

E

APPENDIX E

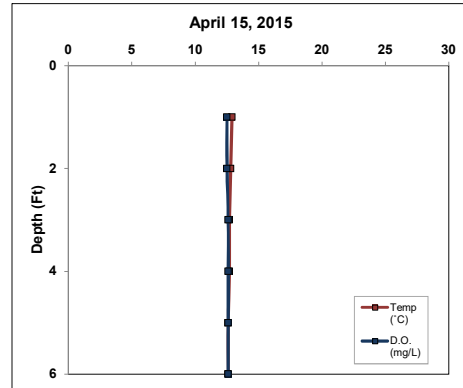
Water Quality Data

Puckaway Lake - Deep Hole

Date: 4/15/2015
Time: 11:15
Weather: 54F, 90% clouds, steady breeze
Entry: EEH

Max Depth: 6.7
PULDHS Depth (ft): 3.0
PULDHB Depth (ft): -
Secchi Depth (ft): 2.8

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	12.9	12.5	9.2	
2	12.8	12.5	9.1	
3	12.7	12.6	9.1	
4	12.7	12.6	9.0	
5	12.6	12.6	9.0	
6	12.6	12.6	9.0	



Parameter	PULDHS	PULDHB
Total P (µg/L)	70.10	NA
Dissolved P (µg/L)	ND	NA
Chl-a (µg/L)	18.10	NA
TKN (µg/L)	1280.00	NA
NO ₃ + NO ₂ -N (µg/L)	388.00	NA
NH ₃ -N (µg/L)	ND	NA
Total N (µg/L)	1668.00	0.00
Lab Cond. (µS/cm)	333.00	NA
Lab pH	8.55	NA
Alkalinity (mg/L CaCO ₃)	148.00	NA
Total Susp. Solids (mg/L)	10.80	NA
Calcium (mg/L)	35.50	NA
Magnesium (mg/L)	22.60	NA
Hardness (mg/L)	182.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

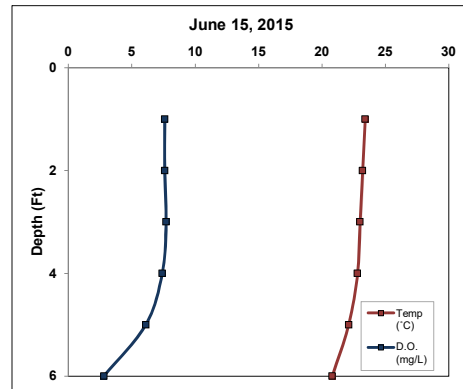
Data collected by BTB and EEH (Onterra)

Puckaway Lake - Deep Hole

Date: 6/15/2015
Time: 14:00
Weather: 80F, 100% clouds
Entry: EEH

Max Depth: 6.8
PULDHS Depth (ft): 3.0
PULDHB Depth (ft): -
Secchi Depth (ft): 5.2

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.4	7.6		
2	23.2	7.6		
3	23.0	7.7		
4	22.8	7.4		
5	22.1	6.1		
6	20.8	2.8		



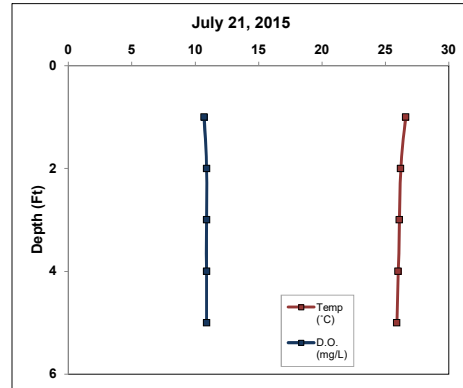
Parameter	PULDHS	PULDHB
Total P (µg/L)	75.70	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	16.00	NA
TKN (µg/L)	NA	NA
NO ₃ + NO ₂ -N (µg/L)	NA	NA
NH ₃ -N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L CaCO ₃)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by SDF (Onterra)

Puckaway Lake - Deep Hole

Date: 7/21/2015 Max Depth: 5.5
 Time: 14:45 PULDHS Depth (ft): 3.0
 Weather: Rough, 80F, Windy, 30% clouds PULDHB Depth (ft): -
 Entry: EEH Secchi Depth (ft): 2.1

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.6	10.7		
2	26.2	10.9		
3	26.1	10.9		
4	26.0	10.9		
5	25.9	10.9		



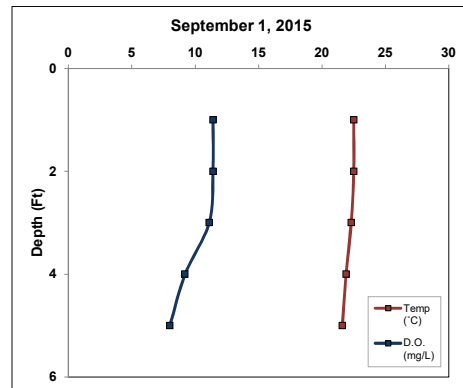
Parameter	PULDHS	PULDHB
Total P (µg/L)	135.00	NA
Dissolved P (µg/L)	4.80	NA
Chl-a (µg/L)	44.80	NA
TKN (µg/L)	1470.00	NA
NO ₃ + NO ₂ -N (µg/L)	ND	NA
NH ₃ -N (µg/L)	ND	NA
Total N (µg/L)	1470.00	NA
Lab Cond. (µS/cm)	383.00	NA
Lab pH	8.94	NA
Alkalinity (mg/L CaCO ₃)	185.00	NA
Total Susp. Solids (mg/L)	28.00	NA
Calcium (mg/L)	41.50	NA
Magnesium (mg/L)	27.90	NA
Hardness (mg/L)	218.00	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

Data collected by TAH (Onterra)

