A

APPENDIX A

Stakeholder Education Materials

CalMan Lakes
Management Planning Project
Kick-Off Meeting
August 22, 2013 – 7:00 PM
Brillion Conservation Club
W695 Sunset Drive, Brillion, WI

This past spring, the Calumet County Resource Management Department has received a grant totaling nearly $25,000 from the Wisconsin Department of Natural Resources to partially fund the completion of a comprehensive management plan for Round, Boot, Becker and Long Lakes. The design for the planning project has been finalized and approved by the WDNR and includes two primary objectives: 1) the completion of in-depth studies including multiple plant surveys, water quality sampling, and watershed investigations; and 2) the completion of a realistic management plan for the lakes and their watersheds.

Onterra ecologist Tim Hoyman speaks to a lake group in Waushara County about their lake management plan. Public participation will be an integral part of the CalMan Lakes project.

Baseline studies will be completed during the spring, summer and fall of 2013. The tasks associated with the analysis of the data will be completed during the following fall and winter. Future phases of the management planning project will take place in 2014 and 2015; these studies include further AIS monitoring and planning, as well as intensive water quality monitoring and quantification. The project will also incorporate opportunities for stakeholder education and input, which are both very important components of all lake management planning efforts.

The first opportunity for your participation in the process will be at the Project Kick-off Meeting to be held on Thursday, August 22nd at 7:00 pm at the Brillion Conservation Club. Onterra, LLC, a lake management planning firm out of De Pere, has been hired to lead the project. During the meeting, Tim Hoyman and Dan Cibulka, aquatic ecologists with Onterra, LLC, will describe the project and its importance. The presentation will include a description of the project's components, a quick course on general lake ecology, and a breakdown of how County staff and lake stakeholders will be involved in the plan's completion.

Please plan on attending the meeting and do not hesitate to ask questions or make comments.

Presentation Outline

- Onterra, LLC
- CalMan Lakes Watershed Plan Background
- General Lake Ecology – Quick Course
- Project Overarching Goals
- Project Elements and Components
- Phased Project Approach

Onterra LLC
Lake Management Planning

Onterra, LLC

- Founded in 2005
- Staff
  - Four full-time ecologists
  - One part-time ecologist
  - One field technician
  - Four summer interns
- Services
  - Science and planning
- Philosophy
  - Promote realistic planning
  - Assist, not direct

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Why create a watershed management plan?

- To create a better understanding of each lake's positive and negative attributes.
- To discover ways to minimize the negative attributes and maximize the positive attributes.
- To foster realistic expectations and dispel myths.
- To create a snapshot of each lake for future reference and planning.

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General Lake Ecology

Aquatic Plants → Production (*Water Quality*) → Phosphorus → Sources

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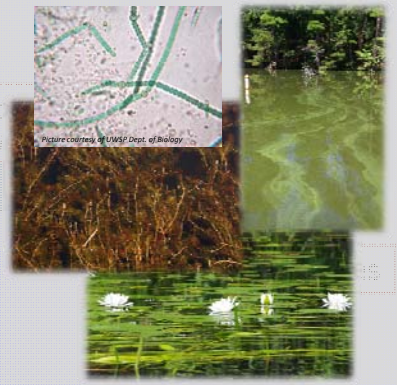
General Lake Ecology

Aquatic Plants

Native
- Benefit water quality
- Provide habitat

Non-Native
- Disrupt ecology of lake
- Negatively impact recreation

Algae
- Feed aquatic organisms
- Can become excessive



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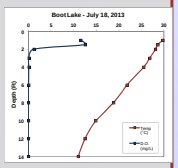
General Lake Ecology

Production

Primary Production
- Growth of algae & vascular plants
- Lakes need *some* production, excessive amounts can cause impairment of lakes



Dissolved Oxygen
- Essential for aquatic life
- Excessive productivity can lead to very low or zero dissolved oxygen

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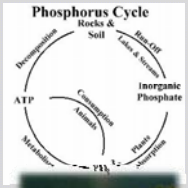
General Lake Ecology

Phosphorus

Element
- Essential component of living beings
- 2nd most abundant element in humans
- Found in rocks, minerals, organic matter, detergents, fertilizers etc.



Limiting nutrient
- Responsible for primary production in lakes
- Primary focus of water related studies

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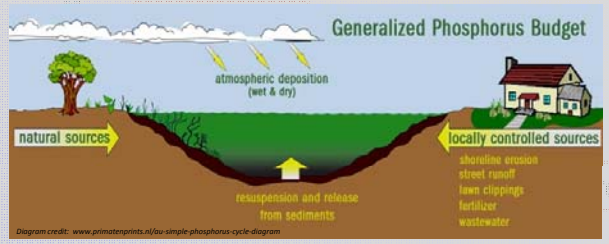
General Lake Ecology

Sources

External & Internal



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Project Goals

"The success or failure of restocking efforts in both Becker and Round Lakes will depend on improving the water quality of each lake. If additional low oxygen events occur during succeeding winters, fish stocking will not restore a desirable mix of self-reproducing fish back into the lakes. To achieve long term stability of a desirable mix of fish species, long term improvements in water quality will be necessary. To improve water quality in these lakes, changes in the watershed that reduce sediment and phosphorus runoff into the lake will be required. Additional management actions may be required even with decreases of external phosphorus levels to ensure long term stability of the lake and its fish community."

- Steve Hogler, August 2012

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Project Overarching Goal

Improve water quality of Becker, Boot, Round and Long Lakes to their maximum, realistic potential

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Project Elements

1. Nutrient Budget
2. AIS Assessment/Monitoring
3. Ecosystem Monitoring
4. Planning Process
5. Implementation

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Project Elements & Components

1. Nutrient Budget
- In-lake water quality testing
- Watershed modeling
- Loading (stream flow, nutrient concentrations)
- Sediment core examination

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Project Elements & Components

2. AIS Assessment/Monitoring
- Early-season AIS survey
- EWM peak-biomass assessment
- AIS management strategy development

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Project Elements & Components

3. Ecosystem Monitoring
- Shoreland development surveys
- Coarse woody habitat assessment
- Fisheries data integration

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Project Elements & Components

4. Planning Process
- Stakeholder engagement
- WDNR, County involvement

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Project Elements & Components

5. Implementation

- Corrective actions
  - Water quality
  - Land management practices
  - AIS monitoring/management

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Phased Project Approach

Approximate Timeline

- Phase I (*2013-2014*)
  - Baseline WQ monitoring, watershed assessment and aquatic plant studies
  - Stakeholder participation
  - Initial data analysis and plan development

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Phased Project Approach

Approximate Timeline

- Phase II (*2014-2015*)
  - Intensive WQ monitoring and watershed modeling
  - Website development
  - Ecosystem monitoring (habitat components)
  - Continued efforts:
    - *AIS surveys*
    - *Stakeholder participation, data analysis and planning development*

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Phased Project Approach

Approximate Timeline

- Phase III (*2015-2016*)
  - Sediment core sampling
  - Continued efforts:
    - *Intensive WQ monitoring, watershed modeling*
    - *AIS surveys (if appropriate)*
    - *Stakeholder participation, data analysis and planning development*

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Phased Project Approach

Approximate Timeline

- Phase IV (*2015-2016*)
  - Corrective action development
  - Complete Watershed Management Plan
  - Project Wrap-up Meeting

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Thank You

Many of the graphics used in this presentation were supplied by:

Wisconsin Lakes Partnership

UW Extension

Wisconsin Dept. of Natural Resources

Onterra LLC
Lake Management Planning

Calumet County Resource Conservation Department

CalMan Lakes

Watershed Management Planning Project

Update Meeting

May 19, 2014

Dan Cibulka &
Tim Hoyman
Onterra LLC
Lake Management Planning

Presentation Outline

- **Watershed Management Planning Project Overview**
- **Phase I Study Results**
  - Water Quality
  - Watershed
  - Aquatic Plants
- **Phase II Components**
- **Project Discussion**

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Study and Plan Goals

- Collect & Analyze Data
- Determine Remedial Path
- Develop Collaborative & Adaptable Strategy
- Monitor Progress

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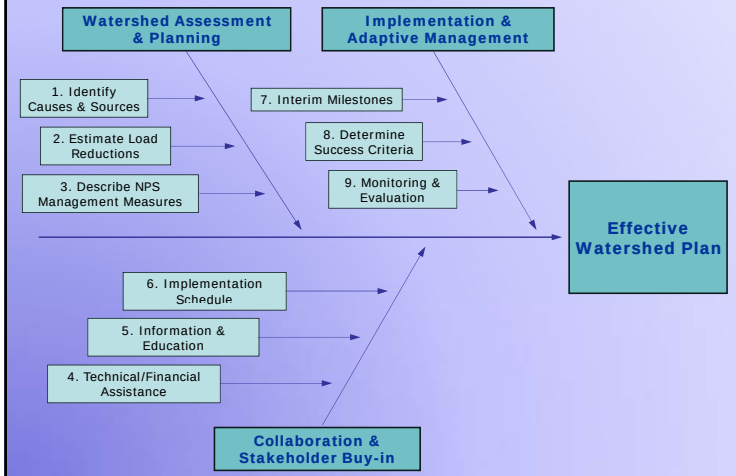
"9 Key Elements" for Watershed Planning




Water Quality
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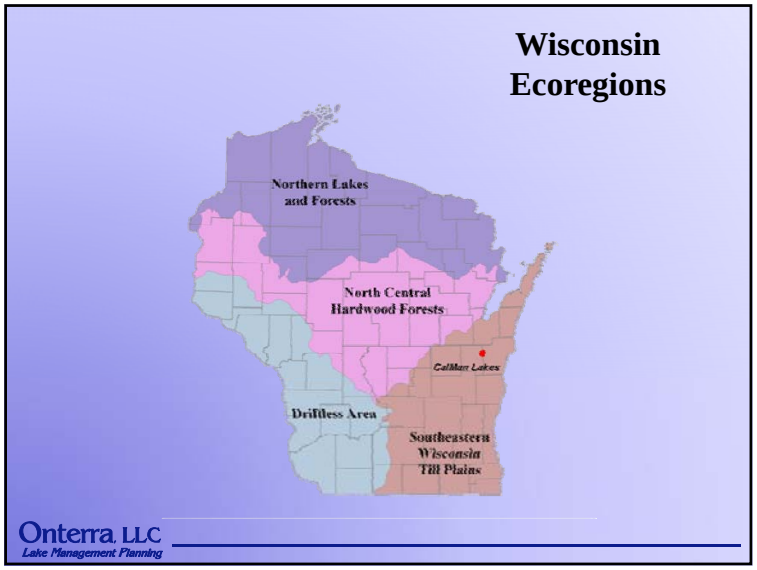
Wisconsin Ecoregions
Northern Lakes and Forests
North Central Hardwood Forests
CalMan Lakes
Driftless Area
Southeastern Wisconsin Till Plains
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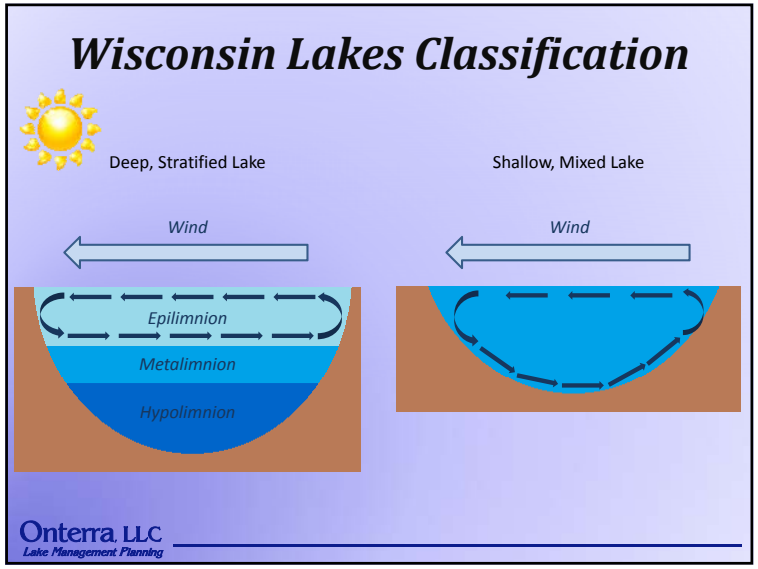
Wisconsin Lakes Classification
Deep, Stratified Lake
Shallow, Mixed Lake
Wind
Wind
Epilimnion
Metalimnion
Hypolimnion
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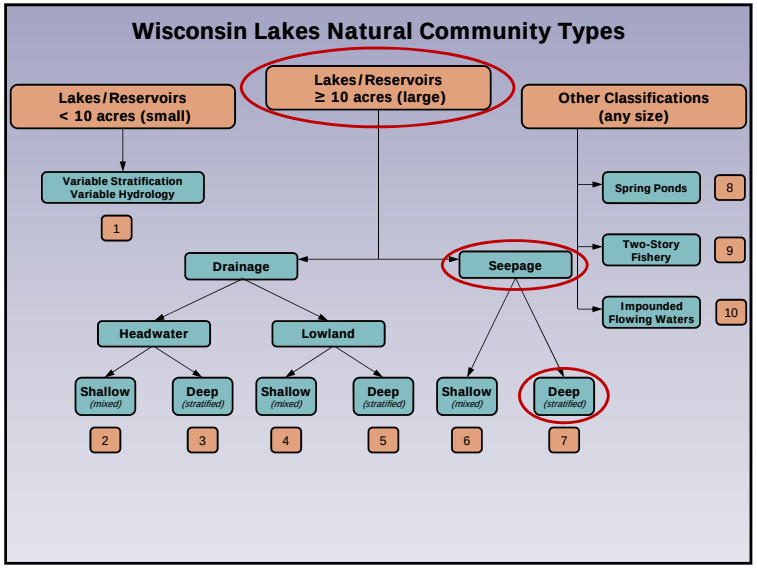
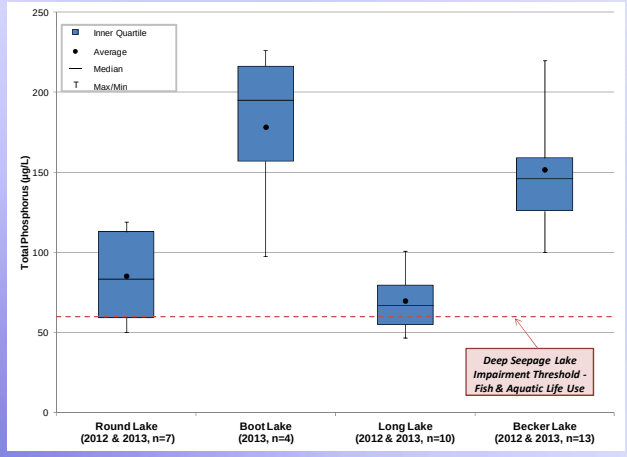

Wisconsin Lakes Natural Community Types
Lakes/Reservoirs < 10 acres (small)
Lakes/Reservoirs ≥ 10 acres (large)
Other Classifications (any size)
Variable Stratification Variable Hydrology
1
Spring Ponds
8
Two-Story Fishery
9
Impounded Flowing Waters
10
Drainage
Seepage
Headwater
Lowland
Shallow (mixed)
Deep (stratified)
Shallow (mixed)
Deep (stratified)
Shallow (mixed)
Deep (stratified)
2
3
4
5
6
7

2012-2013 Annual Total Phosphorus



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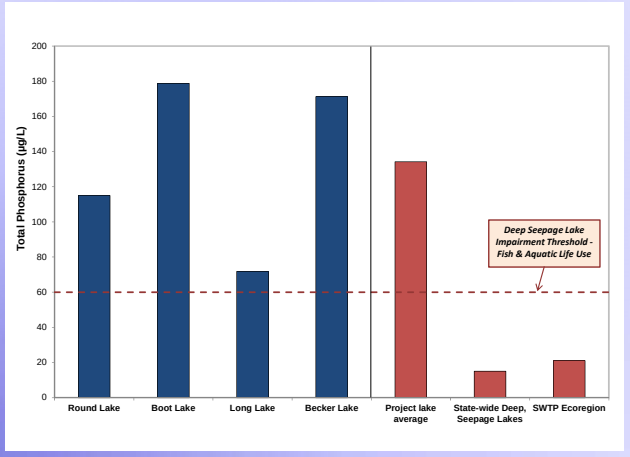
2013 Average Summer Total Phosphorus



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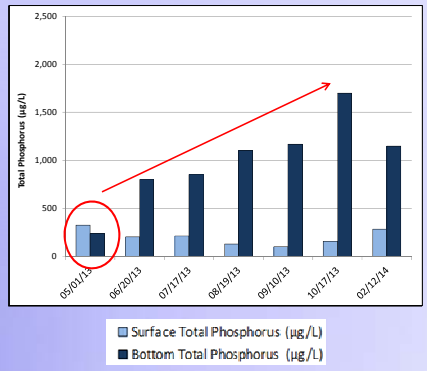
Internal Nutrient Dynamics

Round Lake
Boot Lake
Long Lake
Becker Lake



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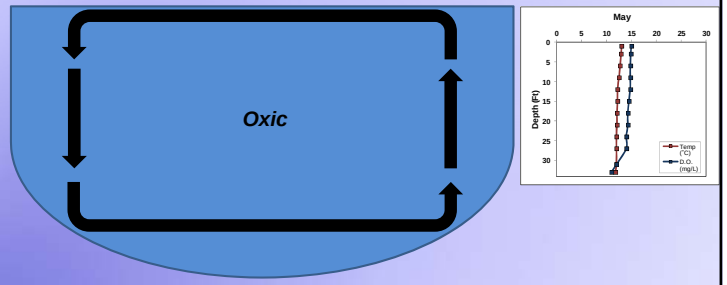
Internal Phosphorus Loading – What is it?

Stratification

Spring



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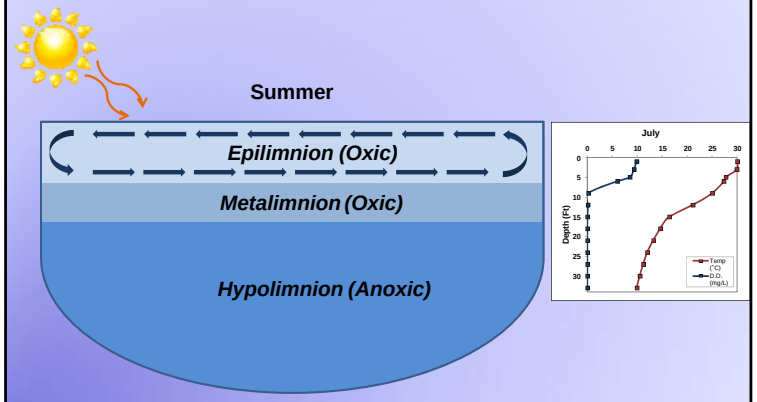
Internal Phosphorus Loading – What is it?

