2.5	4	16.5	3.0	15.3
2003	10	10.4	7	9.7	4	3.6	3	3.5	6	18.5	4.0	18.3
2004	4	9.4	4	9.4	5	4.7	4	3.8	6	24.7	4.0	26.5
2005	12	9.8	9	10.2	5	2.9	4	2.4	5	17.8	3.0	16.0
2006					1	2.5	1	2.5	1	18.0	1.0	18.0
2014	5	6.8	3	7.2	5	5.6	3	3.5	5	16.2	3.0	15.4
All Years (Weighted)		9.2		9.2		4.5		3.5		20.5		19.2
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NLF Ecoregion				8.9				5.6				21.0

July 2014 N: 368.0
July 2014 P: 14.3

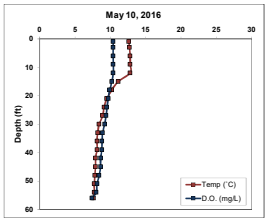
Summer 2014 N:P 26 :1

Manitowish Lake

Date: 5/10/2016
Time: 8:45
Weather: 50F, 50% clouds
Entry: EEH

Max Depth: 59.7
LS Depth (ft): 3.0
LB Depth (ft): 57.0
Secchi Depth (ft): 7.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	12.8	10.4		
3	12.7	10.4		
6	12.8	10.4		
9	12.8	10.4		
12	12.8	10.4		
15	11.1	10.2		
18	10.2	9.9		
21	9.5	9.7		
24	9.1	9.5		
27	8.9	9.4		
30	8.4	9.2		
33	8.2	8.9		
36	8.1	8.8		
39	8.1	8.8		
42	7.9	8.6		
45	7.9	8.6		
48	7.8	8.4		
51	7.7	8.1		
54	7.7	8.0		
56	7.6	7.4		



Parameter	LS	LB
Total P (µg/L)	19.50	31.80
Dissolved P (µg/L)	2.10	2.60
Chl-a (µg/L)	7.78	NA
TKN (µg/L)	432.00	555.00
$NO_3 + NO_2$-N (µg/L)	ND	54.90
NH_3-N (µg/L)	ND	44.50
Total N (µg/L)	432.00	609.90
Lab Cond. (µS/cm)	92.10	93.90
Lab pH	7.86	7.28
Alkalinity (mg/L $CaCO_3$)	37.50	38.00
Total Susp. Solids (mg/L)	3.00	2.60
Calcium (mg/L)	11.50	NA
Magnesium (mg/L)	2.83	NA
Hardness (mg/L)	40.20	NA
Color (SU)	20.00	NA
Turbidity (NTU)	NA	NA

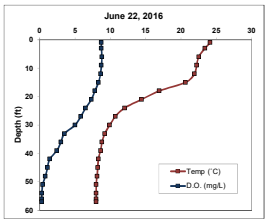
Data collected by TWH and TAH (Onterra)

Manitowish Lake

Date: 6/22/2016
Time: 15:30
Weather: 50% clouds, 73F, light breeze
Entry: JLW

Max Depth: 58.2
LS Depth (ft): 3.0
LB Depth (ft): 56.0
Secchi Depth (ft): 8.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.1	8.7		
3	23.4	8.7		
6	22.5	8.8		
9	22.2	8.7		
12	21.9	8.6		
15	20.6	8.3		
18	16.9	7.8		
21	14.4	7.3		
24	12.0	6.5		
27	10.7	5.8		
30	9.9	5.0		
33	9.2	3.5		
36	8.8	3.0		
39	8.6	2.4		
42	8.3	1.4		
45	8.2	1.1		
48	8.1	0.8		
51	8.0	0.4		
54	8.0	0.3		
56	8.0	0.3		
57	8.0	0.3		



Parameter	LS	LB
Total P (µg/L)	15.70	45.10
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	1.23	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

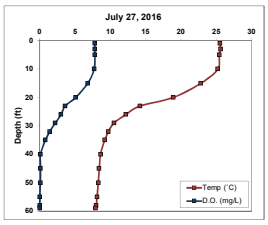
Data collected by TAH (Onterra).

Manitowish Lake

Date: 7/27/2016
Time: 15:05
Weather: Rain, overcast, 70F, little wind
Entry: JMB

Max Depth: 60.0
LS Depth (ft): 3.0
LB Depth (ft): 58.0
Secchi Depth (ft): 9.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.5	7.8		
3	25.6	7.8		
5	25.4	7.8		
10	25.2	7.7		
15	22.8	6.8		
20	18.9	5.1		
23	14.2	3.6		
26	12.2	3.0		
29	10.5	2.2		
32	9.7	1.4		
35	9.2	0.8		
40	8.6	0.1		
45	8.4	0.1		
50	8.3	0.1		
55	8.1	0.0		
58	8.0	0.0		
59	7.9	0.0		



Parameter	LS	LB
Total P (µg/L)	14.40	19.20
Dissolved P (µg/L)	ND	2.30
Chl-a (µg/L)	2.16	NA
TKN (µg/L)	462.00	555.00
$NO_3 + NO_2$-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	259.00
Total N (µg/L)	462.00	555.00
Lab Cond. (µS/cm)	87.20	104.00
Lab pH	7.77	6.97
Alkalinity (mg/L $CaCO_3$)	37.00	45.10
Total Susp. Solids (mg/L)	ND	ND
Calcium (mg/L)	11.70	NA
Magnesium (mg/L)	3.04	NA
Hardness (mg/L)	41.70	NA
Color (SU)	20.00	NA
Turbidity (NTU)	NA	NA

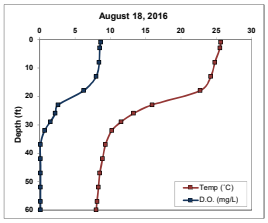
Data collected by TAH (Onterra).

Manitowish Lake

Date: 8/18/2016
Time: 11:00
Weather: 72F, 10% clouds, light breeze
Entry: JMB

Max Depth: 60.0
LS Depth (ft): 3.0
LB Depth (ft): 57.0
Secchi Depth (ft): 10.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.6	8.6		
3	25.5	8.5		
8	24.8	8.4		
13	24.2	8.0		
18	22.7	6.2		
23	15.9	2.6		
26	13.3	2.2		
29	11.5	1.5		
32	10.2	0.7		
37	9.3	0.1		
42	8.9	0.1		
47	8.5	0.1		
52	8.3	0.1		
57	8.1	0.1		
60	8.0	0.1		



Parameter	LS	LB
Total P (µg/L)	14.00	22.10
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	0.91	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

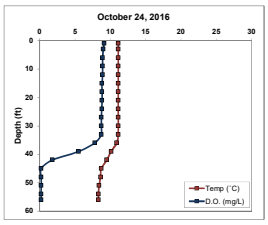
Data collected by TAH and AAH (Onterra).