Puckaway Lake - Deep Hole

Date: 9/1/2015 Max Depth: 5.0
 Time: 9:15 PULDHS Depth (ft): 3.0
 Weather: 10% clouds, 78F, hazy sun PULDHB Depth (ft): -
 Entry: EEH Secchi Depth (ft): 1.2

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.5	11.4		
2	22.5	11.4		
3	22.3	11.1		
4	21.9	9.2		
5	21.6	8.0		



Parameter	PULDHS	PULDHB
Total P (µg/L)	56.30	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	34.20	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)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

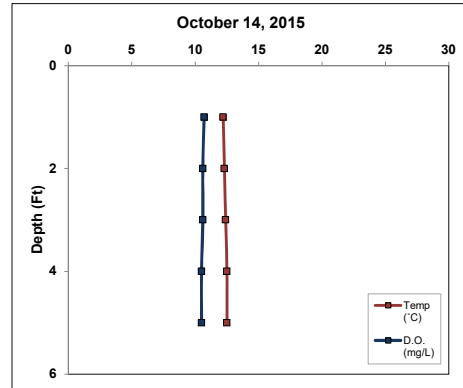
Data collected by TWH and DAC (Onterra).

Puckaway Lake - Deep Hole

Date: 10/14/2015
Time: 11:30
Weather: 100% sun, breezy, 54F
Entry: EEH

Max Depth: 5.4
PULDHS Depth (ft): 3.0
PULDHB Depth (ft): -
Secchi Depth (ft): 2.0

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	12.2	10.7		
2	12.3	10.6		
3	12.4	10.6	9.0	
4	12.5	10.5		
5	12.5	10.5		



Parameter	PULDHS	PULDHB
Total P (µg/L)	93.80	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	36.00	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)	17.00	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

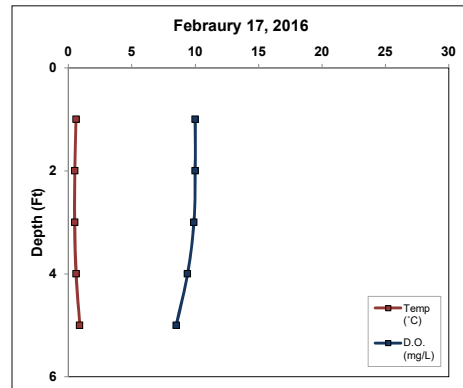
Data collected by TWH (Onterra)

Puckaway Lake - Deep Hole

Date: 2/17/2016
Time: 12:45
Weather: 1% clouds, 25F
Entry: EEH

Max Depth: 5.4
PULDHS Depth (ft): .
PULDHB Depth (ft): -
Secchi Depth (ft): hit bottom

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.6	10.0		
2	0.5	10.0		
3	0.5	9.9		
4	0.6	9.4		
5	0.9	8.5		



Parameter	PULDHS	PULDHB
Total P (µg/L)	29.00	NA
Dissolved P (µg/L)	8.90	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	669.00	NA
NO ₃ + NO ₂ -N (µg/L)	2580.00	NA
NH ₃ -N (µg/L)	106.00	NA
Total N (µg/L)	3249.00	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 & JLW (Onterra). Ice thickness: 1.4 ft

Water Quality Data

2015-2016 Parameter	Surface		Bottom	
	Count	Mean	Count	Mean
Secchi Depth (feet)	5	2.7	NA	NA
Total P (µg/L)	5	76.7	0	NA
Dissolved P (µg/L)	2	6.9	0	NA
Chl a (µg/L)	5	ND	0	NA
TKN (µg/L)	2	ND	0	NA
NO3+NO2-N (µg/L)	2	ND	0	NA
NH3-N (µg/L)	2	ND	0	NA
Total N (µg/L)	2	ND	0	NA
Lab Cond. (µS/cm)	2	ND	0	NA
Lab pH	2	ND	0	NA
Alkal (mg/l CaCO3)	2	ND	0	NA
Total Susp. Solids (mg/l)	3	ND	0	NA
Calcium (µg/L)	2	ND	0	NA
Magnesium (mg/L)	2	ND	0	NA
Hardness (mg/L)	2	ND	0	NA
Color (SU)	2	ND	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1996			64.9
1997			62.5
1998			67.1
2000			65.8
2001			73.9
2002			63.9
2003			65.4
2004	74.5	67.2	57.8
2005	80.8	78.3	77.1
2006	68.0	64.8	
2007	74.4	70.4	
2009	79.5	70.2	68.7
2010			
2011	75.7	74.0	70.7
2012	76.2	71.5	67.0
2013	68.7	67.0	55.4
2014	73.7	67.2	63.6
2015	71.3	64.1	58.5
All Years (Weighted)	74.6	71.2	64.0
Shallow, Lowland Drainage Lakes	54.6	52.6	52.4
SWTP Ecoregion	48.7	47.0	50.0

Year	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1996	8	2.2	6	2.3								
1997	11	2.4	4	2.8								
1998	8	2.0	8	2.0								
2000	8	2.2	4	2.2								
2001	4	2.3	2	1.3								
2002	7	2.1	4	2.5								
2003	8	2.2	6	2.2								
2004	11	3.4	7	3.8	4	41.6	4	41.6	5	121.4	3.0	131.7
2005	7	1.1	4	1.0	6	113.1	5	129.3	4	180.5	3.0	203.7
2006					4	40.1	2	32.6	4	87.3	2.0	83.5
2007					4	50.3	2	57.7	4	112.5	2.0	130.5
2009	3	1.4	1	1.8	4	64.5	2	56.7	4	170.8	2.0	186.5
2010												
2011	7	1.6	7	1.6	7	83.2	7	83.2	7	143.1	7.0	143.1
2012	10	2.3	5	2.0	10	48.5	5	65.0	10	112.5	5.0	147.4
2013	11	3.5	6	4.5	11	60.6	6	41.0	11	96.2	6.0	87.9
2014	12	2.7	6	2.6	13	48.1	6	41.8	13	108.8	6.0	123.9
2015	5	2.7	2	3.7	5	29.8	2	30.4	5	86.2	2.0	105.4
All Years (Weighted)		2.4		2.5		58.4		62.7		117.0		132.3
Shallow, Lowland Drainage Lakes				5.6				9.4				33.0
SWTP Ecoregion				6.6				5.3				22.0