Stratification



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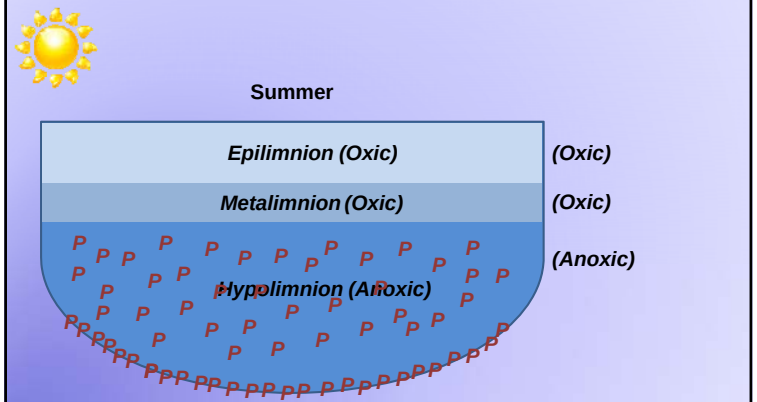
Internal Phosphorus Loading – What is it?

Stratification



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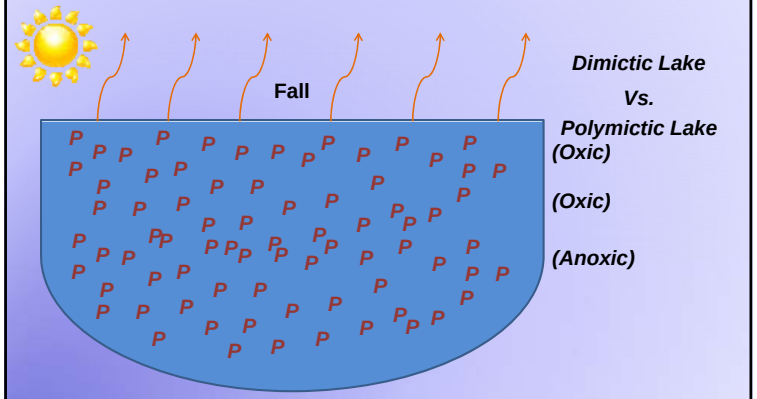
Internal Phosphorus Loading – What is it?

Stratification



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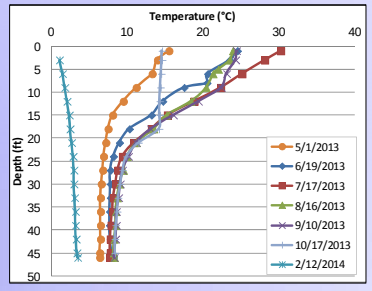
Internal Nutrient Dynamics

- Hypolimnetic anoxia facilitates nutrient release
- Lakes tend to remain stratified throughout open water season.
- Osgood Index Values*
  - Round Lake: 29.1
  - Boot Lake: 11.5
  - Long Lake: 4.9 Likely higher
  - Becker Lake: 12.2

* >9 = dimictic, <4 = polymictic



Becker Lake

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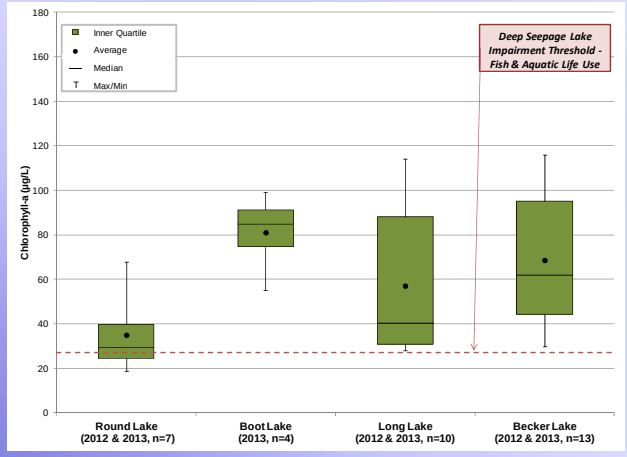
2012-2013 Annual Chlorophyll-α



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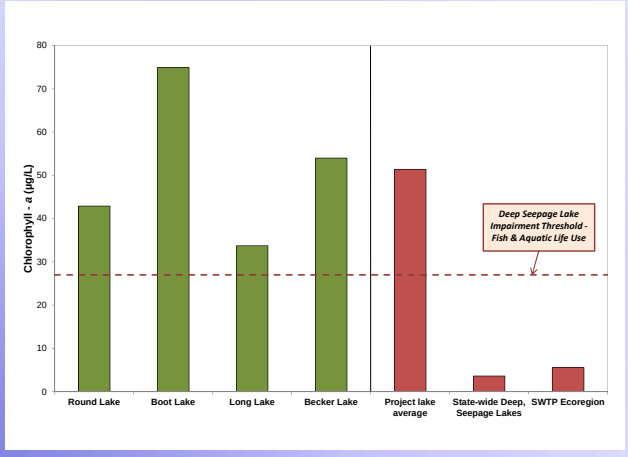
2013 Average Summer Chlorophyll-α



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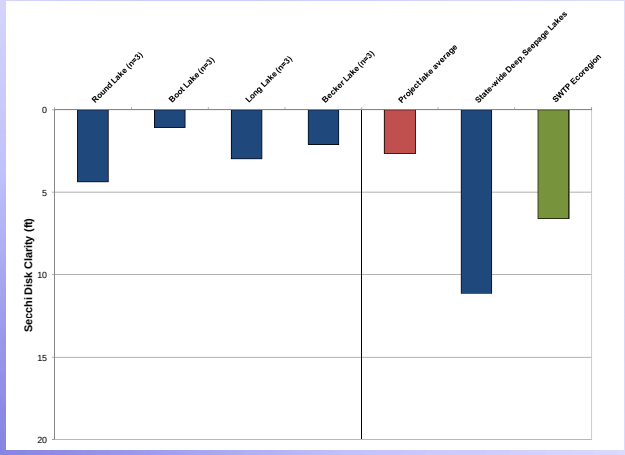
2013 Average Secchi Disk Clarity



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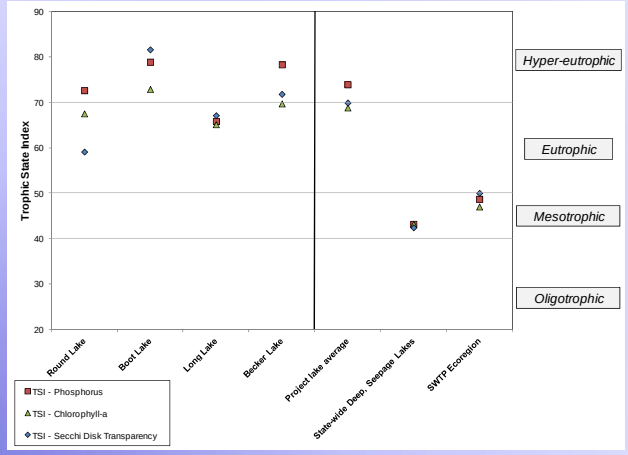
2013 Trophic State Index



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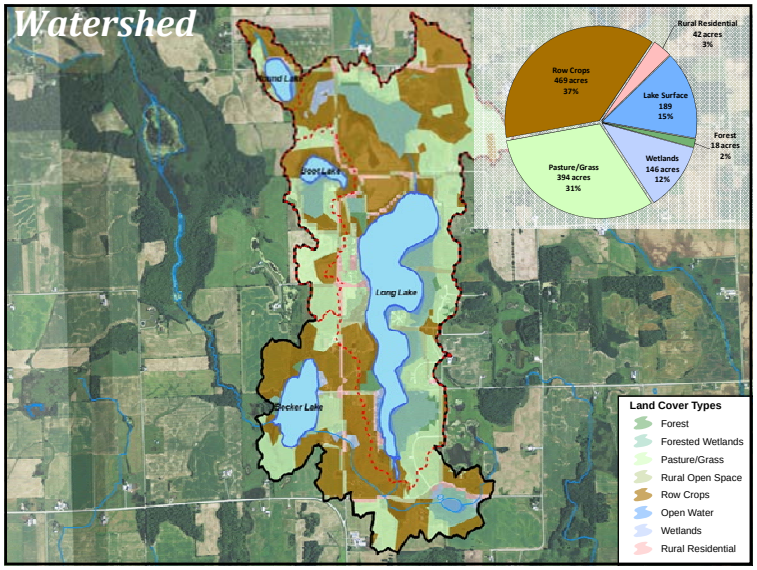

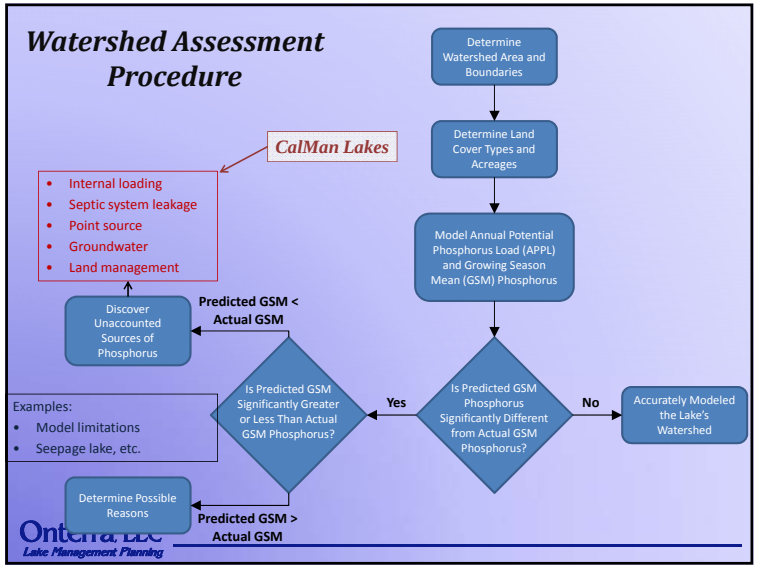

Watershed Modeling: Phosphorus Loading

- Screening-level annual P loading and in-lake concentration results:

Lake	Predicted GSM (ug/L)	Observed GSM (ug/L)	Predicted P Load (lbs)	Estimated P Unaccounted for within model (lbs)
Round	40	154	24	**110**
Boot	83	236	51	**111**
Long	58	86	357	**311**
Becker	75	176	382	**331**

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Early Season AIS Survey (Onterra)

Meander based survey – find AIS if it is present.

Survey Completed: June 2013

Point Intercept Survey (Calumet Cty & WDNR)

Round Lake – 2013

Boot Lake – 2014

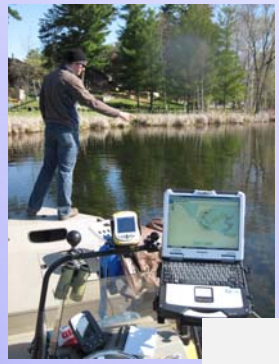
Long Lake – 2012

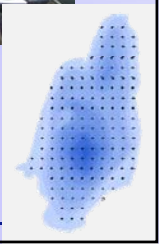
Becker Lake – 2013

EWM Peak-biomass Survey (Onterra)

Refine EWM colonies.

Survey Completed: August 2013





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Aquatic Plant Summary

CalMan Lakes*

- 17 native species
- 6 exotic species
  - 3 submergent
  - 3 emergent
- Depth of plants limited by water clarity

*Boot Lake PI survey to be completed in 2014.

Life Form	Scientific Name	Common Name	C-value	Round Lake	Boot Lake	Long Lake	Becker Lake
Emergent	*Acorus calamus*	Sweetflag	7	I			
	Decodon verticillatus	Water-willow	7			I	
	Eleocharis sp.	Spikerush sp.	NA		I		
	Iris pseudacorus	Pale yellow iris	Exotic			I	
	Iris versicolor	Northern blue flag	5	I		I	
	Lythrum salicaria	Purple loosestrife	Exotic	I	I		I
	Phragmites australis	Giant reed	Exotic				I
	Sagittaria latifolia	Common arrowhead	3	I	I		
	Typha sp.	Cattail sp.	1		I	I	I
Submergent	*Ceratophyllum demersum*	Coontail	3	X		X	X
	Chara spp.	Muskgrasses	7			X	
	Elodea canadensis	Common waterweed	3	X			
	Elodea nuttalii	Slender waterweed	7	X			
	M. sibiricum x M. spicatum	Hybrid water milfoil	Exotic				X
	Myriophyllum spicatum	Eurasian water milfoil	Exotic			X	
	Potamogeton crispus	Curly-leaf pondweed	Exotic	X		I	X
	Potamogeton zosteriformis	Flat-stem pondweed	6				X
	Stuckenia pectinata	Sago pondweed	3	X		X	
FF	*Spirodela polyrhiza*	Greater duckweed	5	X			
FL	*Nuphar variegata*	Spatterdock	6	X		X	I
	Nymphaea odorata	White water lily	6			X	X
	Polygonum amphibium	Water smartweed	5				I
FL/E	*Sparganium eurycarpum*	Common bur-reed	5				I

FF = Free-floating; FL = Floating-leaf; FL/E = Floating-leaf/Emergent
X = Located on rake during point-intercept survey; I = Incidental species

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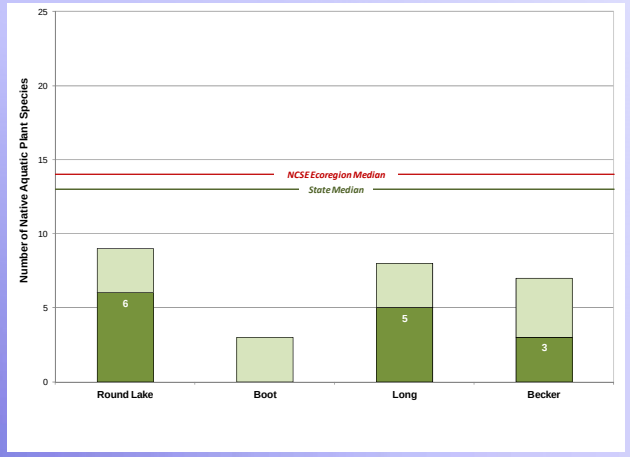
Aquatic Plant Species Richness



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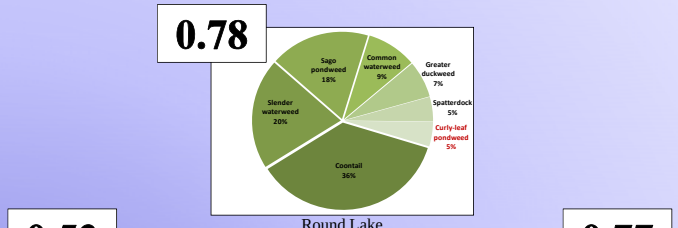
Aquatic Plant Species Diversity



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Phase II Studies

- Continued water quality monitoring.
  - Round and Boot Lake baseline monitoring (2nd year – 303d listing requirement).
  - Tributary flow monitoring in Round, Long and Becker Lakes.
    - Tributary nutrient assessments to begin in 2015.
    - Culvert monitoring to understand flow conditions in secondary tributaries.
- Continued watershed assessments.
  - Document areas of concern.
  - Monitor and refine flow conditions.
- Precipitation monitoring (watershed model calibration).

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Phase II Studies

- Fisheries data integration.
- Shoreland condition (Calumet County).
- Coarse woody habitat surveys (Onterra) .
- Boot Lake point-intercept survey (WDNR).

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B

APPENDIX B

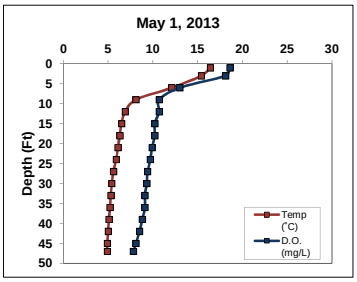
Water Quality Data

Round Lake

Date: 5/1/2013
Time: 10:33
Weather: Clear, 65F, calm
Entry: EEC

Max Depth: 48.6
RLS Depth (ft): 3.0
RLB Depth (ft): 45.0
Secchi Depth (ft): 1.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	16.4	18.6		
3	15.4	18.1		
6	12.1	13.0		
9	8.1	10.7		
12	6.9	10.7		
15	6.5	10.2		
18	6.3	10.2		
21	6.1	9.9		
24	5.9	9.7		
27	5.6	9.4		
30	5.4	9.3		
33	5.3	9.1		
36	5.2	9.1		
39	5.1	8.8		
42	5.0	8.5		
45	4.9	8.1		
47	4.9	7.8		



Parameter	RLS	RLB
Total P (µg/L)	369.00	267.00
Dissolved P (µg/L)	89.40	223.00
Chl-*a* (µg/L)	203.00	NA
TKN (µg/L)	3110.00	2310.00
$NO_3 + NO_2$-N (µg/L)	178.00	347.00
NH_3-N (µg/L)	34.80	1210.00
Total N (µg/L)	3288.00	2657.00
Lab Cond. (µS/cm)	423.00	NA
Lab pH	9.00	NA
Alkalinity (mg/L $CaCO_3$)	179.00	NA
Total Susp. Solids (mg/L)	10.30	0.00
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	30.00	NA
Turbidity (NTU)	NA	NA

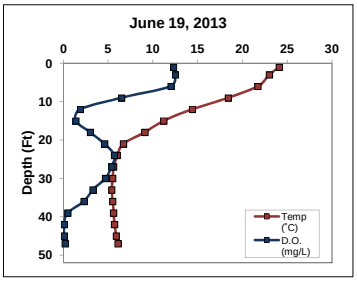
Data collected by DAC and TAH (Onterra)

Round Lake

Date: 6/19/2013
Time: 13:00
Weather: Sunny, breezy
Entry: EEC

Max Depth: 51.0
RLS Depth (ft): 3.0
RLB Depth (ft): 48.0
Secchi Depth (ft): 7.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.1	12.3		
3	23.0	12.5		
6	21.7	12.0		
9	18.4	6.5		
12	14.4	1.9		
15	11.2	1.4		
18	9.1	3.0		
21	6.7	4.6		
24	6.0	5.7		
27	5.6	5.4		
30	5.5	4.7		
33	5.4	3.3		
36	5.5	2.3		
39	5.6	0.5		
42	5.7	0.1		
45	5.9	0.1		
47	6.1	0.2		



Parameter	RLS	RLB
Total P (µg/L)	112.00	719.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	18.80	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)	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

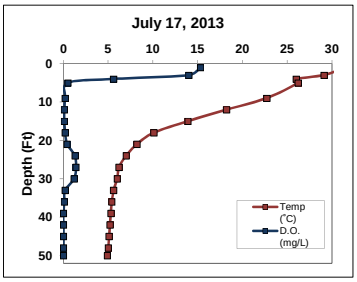
Data collected by Danielle Santry

Round Lake

Date: 7/17/2013
Time: 12:30
Weather: Sunny, breezy, hot
Entry: EEC

Max Depth: 51.9
RLS Depth (ft): 3.0
RLB Depth (ft): 48.0
Secchi Depth (ft): 1.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	31.4	15.3		
3	29.1	14.0		
4	26.0	5.6		
5	26.2	0.5		
9	22.7	0.2		
12	18.2	0.1		
15	13.9	0.1		
18	10.1	0.2		
21	8.2	0.4		
24	7.0	1.3		
27	6.2	1.4		
30	6.0	1.2		
33	5.6	0.2		
36	5.4	0.1		
39	5.3	0.0		
42	5.2	0.0		
45	5.1	0.0		
48	5.0	0.0		
50	4.9	0.0		



Parameter	RLS	RLB
Total P (µg/L)	114.00	913.00
Dissolved P (µg/L)	NA	647.00
Chl-*a* (µg/L)	NA	NA
TKN (µg/L)	2720.00	5670.00
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	27.60	3640.00
Total N (µg/L)	2720.00	5670.00
Lab Cond. (µS/cm)	353.00	487.00
Lab pH	9.48	7.34
Alkalinity (mg/L $CaCO_3$)	154.00	213.00
Total Susp. Solids (mg/L)	8.40	18.80
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