Manitowish Lake

Date: 10/24/2016
Time: 12:10
Weather: 10% clouds, 47F
Entry: JMB

Max Depth: 57.2
LS Depth (ft): 3.0
LB Depth (ft): 54.0
Secchi Depth (ft): 6.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	11.1	9.1		
3	11.1	9.0		
6	11.1	8.9		
9	11.1	8.9		
12	11.1	8.9		
15	11.1	8.8		
18	11.1	8.8		
21	11.1	8.8		
24	11.1	8.8		
27	11.1	8.7		
30	11.1	8.7		
33	11.1	8.7		
36	10.9	7.8		
39	10.1	5.5		
42	9.5	1.8		
45	8.7	0.2		
48	8.6	0.2		
51	8.4	0.2		
54	8.3	0.2		
56	8.3	0.2		



Parameter	LS	LB
Total P (µg/L)	18.10	59.30
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	7.74	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	ND	4.00
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

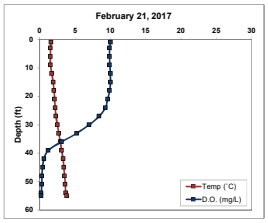
Data collected by JMB and TWH (Onterra).

Manitowish Lake

Date: 2/21/2017
Time: 14:00
Weather: 5% clouds, 50F, 8mph wind
Entry: JMB

Max Depth: 56.8
LS Depth (ft): 3.0
LB Depth (ft): 54.0
Secchi Depth (ft): 9.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	1.6	10.0		
3	1.5	9.9		
6	1.5	9.9		
9	1.5	9.9		
12	1.7	10.0		
15	1.9	10.0		
18	2.0	9.9		
21	2.1	9.6		
24	2.2	9.3		
27	2.3	8.4		
30	2.5	7.0		
33	2.7	5.2		
36	2.9	3.1		
39	3.1	1.2		
42	3.3	0.6		
45	3.4	0.4		
48	3.5	0.3		
51	3.6	0.3		
54	3.7	0.2		
55	3.8	0.2		



Parameter	LS	LB
Total P (µg/L)	16.20	69.30
Dissolved P (µg/L)	3.50	6.90
Chl-a (µg/L)	NA	NA
TKN (µg/L)	250.00	1330.00
$NO_3 + NO_2$-N (µg/L)	82.40	ND
NH_3-N (µg/L)	ND	648.00
Total N (µg/L)	332.40	1330.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH & JMB (Onterra). Ice depth: 1.2ft.

Water Quality Data

2016-2017	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	8.5	NA	NA
Total P (µg/L)	6	16.3	6	41.1
Dissolved P (µg/L)	3	2.8	3	3.9
Chl a (µg/L)	5	4.0	0	NA
TKN (µg/L	3	381.3	3	813.3
NO_3+NO_2-N (µg/L)	3	82.4	3	54.9
NH_3-N (µg/L)	3	ND	3	317.2
Total N (µg/L)	3	408.8	3	831.6
Lab Cond. (µS/cm)	2	89.7	2	99.0
Alkal (mg/l $CaCO_3$)	2	37.4	2	41.6
Total Susp. Solids (mg/l)	3	3.0	3	3.3
Calcium (mg/L)	2	11.6	0	NA
Magnesium (mg/L)	2	2.9	0	NA
Hardness (mg/L)	2	41.0	0	NA
Color (SU)	2	20.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1973			43.9
1974			45.0
1975	44.1		46.3
1992			39.1
1993			39.4
1994			36.6
1995			38.8
1996			38.3
1997			36.9
1998			38.4
2016	42.9	34.1	45.0
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
All Years (Weighted)	43.2	34.1	39.3
DLDL Median	49.4	49.7	46.2
NLF Ecoregion Median	48.1	47.5	45.7

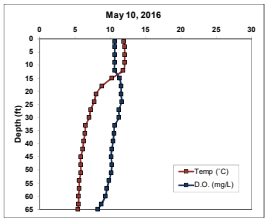
	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1973	2	10.7	1	10.0					2	20.0	1.0	10.0
1974	3	8.6	1	9.3					3	60.0	1.0	20.0
1975	2	8.5	2	8.5					2	13.0	1.0	16.0
1992	4	14.0	4	14.0								
1993	9	13.8	8	13.8								
1994	5	16.7	5	16.7								
1995	6	14.6	5	14.3								
1996	4	14.8	4	14.8								
1997	4	16.3	4	16.3								
1998	4	14.5	3	14.7								
2016	5	8.2	3	9.3	5	4.0	3	1.4	5	16.3	3.0	14.7
All Years (Weighted)		13.3		13.8		4.0		1.4		27.3		15.0
DLDL Median				8.5				7.0				23.0
NLF Ecoregion Median				8.9				5.6				21.0

Little Star Lake

Date: 5/10/2016
Time: 9:20
Weather: 51F, 100% clouds
Entry: EEH

Max Depth: 65.8
LS Depth (ft): 3.0
LB Depth (ft): 63.0
Secchi Depth (ft): 9.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	11.9	10.6		
3	12.0	10.6		
6	12.0	10.6		
9	12.0	10.6		
12	11.8	10.6		
15	10.2	11.3		
18	8.8	11.5		
21	8.0	11.5		
24	7.7	11.6		
27	7.2	11.2		
30	7.0	11.2		
33	6.5	10.6		
36	6.4	10.5		
39	6.2	10.4		
42	6.1	10.2		
45	5.8	10.1		
48	5.8	10.2		
51	5.8	10.1		
54	5.6	9.8		
57	5.6	9.5		
60	5.5	9.3		
63	5.5	8.7		
65	5.4	8.2		