July 2015 N: 1470.0
July 2015 P: 135.0

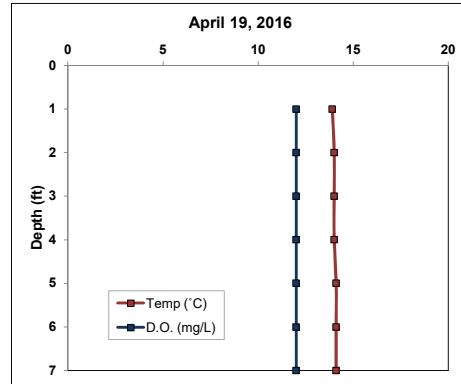
Summer 2015 N:P 11 :1

Puckaway Lake - Deep Hole

Date: 4/19/2016
Time: 14:30
Weather: 100% clouds, 50F
Entry: EEH

Max Depth: 7.8
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.8

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	13.9	12.0		
2	14.0	12.0		
3	14.0	12.0	8.8	
4	14.0	12.0		
5	14.1	12.0		
6	14.1	12.0		
7	14.1	12.0		



Parameter	LS	LB
Total P (µg/L)	61.90	NA
Dissolved P (µg/L)	3.00	NA
Chl-a (µg/L)	21.10	NA
TKN (µg/L)	1330.00	NA
NO ₃ + NO ₂ -N (µg/L)	1300.00	NA
NH ₃ -N (µg/L)	18.60	NA
Total N (µg/L)	2630.00	NA
Lab Cond. (µS/cm)	385.00	NA
Lab pH	8.73	NA
Alkalinity (mg/L CaCO ₃)	163.00	NA
Total Susp. Solids (mg/L)	8.25	NA
Calcium (mg/L)	41.80	NA
Magnesium (mg/L)	23.20	NA
Hardness (mg/L)	200.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

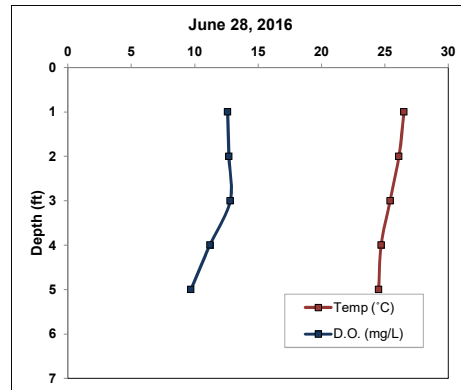
Data collected by TWH (Onterra).

Puckaway Lake - Deep Hole

Date: 6/28/2016
Time: 14:13
Weather: 70F, 10% clouds, light breeze
Entry: EEH

Max Depth: 5.4
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.4

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.5	12.6		
2	26.1	12.7		
3	25.4	12.8		
4	24.7	11.2		
5	24.5	9.7		



Parameter	LS	LB
Total P (µg/L)	89.50	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	59.50	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)	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

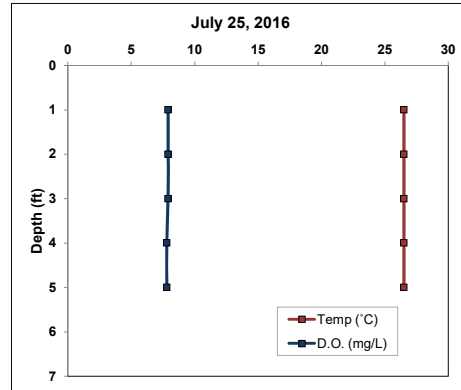
Data collected by TAH (Onterra).

Puckaway Lake - Deep Hole

Date: 7/25/2016
Time: 9:15
Weather: 75F, 0% clouds
Entry: JLW

Max Depth: 5.8
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.1

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.5	7.9		
2	26.5	7.9		
3	26.5	7.9	8.7	
4	26.5	7.8		
5	26.5	7.8		



Parameter	LS	LB
Total P (µg/L)	95.40	NA
Dissolved P (µg/L)	2.50	NA
Chl-a (µg/L)	65.50	NA
TKN (µg/L)	1200.00	NA
NO ₃ + NO ₂ -N (µg/L)	ND	NA
NH ₃ -N (µg/L)	17.30	NA
Total N (µg/L)	1200.00	NA
Lab Cond. (µS/cm)	345.00	NA
Lab pH	8.44	NA
Alkalinity (mg/L CaCO ₃)	164.00	NA
Total Susp. Solids (mg/L)	14.40	NA
Calcium (mg/L)	30.40	NA
Magnesium (mg/L)	29.40	NA
Hardness (mg/L)	197.00	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

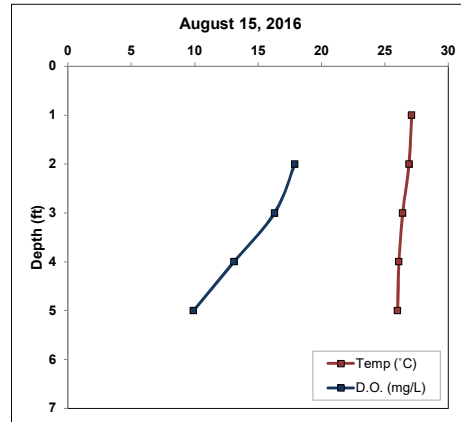
Data collected by BTB & LJS (Onterra)