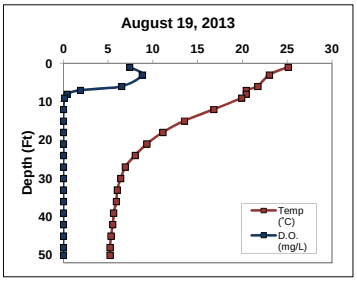
Data collected by Danielle Santry

Round Lake

Date: 8/19/2013
Time: 12:45
Weather: Sunny, warm, breezy
Entry: EEH

Max Depth: 51.0
RLS Depth (ft): 3.0
RLB Depth (ft): 48.0
Secchi Depth (ft): 2.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.1	7.4		
3	23.0	8.8		
6	21.7	6.5		
7	20.4	1.9		
8	20.4	0.4		
9	19.9	0.1		
12	16.8	0.0		
15	13.5	0.0		
18	11.1	0.0		
21	9.3	0.0		
24	8.0	0.0		
27	6.9	0.0		
30	6.4	0.0		
33	6.0	0.0		
36	5.9	0.0		
39	5.6	0.0		
42	5.5	0.0		
45	5.3	0.0		
48	5.2	0.0		
50	5.2	0.0		



Parameter	RLS	RLB
Total P (µg/L)	119.00	1180.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	42.10	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)	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

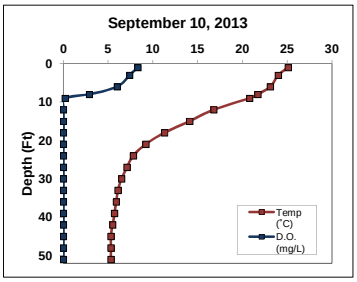
Data collected by Danielle Santry

Round Lake

Date: 9/10/2013
Time:
Weather: Hot, windy, sunny
Entry: EEH

Max Depth: 51.2
RLS Depth (ft): 3.0
RLB Depth (ft): 48.0
Secchi Depth (ft): 3.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.1	8.3		
3	24.0	7.4		
6	23.1	6.0		
8	21.7	2.9		
9	20.8	0.2		
12	16.8	0.0		
15	14.1	0.0		
18	11.3	0.0		
21	9.2	0.0		
24	7.8	0.0		
27	7.1	0.0		
30	6.5	0.0		
33	6.1	0.0		
36	5.9	0.0		
39	5.7	0.0		
42	5.5	0.0		
45	5.3	0.0		
48	5.3	0.0		
51	5.3	0.0		



Parameter	RLS	RLB
Total P (µg/L)	83.60	1130.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	37.20	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

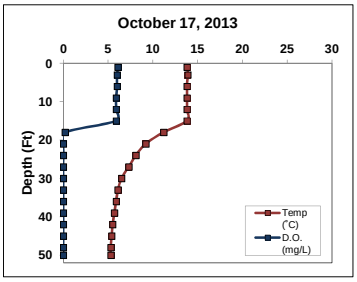
Data collected by Danielle Santry

Round Lake

Date: 10/17/2013
Time: 13:20
Weather: 80% clouds, 52F, breezy
Entry: EEH

Max Depth: 50.8
RLS Depth (ft): 3.0
RLB Depth (ft): 48.0
Secchi Depth (ft): 3.9

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	13.8	6.1	8.0	
3	13.9	6.0		
6	13.8	6.0		
9	13.8	5.9		
12	13.8	5.9		
15	13.8	5.9		
18	11.2	0.2		
21	9.2	0.0		
24	8.1	0.0	7.4	
27	7.3	0.0		
30	6.5	0.0		
33	6.1	0.0		
36	5.9	0.0		
39	5.7	0.0		
42	5.5	0.0		
45	5.4	0.0		
48	5.3	0.0	6.7	
50	5.3	0.0		



Parameter	RLS	RLB
Total P (µg/L)	76.90	1300.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	11.40	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)	5.00	3.67
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

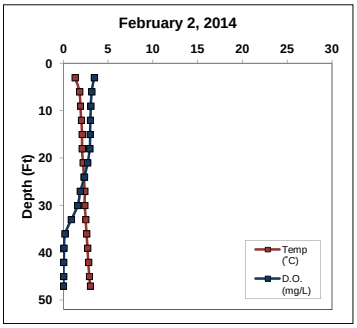
Data collected by DAC and EEH (Onterra)

Round Lake

Date: 2/12/2014
Time: 9:34
Weather: 100% clouds, 15 F, light breeze, light snow
Entry: EEH

Max Depth: 49.8
RLS Depth (ft): 3.0
RLB Depth (ft): 47.0
Secchi Depth (ft): 6.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1				
3	1.3	3.4		
6	1.8	3.2		
9	1.9	3.1		
12	2.0	3.0		
15	2.1	3.0		
18	2.1	2.9		
21	2.2	2.7		
24	2.3	2.3		
27	2.4	1.9		
30	2.4	1.6		
33	2.5	0.9		
36	2.6	0.2		
39	2.7	0.1		
42	2.8	0.0		
45	2.9	0.0		
47	3.0	0.0		



Parameter	RLS	RLB
Total P (µg/L)	316.00	477.00
Dissolved P (µg/L)	240.00	377.00
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)	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 EEH (Onterra) Ice thickness: 1.7 feet

Water Quality Data

2013-2014	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	3.7	NA	NA
Total P (µg/L)	6	170.1	6	855.1
Dissolved P (µg/L)	1	164.7	2	415.7
Chl a (µg/L)	5	62.5	0	NA
TKN (µg/L	2	2915.0	2	3990.0
NO3+NO2-N (µg/L)	1	178.0	1	347.0
NH3-N (µg/L)	2	31.2	2	2425.0
Total N (µg/L)	2	3004.0	2	4163.5
Lab Cond. (µS/cm)	2	388.0	1	487.0
Lab pH	2	9.2	1	7.3
Alkal (mg/l CaCO3)	2	166.5	1	213.0
Total Susp. Solids (mg/l)	3	7.9	2	7.5
Calcium (µg/L)	0	NA	0	NA
Magnesium (mg/L)	0	NA	0	NA
Hardness (mg/L)	0	NA	0	NA
Color (SU)	1	30.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1976			56.8
1996		78.3	49.1
2007			52.6
2012		62.0	60.8
2013		67.5	59.1
All Years (Weighted)		71.1	55.7
Deep, Seepage Lakes		43.2	42.4
SWTP Ecoregion		47.0	50.0

	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
1976	2	4.1	1	4.1					0		0.0	
1996	3	10.8	1	7.0	4	68.8	2	129.0	4	238.3	2.0	264.0
2007	7	4.9	3	5.5								
2012	3	3.1	2	3.1	3	26.1	2	24.5	3	56.3	2.0	53.5
2013	6	3.2	3	3.5	6	63.4	3	42.9	6	145.8	3.0	115.0
All Years (Weighted)		4.9		4.4		56.5		62.2		153.6		140.0
Deep, Seepage Lakes				11.2				3.6				15.0
SWTP Ecoregion				6.6				5.3				22.0

July 2013 N: 2720.0
July 2013 P: 114.0

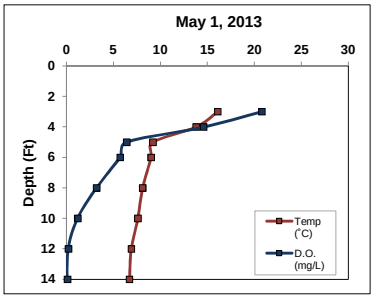
Summer 2013 N:P 24 :1

Boot Lake

Date: 5/1/2013
Time: 11:15
Weather: Clear, 70F, calm
Entry: EEC

Max Depth: 15.4
BLS Depth (ft): 3.0
BLB Depth (ft): 12.0
Secchi Depth (ft): 1.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
3	16.1	20.8		
4	13.8	14.6		
5	9.2	6.4		
6	9.0	5.7		
8	8.1	3.2		
10	7.6	1.2		
12	6.9	0.2		
14	6.7	0.1		



Parameter	BLS	BLB
Total P (µg/L)	294.00	533.00
Dissolved P (µg/L)	ND	314.00
Chl-*a* (µg/L)	309.00	NA
TKN (µg/L)	4890.00	3150.00
$NO_3 + NO_2$-N (µg/L)	108.00	ND
NH_3-N (µg/L)	258.00	2840.00
Total N (µg/L)	4998.00	3150.00
Lab Cond. (µS/cm)	350.00	NA
Lab pH	9.27	NA
Alkalinity (mg/L $CaCO_3$)	140.00	NA
Total Susp. Solids (mg/L)	26.90	6.57
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	60.00	NA
Turbidity (NTU)	NA	NA

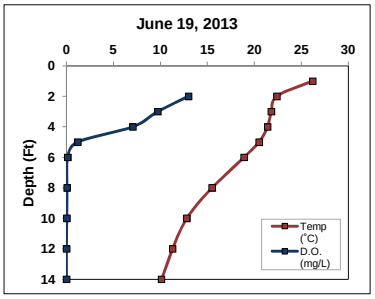
Data collected by DAC and TAH (Onterra)

Boot Lake

Date: 6/19/2013
Time: 12:45
Weather: Warm, slight breeze, partly cloudy
Entry: EEC

Max Depth: 15.0
BLS Depth (ft): 3.0
BLB Depth (ft): 12.0
Secchi Depth (ft): 1.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.2			
2	22.4	13.0		
3	21.8	9.7		
4	21.4	7.1		
5	20.5	1.2		
6	18.9	0.1		
8	15.5	0.1		
10	12.8	0.0		
12	11.3	0.0		
14	10.1	0.0		



Parameter	BLS	BLB
Total P (µg/L)	213.00	1120.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	55.10	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)	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

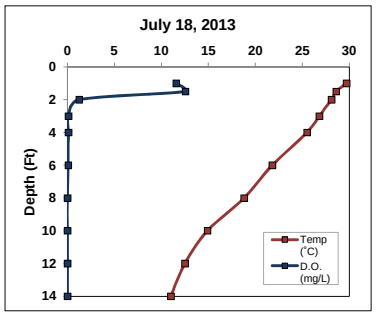
Data collected by Danielle Santry

Boot Lake

Date: 7/18/2013
Time: 10:42
Weather: Sunny, hot, windy
Entry: EEC

Max Depth: 15.0
BLS Depth (ft): 3.0
BLB Depth (ft): 12.0
Secchi Depth (ft): <1.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	29.7	11.6		
1.5	28.6	12.6		
2	28.1	1.2		
3	26.8	0.1		
4	25.5	0.1		
6	21.8	0.1		
8	18.8	0.0		
10	14.9	0.0		
12	12.5	0.0		
14	11.0	0.0		



Parameter	BLS	BLB
Total P (µg/L)	97.50	1200.00
Dissolved P (µg/L)	NA	1100.00
Chl-*a* (µg/L)	88.50	NA
TKN (µg/L)	4410.00	9560.00
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	24.50	7370.00
Total N (µg/L)	4410.00	9560.00
Lab Cond. (µS/cm)	356.00	474.00
Lab pH	7.16	8.72
Alkalinity (mg/L $CaCO_3$)	149.00	196.00
Total Susp. Solids (mg/L)	10.00	32.00
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

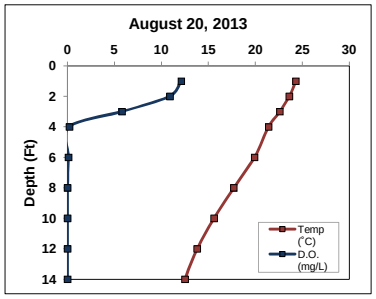
Data collected by Danielle Santry

Boot Lake

Date: 8/20/2013
Time: 11:00
Weather: Sunny, warm, breezy
Entry: EEH

Max Depth: 14.5
BLS Depth (ft): 3.0
BLB Depth (ft): 12.0
Secchi Depth (ft): 0.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.3	12.1		
2	23.6	10.9		
3	22.6	5.8		
4	21.4	0.2		
6	19.9	0.1		
8	17.7	0.0		
10	15.6	0.0		
12	13.8	0.0		
14	12.5	0.0		



Parameter	BLS	BLB
Total P (µg/L)	226.00	2100.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	81.00	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

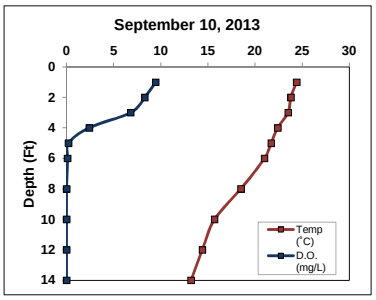
Data collected by Danielle Santry

Boot Lake

Date: 9/10/2013
Time: 10:30
Weather: hot, windy
Entry: EEH

Max Depth: 14.5
BLS Depth (ft): 3.0
BLB Depth (ft): 12.0
Secchi Depth (ft): 0.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.4	9.5		
2	23.8	8.3		
3	23.5	6.8		
4	22.4	2.4		
5	21.7	0.2		
6	21.0	0.1		
8	18.5	0.0		
10	15.7	0.0		
12	14.4	0.0		
14	13.2	0.0		



Parameter	BLS	BLB
Total P (µg/L)	117.00	1530.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	99.30	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

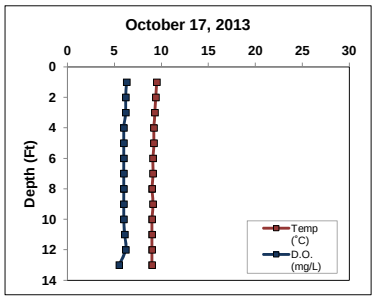
Data collected by Danielle Santry

Boot Lake

Date: 10/21/2013
Time: 12:10
Weather: Cool, light breeze, sunny
Entry: DAC

Max Depth: 14.0
BLS Depth (ft): 3.0
BLB Depth (ft): 12.0
Secchi Depth (ft): 0.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	9.5	6.3		
2	9.4	6.2		
3	9.3	6.2		
4	9.2	6.0		
5	9.2	6.0		
6	9.1	6.0		
7	9.1	6.0		
8	9.0	6.0		
9	9.1	6.0		
10	9.0	6.0		
11	9.0	6.1		
12	9.0	6.2		
13	9.0	5.5		



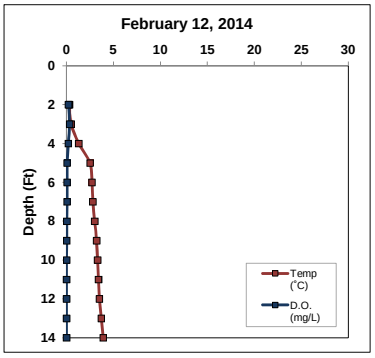
Parameter	BLS	BLB
Total P (µg/L)	357.00	410.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	32.20	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	33.00	34.00
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Boot Lake

Date: 2/12/2014
Time: 10:35
Weather: 100% clouds, 13F, snowing, light wind
Entry: EEH

Max Depth: 15.0
BLS Depth (ft): 3.0
BLB Depth (ft): 12.0
Secchi Depth (ft): 0.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1				
2	0.3	0.2		
3	0.5	0.3		
4	1.3	0.2		
5	2.5	0.1		
6	2.7	0.1		
7	2.8	0.1		
8	3.0	0.0		
9	3.2	0.0		
10	3.3	0.0		
11	3.4	0.0		
12	3.5	0.0		
13	3.7	0.0		
14	3.9	0.0		



Parameter	BLS	BLB
Total P (µg/L)	256.00	453.00
Dissolved P (µg/L)	62.40	260.00
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)	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 EEH (Onterra) Ice Thickness: 1.2 feet

Water Quality Data

2013-2014	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	5	0.8	NA	NA
Total P (µg/L)	6	222.9	6	1049.4
Dissolved P (µg/L)	1	62.4	2	558.0
Chl a (µg/L)	6	110.9	0	NA
TKN (µg/L	2	4650.0	2	6355.0
NO3+NO2-N (µg/L)	1	108.0	1	ND
NH3-N (µg/L)	2	141.3	2	5105.0
Total N (µg/L)	2	4704.0	2	6355.0
Lab Cond. (µS/cm)	2	353.0	1	474.0
Lab pH	2	8.2	1	8.7
Alkal (mg/l CaCO3)	2	144.5	1	196.0
Total Susp. Solids (mg/l)	3	23.3	3	24.2
Calcium (µg/L)	0	NA	0	NA
Magnesium (mg/L)	0	NA	0	NA
Hardness (mg/L)	0	NA	0	NA
Color (SU)	1	60.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1979	70.6	75.2	
1996	74.7		69.1
2013	78.9	72.9	81.6
All Years (Weighted)	76.4	73.5	75.2
Drainage Lakes	52.7	50.4	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
1979					2	113.5	1	94.0	3	350.0	1.0	100.0
1996	4	1.6	2	1.8	2	90.2	0		4	163.5	2.0	133.0
2013	6	0.8	3	0.7	6	110.9	3	74.9	6	227.4	3.0	178.8
All Years (Weighted)		1.1		1.1		107.3		79.7		236.0		150.4
Drainage Lakes				5.6				7.5				29.0
NLF Ecoregion				8.9				5.6				21.0

July 2013 N: 4410.0
July 2013 P: 97.5

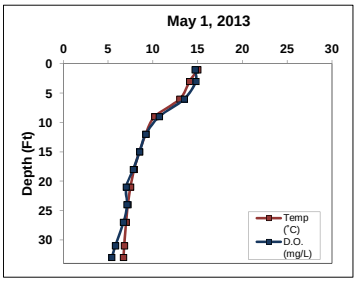
Summer 2013 N:P 45 :1

Long Lake

Date: 5/1/2013
Time: 9:15
Weather: Clear, 60F, breezy
Entry: EEC

Max Depth: 34.2
LLS Depth (ft): 3.0
LLB Depth (ft): 31.1
Secchi Depth (ft): 1.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	15.0	14.7		
3	14.1	14.8		
6	13.0	13.5		
9	10.2	10.7		
12	9.2	9.2		
15	8.5	8.5		
18	7.9	7.8		
21	7.5	7.0		
24	7.2	7.1		
27	7.0	6.7		
31	6.8	5.8		
33	6.7	5.4		



Parameter	LLS	LLB
Total P (µg/L)	189.00	123.00
Dissolved P (µg/L)	ND	18.20
Chl-*a* (µg/L)	136.00	NA
TKN (µg/L)	2780.00	2520.00
NO_3 + NO_2-N (µg/L)	251.00	208.00
NH_3-N (µg/L)	218.00	1290.00
Total N (µg/L)	3249.00	4018.00
Lab Cond. (µS/cm)	355.00	NA
Lab pH	8.68	NA
Alkalinity (mg/L $CaCO_3$)	140.00	NA
Total Susp. Solids (mg/L)	13.70	6.29
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

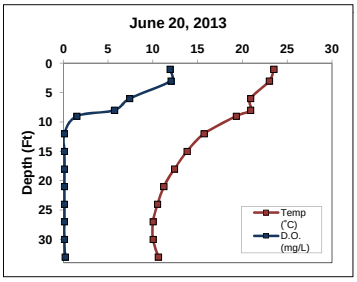
Data collected by DAC and TAH (Onterra)