Parameter	LS	LB
Total P (µg/L)	16.80	22.30
Dissolved P (µg/L)	2.50	1.90
Chl-a (µg/L)	3.23	NA
TKN (µg/L)	341.00	675.00
$NO_3 + NO_2$-N (µg/L)	ND	ND
NH_3-N (µg/L)	ND	ND
Total N (µg/L)	341.00	675.00
Lab Cond. (µS/cm)	96.00	97.70
Lab pH	7.91	7.34
Alkalinity (mg/L $CaCO_3$)	38.20	38.50
Total Susp. Solids (mg/L)	2.40	2.60
Calcium (mg/L)	12.00	NA
Magnesium (mg/L)	2.94	NA
Hardness (mg/L)	42.00	NA
Color (SU)	5.00	NA
Turbidity (NTU)	NA	NA

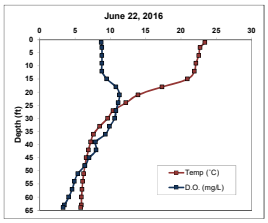
Data collected by TWH & TAH (Onterra)

Little Star Lake

Date: 6/22/2016
Time: 14:40
Weather: 75% clouds, 75F, light breeze
Entry: JLW

Max Depth: 65.0
LS Depth (ft): 3.0
LB Depth (ft): 63.0
Secchi Depth (ft): 17.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.4	8.7		
3	22.7	8.8		
6	22.5	8.8		
9	22.1	8.8		
12	21.9	8.8		
15	20.9	9.5		
18	17.3	10.8		
21	13.9	11.3		
24	12.2	11.1		
27	10.4	10.8		
30	9.6	10.6		
33	8.5	9.9		
36	7.6	9.3		
39	7.2	7.9		
42	6.9	8.0		
45	6.6	7.0		
48	6.4	6.4		
51	6.2	5.4		
54	6.1	4.9		
57	6.0	4.6		
60	5.9	4.1		
63	5.9	3.5		
64	5.8	3.3		



Parameter	LS	LB
Total P (µg/L)	11.20	18.60
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	ND	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

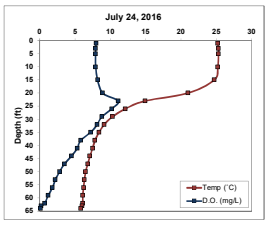
Collected by TAH (Onterra).

Little Star Lake

Date: 7/27/2016
Time: 14:25
Weather: Overcast, no wind 72F
Entry: JMB

Max Depth: 64.9
LS Depth (ft): 3.0
LB Depth (ft): 63.0
Secchi Depth (ft): 15.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.2	8.0		
3	25.3	7.9		
5	25.3	7.9		
10	25.2	7.9		
15	24.7	8.2		
20	21.0	8.9		
23	14.9	11.1		
26	12.1	10.2		
29	10.3	8.8		
32	9.1	8.1		
35	8.4	7.2		
38	7.8	5.8		
41	7.5	5.3		
44	7.1	4.5		
47	6.8	3.5		
50	6.5	2.8		
53	6.3	2.2		
56	6.2	1.8		
59	6.1	1.2		
62	6.1	0.7		
63	6.0	0.2		
64	5.8	0.1		



Parameter	LS	LB
Total P (µg/L)	10.80	28.50
Dissolved P (µg/L)	1.90	3.30
Chl-a (µg/L)	0.70	NA
TKN (µg/L)	298.00	346.00
$NO_3 + NO_2$-N (µg/L)	ND	30.00
NH_3-N (µg/L)	ND	54.90
Total N (µg/L)	298.00	376.00
Lab Cond. (µS/cm)	90.40	102.00
Lab pH	7.82	7.08
Alkalinity (mg/L $CaCO_3$)	37.50	41.00
Total Susp. Solids (mg/L)	ND	ND
Calcium (mg/L)	11.80	NA
Magnesium (mg/L)	3.09	NA
Hardness (mg/L)	42.20	NA
Color (SU)	ND	NA
Turbidity (NTU)	NA	NA

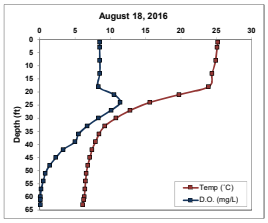
Data collected by TAH (Onterra).

Little Star Lake

Date: 8/18/2016
Time: 10:20
Weather: 10% clouds, 72F, light breeze
Entry: JMB

Max Depth: 63.4
LS Depth (ft): 3.0
LB Depth (ft): 61.0
Secchi Depth (ft): 17.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.2	8.5		
3	25.1	8.5		
8	24.9	8.5		
13	24.4	8.5		
18	23.9	8.3		
21	19.7	10.5		
24	15.6	11.4		
27	12.8	10.1		
30	10.8	8.3		
33	9.2	6.7		
36	8.4	5.5		
39	7.9	5.0		
42	7.4	3.3		
45	7.1	2.3		
48	6.8	1.4		
51	6.6	0.8		
54	6.5	0.5		
57	6.4	0.2		
60	6.3	0.1		
61	6.2	0.1		
63	6.1	0.1		



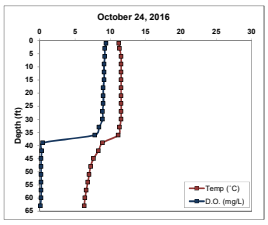
Parameter	LS	LB
Total P (µg/L)	11.30	22.10
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	0.59	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Little Star Lake

Date: 10/24/2016
Time: 12:50
Weather: 10% clouds, 47F
Entry: JMB

Max Depth: 63.0
LS Depth (ft): 3.0
LB Depth (ft): 60.0
Secchi Depth (ft): 10.3

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	11.2	9.4		
3	11.5	9.2		
6	11.5	9.2		
9	11.5	9.1		
12	11.5	9.1		
15	11.5	9.1		
18	11.5	9.0		
21	11.5	9.0		
24	11.5	9.0		
27	11.5	8.9		
30	11.5	8.9		
33	11.3	8.4		
36	11.1	7.8		
39	8.9	0.4		
42	8.3	0.3		
45	7.6	0.2		
48	7.2	0.2		
51	7.0	0.2		
54	6.8	0.2		
57	6.6	0.2		
60	6.4	0.2		
63	6.3	0.1		



Parameter	LS	LB
Total P (µg/L)	15.00	106.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.49	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	ND	ND
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

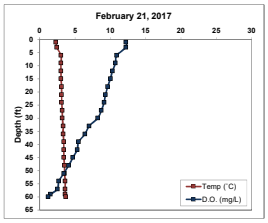
Data collected by TWH and JMB (Onterra).