Puckaway Lake - Deep Hole

Date: 8/15/2016
Time: 12:30
Weather: 75% clouds, 82F
Entry: JMB

Max Depth: 5.5
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 1.1

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	27.1	17.9		
2	26.9	16.3		
3	26.4	13.1		
4	26.1	9.9		
5	26.0	9.1		



Parameter	LS	LB
Total P (µg/L)	98.10	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	119.00	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

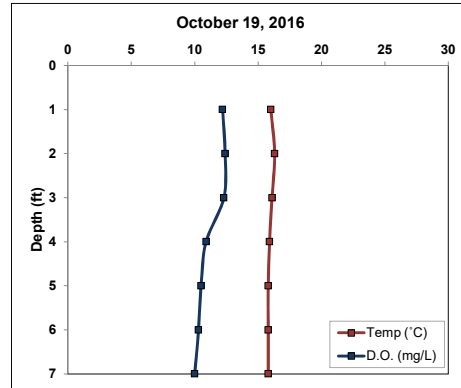
Data collected by TWH and LJS (Onterra).

Puckaway Lake - Deep Hole

Date: 10/19/2016
Time: 11:48
Weather: 75% clouds, 70F, no wind
Entry: JMB

Max Depth: 7.9
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.7

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	16.0	12.2		
2	16.3	12.4		
3	16.1	12.3		
4	15.9	10.9		
5	15.8	10.5		
6	15.8	10.3		
7	15.8	10.0		



Parameter	LS	LB
Total P (µg/L)	96.50	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	63.50	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)	7.40	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

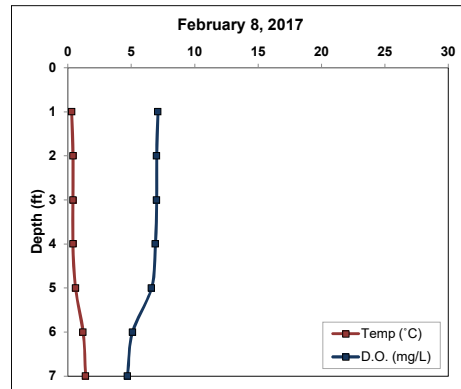
Data collected by JMB and LJS (Onterra).

Puckaway Lake - Deep Hole

Date: 2/8/2017
Time: 13:20
Weather: 18F, 30% clouds, light wind
Entry: EEH

Max Depth: 7.1
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 5.8

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.3	7.1		
2	0.4	7.0		
3	0.4	7.0		
4	0.4	6.9		
5	0.6	6.6		
6	1.2	5.1		
7	1.4	4.7		



Parameter	LS	LB
Total P (µg/L)	68.20	NA
Dissolved P (µg/L)	25.10	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	875.00	NA
NO ₃ + NO ₂ -N (µg/L)	2440.00	NA
NH ₃ -N (µg/L)	122.00	NA
Total N (µg/L)	3315.00	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 LJS (Onterra). Ice depth = 1.4 ft.

Water Quality Data

2016-2017 Parameter	Surface		Bottom	
	Count	Mean	Count	Mean
Secchi Depth (feet)	6	2.8	NA	NA
Total P (µg/L)	6	84.9	0	NA
Dissolved P (µg/L)	3	10.2	0	NA
Chl a (µg/L)	5	65.7	0	NA
TKN (µg/L)	3	1135.0	0	NA
NO ₃ +NO ₂ -N (µg/L)	3	1870.0	0	NA
NH ₃ -N (µg/L)	3	52.6	0	NA
Total N (µg/L)	3	2381.7	0	NA
Lab Cond. (µS/cm)	2	365.0	0	NA
Alkal (mg/l CaCO ₃)	2	163.5	0	NA
Total Susp. Solids (mg/l)	3	10.0	0	NA
Calcium (mg/L)	2	36.1	0	NA
Magnesium (mg/L)	2	26.3	0	NA
Hardness (mg/L)	2	198.5	0	NA
Color (SU)	2	45.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1976			79.7
1985			60.1
1986			70.5
1987			73.9
1988			61.7
1989			61.3
1990			59.1
1991			53.5
1996			64.9
1997			62.5
1998			67.1
2000			65.8
2001			73.9
2002			63.9
2003			65.9
2004	74.5	67.2	57.8
2005	80.8	75.9	73.4
2006	68.0	64.8	63.5
2007	74.4	70.4	73.2
2009	79.5	70.2	68.7
2011	75.7	74.0	70.7
2012	76.2	71.5	67.0
2013	68.7	67.0	55.4
2014	73.7	67.2	63.6
2015	71.3	64.1	58.5
2016	69.7	73.7	68.1
All Years (Weighted)	74.3	70.4	64.3
SLDL Median	54.6	52.6	52.4
SWTP Ecoregion Median	48.7	47.0	50.0