Long Lake

Date: 6/20/2013
Time: 12:00
Weather: Sunny, calm
Entry: EEC

Max Depth: 34.7
LLS Depth (ft): 3.0
LLB Depth (ft): 31.0
Secchi Depth (ft): 1.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.5	11.9		
3	23.0	12.0		
6	20.9	7.4		
8	20.9	5.7		
9	19.3	1.5		
12	15.7	0.1		
15	13.8	0.1		
18	12.4	0.1		
21	11.2	0.1		
24	10.5	0.1		
27	10.0	0.1		
30	10.0	0.1		
33	10.6	0.2		



Parameter	LLS	LLB
Total P (µg/L)	95.80	87.20
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	29.40	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

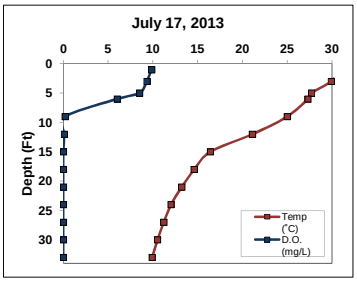
Data collected by Danielle Santry

Long Lake

Date: 7/17/2013
Time: 12:00
Weather: Sunny, HOT!
Entry: EEC

Max Depth: 34.2
LLS Depth (ft): 3.0
LLB Depth (ft): 31.0
Secchi Depth (ft): 2.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	31.0	9.9		
3	29.9	9.3		
5	27.7	8.5		
6	27.3	6.0		
9	25.0	0.2		
12	21.1	0.1		
15	16.4	0.0		
18	14.6	0.0		
21	13.2	0.0		
24	12.0	0.0		
27	11.2	0.0		
30	10.5	0.0		
33	9.9	0.0		



Parameter	LLS	LLB
Total P (µg/L)	52.10	983.00
Dissolved P (µg/L)	ND	887.00
Chl-*a* (µg/L)	27.80	NA
TKN (µg/L)	2190.00	9920.00
$NO_3 + NO_2$-N (µg/L)	ND	ND
NH_3-N (µg/L)	25.50	7120.00
Total N (µg/L)	2190.00	9920.00
Lab Cond. (µS/cm)	340.00	438.00
Lab pH	9.10	7.14
Alkalinity (mg/L $CaCO_3$)	145.00	188.00
Total Susp. Solids (mg/L)	13.20	9.20
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

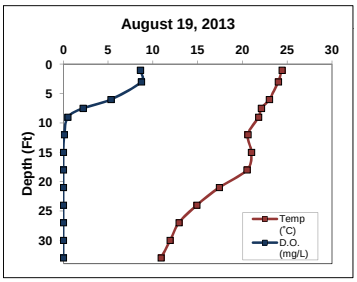
Data collected by Danielle Santry

Long Lake

Date: 8/19/2013
Time: 11:45
Weather: Sunny, warm
Entry: EEH

Max Depth: 34.0
LLS Depth (ft): 3.0
LLB Depth (ft): 31.0
Secchi Depth (ft): 2.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.4	8.6		
3	24.0	8.7		
6	23.0	5.3		
7.5	22.1	2.2		
9	21.8	0.5		
12	20.6	0.1		
15	21.0	0.0		
18	20.5	0.0		
21	17.4	0.0		
24	14.9	0.0		
27	12.9	0.0		
30	11.9	0.0		
33	10.9	0.0		



Parameter	LLS	LLB
Total P (µg/L)	52.90	1420.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	35.60	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

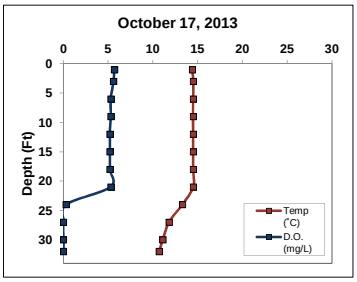
Data collected by Danielle Santry

Long Lake

Date: 10/17/2013
Time: 12:30
Weather: 90% clouds, 52F, light breeze
Entry: EEH

Max Depth: 32.7
LLS Depth (ft): 3.0
LLB Depth (ft): 30.0
Secchi Depth (ft): 1.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	14.4	5.7	7.8	
3	14.5	5.6		
6	14.5	5.3		
9	14.5	5.3		
12	14.5	5.2		
15	14.5	5.2		
18	14.5	5.2	7.9	
21	14.5	5.3		
24	13.3	0.3		
27	11.8	0.0		
30	11.1	0.0	6.5	
32	10.7	0.0		



Parameter	LLS	LLB
Total P (µg/L)	88.30	1880.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	17.40	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)	11.70	10.70
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

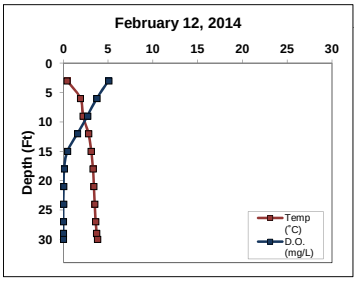
Data collected by DAC and EEH (Onterra)

Long Lake

Date: 2/12/2014
Time: 11:38
Weather: 100% clouds, 13F, snowing
Entry: EEH

Max Depth: 31.9
LLS Depth (ft): 3.0
LLB Depth (ft): 29.0
Secchi Depth (ft): 1.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1				
3	0.4	5.1		
6	1.9	3.7		
9	2.2	2.7		
12	2.8	1.6		
15	3.1	0.5		
18	3.3	0.1		
21	3.4	0.0		
24	3.5	0.0		
27	3.6	0.0		
29	3.7	0.0		
30	3.8	0.0		



Parameter	LLS	LLB
Total P (µg/L)	166.00	169.00
Dissolved P (µg/L)	ND	61.70
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)	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 EEH (Onterra). Ice Thickness: 1.6 feet

Water Quality Data

2013-2014	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	1.9	NA	NA
Total P (µg/L)	6	107.4	6	777.0
Dissolved P (µg/L)	3	ND	3	322.3
Chl a (µg/L)	5	49.2	0	NA
TKN (µg/L	2	2485.0	2	6220.0
NO3+NO2-N (µg/L)	2	251.0	2	208.0
NH3-N (µg/L)	2	121.8	2	4205.0
Total N (µg/L)	2	2719.5	2	6969.0
Lab Cond. (µS/cm)	2	347.5	1	438.0
Lab pH	2	8.9	1	7.1
Alkal (mg/l CaCO3)	2	142.5	1	188.0
Total Susp. Solids (mg/l)	3	12.9	3	8.7
Calcium (µg/L)	0	NA	0	NA
Magnesium (mg/L)	0	NA	0	NA
Hardness (mg/L)	0	NA	0	NA
Color (SU)	1	40.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1980			
1981	65.4	69.0	
1982			
1984	67.3		
1988	67.3	74.0	
1989	62.9		67.4
1990	70.8	71.2	62.1
1991	61.3	66.7	64.1
1992	65.0	70.7	63.9
1993	78.1	69.4	59.0
1994	69.9	66.6	59.6
1995	60.0	59.0	56.4
1996	65.7	61.8	58.2
1997	61.5	58.3	
1998	58.8	59.9	
1999	68.7	66.4	
2004	68.5		61.4
2005	64.8	68.5	57.4
2006	58.2	55.0	57.7
2008	68.0	63.1	62.4
2009	64.0	65.4	60.4
2010	67.9	73.5	68.7
2011	70.9	65.6	73.0
2012	64.8	75.0	75.1
2013	65.8	65.1	67.1
All Years (Weighted)	66.6	68.0	61.3
Shallow, Headwater Drainage Lakes	52.7	50.4	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
1980					0		0		0		0.0	
1981	0		0		2	40.0	1	50.0	2	70.0	1.0	70.0
1982					1	50.0	0		1	100.0	0.0	
1984									1	80.0	1.0	80.0
1988					2	83.5	2	83.5	2	80.0	2.0	80.0
1989	2	2.0	2	2.0					2	59.0	2.0	59.0
1990	4	3.1	3	2.8	4	68.5	3	63.0	4	107.8	3.0	101.7
1991	2	2.5	2	2.5	3	56.0	2	39.5	3	75.7	2.0	52.5
1992	11	2.5	11	2.5	3	59.7	3	59.7	3	68.0	3.0	68.0
1993	3	3.5	3	3.5	3	52.1	3	52.1	3	168.7	3.0	168.7
1994	3	3.4	3	3.4	3	39.3	3	39.3	3	95.7	3.0	95.7
1995	4	3.9	3	4.2	3	32.8	2	18.0	4	58.5	3.0	48.0
1996	3	3.8	1	3.7	4	22.8	2	24.0	4	76.3	2.0	71.5
1997	1	2.6	0		4	30.5	3	16.9	4	67.0	3.0	53.3
1998					4	25.8	3	19.9	4	54.3	3.0	44.3
1999					2	34.5	1	38.4	2	73.5	1.0	88.0
2004	20	3.5	12	3.0					4	84.3	2.0	86.5
2005	21	4.3	14	3.9	3	47.5	3	47.5	3	67.0	3.0	67.0
2006	26	4.2	14	3.8	3	17.4	2	12.0	3	43.7	2.0	42.5
2008	15	3.5	8	2.8	2	48.8	1	27.6	4	107.3	2.0	83.5
2009	6	4.5	4	3.2	4	34.7	4	34.7	6	92.2	4.0	63.5
2010	6	3.1	4	1.8	4	79.3	4	79.3	5	84.2	3.0	83.0
2011	6	1.5	3	1.3	4	38.6	3	35.6	6	109.2	3.0	102.7
2012	5	1.1	4	1.2	5	84.9	4	92.1	5	72.2	4.0	67.0
2013	9	1.9	5	2.0	8	44.4	6	33.7	10	103.7	6.0	71.8
All Years (Weighted)		3.4		3.0		47.3		45.4		85.8		76.0
Shallow, Headwater Drainage Lakes				5.6				7.5				29.0
NLF Ecoregion				8.9				5.6				21.0

July 2013 N: 2190.0
July 2013 P: 52.1

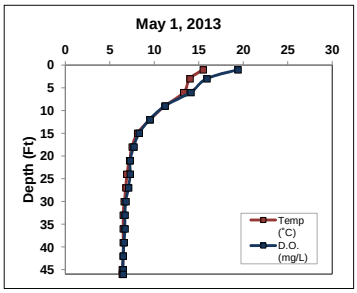
Summer 2013 N:P 42 :1

Becker Lake

Date: 5/1/2013
Time: 12:35
Weather: Clear, 65F, Breezy
Entry: EEC

Max Depth: 47.0
BELS Depth (ft): 3.0
BELB Depth (ft): 44.0
Secchi Depth (ft): 1.2

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	15.5	19.4		
3	14.0	15.9		
6	13.3	14.1		
9	11.2	11.2		
12	9.5	9.5		
15	8.1	8.3		
18	7.5	7.7		
21	7.2	7.3		
24	6.9	7.3		
27	6.8	7.1		
30	6.6	6.8		
33	6.5	6.7		
36	6.5	6.7		
39	6.5	6.6		
42	6.5	6.5		
45	6.4	6.5		
46	6.4	6.5		



Parameter	BELS	BELB
Total P (µg/L)	328.00	238.00
Dissolved P (µg/L)	5.80	140.00
Chl-a (µg/L)	244.00	NA
TKN (µg/L)	2730.00	3740.00
$NO_3 + NO_2$-N (µg/L)	238.00	311.00
NH_3-N (µg/L)	278.00	1550.00
Total N (µg/L)	2968.00	4051.00
Lab Cond. (µS/cm)	346.00	NA
Lab pH	8.92	NA
Alkalinity (mg/L $CaCO_3$)	141.00	NA
Total Susp. Solids (mg/L)	15.40	5.00
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

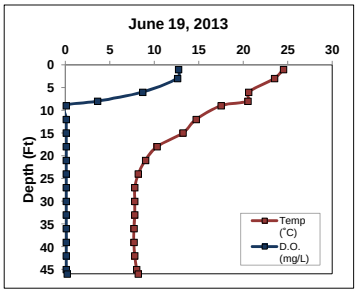
Data collected by DAC and TAH (Onterra)

Becker Lake

Date: 6/19/2013
Time: 14:00
Weather: Partly cloudy, breezy
Entry: EEC

Max Depth: 47.9
BELS Depth (ft): 3.0
BELB Depth (ft): 44.0
Secchi Depth (ft): 1.5

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.5	12.7		
3	23.5	12.6		
6	20.6	8.7		
8	20.5	3.6		
9	17.5	0.1		
12	14.7	0.1		
15	13.2	0.1		
18	10.3	0.1		
21	9.0	0.1		
24	8.2	0.1		
27	7.8	0.1		
30	7.8	0.1		
33	7.8	0.1		
36	7.7	0.1		
39	7.7	0.1		
42	7.8	0.1		
45	8.0	0.1		
46	8.2	0.2		



Parameter	BELS	BELB
Total P (µg/L)	202.00	799.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	29.80	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)	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

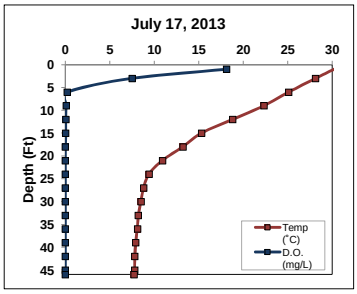
Data collected by Danielle Santry

Becker Lake

Date: 7/17/2013
Time:
Weather: Party cloudy, hot
Entry: EEC

Max Depth: 47.8
BELS Depth (ft): 3.0
BELB Depth (ft): 44.0
Secchi Depth (ft): 1.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	30.2	18.1		
3	28.1	7.5		
6	25.1	0.2		
9	22.3	0.1		
12	18.8	0.0		
15	15.3	0.0		
18	13.2	0.0		
21	10.9	0.0		
24	9.4	0.0		
27	8.8	0.0		
30	8.5	0.0		
33	8.2	0.0		
36	8.1	0.0		
39	7.9	0.0		
42	7.8	0.0		
45	7.8	0.0		
46	7.7	0.0		



Parameter	BELS	BELB
Total P (µg/L)	213.00	854.00
Dissolved P (µg/L)	ND	551.00
Chl-*a* (µg/L)	84.30	NA
TKN (µg/L)	4070.00	5970.00
$NO_3 + NO_2$-N (µg/L)	ND	ND
NH_3-N (µg/L)	25.00	4030.00
Total N (µg/L)	4070.00	5970.00
Lab Cond. (µS/cm)	309.00	401.00
Lab pH	9.34	7.27
Alkalinity (mg/L $CaCO_3$)	132.00	174.00
Total Susp. Solids (mg/L)	31.60	6.40
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

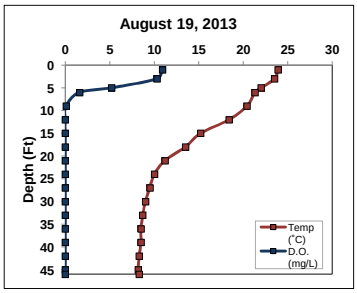
Data collected by Danielle Santry

Becker Lake

Date: 8/19/2013
Time: 13:45
Weather: Sunny, warm, windy
Entry: EEH

Max Depth: 47.0
BELS Depth (ft): 3.0
BELB Depth (ft): 44.0
Secchi Depth (ft): 1.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.9	10.9		
3	23.5	10.3		
5	22.0	5.2		
6	21.3	1.6		
9	20.4	0.1		
12	18.4	0.0		
15	15.2	0.0		
18	13.5	0.0		
21	11.2	0.0		
24	10.0	0.0		
27	9.5	0.0		
30	9.0	0.0		
33	8.7	0.0		
36	8.5	0.0		
39	8.5	0.0		
42	8.3	0.0		
45	8.2	0.0		
46	8.3	0.0		



Parameter	BELS	BELB
Total P (µg/L)	128.00	1100.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	46.70	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

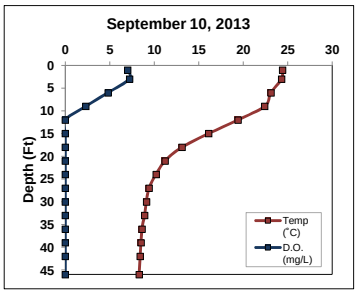
Data collected by Danielle Santry

Becker Lake

Date: 9/10/2013
Time:
Weather: Hot, windy
Entry: EEH

Max Depth: 47.1
BELS Depth (ft): 3.0
BELB Depth (ft): 44.0
Secchi Depth (ft): 1.5

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	24.4	7.0		
3	24.3	7.2		
6	23.1	4.8		
9	22.4	2.3		
12	19.4	0.0		
15	16.1	0.0		
18	13.1	0.0		
21	11.2	0.0		
24	10.2	0.0		
27	9.4	0.0		
30	9.1	0.0		
33	8.9	0.0		
36	8.6	0.0		
39	8.5	0.0		
42	8.4	0.0		
46	8.3	0.0		



Parameter	BELS	BELB
Total P (µg/L)	1170.00	100.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	44.30	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

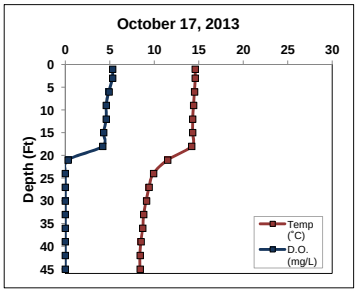
Data collected by Danielle Santry

Becker Lake

Date: 10/17/2013
Time: 12:00
Weather: 90% clouds, 52F, light breeze
Entry: EEH

Max Depth: 47.0
BELS Depth (ft): 3.0
BELB Depth (ft): 44.0
Secchi Depth (ft): 1.9

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	14.6	5.3	7.1	
3	14.6	5.3		
6	14.5	4.9		
9	14.4	4.6		
12	14.3	4.6		
15	14.3	4.3		
18	14.2	4.2		
21	11.5	0.3	6.9	
24	9.9	0.0		
27	9.4	0.0		
30	9.1	0.0		
33	8.8	0.0		
36	8.7	0.0		
39	8.5	0.0		
42	8.4	0.0		
45	8.4	0.0	6.5	



Parameter	BELS	BELB
Total P (µg/L)	155.00	1700.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	13.40	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)	11.60	11.30
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

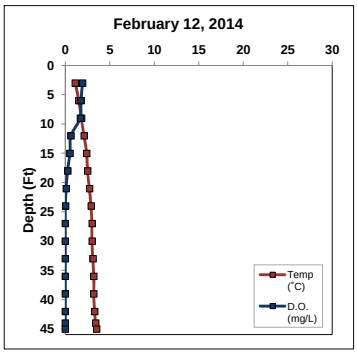
Data collected by DAC and EEH (Onterra)

Becker Lake

Date: 2/12/2014
Time: 12:37
Weather: 100% clouds, 13F, lightly snowing
Entry: EEH

Max Depth: 47.4
BELS Depth (ft): 3.0
BELB Depth (ft): 44.0
Secchi Depth (ft): 8.1

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1				
3	1.1	1.9		
6	1.5	1.8		
9	1.8	1.7		
12	2.1	0.6		
15	2.4	0.5		
18	2.5	0.3		
21	2.7	0.1		
24	2.9	0.0		
27	3.0	0.0		
30	3.0	0.0		
33	3.1	0.0		
36	3.2	0.0		
39	3.2	0.0		
42	3.3	0.0		
44	3.4	0.0		
45	3.5	0.0		



Parameter	BELS	BELB
Total P (µg/L)	282.00	1150.00
Dissolved P (µg/L)	194.00	542.00
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)	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 EEH (Onterra). Ice Thickness: 1.5 ft