Little Star Lake

Date: 2/21/2017
Time: 13:30
Weather: 10% clouds, 50F, 8mph wind
Entry: JMB

Max Depth: 62.2
LS Depth (ft): 3.0
LB Depth (ft): 59.0
Secchi Depth (ft): 17.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	2.3	12.2		
3	2.4	12.2		
6	3.0	10.9		
9	3.0	10.7		
12	3.0	10.3		
15	3.0	10.0		
18	3.1	9.6		
21	3.1	9.3		
24	3.1	9.1		
27	3.2	8.7		
30	3.2	8.2		
33	3.3	7.0		
36	3.3	6.4		
39	3.4	5.5		
42	3.4	5.3		
45	3.4	4.7		
48	3.5	4.1		
51	3.5	3.4		
54	3.6	2.7		
57	3.6	2.5		
59	3.6	1.5		
60	3.7	1.2		



Parameter	LS	LB
Total P (µg/L)	12.20	32.30
Dissolved P (µg/L)	4.30	9.20
Chl-a (µg/L)	NA	NA
TKN (µg/L)	222.00	273.00
$NO_3 + NO_2$-N (µg/L)	ND	256.00
NH_3-N (µg/L)	ND	35.00
Total N (µg/L)	222.00	529.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH & JMB (Onterra). Ice depth: 1.3.

Water Quality Data

2016-2017	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	14.6	NA	NA
Total P (µg/L)	6	12.9	6	38.3
Dissolved P (µg/L)	3	2.9	3	4.8
Chl a (µg/L)	5	1.8	0	NA
TKN (µg/L	3	287.0	3	431.3
NO_3+NO_2-N (µg/L)	3	ND	3	143.0
NH_3-N (µg/L)	3	ND	3	45.0
Total N (µg/L)	3	287.0	3	526.7
Lab Cond. (µS/cm)	2	93.2	2	99.9
Alkal (mg/l $CaCO_3$)	2	37.9	2	39.8
Total Susp. Solids (mg/l)	3	2.4	3	2.6
Calcium (mg/L)	2	11.9	0	NA
Magnesium (mg/L)	2	3.0	0	NA
Hardness (mg/L)	2	42.1	0	NA
Color (SU)	2	5.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1979			57.5
1994			36.8
1995			34.9
1996			34.7
1997	51.1	32.6	33.5
1998	35.8	34.2	37.2
1999	32.9		34.7
2000	32.2	35.8	34.8
2001			34.0
2002			36.3
2003	35.8	33.0	33.2
2006			34.9
2008	35.0	31.8	35.3
2009	38.1	35.0	35.1
2016	38.9	26.3	36.4
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
All Years (Weighted)	38.7	37.2	35.1
DLDL Median	49.4	49.7	46.2
NLF Ecoregion Median	48.1	47.5	45.7

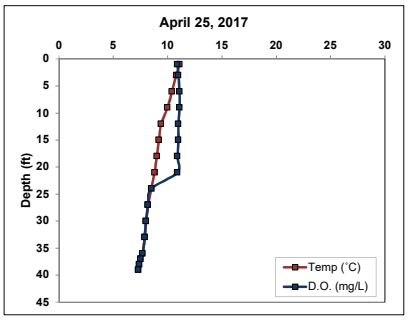
	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1979	1	3.9	1	3.9	1	10.5	1	10.5				
1994	3	16.1	2	16.4								
1995	9	19.5	3	18.7								
1996	19	17.9	12	19.0								
1997	9	19.2	5	20.7	3	1.9	2	1.2	3	21.0	2.0	26.0
1998	4	16.3	2	16.0	3	1.5	2	1.5	3	9.3	2.0	9.0
1999	4	19.0	4	19.0					3	7.3	3.0	7.3
2000	6	18.4	5	18.8	2	1.9	1	1.7	3	8.0	2.0	7.0
2001	6	18.8	3	20.0	2	2.6	0		1	11.0	0.0	
2002	3	16.8	1	17.0					1	10.0	0.0	
2003	1	21.0	1	21.0	1	1.3	1	1.3	1	9.0	1.0	9.0
2006	3	18.7	3	18.7	1	1.0	0					
2008	7	18.4	6	18.2	3	1.1	2	1.1	3	8.7	2.0	8.5
2009	7	18.4	7	18.4	2	1.6	2	1.6	2	10.5	2.0	10.5
2016	5	14.0	3	16.8	4	1.8	2	0.6	5	13.0	3.0	11.1
All Years (Weighted)		17.9		18.4		2.1		2.0		11.2		11.0
DLDL Median				8.5				7.0				23.0
NLF Ecoregion Median				8.9				5.6				21.0

Stone Lake

Date: 4/25/2017
Time: 13:30
Weather: 75% clouds, 8 mph winds, 67F
Entry: EEH

Max Depth: 39.5
STOS Depth (ft): 3.0
STOB Depth (ft): 36.0
Secchi Depth (ft): 6.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	11.1	10.9	99%		
3	10.8	11.0	99%		
6	10.4	11.1	99%		
9	10.0	11.1	98%		
12	9.4	11.0	96%		
15	9.2	11.0	96%		
18	9.0	10.9	94%		
21	8.8	10.9	94%		
24	8.5	8.5	73%		
27	8.2	8.2	69%		
30	8.0	8.0	68%		
33	7.9	7.9	66%		
36	7.7	7.7	65%		
37	7.5	7.5	63%		
38	7.4	7.4	62%		
39	7.3	7.3	60%		



Parameter	STOS	STOB
Total P (µg/L)	24.10	21.80
Dissolved P (µg/L)	3.50	3.20
Chl-*a* (µg/L)	5.06	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	332.00	365.00
Lab Cond. (µS/cm)	89.10	89.70
Lab pH	7.40	7.30
Alkalinity (mg/L $CaCO_3$)	38.10	37.90
Total Susp. Solids (mg/L)	2.00	ND
Calcium (mg/L)	11.80	NA
Magnesium (mg/L)	3.08	NA
Hardness (mg/L)	42.20	NA
Color (SU)	30.00	NA
Turbidity (NTU)	NA	NA

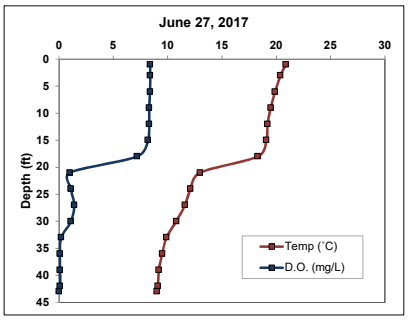
Data collected by JMB (Onterra).