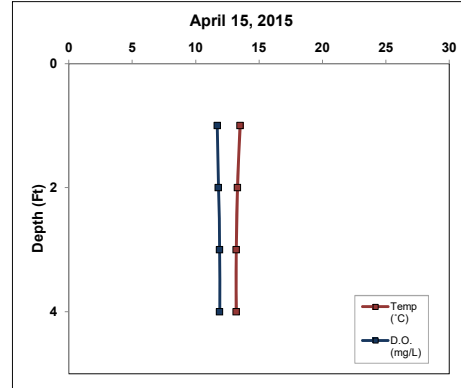
Year	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1976	1	0.8	1	0.8								
1985	1	3.3	1	3.3								
1986	1	1.6	1	1.6								
1987	1	1.3	1	1.3								
1988	1	2.9	1	2.9								
1989	1	3.0	1	3.0								
1990	1	3.5	1	3.5								
1991	1	5.2	1	5.2	1	0.0	1	0.0				
1996	8	2.2	6	2.3								
1997	11	2.4	4	2.8								
1998	8	2.0	8	2.0								
2000	8	2.2	4	2.2								
2001	4	2.3	2	1.3								
2002	7	2.1	4	2.5								
2003	7	2.1	5	2.2								
2004	11	3.4	7	3.8	4	41.6	4	41.6	5	121.4	3	131.7
2005	11	1.3	7	1.3	4	84.1	3	101.5	4	180.5	3	203.7
2006	4	2.4	3	2.6	4	40.1	2	32.6	4	87.3	2	83.5
2007	4	1.7	2	1.3	4	50.3	2	57.7	4	112.5	2	130.5
2009	3	1.4	1	1.8	4	64.5	2	56.7	4	170.8	2	186.5
2011	7	1.6	7	1.6	7	83.2	7	83.2	7	143.1	7	143.1
2012	10	2.3	5	2.0	10	48.5	5	65.0	10	112.5	5	147.4
2013	11	3.5	6	4.5	11	60.6	6	41.0	11	96.2	6	87.9
2014	12	2.7	6	2.6	13	48.1	6	41.8	13	108.8	6	123.9
2015	5	2.7	2	3.7	5	29.8	2	30.4	5	86.2	2	105.4
2016	5	2.2	3	1.9	5	65.7	3	81.3	5	88.3	3	94.3
All Years (Weighted)		2.4		2.4		55.0		57.5		115.0		129.5
SLDL Median				5.6				9.4				33.0
SWTP Ecoregion				6.6				5.3				22.0

Puckaway Lake - Mid Basin

Date: 4/15/2015
Time: 12:20
Weather: 54F, 90% clouds, steady breeze
Entry: EEH

Max Depth: 5.1
PULMBS Depth (ft): 3.0
PULMBS Depth (ft): -
Secchi Depth (ft): 2.5

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	13.5	11.7	9.2	
2	13.3	11.8	9.2	
3	13.2	11.9	9.2	
4	13.2	11.9	9.2	
5				



Parameter	PULMBS	PULMBS
Total P (µg/L)	64.10	NA
Dissolved P (µg/L)	2.50	NA
Chl-a (µg/L)	14.00	NA
TKN (µg/L)	1170.00	NA
NO ₃ + NO ₂ -N (µg/L)	ND	NA
NH ₃ -N (µg/L)	ND	NA
Total N (µg/L)	1170.00	NA
Lab Cond. (µS/cm)	303.00	NA
Lab pH	8.66	NA
Alkalinity (mg/L CaCO ₃)	137.00	NA
Total Susp. Solids (mg/L)	13.40	NA
Calcium (mg/L)	31.60	NA
Magnesium (mg/L)	20.50	NA
Hardness (mg/L)	163.00	NA
Color (SU)	30.00	NA
Turbidity (NTU)	NA	NA

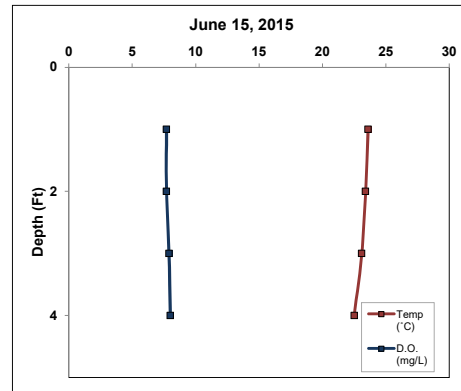
Data collected by EEH and BTB (Onterra).

Puckaway Lake - Mid Basin

Date: 6/15/2015
Time: 12:45
Weather: 80F, 95% clouds
Entry: EEH

Max Depth: 5.0
PULMBS Depth (ft): 3.0
PULMBS Depth (ft): -
Secchi Depth (ft): 5.0

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.6	7.7		
2	23.4	7.7		
3	23.1	7.9		
4	22.5	8.0		



Parameter	PULMBS	PULMBS
Total P (µg/L)	79.70	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	14.40	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)	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 SDF (Onterra)

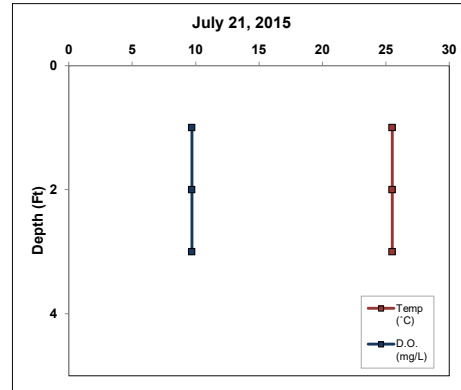
Puckaway Lake - Mid Basin

Date: 7/21/2015
Time: 15:45
Weather: Rough, 80F, Windy, 30% clouds
Entry: EEH

Max Depth: 3.8
PULMBS Depth (ft): 2.0
PULMBS Depth (ft): -
Secchi Depth (ft): 1.9

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.5	9.7		
2	25.5	9.7		
3	25.5	9.7		

Parameter	PULMBS	PULMBS
Total P (µg/L)	78.70	NA
Dissolved P (µg/L)	1.90	NA
Chl-a (µg/L)	39.60	NA
TKN (µg/L)	1740.00	NA
NO ₃ + NO ₂ -N (µg/L)	ND	NA
NH ₃ -N (µg/L)	16.50	NA
Total N (µg/L)	1740.00	NA
Lab Cond. (µS/cm)	361.00	NA
Lab pH	9.05	NA
Alkalinity (mg/L CaCO ₃)	173.00	NA
Total Susp. Solids (mg/L)	24.80	NA
Calcium (mg/L)	38.50	NA
Magnesium (mg/L)	27.20	NA
Hardness (mg/L)	208.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA



Data collected by TAH (Onterra)

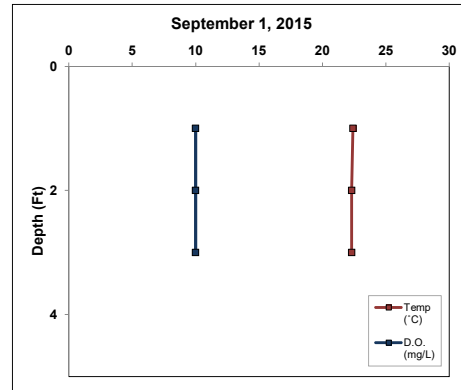
Puckaway Lake - Mid Basin

Date: 9/1/2015
Time: 9:00
Weather: 78F, hazy sun, 0% clouds
Entry: EEH

Max Depth: 3.0
PULMBS Depth (ft): 1.5
PULMBS Depth (ft): -
Secchi Depth (ft): 1.1

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.4	10.0		
2	22.3	10.0		
3	22.3	10.0		

Parameter	PULMBS	PULMBS
Total P (µg/L)	72.30	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	41.60	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)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA



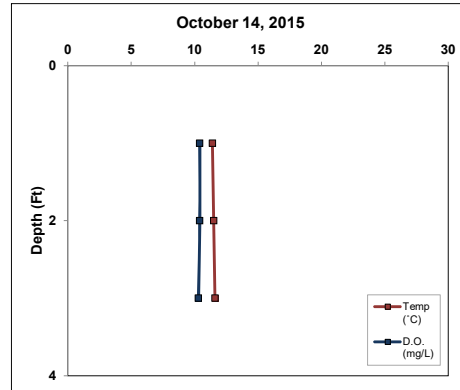
Data collected by TWH and DAC (Onterra)

Puckaway Lake - Mid Basin

Date: 10/14/2015
Time: 11:05
Weather: 54F, light breeze, 100% sun
Entry: EEH

Max Depth: 3.4
PULMBS Depth (ft): 2.0
PULMBB Depth (ft): -
Secchi Depth (ft): 1.5

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	11.4	10.4		
2	11.5	10.4	8.8	
3	11.6	10.3		



Parameter	PULMBS	PULMBB
Total P (µg/L)	43.20	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	24.80	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)	21.00	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

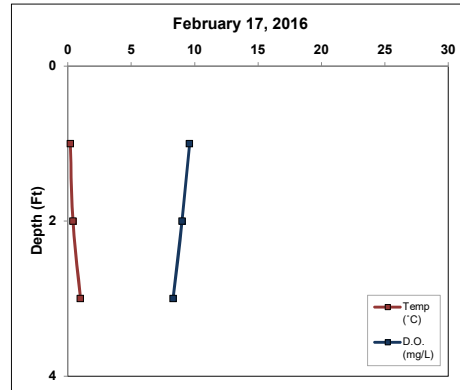
Data collected by TWH (Onterra)

Puckaway Lake - Mid Basin

Date: 2/17/2016
Time: 13:15
Weather: % clouds, 25F
Entry: EEH

Max Depth: 5.4
PULMBS Depth (ft): 3.0
PULMBB Depth (ft): -
Secchi Depth (ft): hit bottom

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.2	9.6		
2	0.4	9.0		
3	1.0	8.3		



Parameter	PULMBS	PULMBB
Total P (µg/L)	43.40	NA
Dissolved P (µg/L)	8.20	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	744.00	NA
NO ₃ + NO ₂ -N (µg/L)	2570.00	NA
NH ₃ -N (µg/L)	111.00	NA
Total N (µg/L)	3314.00	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). Ice thickness: 1.3 ft

Water Quality Data

2015-2016 Parameter	Surface		Bottom	
	Count	Mean	Count	Mean
Secchi Depth (feet)	5	2.4	NA	NA
Total P (µg/L)	6	63.6	0	NA
Dissolved P (µg/L)	3	4.2	0	NA
Chl a (µg/L)	5	26.9	0	NA
TKN (µg/L)	3	1218.0	0	NA
NO3+NO2-N (µg/L)	3	2570.0	0	NA
NH3-N (µg/L)	3	63.8	0	NA
Total N (µg/L)	3	2074.7	0	NA
Lab Cond. (µS/cm)	2	332.0	0	NA
Lab pH	2	8.9	0	NA
Alkal (mg/l CaCO3)	2	155.0	0	NA
Total Susp. Solids (mg/l)	3	19.7	0	NA
Calcium (µg/L)	2	35.1	0	NA
Magnesium (mg/L)	2	23.9	0	NA
Hardness (mg/L)	2	185.5	0	NA
Color (SU)	2	40.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
2004	67.2	66.2	62.2
2005	84.1	80.0	
2006	66.7	62.7	
2007	73.4	71.4	
2009	82.5	80.7	84.5
2011	76.8	76.6	75.1
2012	79.2	76.4	70.7
2013	66.6	68.2	61.7
2014	69.6	67.1	67.6
2015	67.2	62.9	59.3
All Years (Weighted)	74.9	73.6	66.7
Shallow, Lowland Drainage Lakes	54.6	52.6	52.4
SWTP Ecoregion	48.7	47.0	50.0