Water Quality Data

2013-2014	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	2.4	NA	NA
Total P (µg/L)	6	354.0	6	848.7
Dissolved P (µg/L)	2	99.9	2	411.0
Chl a (µg/L)	6	77.1	0	NA
TKN (µg/L	2	3400.0	2	4855.0
NO3+NO2-N (µg/L)	2	238.0	2	311.0
NH3-N (µg/L)	2	151.5	2	2790.0
Total N (µg/L)	2	3519.0	2	5010.5
Lab Cond. (µS/cm)	2	327.5	1	401.0
Lab pH	2	9.1	1	7.3
Alkal (mg/l CaCO3)	2	136.5	1	174.0
Total Susp. Solids (mg/l)	3	19.5	3	7.6
Calcium (µg/L)	0	NA	0	NA
Magnesium (mg/L)	0	NA	0	NA
Hardness (mg/L)	0	NA	0	NA
Color (SU)	1	40.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1979	63.2	71.6	
1996	82.6	63.5	54.7
2007			63.0
2011			63.9
2012	75.5	75.1	73.6
2013	78.3	69.7	71.8
All Years (Weighted)	77.4	71.6	66.4
Deep, Seepage Lakes	43.2	43.2	42.4
SWTP Ecoregion	48.7	47.0	50.0

	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					2	35.9	1	65.0	4	140.0	1.0	60.0
1996	4	4.4	2	4.8	4	47.5	2	28.8	4	225.8	2.0	231.0
2007	7	2.5	3	2.7								
2011	7	2.4	3	2.5								
2012	7	1.3	5	1.3	6	87.1	5	93.5	7	163.6	5.0	140.6
2013	10	1.6	6	1.5	9	69.5	6	54.0	10	179.8	6.0	171.3
All Years (Weighted)		2.2		2.1		67.1		65.3		176.2		160.9
Deep, Seepage Lakes				11.2				3.6				15.0
SWTP Ecoregion				6.6				5.3				22.0

July 2013 N: 4070.0
July 2013 P: 213.0

Summer 2013 N:P 19 :1

C

APPENDIX C

WiLMS Watershed Modeling Results

Date: 4/21/2014 Scenario: Round Lake Current

Lake Id:
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 32.0 acre
Total Unit Runoff: 7.90 in.
Annual Runoff Volume: 21.1 acre-ft
Lake Surface Area <As>: 12.0 acre
Lake Volume <V>: 246.4 acre-ft
Lake Mean Depth <z>: 20.5 ft
Precipitation - Evaporation: 3.5 in.
Hydraulic Loading: 24.6 acre-ft/year
Areal Water Load <qs>: 2.0 ft/year
Lake Flushing Rate <p>: 0.10 1/year
Water Residence Time: 10.03 year
Observed spring overturn total phosphorus (SPO): 369.0 mg/m^3
Observed growing season mean phosphorus (GSM): 153.6 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre	Low	Most Likely	High	Loading %	Low	Most Likely	High
	(ac)	Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	22.0	0.50	1.00	3.00	76.7	4	9	27
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	8.0	0.10	0.30	0.50	8.4	0	1	2
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	1.0	0.05	0.10	0.25	0.3	0	0	0
Wetlands	1.0	0.10	0.10	0.10	0.3	0	0	0
Forest	0.0	0.05	0.09	0.18	0.0	0	0	0
Lake Surface	12.0	0.10	0.30	1.00	12.5	0	1	5

POINT SOURCE DATA

Point Sources	Water Load	Low	Most Likely	High	Loading %
	(m^3/year)	(kg/year)	(kg/year)	(kg/year)	

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	4.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.02	0.20	0.64	1.7

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	11.8	25.6	74.9	100.0
Total Loading (kg)	5.3	11.6	34.0	100.0
Areal Loading (lb/ac-year)	0.98	2.13	6.24	
Areal Loading (mg/m^2-year)	110.08	239.13	699.45	
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	10.7	21.9	62.8	98.3
Total NPS Loading (kg)	4.8	10.0	28.5	98.3

Phosphorus Prediction and Uncertainty Analysis Module

Date: 4/22/2014 Scenario: 105
Observed spring overturn total phosphorus (SPO): 369.0 mg/m^3
Observed growing season mean phosphorus (GSM): 153.6 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	30	65	189	-89	-58
Canfield-Bachmann, 1981 Natural Lake	25	40	74	-114	-74
Canfield-Bachmann, 1981 Artificial Lake	25	36	58	-118	-77
Rechow, 1979 General	9	19	57	-135	-88
Rechow, 1977 Anoxic	62	135	395	-19	-12
Rechow, 1977 water load<50m/year	15	32	92	-122	-79
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	53	114	335	-255	-69
Vollenweider, 1982 Combined OECD	33	63	152	-198	-76
Dillon-Rigler-Kirchner	41	90	262	-279	-76

Vollenweider, 1982 Shallow Lake/Res.	28	55	140	-206	-79
Larsen-Mercier, 1976	42	92	269	-277	-75
Nurnberg, 1984 Oxic	34	75	218	-79	-51

Lake Phosphorus Model	**Confidence** Lower Bound	**Confidence** Upper Bound	**Parameter** Fit?	**Back** Calculation (kg/year)	**Model** Type
Walker, 1987 Reservoir	37	144	Tw	0	GSM
Canfield-Bachmann, 1981 Natural Lake	12	115	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	11	104	FIT	1	GSM
Rechow, 1979 General	11	43	qs	0	GSM
Rechow, 1977 Anoxic	78	299	FIT	0	GSM
Rechow, 1977 water load<50m/year	18	71	Pin	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	56	264	FIT	0	SPO
Vollenweider, 1982 Combined OECD	30	132	FIT	0	ANN
Dillon-Rigler-Kirchner	52	199	P qs p	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	27	118	FIT	0	ANN
Larsen-Mercier, 1976	55	203	P Pin	0	SPO
Nurnberg, 1984 Oxic	38	170	P	0	ANN

Water and Nutrient Outflow Module

Date: 4/22/2014 Scenario: 93
Average Annual Surface Total Phosphorus: 261.3mg/m^3
Annual Discharge: 2.46E+001 AF => 3.03E+004 m^3
Annual Outflow Loading: 16.8 LB => 7.6 kg

Date: 4/22/2014 Scenario: 151

Lake Id:
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 108.4 acre
Total Unit Runoff: 7.60 in.
Annual Runoff Volume: 68.7 acre-ft
Lake Surface Area <As>: 11.0 acre
Lake Volume <V>: 87.5 acre-ft
Lake Mean Depth <z>: 8.0 ft
Precipitation - Evaporation: 3.2 in.
Hydraulic Loading: 71.6 acre-ft/year
Areal Water Load <qs>: 6.5 ft/year
Lake Flushing Rate <p>: 0.82 1/year
Water Residence Time: 1.22 year
Observed spring overturn total phosphorus (SPO): 294.0 mg/m^3
Observed growing season mean phosphorus (GSM): 236.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre	Low	Most Likely	High	Loading %	Low	Most Likely	High
	(ac)	Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	35.7	0.50	1.00	3.00	58.6	7	14	43
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	60.9	0.10	0.30	0.50	30.0	2	7	12
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	3.5	0.05	0.10	0.25	0.6	0	0	0
Wetlands	7.6	0.10	0.10	0.10	1.2	0	0	0
Forest	0.7	0.05	0.09	0.18	0.1	0	0	0
Lake Surface	11.0	0.10	0.30	1.00	5.4	0	1	4

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	20.0				

% Phosphorus Retained by Soil	98.0	90.0	80.0	
Septic Tank Loading (kg/year)	0.12	1.00	3.20	4.1

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	23.5	54.3	141.2	100.0
Total Loading (kg)	10.6	24.7	64.0	100.0
Areal Loading (lb/ac-year)	2.13	4.94	12.83	
Areal Loading (mg/m^2-year)	239.16	553.78	1438.40	
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	22.2	49.2	124.3	95.9
Total NPS Loading (kg)	10.1	22.3	56.4	95.9

Phosphorus Prediction and Uncertainty Analysis Module

Date: 4/22/2014 Scenario: 106
Observed spring overturn total phosphorus (SPO): 294.0 mg/m^3
Observed growing season mean phosphorus (GSM): 236.0 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	37	85	220	-151	-64
Canfield-Bachmann, 1981 Natural Lake	46	83	155	-153	-65
Canfield-Bachmann, 1981 Artificial Lake	39	63	104	-173	-73
Rechow, 1979 General	17	40	103	-196	-83
Rechow, 1977 Anoxic	90	209	542	-27	-11
Rechow, 1977 water load<50m/year	42	98	255	-138	-58
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	63	147	381	-147	-50
Vollenweider, 1982 Combined OECD	43	85	187	-180	-68
Dillon-Rigler-Kirchner	30	70	183	-224	-76
Vollenweider, 1982 Shallow Lake/Res.	36	75	174	-190	-72
Larsen-Mercier, 1976	57	133	344	-161	-55
Nurnberg, 1984 Oxic	30	70	181	-166	-70

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	47	173	FIT	0	GSM
Canfield-Bachmann, 1981 Natural Lake	26	239	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	20	181	FIT	1	GSM
Rechow, 1979 General	21	82	FIT	0	GSM
Rechow, 1977 Anoxic	118	423	FIT	0	GSM
Rechow, 1977 water load<50m/year	53	201	P	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	70	314	FIT	0	SPO
Vollenweider, 1982 Combined OECD	40	170	FIT	0	ANN
Dillon-Rigler-Kirchner	39	143	P	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	35	152	FIT	0	ANN
Larsen-Mercier, 1976	77	267	P Pin	0	SPO
Nurnberg, 1984 Oxic	35	147	P	0	ANN

Water and Nutrient Outflow Module

Date: 4/22/2014 Scenario: 94
Average Annual Surface Total Phosphorus: 265mg/m^3
Annual Discharge: 7.16E+001 AF => 8.83E+004 m^3
Annual Outflow Loading: 49.4 LB => 22.4 kg

Date: 5/7/2014 Scenario: Long Lake Direct WS with Round/Boot inputs

Lake Id: Long Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 618.0 acre
Total Unit Runoff: 7.60 in.
Annual Runoff Volume: 391.4 acre-ft
Lake Surface Area <As>: 129.0 acre
Lake Volume <V>: 1508.8 acre-ft
Lake Mean Depth <z>: 11.7 ft
Precipitation - Evaporation: 3.2 in.
Hydraulic Loading: 522.0 acre-ft/year
Areal Water Load <qs>: 4.0 ft/year
Lake Flushing Rate <p>: 0.35 1/year
Water Residence Time: 2.89 year
Observed spring overturn total phosphorus (SPO): 189.0 mg/m^3
Observed growing season mean phosphorus (GSM): 85.8 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre	Low	Most Likely	High	Loading %	Low	Most Likely	High
	(ac)	Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	234.0	0.50	1.00	3.00	52.6	47	95	284
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	234.0	0.10	0.30	0.50	15.8	9	28	47
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	26.0	0.05	0.10	0.25	0.6	1	1	3
Wetlands	110.0	0.10	0.10	0.10	2.5	4	4	4
Forest	14.0	0.05	0.09	0.18	0.3	0	1	1
Lake Surface	129.0	0.10	0.30	1.00	8.7	5	16	52

POINT SOURCE DATA

Point Sources	Water Load	Low	Most Likely	High	Loading %
	(m^3/year)	(kg/year)	(kg/year)	(kg/year)	
Round Input	30300	0.0	7.6	0.0	4.2
Boot Input	88300	0.0	22.4	0.0	12.4

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	103.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.62	5.15	16.48	2.9

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	149.7	396.7	900.0	100.0
Total Loading (kg)	67.9	179.9	408.2	100.0
Areal Loading (lb/ac-year)	1.16	3.08	6.98	
Areal Loading (mg/m^2-year)	130.10	344.67	782.00	
Total PS Loading (lb)	0.0	66.1	0.0	16.7
Total PS Loading (kg)	0.0	30.0	0.0	16.7
Total NPS Loading (lb)	136.9	284.7	748.6	80.5
Total NPS Loading (kg)	62.1	129.1	339.6	80.5

Phosphorus Prediction and Uncertainty Analysis Module

Date: 5/7/2014 Scenario: 109
Observed spring overturn total phosphorus (SPO): 189.0 mg/m^3
Observed growing season mean phosphorus (GSM): 85.8 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	27	71	161	-15	-17
Canfield-Bachmann, 1981 Natural Lake	31	58	97	-28	-33
Canfield-Bachmann, 1981 Artificial Lake	28	48	71	-38	-44
Rechow, 1979 General	10	26	60	-60	-70
Rechow, 1977 Anoxic	65	172	391	86	100
Rechow, 1977 water load<50m/year	22	57	129	-29	-34
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	45	120	272	-69	-37
Vollenweider, 1982 Combined OECD	31	70	136	-67	-49
Dillon-Rigler-Kirchner	26	68	153	-121	-64

Vollenweider, 1982 Shallow Lake/Res.	26	61	124	-76	-55
Larsen-Mercier, 1976	39	104	235	-85	-45
Nurnberg, 1984 Oxic	23	62	140	-24	-28

Lake Phosphorus Model	**Confidence** Lower Bound	**Confidence** Upper Bound	**Parameter** Fit?	**Back** Calculation (kg/year)	**Model** Type
Walker, 1987 Reservoir	38	131	Tw	0	GSM
Canfield-Bachmann, 1981 Natural Lake	18	167	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	15	138	FIT	1	GSM
Rechow, 1979 General	13	49	FIT	0	GSM
Rechow, 1977 Anoxic	93	317	FIT	0	GSM
Rechow, 1977 water load<50m/year	30	106	FIT	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	54	236	FIT	0	SPO
Vollenweider, 1982 Combined OECD	31	132	FIT	0	ANN
Dillon-Rigler-Kirchner	37	125	P qs	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	28	116	FIT	0	ANN
Larsen-Mercier, 1976	57	189	P Pin	0	SPO
Nurnberg, 1984 Oxic	29	119	P	0	ANN

Water and Nutrient Outflow Module

Date: 5/7/2014 Scenario: 97
Average Annual Surface Total Phosphorus: 137.4mg/m^3
Annual Discharge: 5.22E+002 AF => 6.44E+005 m^3
Annual Outflow Loading: 186.5 LB => 84.6 kg

Date: 5/7/2014 Scenario: 155

Lake Id: Becker Lake
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 311.0 acre
Total Unit Runoff: 7.90 in.
Annual Runoff Volume: 204.7 acre-ft
Lake Surface Area <As>: 37.0 acre
Lake Volume <V>: 572.2 acre-ft
Lake Mean Depth <z>: 15.5 ft
Precipitation - Evaporation: 3.5 in.
Hydraulic Loading: 737.6 acre-ft/year
Areal Water Load <qs>: 19.9 ft/year
Lake Flushing Rate <p>: 1.29 1/year
Water Residence Time: 0.78 year
Observed spring overturn total phosphorus (SPO): 328.0 mg/m^3
Observed growing season mean phosphorus (GSM): 176.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre	Low	Most Likely	High	Loading %	Low	Most Likely	High
	(ac)	Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	177.0	0.50	1.00	3.00	41.1	36	72	215
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	94.0	0.10	0.30	0.50	6.6	4	11	19
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	11.0	0.05	0.10	0.25	0.3	0	0	1
Wetlands	26.0	0.10	0.10	0.10	0.6	1	1	1
Forest	3.0	0.05	0.09	0.18	0.1	0	0	0
Lake Surface	37.0	0.10	0.30	1.00	2.6	1	4	15

POINT SOURCE DATA

Point Sources	Water Load	Low	Most Likely	High	Loading %
	(m^3/year)	(kg/year)	(kg/year)	(kg/year)	
Long Lake Input	644000	0.0	84.6	0.0	48.6

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	9.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.05	0.45	1.44	0.3

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	93.7	384.0	557.1	100.0
Total Loading (kg)	42.5	174.2	252.7	100.0
Areal Loading (lb/ac-year)	2.53	10.38	15.06	
Areal Loading (mg/m^2-year)	283.88	1163.35	1687.76	
Total PS Loading (lb)	0.0	186.5	0.0	48.6
Total PS Loading (kg)	0.0	84.6	0.0	48.6
Total NPS Loading (lb)	90.3	186.6	520.9	51.2
Total NPS Loading (kg)	41.0	84.7	236.3	51.2

Phosphorus Prediction and Uncertainty Analysis Module

Date: 5/7/2014 Scenario: 110
Observed spring overturn total phosphorus (SPO): 328.0 mg/m^3
Observed growing season mean phosphorus (GSM): 176.0 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	14	57	83	-119	-68
Canfield-Bachmann, 1981 Natural Lake	26	75	97	-101	-57
Canfield-Bachmann, 1981 Artificial Lake	23	59	73	-117	-66
Rechow, 1979 General	15	62	89	-114	-65
Rechow, 1977 Anoxic	37	152	220	-24	-14
Rechow, 1977 water load<50m/year	22	92	134	-84	-48
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	27	110	160	-218	-66
Vollenweider, 1982 Combined OECD	22	69	93	-183	-73
Dillon-Rigler-Kirchner	14	58	84	-270	-82

Vollenweider, 1982 Shallow Lake/Res.	17	60	83	-192	-76
Larsen-Mercier, 1976	25	102	148	-226	-69
Nurnberg, 1984 Oxic	18	72	105	-104	-59

Lake Phosphorus Model	**Confidence** Lower Bound	**Confidence** Upper Bound	**Parameter** Fit?	**Back** Calculation (kg/year)	**Model** Type
Walker, 1987 Reservoir	26	83	FIT	0	GSM
Canfield-Bachmann, 1981 Natural Lake	23	216	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	18	170	FIT	1	GSM
Rechow, 1979 General	28	93	FIT	0	GSM
Rechow, 1977 Anoxic	72	217	FIT	0	GSM
Rechow, 1977 water load<50m/year	41	137	P	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	43	181	FIT	0	SPO
Vollenweider, 1982 Combined OECD	28	118	FIT	0	ANN
Dillon-Rigler-Kirchner	27	83	P	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	24	101	FIT	0	ANN
Larsen-Mercier, 1976	49	143	P Pin	0	SPO
Nurnberg, 1984 Oxic	30	115	P	0	ANN

Water and Nutrient Outflow Module

Date: 5/7/2014 Scenario: 98
Average Annual Surface Total Phosphorus: 252mg/m^3
Annual Discharge: 7.38E+002 AF => 9.10E+005 m^3
Annual Outflow Loading: 483.2 LB => 219.2 kg

D

APPENDIX D

CCLWCD Watershed Investigation Materials

CalMan Watershed Assessment:

Summary: Over a 2 year period (2013, 2014), Calumet LWCD staff observed cropping practices, spring runoff characteristics, and rain event characteristics throughout the CalMan watershed. NRCS Lidar tools were used to model concentrated flow paths within the watershed. Both aerial photos and field visit photos were used to verify the model. Nutrient management determinations were based on plans turned into the counties for compliance with NR 151.

Nutrient Management: The conservation staff from Manitowoc County, Calumet County and local NRCS offices have made considerable progress in the watershed with nutrient management. Most cropland acres are currently meeting NRCS 590 Nutrient Management Standards. NRCS 590 is a set of standards the operators follow to ensure nutrient applications are limited to crop requirements. Only approximately 65 acres remain without a 590 Plan, which is anticipated to be resolved in 2015. Changes in management are likely to occur, therefore continual assessment of nutrient management plans are needed to ensure plans remain current.