Stone Lake

Date: 6/27/2017
Time: 12:15
Weather: 50% clouds, 68F, light breeze
Entry: EEH

Max Depth: 43.6
STOS Depth (ft): 3.0
STOB Depth (ft): 4.0
Secchi Depth (ft): 6.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	20.9	8.4	94%		
3	20.4	8.4	93%		
6	19.9	8.4	92%		
9	19.5	8.3	90%		
12	19.2	8.3	90%		
15	19.1	8.2	88%		
18	18.3	7.2	77%		
21	13.0	1.0	10%		
24	12.1	1.1	10%		
27	11.6	1.4	13%		
30	10.8	1.1	10%		
33	9.9	0.2	2%		
36	9.5	0.1	1%		
39	9.2	0.1	1%		
42	9.1	0.1	1%		
43	9.0	0.0	0%		



Parameter	STOS	STOB
Total P (µg/L)	18.50	45.90
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	6.19	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

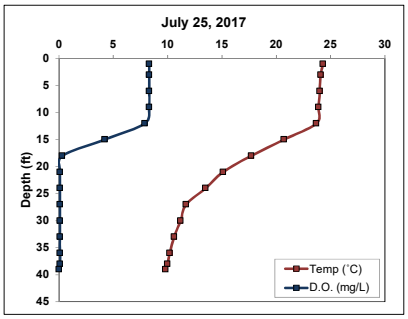
Data collected by TAH and JMB (Onterra).

Stone Lake

Date: 7/25/2017
Time: 12:40
Weather: 40% clouds, 77F, 6 mph wind
Entry: EEH

Max Depth: 41.1
STOS Depth (ft): 3.0
STOB Depth (ft): 38.0
Secchi Depth (ft): 7.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	24.3	8.3	99%		
3	24.1	8.3	99%		
6	24.0	8.3	99%		
9	23.9	8.3	99%		
12	23.7	7.9	93%		
15	20.7	4.2	47%		
18	17.7	0.3	3%		
21	15.1	0.1	1%		
24	13.5	0.1	1%		
27	11.7	0.1	1%		
30	11.2	0.1	1%		
33	10.6	0.1	1%		
36	10.2	0.1	1%		
38	10.0	0.1	1%		
39	9.8	0.0	0%		



Parameter	STOS	STOB
Total P (µg/L)	33.50	32.90
Dissolved P (µg/L)	NA	5.70
Chl-*a* (µg/L)	3.75	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	317.00	943.00
Lab Cond. (µS/cm)	85.60	110.00
Lab pH	7.74	7.39
Alkalinity (mg/L $CaCO_3$)	37.20	50.00
Total Susp. Solids (mg/L)	NA	2.00
Calcium (mg/L)	10.50	NA
Magnesium (mg/L)	2.78	NA
Hardness (mg/L)	37.70	NA
Color (SU)	30.00	NA
Turbidity (NTU)	NA	NA

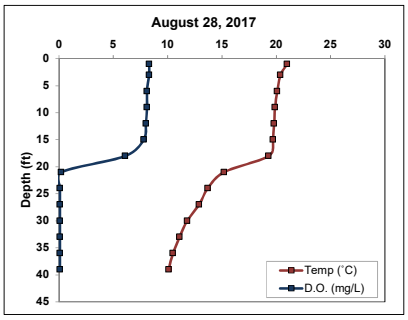
Data collected by JMB & AMS (Onterra).

Stone Lake

Date: 8/28/2017
Time: 11:30
Weather: 70% clouds, 75F
Entry: EEH

Max Depth: 41.6
STOS Depth (ft): 3.0
STOB Depth (ft): 36.0
Secchi Depth (ft): 8.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	21.0	8.3	93%		
3	20.4	8.3	92%		
6	20.1	8.1	89%		
9	19.9	8.1	89%		
12	19.8	8.0	88%		
15	19.7	7.8	86%		
18	19.3	6.1	66%		
21	15.2	0.2	2%		
24	13.7	0.1	1%		
27	12.9	0.1	1%		
30	11.8	0.1	1%		
33	11.1	0.1	1%		
36	10.5	0.1	1%		
39	10.1	0.1	1%		



Parameter	STOS	STOB
Total P (µg/L)	16.90	98.10
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	8.58	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

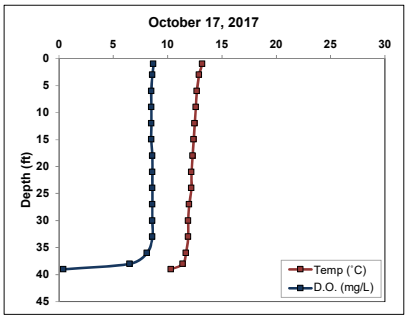
Data collected by JMB (Onterra).

Stone Lake

Date: 10/17/2017
Time: 12:00
Weather: 60F, 30% clouds, no wind
Entry: EEH

Max Depth: 40.6
STOS Depth (ft): 3.0
STOB Depth (ft): 38.0
Secchi Depth (ft): 6.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	13.2	8.7	83%		
3	12.9	8.6	81%		
6	12.7	8.5	80%		
9	12.6	8.5	80%		
12	12.5	8.5	79%		
15	12.4	8.5	79%		
18	12.3	8.6	80%		
21	12.2	8.6	80%		
24	12.2	8.6	80%		
27	12.0	8.6	80%		
30	11.9	8.6	80%		
33	11.9	8.6	80%		
36	11.7	8.1	74%		
38	11.4	6.5	60%		
39	10.3	0.4	4%		



Parameter	STOS	STOB
Total P (µg/L)	20.90	40.10
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	4.94	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	ND	3.00
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

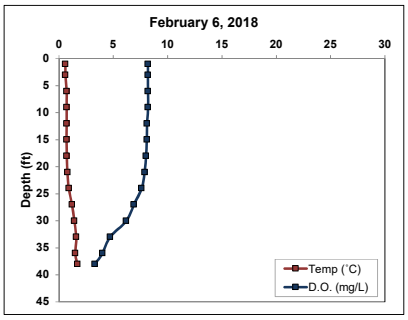
Data collected by JMB & CJF (Onterra).