Year	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
2004	10	2.6	7	2.8	1	37.5	1	37.5	2	115.5	1.0	79.0
2005					4	125.4	3	154.0	5	185.6	3.0	256.0
2006					4	40.2	2	26.3	4	87.8	2.0	76.5
2007					4	56.7	2	63.8	5	117.2	3.0	122.0
2009	4	0.8	2	0.6	4	136.8	2	165.0	4	195.8	2.0	229.5
2011	7	1.2	7	1.2	7	109.0	7	109.0	7	154.4	7.0	154.4
2012	10	2.0	5	1.6	10	77.1	5	106.9	10	141.4	5.0	182.0
2013	10	2.3	5	2.9	11	64.1	6	46.3	11	98.3	6.0	76.1
2014	13	2.4	6	1.9	12	37.7	6	41.2	13	87.9	6.0	93.9
2015	5	2.4	2	3.5	5	26.9	2	27.0	5	67.6	2.0	79.2
All Years (Weighted)		2.1		2.1		69.3		80.2		120.2		135.0
Shallow, Lowland Drainage Lakes				5.6				9.4				33.0
SWTP Ecoregion				6.6				5.3				22.0

July 2015 N: 1740.0
July 2015 P: 78.7

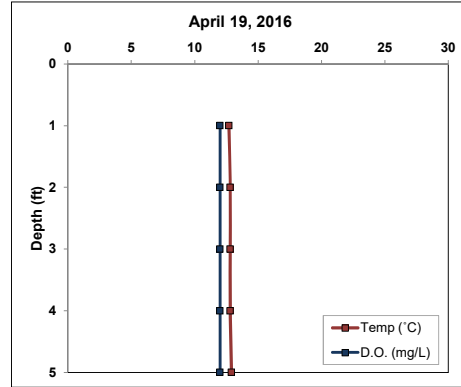
Summer 2015 N:P 22 :1

Puckaway Lake - Mid Basin

Date: 4/19/2016
Time: 14:00
Weather: 100% clouds, 50F
Entry: EEH

Max Depth: 5.7
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.9

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	12.7	12.0		
2	12.8	12.0		
3	12.8	12.0	9.0	
4	12.8	12.0		
5	12.9	12.0		



Parameter	LS	LB
Total P (µg/L)	33.60	NA
Dissolved P (µg/L)	4.30	NA
Chl-a (µg/L)	30.20	NA
TKN (µg/L)	1590.00	NA
NO ₃ + NO ₂ -N (µg/L)	1300.00	NA
NH ₃ -N (µg/L)	ND	NA
Total N (µg/L)	2890.00	NA
Lab Cond. (µS/cm)	393.00	NA
Lab pH	8.71	NA
Alkalinity (mg/L CaCO ₃)	166.00	NA
Total Susp. Solids (mg/L)	6.25	NA
Calcium (mg/L)	41.70	NA
Magnesium (mg/L)	22.80	NA
Hardness (mg/L)	198.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

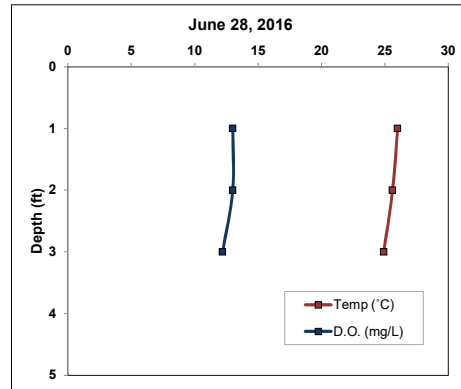
Data collected by TWH (Onterra)

Puckaway Lake - Mid Basin

Date: 6/28/2016
Time: 13:40
Weather: 70F, 10% clouds, light breeze
Entry: EEH

Max Depth: 3.4
LS Depth (ft): 2.0
LB Depth (ft):
Secchi Depth (ft): 1.7

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.0	13.0		
2	25.6	13.0		
3	24.9	12.2		



Parameter	LS	LB
Total P (µg/L)	112.00	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	103.00	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

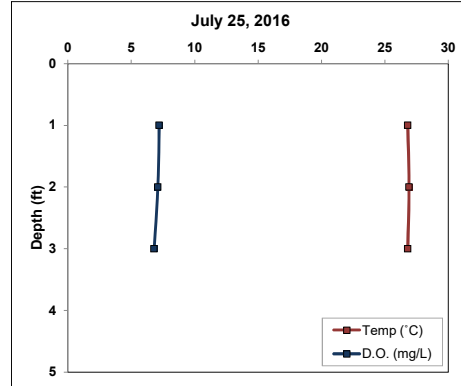
Puckaway Lake - Mid Basin

Date: 7/25/2016
Time: 10:00
Weather: 75F, 0% clouds
Entry: JLW

Max Depth: 3.9
LS Depth (ft): 2.0
LB Depth (ft):
Secchi Depth (ft): 1.2

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.8	7.2		
2	26.9	7.1	8.8	
3	26.8	6.8		

Parameter	LS	LB
Total P (µg/L)	127.00	NA
Dissolved P (µg/L)	3.50	NA
Chl-a (µg/L)	89.00	NA
TKN (µg/L)	2020.00	NA
NO ₃ + NO ₂ -N (µg/L)	ND	NA
NH ₃ -N (µg/L)	36.20	NA
Total N (µg/L)	2020.00	NA
Lab Cond. (µS/cm)	330.00	NA
Lab pH	8.54	NA
Alkalinity (mg/L CaCO ₃)	160.00	NA
Total Susp. Solids (mg/L)	42.70	NA
Calcium (mg/L)	31.90	NA
Magnesium (mg/L)	29.10	NA
Hardness (mg/L)	199.00	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA



Data collected by BTB & LJS (Onterra).