Currently, nutrient management calculations assume soil loss is kept to tolerable levels (or "T") and all gully erosion is addressed. The most common model used by Certified Crop Advisors (CCAs) to write plans is SNAP+, which requires this soil loss assumption. Unfortunately, over the 2 year period, soil loss issues were clearly identified throughout the watershed. Soil losses occurred as gullies, sheet erosion, and rill erosion. Soil loss will need to be addressed through both voluntary and regulatory mechanisms.

Lidar Tools for Watershed Delineations and Concentrated Flow Paths: NRCS GIS Engineering Tools were used to delineate the sub watersheds and concentrated flow paths in the CalMan Watershed. The tools are based on the use of DEM (Digital Elevation Model) data derived from Lidar (Light Detection and Ranging) Data. The tools utilize GIS Spatial Analyst and allow a user to extract data such as concentrated flow paths, relief maps and contour maps for a given area of interest. The tool will also delineate a watershed to a given point as well as calculate the average slope of the watershed and display and calculate the longest flow path length of that watershed.

Maps of the subwatershed and concentrated flow paths were created for this assessment. Staff compared the concentrated flow paths with the field observations using photography, detailed further on below. The maps can be used as a guide to determine areas that need to be monitored for erosion and runoff concerns and targeted for soil conservation practices.

Soil Conservation: Several best management practices may be deployed to reduce sheet and rill erosion, and eliminate gully erosion. These include, but are not limited to, crop rotations, tillage practices, residue management, cover crops, permanent vegetation, sediment basins and engineered waterways. Currently, the most popular practice to reduce sheet and rill erosion is through crop rotations and tillage practices. These practices are popluar because they are economically favorable and do not take cropland out of production.

Engineered waterways are effective tools for gullies in large fields, where operators can work around the wide swales with large equipment. Some areas in the CalMan watershed are not well suited for appropriately sized waterways due to the relatively small area of the watershed. Engineered waterways take a considerable amount of cropland out of production, which is not advantageous in fields with smaller acres. Several large waterways exist in the northern part of the watershed where larger crop fields exist, with more planned in 2016.

In areas not well suited for engineered waterways, other tools can be used to reduce gully erosion. Sediment basins help reduce the velocity of the water moving through the concentrated flow paths, slowing down the high energy flow and allowing sediment to settle out. Permanent vegetation is a common practice because they are well suited for small fields. Operators will work around small areas with tillage equipment to keep permanent vegetation in place. At times, these areas tend to shrink with each pass of the till, and after several years, the gully can resurface without proper management. Often, vegetated areas in the watershed have wet plant species present, such as cattails. These areas are difficult to farm during wet years, but may be cropped during dry years.

Conservation Plans: Crop rotations are typically on a 5 to 7 year rotation plan, a timeframe that does not allow for accurate assessment during the grant cycle. Crop rotations can dictate tillage practices. A field planted in alfalfa typically remains in alfalfa for two to three years. Corn harvested as grain rather than silage can increase the amount of residue left on the field

over winter and reduce soil and nutrient loss. It is very possible that any tillage or crop rotation observed in this two-year period could be the result of the typical conservation plan. However, improvements in residue management and crop selection (alfalfa vs corn) were observed in the watershed over the two-year period. In particular,

- Cropland with significant slope into Becker Lake was replanted to alfalfa as opposed to corn as planned for 2014.
- Cropland with significant slope into Round Lake was planted into alfalfa.
- Increased residue after corn on fields draining to Boot Lake.
- Increased residue after corn on fields draining to Round Lake.

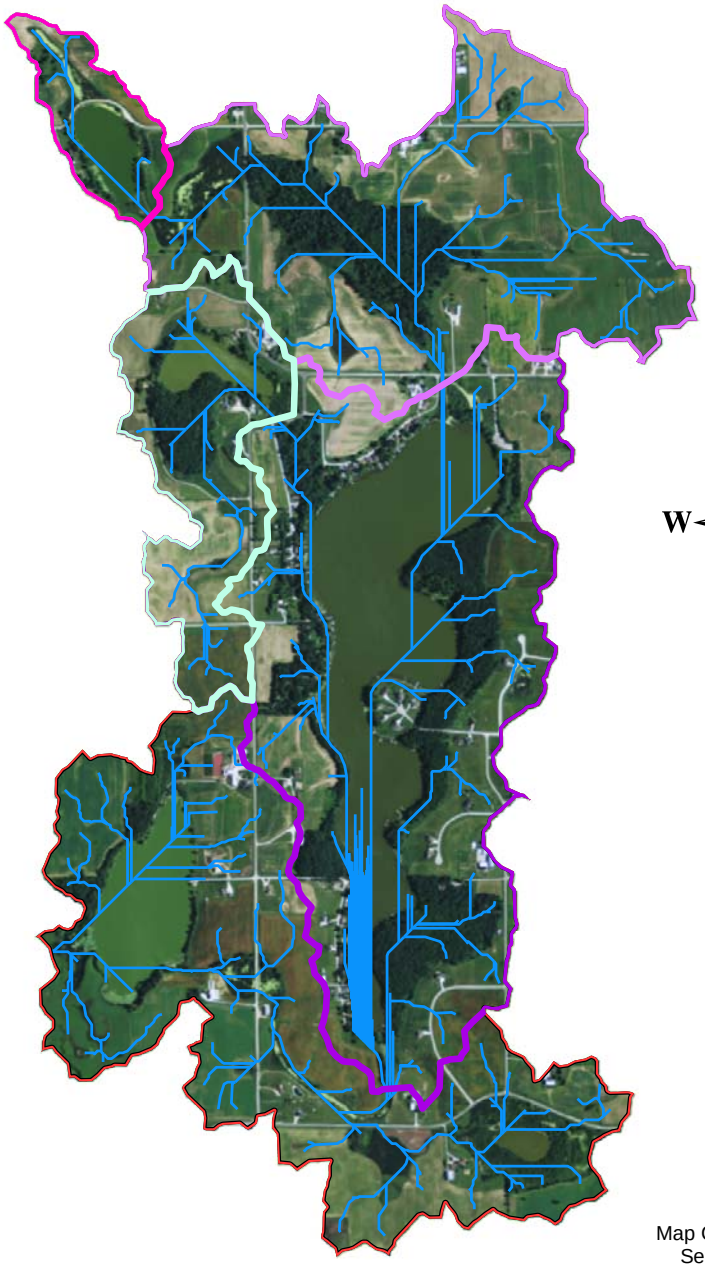
Other Conservation Efforts: Calumet LWCD Staff discovered two significant gullies in the Becker Lake watershed during field assessments. One gully was over six feet in areas and discharged directly in the wetland north of Becker Lake. Conservation staff worked with the landowner over the two-year period, designing multiple practices to address the problem. The final design included a rock-lined waterway to prevent further gully erosion. The second gully will be addressed in 2015.

It is important to note that over the course of the watershed assessment period, significant rain events (four inches or more) did not occur as they did in 2008, 2009, and 2010 which may have contributed the fish kills in 2009 and 2010 in Round and Becker Lakes. However, this watershed assessment provided a sound baseline to help understand land use and nutrient loss issues in the watershed.

CalMan Lakes Watershed

Legend

- Becker_Lake_Watershed
- Round_Lake_Watershed
- Boot_Lake_Watershed
- Long_Lake_Sub_1
- Long_Lake_Watershed
- Concentrated Flow



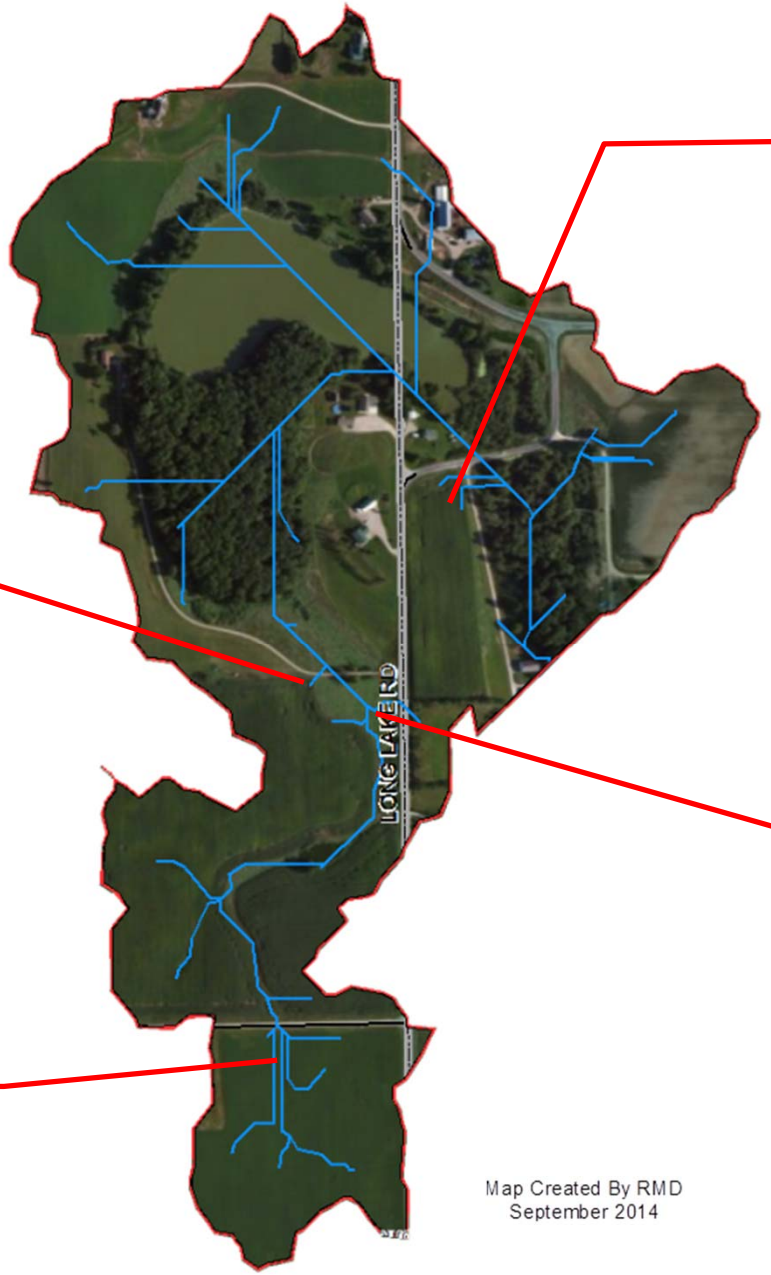
NRCS GIS Engineering Tools were used to delineate the sub watersheds and concentrated flow paths in the CalMan Watershed. The tools are based on the use of DEM (Digital Elevation Model) data derived from Lidar (Light Detection and Ranging) Data. The tools utilize GIS Spatial Analyst and allow a user to extract data such as concentrated flow paths, relief maps and contour maps for a given area of interest. The tool will also delineate a watershed to a given point as well as calculate the average slope of the watershed and display and calculate the longest flow path length of that watershed.

Maps of the subwatershed and concentrated flow paths were created for this assessment. Staff compared the concentrated flow paths with the field observations using photography. The comparison is detailed in this document. The maps can be used as a guide to determine areas that need to be monitored for erosion and runoff concerns and targeted for soil conservation practices.