Stone Lake

Date: 2/6/2018
Time: 2:20
Weather: 30% clouds, 3F
Entry: EEH

Max Depth: 39.2
STOS Depth (ft): 3.0
STOB Depth (ft): 36.0
Secchi Depth (ft): 4.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	0.6	8.2	57%		
3	0.6	8.2	57%		
6	0.7	8.2	57%		
9	0.7	8.2	57%		
12	0.7	8.1	57%		
15	0.7	8.1	57%		
18	0.7	8.0	56%		
21	0.8	7.9	55%		
24	0.9	7.6	53%		
27	1.2	6.9	49%		
30	1.4	6.2	44%		
33	1.6	4.7	34%		
36	1.5	4.0	29%		
38	1.7	3.3	24%		



Parameter	STOS	STOB
Total P (µg/L)	14.60	24.60
Dissolved P (µg/L)	3.30	8.10
Chl-*a* (µg/L)	NA	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	400.00	591.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and JMB (Onterra). Ice thickness = 1.1 feet

Water Quality Data

2017-2018	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	6.7	NA	NA
Total P (µg/L)	6	21.4	6	43.9
Dissolved P (µg/L)	2	3.4	3	5.7
Chl a (µg/L)	5	5.7	0	NA
TKN (µg/L	0	NA	0	NA
NO_3+NO_2-N (µg/L)	0	NA	0	NA
NH_3-N (µg/L)	0	NA	0	NA
Total N (µg/L)	3	349.7	3	633.0
Lab Cond. (µS/cm)	2	87.4	2	99.9
Alkal (mg/l $CaCO_3$)	2	37.7	2	44.0
Total Susp. Solids (mg/l)	2	2.0	3	2.5
Calcium (mg/L)	2	11.2	0	NA
Magnesium (mg/L)	2	2.9	0	NA
Hardness (mg/L)	2	40.0	0	NA
Color (SU)	2	30.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1984		48.2	
1985			
1993			46.2
1994			45.1
1995			46.4
2002			45.4
2003			45.2
2004			44.9
2005			46.9
2006			43.8
2014			45.5
2015			
2016			
2017	49.3	48.5	48.0
All Years (Weighted)	49.3	48.4	45.8
DLDL Median	49.4	49.7	46.2
NLF Ecoregion Median	48.1	47.5	45.7

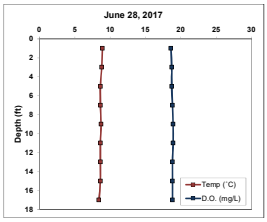
	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1984					1	6.0	1	6.0				
1985									1	14.0	0.0	
1993	5	8.3	4	8.6								
1994	3	8.6	2	9.3								
1995	3	8.4	3	8.4								
2002	2	9.0	2	9.0								
2003	4	9.2	4	9.2								
2004	3	9.3	3	9.3								
2005	3	8.2	3	8.2								
2006	2	10.1	2	10.1								
2014	2	9.0	2	9.0								
2015	0		0									
2016	0		0									
2017	5	7.2	3	7.6	5	5.7	3	6.2	5	22.8	3.0	23.0
All Years (Weighted)		8.6		8.8		5.8		6.1		21.3		23.0
DLDL Median				8.5				7.0				23.0
NLF Ecoregion Median				8.9				5.6				21.0

Vance Lake

Date: 6/28/2017
Time: 12:05
Weather: 100% clouds, 64F
Entry: EEH

Max Depth: 18.4
VANS Depth (ft): 3.0
VANB Depth (ft): 16.0
Secchi Depth (ft): 6.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	8.9	18.6	160%		
3	8.8	18.7	161%		
5	8.6	18.7	160%		
7	8.6	18.8	161%		
9	8.7	18.9	163%		
11	8.6	18.9	162%		
13	8.6	18.8	161%		
15	8.6	18.8	161%		
17	8.4	18.8	161%		



Parameter	VANS	VANB
Total P (µg/L)	18.80	23.60
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	5.87	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	279.00	322.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

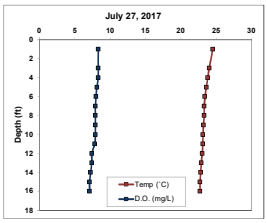
Data collected by TWH and JBS (Onterra).

Vance Lake

Date: 7/27/2017
Time: 11:30
Weather: 40% clouds, 78F, 2 mph wind
Entry: EEH

Max Depth: 16.5
VANS Depth (ft): 3.0
VANB Depth (ft): 14.0
Secchi Depth (ft): 9.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	24.5	8.3	100%		
3	24.0	8.3	99%		
4	23.8	8.3	98%		
5	23.6	8.1	95%		
6	23.4	8.0	94%		
7	23.3	7.9	93%		
8	23.3	7.9	93%		
9	23.2	7.9	93%		
10	23.1	7.9	92%		
11	23.1	7.8	91%		
12	23.0	7.4	86%		
13	22.9	7.4	86%		
14	22.8	7.2	84%		
15	22.7	7.1	83%		
16	22.7	7.1	83%		



Parameter	VANS	VANB
Total P (µg/L)	19.30	21.90
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	5.26	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	328.00	406.00
Lab Cond. (µS/cm)	90.30	92.30
Lab pH	7.79	7.67
Alkalinity (mg/L $CaCO_3$)	38.80	39.80
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

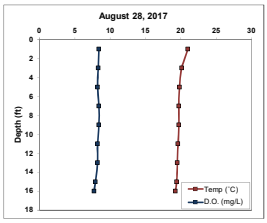
Data collected by JMB & AMS (Onterra)

Vance Lake

Date: 8/28/2017
Time: 13:55
Weather: 50% clouds, 73F
Entry: EEH

Max Depth: 16.9
VANS Depth (ft): 3.0
VANB Depth (ft): 15.0
Secchi Depth (ft): 9.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	21.0	8.4	94%		
3	20.1	8.3	91%		
5	19.8	8.2	90%		
7	19.7	8.4	92%		
9	19.7	8.4	92%		
11	19.6	8.2	89%		
13	19.5	8.2	89%		
15	19.4	7.9	86%		
16	19.2	7.7	84%		



Parameter	VANS	VANB
Total P (µg/L)	13.90	13.20
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	5.67	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	357.00	305.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH & CJF (Onterra).