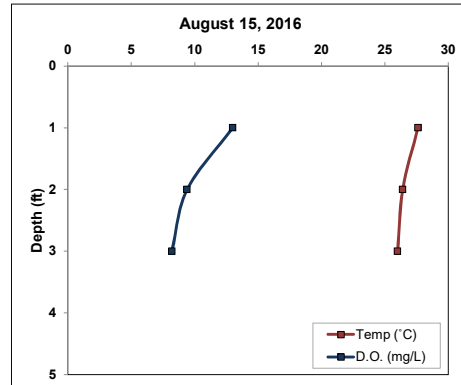
Puckaway Lake - Mid Basin

Date: 8/15/2016
Time: 12:10
Weather: 75% clouds, 82F
Entry: JMB

Max Depth: 3.7
LS Depth (ft): 2.0
LB Depth (ft):
Secchi Depth (ft): 1.0

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	27.6	13.0		
2	26.4	9.4		
3	26.0	8.2		

Parameter	LS	LB
Total P (µg/L)	101.00	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	82.40	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)	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



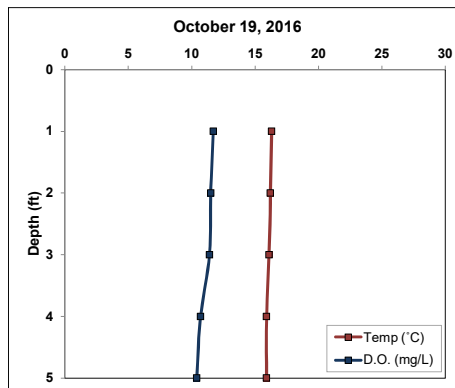
Data collected by TWH and LJS (Onterra). Water is brown, maybe a little low?

Puckaway Lake - Mid Basin

Date: 10/19/2016
Time: 11:30
Weather: 75% clouds, 70F, no wind
Entry: JMB

Max Depth: 5.8
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.1

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	16.3	11.7		
2	16.2	11.5		
3	16.1	11.4		
4	15.9	10.7		
5	15.9	10.4		



Parameter	LS	LB
Total P (µg/L)	73.70	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	61.00	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)	12.80	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

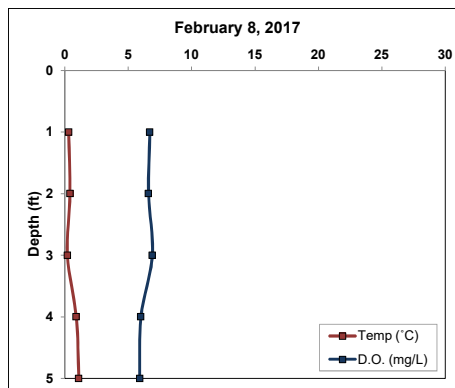
Data collected by JMB and LJS (Onterra).

Puckaway Lake - Mid Basin

Date: 2/8/2017
Time: 12:55
Weather: 18F, 30% clouds, light wind
Entry: EEH

Max Depth: 5.5
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 5.0

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.3	6.7		
2	0.4	6.6		
3	0.2	6.9		
4	0.9	6.0		
5	1.1	5.9		



Parameter	LS	LB
Total P (µg/L)	79.10	NA
Dissolved P (µg/L)	32.60	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	884.00	NA
NO ₃ + NO ₂ -N (µg/L)	2120.00	NA
NH ₃ -N (µg/L)	121.00	NA
Total N (µg/L)	3125.00	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 LJS (Onterra). Ice depth = 1.3 feet.

Water Quality Data

2016-2017 Parameter	Surface		Bottom	
	Count	Mean	Count	Mean
Secchi Depth (feet)	6	2.3	NA	NA
Total P (µg/L)	6	87.7	0	NA
Dissolved P (µg/L)	3	13.5	0	NA
Chl a (µg/L)	5	73.1	0	NA
TKN (µg/L)	3	1498.0	0	NA
NO ₃ +NO ₂ -N (µg/L)	3	1710.0	0	NA
NH ₃ -N (µg/L)	3	78.6	0	NA
Total N (µg/L)	3	2678.3	0	NA
Lab Cond. (µS/cm)	2	361.5	0	NA
Alkal (mg/l CaCO ₃)	2	163.0	0	NA
Total Susp. Solids (mg/l)	3	20.6	0	NA
Calcium (mg/L)	2	36.8	0	NA
Magnesium (mg/L)	2	26.0	0	NA
Hardness (mg/L)	2	198.5	0	NA
Color (SU)	2	45.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
2004			62.2
2005			73.4
2006	66.7	62.7	67.0
2007	73.4	71.4	75.1
2009	82.5	80.7	84.5
2011	76.8	76.6	75.1
2012	79.2	76.4	70.7
2013	66.6	68.2	61.7
2014	69.6	67.1	67.6
2015	67.2	62.9	59.3
2016	72.4	74.9	73.3
All Years (Weighted)	74.7	73.7	67.8
SLDL Median	54.6	52.6	52.4
SWTP Ecoregion Median	48.7	47.0	50.0

Year	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
2004	10	2.6	7	2.8	1	37.5	1	37.5	2	115.5	1.0	79.0
2005	4	1.5	3	1.3	4	125.4	3	154.0	5	185.6	3.0	256.0
2006	4	1.9	3	2.0	4	40.2	2	26.3	4	87.8	2.0	76.5
2007	4	1.3	2	1.1	4	56.7	2	63.8	5	117.2	3.0	122.0
2009	4	0.8	2	0.6	4	136.8	2	165.0	4	195.8	2.0	229.5
2011	7	1.2	7	1.2	7	109.0	7	109.0	7	154.4	7.0	154.4
2012	10	2.0	5	1.6	10	77.1	5	106.9	10	141.4	5.0	182.0
2013	10	2.3	5	2.9	11	64.1	6	46.3	11	98.3	6.0	76.1
2014	13	2.4	6	1.9	12	37.7	6	41.2	13	87.9	6.0	93.9
2015	5	2.4	2	3.5	5	26.9	2	27.0	5	67.6	2.0	79.2
2016	5	1.8	3	1.3	5	73.1	3	91.5	5	89.5	3.0	113.3
All Years (Weighted)		2.0		1.9		69.6		81.0		118.1		133.4
SLDL Median				5.6				9.4				33.0
SWTP Ecoregion				6.6				5.3				22.0