Map Created By RMD
September 2014

Boot Lake Watershed

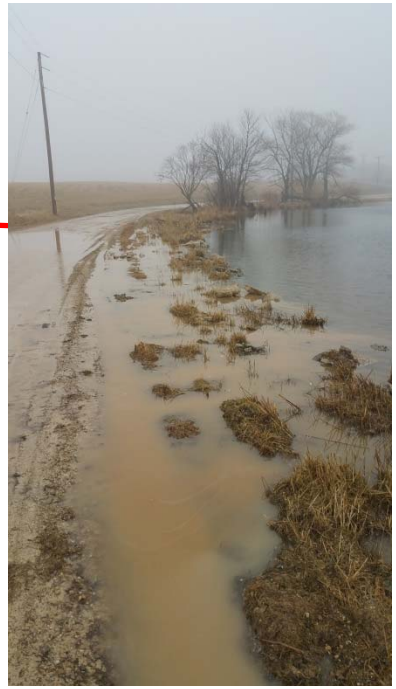
Concentrated Flow



Map Created By RMD
September 2014

Round Lake Watershed

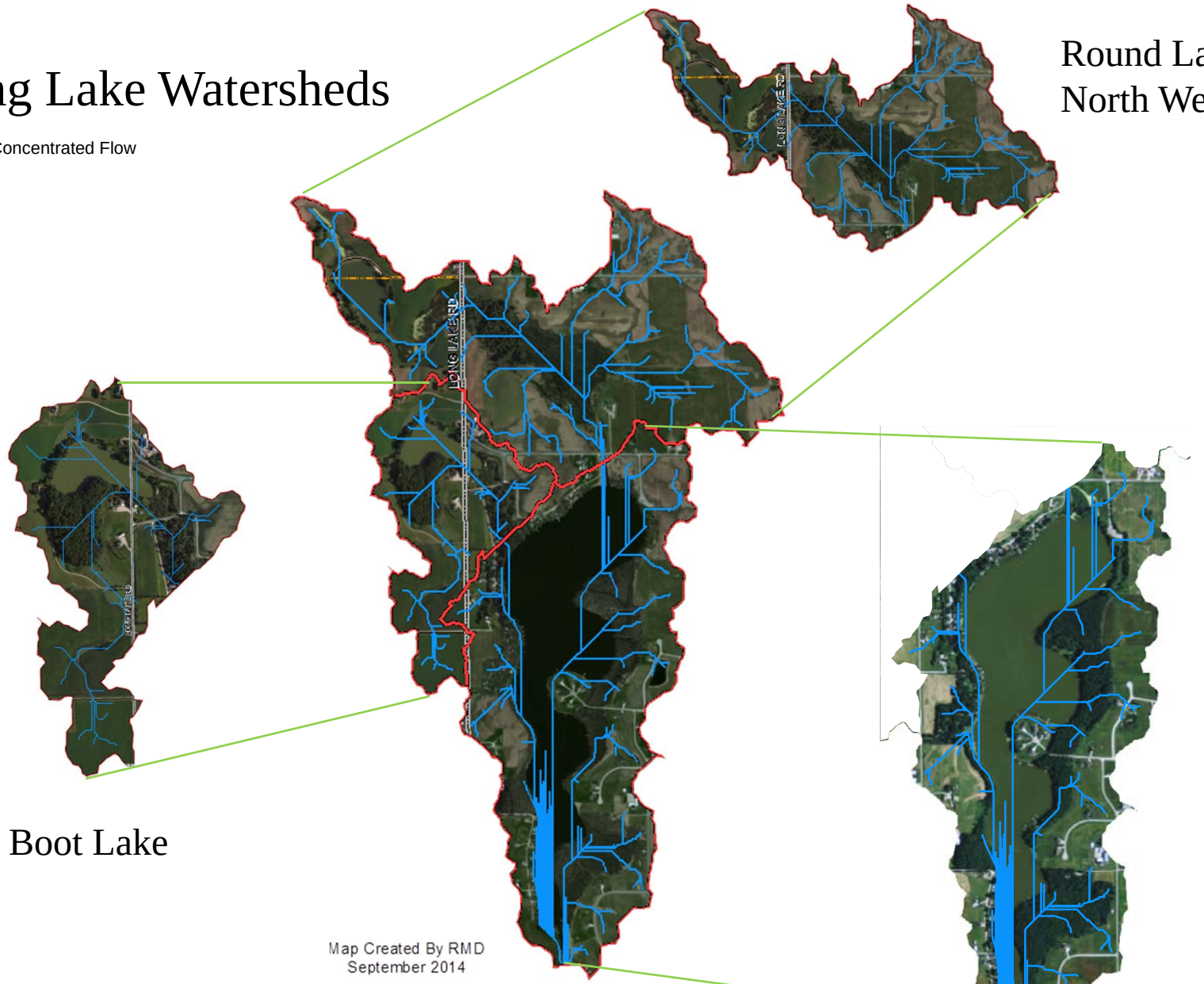
Concentrated Flow



Map Created By RMD
September 2014

Long Lake Watersheds

Concentrated Flow



Round Lake &
North Wetland

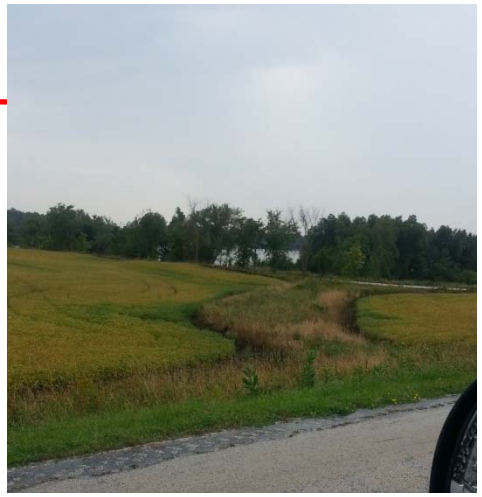
Boot Lake

Long Lake

Map Created By RMD
September 2014

Long Lake

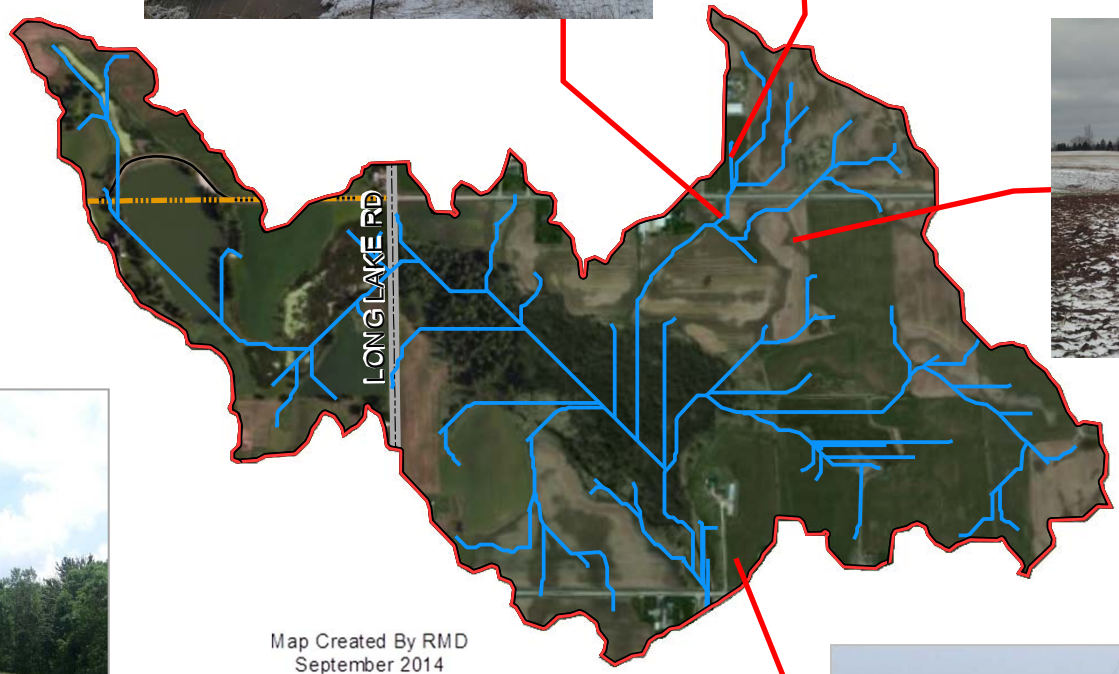
Concentrated Flow



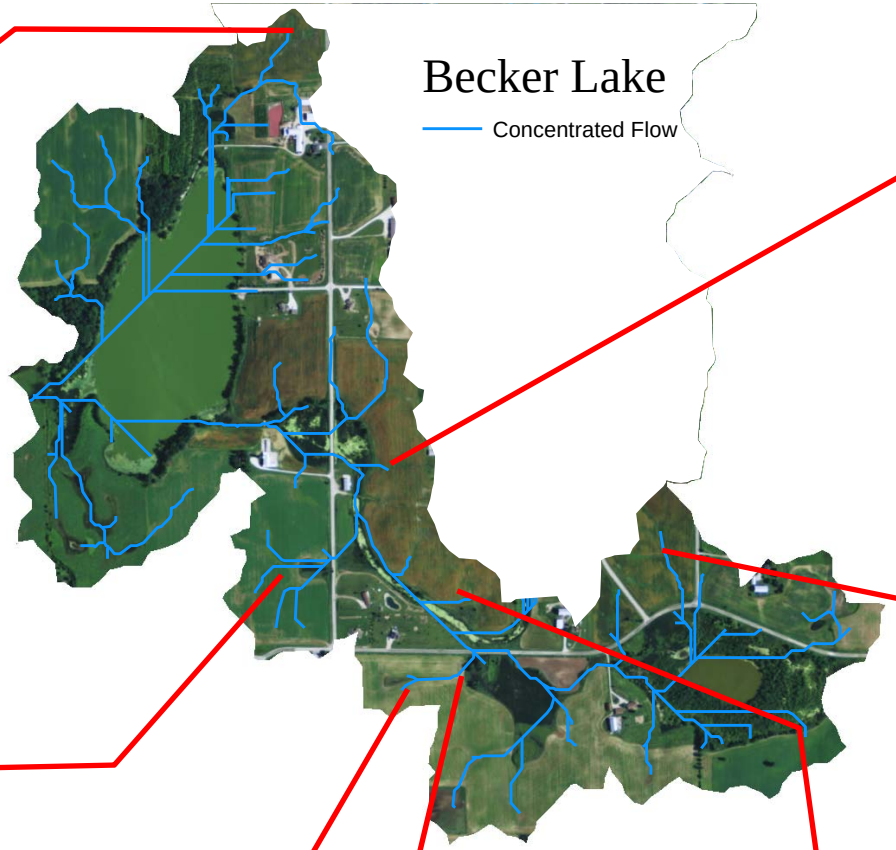
Map Created By RMD
September 2014

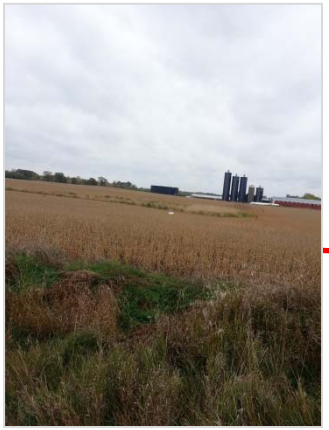
Round Lake & North Wetland

Concentrated Flow



Map Created By RMD
September 2014





Map Created By RMD
September 2014

CalMan Lakes Watershed

Digital Elevation Model
of Entire Watershed

Legend

Depth Grid

Value

High : 10.9152

Low : 6.10352e-005

Hillshade

Value

High : 228

Low : 120

Digital Elevation Model

Value

High : 892.142

Low : 807.953

CALUMET COUNTY RESOURCE MANAGEMENT DEPARTMENT

Map Created By RMD
September 2014

1 inch = 1,458 feet

0 1,400 2,800 4,200 5,600 Feet

E

APPENDIX E

Aquatic Plant Point-Intercept Survey Data

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	Total Rake Fullness	HWM	CLP	CERDE	NYMOD	POTZO
1	44.13001448	-88.04999762	Becker Lake	Calumet	6/27/2013	2.5	M	P		2		2	2	V	2
2	44.12973554	-88.0500068	Becker Lake	Calumet	6/27/2013	3	M	P		2	2	1	1	V	2
3	44.13112363	-88.0495736	Becker Lake	Calumet	6/27/2013	6.5	S	P							
4	44.13084469	-88.04958279	Becker Lake	Calumet	6/27/2013	7.5	S	P							
5	44.13056575	-88.04959197	Becker Lake	Calumet	6/27/2013	8	S	P							
6	44.13028681	-88.04960115	Becker Lake	Calumet	6/27/2013	6.5	M	P							
7	44.13000787	-88.04961034	Becker Lake	Calumet	6/27/2013	5	R	P							
8	44.12972893	-88.04961952	Becker Lake	Calumet	6/27/2013	9	M	P							
9	44.13195384	-88.04915876	Becker Lake	Calumet	6/27/2013	6	R	P							
10	44.1316749	-88.04916795	Becker Lake	Calumet	6/27/2013	7	S	P							
11	44.13139596	-88.04917713	Becker Lake	Calumet	6/27/2013	10	M	P							
12	44.13111702	-88.04918632	Becker Lake	Calumet	6/27/2013	11			DEEP						
13	44.13083807	-88.0491955	Becker Lake	Calumet	6/27/2013	14			DEEP						
14	44.13055913	-88.04920469	Becker Lake	Calumet	6/27/2013	13			DEEP						
15	44.13028019	-88.04921387	Becker Lake	Calumet	6/27/2013	19			DEEP						
16	44.13000125	-88.04922306	Becker Lake	Calumet	6/27/2013	24			DEEP						
17	44.12972231	-88.04923224	Becker Lake	Calumet	6/27/2013	17.5			DEEP						
18	44.12944337	-88.04924143	Becker Lake	Calumet	6/27/2013	10.5			DEEP						
19	44.12916443	-88.04925061	Becker Lake	Calumet	6/27/2013	6	M	P							
20	44.12888549	-88.04925979	Becker Lake	Calumet	6/27/2013	5	R	P							
21	44.1325051	-88.04875309	Becker Lake	Calumet	6/27/2013	4	M	P							
22	44.13222616	-88.04876228	Becker Lake	Calumet	6/27/2013	8	M	P							
23	44.13194722	-88.04877147	Becker Lake	Calumet	6/27/2013	15			DEEP						
24	44.13166828	-88.04878065	Becker Lake	Calumet	6/27/2013	14			DEEP						
25	44.13138934	-88.04878984	Becker Lake	Calumet	6/27/2013	14			DEEP						
26	44.1311104	-88.04879903	Becker Lake	Calumet	6/27/2013	14			DEEP						
27	44.13083146	-88.04880822	Becker Lake	Calumet	6/27/2013	15			DEEP						
28	44.13055252	-88.0488174	Becker Lake	Calumet	6/27/2013	23			DEEP						
29	44.13027358	-88.04882659	Becker Lake	Calumet	6/27/2013	32			DEEP						
30	44.12999464	-88.04883578	Becker Lake	Calumet	6/27/2013	36			DEEP						
31	44.1297157	-88.04884496	Becker Lake	Calumet	6/27/2013	28			DEEP						
32	44.12943676	-88.04885415	Becker Lake	Calumet	6/27/2013	19			DEEP						
33	44.12915782	-88.04886334	Becker Lake	Calumet	6/27/2013	14			DEEP						
34	44.12887888	-88.04887252	Becker Lake	Calumet	6/27/2013	10	M	P							
35	44.12859994	-88.04888171	Becker Lake	Calumet	6/27/2013	8	M	P							
36	44.128321	-88.04889089	Becker Lake	Calumet	6/27/2013	4	M	P							
37	44.13249848	-88.04836579	Becker Lake	Calumet	6/27/2013	7	M	P							
38	44.13221954	-88.04837498	Becker Lake	Calumet	6/27/2013	13		R							
39	44.1319406	-88.04838417	Becker Lake	Calumet	6/27/2013	13			DEEP						
40	44.13166166	-88.04839336	Becker Lake	Calumet	6/27/2013				DEEP						

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	Total Rake Fullness	HWM	CLP	CERDE	NYMOD	POTZO
41	44.13138272	-88.04840255	Becker Lake	Calumet	6/27/2013				DEEP						
42	44.13110378	-88.04841174	Becker Lake	Calumet	6/27/2013				DEEP						
43	44.13082484	-88.04842093	Becker Lake	Calumet	6/27/2013				DEEP						
44	44.1305459	-88.04843012	Becker Lake	Calumet	6/27/2013				DEEP						
45	44.13026696	-88.04843931	Becker Lake	Calumet	6/27/2013				DEEP						
46	44.12998802	-88.0484485	Becker Lake	Calumet	6/27/2013				DEEP						
47	44.12970908	-88.04845768	Becker Lake	Calumet	6/27/2013				DEEP						
48	44.12943014	-88.04846687	Becker Lake	Calumet	6/27/2013				DEEP						
49	44.1291512	-88.04847606	Becker Lake	Calumet	6/27/2013				DEEP						
50	44.12887226	-88.04848525	Becker Lake	Calumet	6/27/2013	11			DEEP						
51	44.12859332	-88.04849444	Becker Lake	Calumet	6/27/2013	8	M	P							
52	44.12831438	-88.04850362	Becker Lake	Calumet	6/27/2013	4	M	P						V	
53	44.13249186	-88.0479785	Becker Lake	Calumet	6/27/2013	7	M	P							
54	44.13221292	-88.04798769	Becker Lake	Calumet	6/27/2013	13			DEEP						
55	44.13193398	-88.04799688	Becker Lake	Calumet	6/27/2013				DEEP						
56	44.13165504	-88.04800607	Becker Lake	Calumet	6/27/2013				DEEP						
57	44.1313761	-88.04801526	Becker Lake	Calumet	6/27/2013				DEEP						
58	44.13109716	-88.04802445	Becker Lake	Calumet	6/27/2013				DEEP						
59	44.13081822	-88.04803364	Becker Lake	Calumet	6/27/2013				DEEP						
60	44.13053928	-88.04804283	Becker Lake	Calumet	6/27/2013				DEEP						
61	44.13026034	-88.04805203	Becker Lake	Calumet	6/27/2013				DEEP						
62	44.1299814	-88.04806122	Becker Lake	Calumet	6/27/2013				DEEP						
63	44.12970246	-88.04807041	Becker Lake	Calumet	6/27/2013				DEEP						
64	44.12942352	-88.0480796	Becker Lake	Calumet	6/27/2013				DEEP						
65	44.12914458	-88.04808879	Becker Lake	Calumet	6/27/2013				DEEP						
66	44.12886564	-88.04809798	Becker Lake	Calumet	6/27/2013	9	M	P							
67	44.1285867	-88.04810717	Becker Lake	Calumet	6/27/2013	5	S	P							
68	44.12830776	-88.04811635	Becker Lake	Calumet	6/27/2013	2.5	R	P		2	1	1	2	1	
69	44.13276418	-88.04758201	Becker Lake	Calumet	6/27/2013	7.5	S	P							
70	44.13248524	-88.0475912	Becker Lake	Calumet	6/27/2013	11			DEEP						
71	44.1322063	-88.04760039	Becker Lake	Calumet	6/27/2013				DEEP						
72	44.13192736	-88.04760959	Becker Lake	Calumet	6/27/2013				DEEP						
73	44.13164842	-88.04761878	Becker Lake	Calumet	6/27/2013				DEEP						
74	44.13136948	-88.04762797	Becker Lake	Calumet	6/27/2013				DEEP						
75	44.13109054	-88.04763717	Becker Lake	Calumet	6/27/2013				DEEP						
76	44.1308116	-88.04764636	Becker Lake	Calumet	6/27/2013				DEEP						
77	44.13053266	-88.04765555	Becker Lake	Calumet	6/27/2013				DEEP						
78	44.13025372	-88.04766474	Becker Lake	Calumet	6/27/2013				DEEP						
79	44.12997478	-88.04767394	Becker Lake	Calumet	6/27/2013				DEEP						
80	44.12969584	-88.04768313	Becker Lake	Calumet	6/27/2013				DEEP						

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	Total Rake Fullness	HWM	CLP	CERDE	NYMOD	POTZO
81	44.1294169	-88.04769232	Becker Lake	Calumet	6/27/2013				DEEP						
82	44.12913796	-88.04770151	Becker Lake	Calumet	6/27/2013	13			DEEP						
83	44.12885902	-88.0477107	Becker Lake	Calumet	6/27/2013	4.5	R	P							
84	44.13359438	-88.04716712	Becker Lake	Calumet	6/27/2013	4	S	P							
85	44.13331544	-88.04717632	Becker Lake	Calumet	6/27/2013	7	M	P							
86	44.1330365	-88.04718551	Becker Lake	Calumet	6/27/2013	10	M	P							
87	44.13275756	-88.04719471	Becker Lake	Calumet	6/27/2013	17			DEEP						
88	44.13247862	-88.04720391	Becker Lake	Calumet	6/27/2013				DEEP						
89	44.13219968	-88.0472131	Becker Lake	Calumet	6/27/2013				DEEP						
90	44.13192074	-88.0472223	Becker Lake	Calumet	6/27/2013				DEEP						
91	44.1316418	-88.04723149	Becker Lake	Calumet	6/27/2013				DEEP						
92	44.13136286	-88.04724068	Becker Lake	Calumet	6/27/2013				DEEP						
93	44.13108392	-88.04724988	Becker Lake	Calumet	6/27/2013				DEEP						
94	44.13080498	-88.04725907	Becker Lake	Calumet	6/27/2013				DEEP						
95	44.13052604	-88.04726827	Becker Lake	Calumet	6/27/2013				DEEP						
96	44.1302471	-88.04727746	Becker Lake	Calumet	6/27/2013				DEEP						
97	44.12996816	-88.04728666	Becker Lake	Calumet	6/27/2013				DEEP						
98	44.12968922	-88.04729585	Becker Lake	Calumet	6/27/2013				DEEP						
99	44.12941028	-88.04730504	Becker Lake	Calumet	6/27/2013	7	M	P							
100	44.12913134	-88.04731424	Becker Lake	Calumet	6/27/2013	4	R	P							
101	44.1288524	-88.04732343	Becker Lake	Calumet	6/27/2013				TERRESTRIAL						
102	44.13358776	-88.04677982	Becker Lake	Calumet	6/27/2013	6	M	P							
103	44.13330882	-88.04678902	Becker Lake	Calumet	6/27/2013	10			DEEP						
104	44.13302988	-88.04679821	Becker Lake	Calumet	6/27/2013	20			DEEP						
105	44.13275094	-88.04680741	Becker Lake	Calumet	6/27/2013				DEEP						
106	44.132472	-88.04681661	Becker Lake	Calumet	6/27/2013				DEEP						
107	44.13219306	-88.04682581	Becker Lake	Calumet	6/27/2013				DEEP						
108	44.13191412	-88.046835	Becker Lake	Calumet	6/27/2013				DEEP						
109	44.13163518	-88.0468442	Becker Lake	Calumet	6/27/2013				DEEP						
110	44.13135624	-88.0468534	Becker Lake	Calumet	6/27/2013				DEEP						
111	44.1310773	-88.04686259	Becker Lake	Calumet	6/27/2013				DEEP						
112	44.13079836	-88.04687179	Becker Lake	Calumet	6/27/2013				DEEP						
113	44.13051942	-88.04688098	Becker Lake	Calumet	6/27/2013				DEEP						
114	44.13024048	-88.04689018	Becker Lake	Calumet	6/27/2013				DEEP						
115	44.12996154	-88.04689938	Becker Lake	Calumet	6/27/2013				DEEP						
116	44.1296826	-88.04690857	Becker Lake	Calumet	6/27/2013	7.5	M	P							
117	44.12940366	-88.04691777	Becker Lake	Calumet	6/27/2013	4	M	P							
118	44.12912472	-88.04692696	Becker Lake	Calumet	6/27/2013				TERRESTRIAL						
119	44.13358113	-88.04639252	Becker Lake	Calumet	6/27/2013	6	M	P							
120	44.13330219	-88.04640172	Becker Lake	Calumet	6/27/2013	9	M	P							

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	Total Rake Fullness	HWM	CLP	CERDE	NYMOD	POTZO
121	44.13302325	-88.04641092	Becker Lake	Calumet	6/27/2013	16									
122	44.13274431	-88.04642011	Becker Lake	Calumet	6/27/2013	22									
123	44.13246537	-88.04642931	Becker Lake	Calumet	6/27/2013	22.5									
124	44.13218643	-88.04643851	Becker Lake	Calumet	6/27/2013	20									
125	44.13190749	-88.04644771	Becker Lake	Calumet	6/27/2013	18									
126	44.13162855	-88.04645691	Becker Lake	Calumet	6/27/2013	15.5									
127	44.13134961	-88.04646611	Becker Lake	Calumet	6/27/2013	16.5									
128	44.13107067	-88.0464753	Becker Lake	Calumet	6/27/2013	17.5									
129	44.13079173	-88.0464845	Becker Lake	Calumet	6/27/2013	17									
130	44.13051279	-88.0464937	Becker Lake	Calumet	6/27/2013	16.5									
131	44.13023385	-88.0465029	Becker Lake	Calumet	6/27/2013	15									
132	44.12995491	-88.0465121	Becker Lake	Calumet	6/27/2013	11									
133	44.12967597	-88.04652129	Becker Lake	Calumet	6/27/2013	6	M	P							
134	44.12939703	-88.04653049	Becker Lake	Calumet	6/27/2013	3	M	P		1	1	1	V	1	
135	44.13329557	-88.04601441	Becker Lake	Calumet	6/27/2013	4	R	P							
136	44.13301663	-88.04602362	Becker Lake	Calumet	6/27/2013	6	S	P							
137	44.13273769	-88.04603282	Becker Lake	Calumet	6/27/2013	7	S	P							
138	44.13245875	-88.04604202	Becker Lake	Calumet	6/27/2013	10			DEEP						
139	44.13217981	-88.04605122	Becker Lake	Calumet	6/27/2013	11			DEEP						
140	44.13190087	-88.04606042	Becker Lake	Calumet	6/27/2013	8	S	P							
141	44.13162193	-88.04606962	Becker Lake	Calumet	6/27/2013	2	R	P		1	V	1			
142	44.13134299	-88.04607882	Becker Lake	Calumet	6/27/2013	7.5	R	P							
143	44.13106405	-88.04608802	Becker Lake	Calumet	6/27/2013	10	M	P							
144	44.13078511	-88.04609722	Becker Lake	Calumet	6/27/2013	9.5	M	P							
145	44.13050617	-88.04610642	Becker Lake	Calumet	6/27/2013	9	M	P							
146	44.13022723	-88.04611562	Becker Lake	Calumet	6/27/2013	8	S	P							
147	44.12994829	-88.04612482	Becker Lake	Calumet	6/27/2013	4	S	P							
148	44.12966935	-88.04613402	Becker Lake	Calumet	6/27/2013				TERRESTRIAL						