Water Quality Data

2017-2018	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	3	8.4	NA	NA
Total P (µg/L)	3	17.3	3	19.6
Dissolved P (µg/L)	0	NA	0	NA
Chl a (µg/L)	3	5.6	0	NA
TKN (µg/L	0	NA	0	NA
NO_3+NO_2-N (µg/L)	0	NA	0	NA
NH_3-N (µg/L)	0	NA	0	NA
Total N (µg/L)	3	321.3	3	344.3
Lab Cond. (µS/cm)	1	90.3	1	92.3
Alkal (mg/l $CaCO_3$)	1	38.8	1	39.8
Total Susp. Solids (mg/l)	0	NA	0	NA
Calcium (mg/L)	0	NA	0	NA
Magnesium (mg/L)	0	NA	0	NA
Hardness (mg/L)	0	NA	0	NA
Color (SU)	0	NA	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
2003			
2004			41.1
2005			40.7
2006			43.9
2007			
2008			41.3
2009			
2010			47.2
2011			42.4
2012			41.9
2013			
2014			
2015			
2016			
2017	45.3	47.5	46.5
All Years (Weighted)	45.3	47.5	42.7
SLDL Median	54.6	52.6	52.4
NLF Ecoregion Median	48.1	47.5	45.7

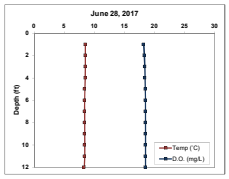
	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
2003	2	12.8	0									
2004	7	11.9	3	12.2								
2005	6	11.1	2	12.5								
2006	3	11.3	1	10.0								
2007	0		0									
2008	2	12.0	2	12.0								
2009	0		0									
2010	1	8.0	1	8.0								
2011	3	11.2	3	11.2								
2012	3	11.2	2	11.5								
2013	0		0									
2014	0		0									
2015	0		0									
2016	0		0									
2017	3	8.4	3	8.4	3	5.6	3	5.6	3	17.3	3.0	17.3
All Years (Weighted)		11.1		10.9		5.6		5.6		17.3		17.3
SLDL Median				5.6				9.4				33.0
NLF Ecoregion Median				8.9				5.6				21.0

Sturgeon Lake

Date: 6/28/2017
Time: 11:15
Weather: 100% clouds, 64F
Entry: EEH

Max Depth: 12.6
STUS Depth (ft): 3.0
STUB Depth (ft): 10.0
Secchi Depth (ft): 6.3

Depth (ft)	Temp (°C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	8.5	18.2	156%		
2	8.5	18.3	156%		
3	8.5	18.4	157%		
4	8.5	18.4	157%		
5	8.4	18.5	158%		
6	8.4	18.5	158%		
7	8.4	18.5	158%		
8	8.4	18.5	158%		
9	8.4	18.5	158%		
10	8.4	18.5	158%		
11	8.4	18.5	158%		
12	8.3	18.5	157%		



Parameter	STUS	STUB
Total P (µg/L)	21.50	20.30
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	6.42	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	351.00	385.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

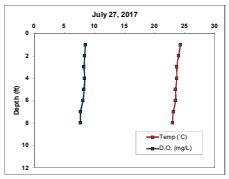
Data collected by TWH and JBS (Onterra). Moved WQ point.

Sturgeon Lake

Date: 7/27/2017
Time: 12:30
Weather: 40% clouds, 78F, 10 mph winds
Entry: EEH

Max Depth: 10.6
STUS Depth (ft): 3.0
STUB Depth (ft): 8.0
Secchi Depth (ft): 8.2

Depth (ft)	Temp (°C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	24.3	8.5	101%		
2	24.0	8.4	100%		
3	23.7	8.3	98%		
4	23.7	8.4	99%		
5	23.5	8.3	98%		
6	23.5	8.1	95%		
7	23.1	7.7	90%		
8	23.0	7.7	90%		



Parameter	STUS	STUB
Total P (µg/L)	21.80	20.60
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	4.50	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	327.00	335.00
Lab Cond. (µS/cm)	91.90	90.90
Lab pH	7.79	7.66
Alkalinity (mg/L $CaCO_3$)	38.80	39.25
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

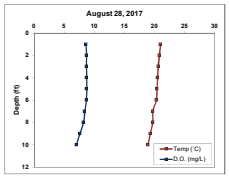
Data collected by JMB & AMS (Onterra).

Sturgeon Lake

Date: 8/28/2017
Time: 14:30
Weather: 50% clouds, 73F
Entry: EEH

Max Depth: 10.9
STUS Depth (ft): 3.0
STUB Depth (ft): 9.0
Secchi Depth (ft): 8.8

Depth (ft)	Temp (°C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	21.0	8.6	97%		
2	20.8	8.7	97%		
3	20.6	8.7	97%		
4	20.5	8.7	97%		
5	20.4	8.7	97%		
6	20.3	8.7	97%		
7	19.7	8.4	92%		
8	19.7	8.2	90%		
9	19.3	7.6	83%		
10	18.9	7.0	75%		



Parameter	STUS	STUB
Total P (µg/L)	13.70	16.50
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	4.40	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	367.00	335.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH & CJF (Onterra).

Water Quality Data

2017-2018	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	3	7.8	NA	NA
Total P (µg/L)	3	19.0	3	19.1
Dissolved P (µg/L)	0	NA	0	NA
Chl a (µg/L)	3	5.1	0	NA
TKN (µg/L	0	NA	0	NA
NO_3+NO_2-N (µg/L)	0	NA	0	NA
NH_3-N (µg/L)	0	NA	0	NA
Total N (µg/L)	3	348.3	3	351.7
Lab Cond. (µS/cm)	1	91.9	1	90.9
Alkal (mg/l $CaCO_3$)	1	38.8	1	39.2
Total Susp. Solids (mg/l)	0	NA	0	NA
Calcium (mg/L)	0	NA	0	NA
Magnesium (mg/L)	0	NA	0	NA
Hardness (mg/L)	0	NA	0	NA
Color (SU)	0	NA	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
2017	46.6	46.6	47.6
All Years (Weighted)	46.6	46.6	47.6
DLDL Median	49.4	49.7	46.2
NLF Ecoregion Median	48.1	47.5	45.7

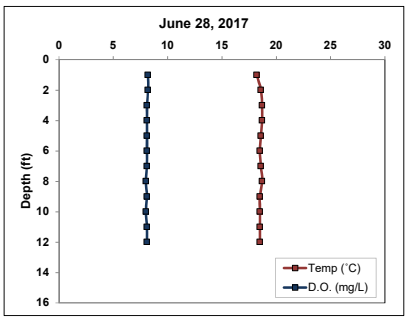
	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
2017	3	7.8	3	7.8	3	5.1	3	5.1	3	19.0	3.0	19.0
All Years (Weighted)		7.8		7.8		5.1		5.1		19.0		19.0
DLDL Median				8.5				7.0				23.0
NLF Ecoregion Median				8.9				5.6				21.0

Benson Lake

Date: 6/28/2017
Time: 9:00
Weather: 100% clouds, 62F
Entry: EEH

Max Depth: 13.5
BENS Depth (ft): 3.0
BENB Depth (ft): 11.0
Secchi Depth (ft): 6.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	18.2	8.2	87%		
2	18.6	8.2	87%		
3	18.7	8.1	87%		
4	18.7	8.1	87%		
5	18.6	8.1	86%		
6	18.5	8.1	86%		
7	18.6	8.1	86%		
8	18.7	8.0	86%		
9	18.5	8.1	86%		
10	18.5	8.0	85%		
11	18.5	8.1	86%		
12	18.5	8.1	86%		



Parameter	BENS	BENB
Total P (µg/L)	26.90	19.50
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	5.46	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	341.00	332.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

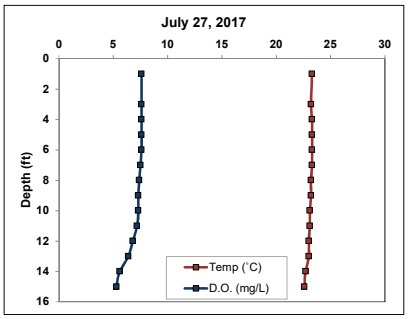
Data collected by TWH and JBS (Onterra). Moved WQ point.

Benson Lake

Date: 7/27/2017
Time: 10:15
Weather: 0% clouds, 75F, no wind
Entry: EEH

Max Depth: 15.1
BENS Depth (ft): 3.0
BENB Depth (ft): 13.0
Secchi Depth (ft): 8.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	23.3	7.6	89%		
3	23.2	7.6	89%		
4	23.3	7.6	89%		
5	23.3	7.6	89%		
6	23.3	7.6	89%		
7	23.3	7.5	88%		
8	23.2	7.4	87%		
9	23.2	7.3	86%		
10	23.1	7.3	85%		
11	23.1	7.2	84%		
12	23.0	6.8	79%		
13	23.0	6.4	74%		
14	22.7	5.6	65%		
15	22.6	5.3	62%		



Parameter	BENS	BENB
Total P (µg/L)	24.20	25.60
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	5.48	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	351.00	333.00
Lab Cond. (µS/cm)	92.60	91.70
Lab pH	7.66	7.53
Alkalinity (mg/L $CaCO_3$)	39.10	39.40
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

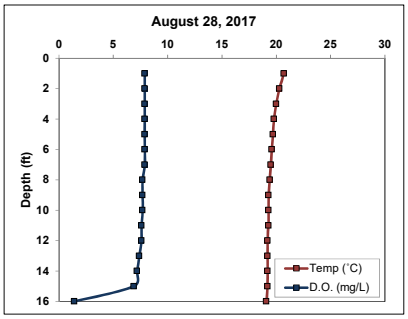
Data collected by JMB & AMS (Onterra).

Benson Lake

Date: 8/28/2017
Time: 12:45
Weather: 75F, 60% clouds
Entry: EEH

Max Depth: 16.1
BENS Depth (ft): 3.0
BENB Depth (ft): 13.0
Secchi Depth (ft): 6.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	% Saturation	pH	Sp. Cond. (µS/cm)
1	20.7	7.9	88%		
2	20.3	7.9	88%		
3	20.0	7.9	87%		
4	19.8	7.9	87%		
5	19.7	7.9	87%		
6	19.6	7.9	86%		
7	19.5	7.9	86%		
8	19.4	7.7	84%		
9	19.3	7.7	84%		
10	19.3	7.7	84%		
11	19.3	7.6	83%		
12	19.2	7.6	83%		
13	19.2	7.4	80%		
14	19.2	7.2	78%		
15	19.2	6.9	75%		
16	19.1	1.4	15%		



Parameter	BENS	BENB
Total P (µg/L)	18.40	17.60
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	4.40	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	318.00	321.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by JMB (Onterra).

Water Quality Data

2017-2018	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	3	7.0	NA	NA
Total P (µg/L)	3	23.2	3	20.9
Dissolved P (µg/L)	0	NA	0	NA
Chl a (µg/L)	3	5.1	0	NA
TKN (µg/L	0	NA	0	NA
NO_3+NO_2-N (µg/L)	0	NA	0	NA
NH_3-N (µg/L)	0	NA	0	NA
Total N (µg/L)	3	336.7	3	328.7
Lab Cond. (µS/cm)	1	92.6	1	91.7
Alkal (mg/l $CaCO_3$)	1	39.1	1	39.4
Total Susp. Solids (mg/l)	0	NA	0	NA
Calcium (mg/L)	0	NA	0	NA
Magnesium (mg/L)	0	NA	0	NA
Hardness (mg/L)	0	NA	0	NA
Color (SU)	0	NA	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1993			45.0
1994			45.9
1995			46.1
1996			48.1
1997			46.4
2017	49.5	46.6	49.0
All Years (Weighted)	49.5	46.6	46.2
SLDL Median	54.6	52.6	52.4
NLF Ecoregion Median	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1993	11	9.1	7	9.3								
1994	4	8.0	2	8.8								
1995	4	8.4	2	8.6								
1996	4	7.6	1	7.5								
1997	3	8.4	3	8.4								
2017	3	7.0	3	7.0	3	5.1	3	5.1	3	23.2	3.0	23.2
All Years (Weighted)		8.4		8.5		5.1		5.1		23.2		23.2
SLDL Median				5.6				9.4				33.0
NLF Ecoregion Median				8.9				5.6				21.0