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	NOTES	NUISIANCE	Total Rake Fullness	EWM	CERDE	CHARA	NUPVA	NYMOD	STUPE
1	44.142068	-88.040812	Long	Manitowoc	8/2/2012	4	M	P				3	v	3				
2	44.141708	-88.040824	Long	Manitowoc	8/2/2012	8	M	P				1						
3	44.141348	-88.040836	Long	Manitowoc	8/2/2012	8												
4	44.140988	-88.040848	Long	Manitowoc	8/2/2012	8												
5	44.140628	-88.040860	Long	Manitowoc	8/2/2012	7												
6	44.140268	-88.040872	Long	Manitowoc	8/2/2012	8												
7	44.139909	-88.040884	Long	Manitowoc	8/2/2012	8												
8	44.142419	-88.040301	Long	Manitowoc	8/2/2012	5	M	P					v					
9	44.142060	-88.040313	Long	Manitowoc	8/2/2012	8												
10	44.141700	-88.040324	Long	Manitowoc	8/2/2012	11												
11	44.141340	-88.040336	Long	Manitowoc	8/2/2012	11												
12	44.140980	-88.040348	Long	Manitowoc	8/2/2012	11.5												
13	44.140620	-88.040360	Long	Manitowoc	8/2/2012	13												
14	44.140260	-88.040372	Long	Manitowoc	8/2/2012	15												
15	44.139900	-88.040384	Long	Manitowoc	8/2/2012	10												
16	44.139540	-88.040396	Long	Manitowoc	8/2/2012	8										v		
17	44.137381	-88.040467	Long	Manitowoc	8/2/2012	8										v		
18	44.137021	-88.040479	Long	Manitowoc	8/2/2012	10												
19	44.136661	-88.040491	Long	Manitowoc	8/2/2012	11												
20	44.136301	-88.040503	Long	Manitowoc	8/2/2012	10												
21	44.135941	-88.040515	Long	Manitowoc	8/2/2012	2	R	P					1			v		v
22	44.142771	-88.039789	Long	Manitowoc	8/2/2012	5.5	M	P					v					
23	44.142411	-88.039801	Long	Manitowoc	8/2/2012	11												
24	44.142051	-88.039813	Long	Manitowoc	8/2/2012	13												
25	44.141691	-88.039825	Long	Manitowoc	8/2/2012	16						1						
26	44.141331	-88.039837	Long	Manitowoc	8/2/2012	16						1						
27	44.140971	-88.039848	Long	Manitowoc	8/2/2012	17.5						1						
28	44.140611	-88.039860	Long	Manitowoc	8/2/2012	18.5												
29	44.140251	-88.039872	Long	Manitowoc	8/2/2012	17												
30	44.139891	-88.039884	Long	Manitowoc	8/2/2012	17												
31	44.139531	-88.039896	Long	Manitowoc	8/2/2012	13												
32	44.139172	-88.039908	Long	Manitowoc	8/2/2012	11												
33	44.138812	-88.039920	Long	Manitowoc	8/2/2012	11												
34	44.138452	-88.039932	Long	Manitowoc	8/2/2012	14												
35	44.138092	-88.039944	Long	Manitowoc	8/2/2012	13.5												
36	44.137732	-88.039956	Long	Manitowoc	8/2/2012	14.5												
37	44.137372	-88.039968	Long	Manitowoc	8/2/2012	19												
38	44.137012	-88.039980	Long	Manitowoc	8/2/2012	24.5												
39	44.136652	-88.039991	Long	Manitowoc	8/2/2012	25.5												

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	NOTES	NUISIANCE	Total Rake Fullness	EWM	CERDE	CHARA	NUPVA	NYMOD	STUPE
40	44.136292	-88.040003	Long	Manitowoc	8/2/2012	22												
41	44.135932	-88.040015	Long	Manitowoc	8/2/2012	20.5												
42	44.135572	-88.040027	Long	Manitowoc	8/2/2012	10							v					
43	44.133053	-88.040111	Long	Manitowoc	8/2/2012	1.5	M	P					3	1		1	1	
44	44.143122	-88.039277	Long	Manitowoc	8/2/2012	3.5	M	P					1				v	
45	44.142762	-88.039289	Long	Manitowoc	8/2/2012	8.5	M	P										
46	44.142402	-88.039301	Long	Manitowoc	8/2/2012	14												
47	44.142042	-88.039313	Long	Manitowoc	8/2/2012	20												
48	44.141682	-88.039325	Long	Manitowoc	8/2/2012	23.5												
49	44.141323	-88.039337	Long	Manitowoc	8/2/2012	24						2						
50	44.140963	-88.039349	Long	Manitowoc	8/2/2012	19						2						
51	44.140603	-88.039361	Long	Manitowoc	8/2/2012	15												
52	44.140243	-88.039373	Long	Manitowoc	8/2/2012	16												
53	44.139883	-88.039384	Long	Manitowoc	8/2/2012	22												
54	44.139523	-88.039396	Long	Manitowoc	8/2/2012	23												
55	44.139163	-88.039408	Long	Manitowoc	8/2/2012	22												
56	44.138803	-88.039420	Long	Manitowoc	8/2/2012	22												
57	44.138443	-88.039432	Long	Manitowoc	8/2/2012	26												
58	44.138083	-88.039444	Long	Manitowoc	8/2/2012	29												
59	44.137723	-88.039456	Long	Manitowoc	8/2/2012	28.5												
60	44.137363	-88.039468	Long	Manitowoc	8/2/2012	23												
61	44.137003	-88.039480	Long	Manitowoc	8/2/2012	16.5												
62	44.136644	-88.039492	Long	Manitowoc	8/2/2012	20												
63	44.136284	-88.039504	Long	Manitowoc	8/2/2012	25						2						
64	44.135924	-88.039515	Long	Manitowoc	8/2/2012	25						1						
65	44.135564	-88.039527	Long	Manitowoc	8/2/2012	17												
66	44.135204	-88.039539	Long	Manitowoc	8/2/2012	10.5												
67	44.134844	-88.039551	Long	Manitowoc	8/2/2012	1.5	R	P					1					v
68	44.134484	-88.039563	Long	Manitowoc	8/2/2012	1.5	R	P					1					
69	44.134124	-88.039575	Long	Manitowoc	8/2/2012	4	R	P				1	1					
70	44.133764	-88.039587	Long	Manitowoc	8/2/2012	14						1						
71	44.133404	-88.039599	Long	Manitowoc	8/2/2012	17												
72	44.133044	-88.039611	Long	Manitowoc	8/2/2012	15												
73	44.132684	-88.039623	Long	Manitowoc	8/2/2012	6	R	P					v			v		
74	44.143114	-88.038777	Long	Manitowoc	8/2/2012	7	M	P										
75	44.142754	-88.038789	Long	Manitowoc	8/2/2012	9	M	P										
76	44.142394	-88.038801	Long	Manitowoc	8/2/2012	16												
77	44.142034	-88.038813	Long	Manitowoc	8/2/2012	20.5												
78	44.141674	-88.038825	Long	Manitowoc	8/2/2012	23												
79	44.141314	-88.038837	Long	Manitowoc	8/2/2012	20												

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	NOTES	NUISIANCE	Total Rake Fullness	EWM	CERDE	CHARA	NUPVA	NYMOD	STUPE
80	44.140954	-88.038849	Long	Manitowoc	8/2/2012	15												
81	44.140594	-88.038861	Long	Manitowoc	8/2/2012	11.5												
82	44.140234	-88.038873	Long	Manitowoc	8/2/2012	18												
83	44.139874	-88.038885	Long	Manitowoc	8/2/2012	27.5												
84	44.139514	-88.038897	Long	Manitowoc	8/2/2012	32												
85	44.139154	-88.038908	Long	Manitowoc	8/2/2012	32												
86	44.138794	-88.038920	Long	Manitowoc	8/2/2012	30.5												
87	44.138435	-88.038932	Long	Manitowoc	8/2/2012	29						2						
88	44.138075	-88.038944	Long	Manitowoc	8/2/2012	25												
89	44.137715	-88.038956	Long	Manitowoc	8/2/2012	16												
90	44.137355	-88.038968	Long	Manitowoc	8/2/2012	10	M	P										
91	44.136995	-88.038980	Long	Manitowoc	8/2/2012	1.5	R	P					2			v		v
92	44.136635	-88.038992	Long	Manitowoc	8/2/2012	4.5	M	P					1			2		
93	44.136275	-88.039004	Long	Manitowoc	8/2/2012	11												
94	44.135915	-88.039016	Long	Manitowoc	8/2/2012	12.5												
95	44.135555	-88.039028	Long	Manitowoc	8/2/2012	15												
96	44.135195	-88.039040	Long	Manitowoc	8/2/2012	17												
97	44.134835	-88.039051	Long	Manitowoc	8/2/2012	16												
98	44.134475	-88.039063	Long	Manitowoc	8/2/2012	15												
99	44.134116	-88.039075	Long	Manitowoc	8/2/2012	16.5												
100	44.133756	-88.039087	Long	Manitowoc	8/2/2012	18												
101	44.133396	-88.039099	Long	Manitowoc	8/2/2012	18												
102	44.133036	-88.039111	Long	Manitowoc	8/2/2012	16.5												
103	44.132676	-88.039123	Long	Manitowoc	8/2/2012	12						1						
104	44.132316	-88.039135	Long	Manitowoc	8/2/2012	9	M	P				2						
105	44.131956	-88.039147	Long	Manitowoc	8/2/2012	2	M	P				2	1	1		v	1	1
106	44.130876	-88.039183	Long	Manitowoc	8/2/2012	4	M	P				2	1			v	v	
107	44.130516	-88.039194	Long	Manitowoc	8/2/2012	8	M	P					v			v	v	
108	44.130156	-88.039206	Long	Manitowoc	8/2/2012	9	M	P					v					
109	44.129796	-88.039218	Long	Manitowoc	8/2/2012	9	M	P					v					
110	44.129437	-88.039230	Long	Manitowoc	8/2/2012	9	M	P					v					
111	44.129077	-88.039242	Long	Manitowoc	8/2/2012	4	M	P					1	1			v	
112	44.143465	-88.038266	Long	Manitowoc	8/2/2012	3	R	P					1					
113	44.143105	-88.038278	Long	Manitowoc	8/2/2012	8	M	P										
114	44.142745	-88.038289	Long	Manitowoc	8/2/2012	14												
115	44.142385	-88.038301	Long	Manitowoc	8/2/2012	21												
116	44.142025	-88.038313	Long	Manitowoc	8/2/2012	22												
117	44.141665	-88.038325	Long	Manitowoc	8/2/2012	21												
118	44.141305	-88.038337	Long	Manitowoc	8/2/2012	16												
119	44.140945	-88.038349	Long	Manitowoc	8/2/2012	16												

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	NOTES	NUISIANCE	Total Rake Fullness	EWM	CERDE	CHARA	NUPVA	NYMOD	STUPE
120	44.140585	-88.038361	Long	Manitowoc	8/2/2012	15												
121	44.140226	-88.038373	Long	Manitowoc	8/2/2012	10												
122	44.139866	-88.038385	Long	Manitowoc	8/2/2012	25												
123	44.139506	-88.038397	Long	Manitowoc	8/2/2012	34												
124	44.139146	-88.038409	Long	Manitowoc	8/2/2012	34												
125	44.138786	-88.038421	Long	Manitowoc	8/2/2012	32												
126	44.138426	-88.038433	Long	Manitowoc	8/2/2012	27												
127	44.138066	-88.038444	Long	Manitowoc	8/2/2012	22												
128	44.137706	-88.038456	Long	Manitowoc	8/2/2012	14						2						
129	44.137346	-88.038468	Long	Manitowoc	8/2/2012	2	R	P					2					
130	44.135547	-88.038528	Long	Manitowoc	8/2/2012	12												
131	44.135187	-88.038540	Long	Manitowoc	8/2/2012	15.5												
132	44.134827	-88.038552	Long	Manitowoc	8/2/2012	17.5												
133	44.134467	-88.038564	Long	Manitowoc	8/2/2012	18												
134	44.134107	-88.038576	Long	Manitowoc	8/2/2012	19.5						1						
135	44.133747	-88.038587	Long	Manitowoc	8/2/2012	16.5						3						
136	44.133387	-88.038599	Long	Manitowoc	8/2/2012	11.5						1						
137	44.133027	-88.038611	Long	Manitowoc	8/2/2012	8												
138	44.132667	-88.038623	Long	Manitowoc	8/2/2012	12												
139	44.132307	-88.038635	Long	Manitowoc	8/2/2012	11												
140	44.131947	-88.038647	Long	Manitowoc	8/2/2012	9												
141	44.131587	-88.038659	Long	Manitowoc	8/2/2012	10												
142	44.131228	-88.038671	Long	Manitowoc	8/2/2012	11						1						
143	44.130868	-88.038683	Long	Manitowoc	8/2/2012	11						1						
144	44.130508	-88.038695	Long	Manitowoc	8/2/2012	8	M	P				1						
145	44.130148	-88.038707	Long	Manitowoc	8/2/2012	5	M	P				2	1					
146	44.129788	-88.038719	Long	Manitowoc	8/2/2012	3	M	P				2	1	2			v	
147	44.129428	-88.038730	Long	Manitowoc	8/2/2012	3	M	P				2	2	1			v	
148	44.129068	-88.038742	Long	Manitowoc	8/2/2012	3	M	P					1	2			v	
149	44.128708	-88.038754	Long	Manitowoc	8/2/2012	8	M	P										
150	44.128348	-88.038766	Long	Manitowoc	8/2/2012	8	M	P										
151	44.127988	-88.038778	Long	Manitowoc	8/2/2012	8	M	P										
152	44.127628	-88.038790	Long	Manitowoc	8/2/2012	7	M	P										
153	44.143456	-88.037766	Long	Manitowoc	8/2/2012	7.5	M	P										
154	44.143096	-88.037778	Long	Manitowoc	8/2/2012	13.5												
155	44.142736	-88.037790	Long	Manitowoc	8/2/2012	19												
156	44.142377	-88.037802	Long	Manitowoc	8/2/2012	20												
157	44.142017	-88.037813	Long	Manitowoc	8/2/2012	21						2						
158	44.141657	-88.037825	Long	Manitowoc	8/2/2012	17						2						
159	44.141297	-88.037837	Long	Manitowoc	8/2/2012	12.5												

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	NOTES	NUISIANCE	Total Rake Fullness	EWM	CERDE	CHARA	NUPVA	NYMOD	STUPE
160	44.140937	-88.037849	Long	Manitowoc	8/2/2012	10												
161	44.140577	-88.037861	Long	Manitowoc	8/2/2012	10	M	P										
162	44.140217	-88.037873	Long	Manitowoc	8/2/2012	2	R	P										
163	44.139857	-88.037885	Long	Manitowoc	8/2/2012	15												
164	44.139497	-88.037897	Long	Manitowoc	8/2/2012	30												
165	44.139137	-88.037909	Long	Manitowoc	8/2/2012	34												
166	44.138777	-88.037921	Long	Manitowoc	8/2/2012	31												
167	44.138417	-88.037933	Long	Manitowoc	8/2/2012	28												
168	44.138057	-88.037945	Long	Manitowoc	8/2/2012	20												
169	44.137698	-88.037957	Long	Manitowoc	8/2/2012	5.5	R	P										
170	44.135538	-88.038028	Long	Manitowoc	8/2/2012	3	R	P					2					
171	44.135178	-88.038040	Long	Manitowoc	8/2/2012	12.5												
172	44.134818	-88.038052	Long	Manitowoc	8/2/2012	16												
173	44.134458	-88.038064	Long	Manitowoc	8/2/2012	17						3						
174	44.134098	-88.038076	Long	Manitowoc	8/2/2012	18						3						
175	44.133738	-88.038088	Long	Manitowoc	8/2/2012	14												
176	44.133379	-88.038100	Long	Manitowoc	8/2/2012	2	R	P					1			v		
177	44.133019	-88.038112	Long	Manitowoc	8/2/2012	2.5	R	P				1	3			v		
178	44.132659	-88.038123	Long	Manitowoc	8/2/2012	4	M	P					1				v	
179	44.132299	-88.038135	Long	Manitowoc	8/2/2012	8	M	P				3						
180	44.131939	-88.038147	Long	Manitowoc	8/2/2012	10												
181	44.131579	-88.038159	Long	Manitowoc	8/2/2012	10.5												
182	44.131219	-88.038171	Long	Manitowoc	8/2/2012	11.5												
183	44.130859	-88.038183	Long	Manitowoc	8/2/2012	9.5												
184	44.130499	-88.038195	Long	Manitowoc	8/2/2012	3	M	P					1					
185	44.128340	-88.038267	Long	Manitowoc	8/2/2012	3	M	P						1			v	
186	44.127980	-88.038278	Long	Manitowoc	8/2/2012	3	M	P					v	1				
187	44.127620	-88.038290	Long	Manitowoc	8/2/2012	3	M	P					1	2	1		v	
188	44.127260	-88.038302	Long	Manitowoc	8/2/2012	3	M	P				3	1	2				
189	44.144168	-88.037242	Long	Manitowoc	8/2/2012	3	M	P					2					
190	44.143808	-88.037254	Long	Manitowoc	8/2/2012	9												
191	44.143448	-88.037266	Long	Manitowoc	8/2/2012	14												
192	44.143088	-88.037278	Long	Manitowoc	8/2/2012	16												
193	44.142728	-88.037290	Long	Manitowoc	8/2/2012	15												
194	44.142368	-88.037302	Long	Manitowoc	8/2/2012	15.5												
195	44.142008	-88.037314	Long	Manitowoc	8/2/2012	17												
196	44.141648	-88.037326	Long	Manitowoc	8/2/2012	13												
197	44.141288	-88.037338	Long	Manitowoc	8/2/2012	8.5												
198	44.140928	-88.037349	Long	Manitowoc	8/2/2012	5	M	P				1						
199	44.140568	-88.037361	Long	Manitowoc	8/2/2012	2	S	P					2					1

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	NOTES	NUISIANCE	Total Rake Fullness	EWM	CERDE	CHARA	NUPVA	NYMOD	STUPE
200	44.140208	-88.037373	Long	Manitowoc	8/2/2012	1.5	S	P					2					1
201	44.139848	-88.037385	Long	Manitowoc	8/2/2012	10						3						
202	44.139489	-88.037397	Long	Manitowoc	8/2/2012	24						1						
203	44.139129	-88.037409	Long	Manitowoc	8/2/2012	29						2						
204	44.138769	-88.037421	Long	Manitowoc	8/2/2012	29												
205	44.138409	-88.037433	Long	Manitowoc	8/2/2012	26												
206	44.138049	-88.037445	Long	Manitowoc	8/2/2012	20												
207	44.137689	-88.037457	Long	Manitowoc	8/2/2012	11							v					
208	44.135529	-88.037528	Long	Manitowoc	8/2/2012	3	S	P										
209	44.135170	-88.037540	Long	Manitowoc	8/2/2012	10												
210	44.134810	-88.037552	Long	Manitowoc	8/2/2012	12												
211	44.134450	-88.037564	Long	Manitowoc	8/2/2012	13												
212	44.134090	-88.037576	Long	Manitowoc	8/2/2012	11												
213	44.13372984	-88.03758797	Long	Manitowoc	8/2/2012	6	R	P										
214	44.13336992	-88.03759989	Long	Manitowoc	8/2/2012	2	M	P					3			v		
215	44.13193024	-88.03764758	Long	Manitowoc	8/2/2012	4	M	P					3					
216	44.13157032	-88.03765951	Long	Manitowoc	8/2/2012	8	M	P										
217	44.13121039	-88.03767143	Long	Manitowoc	8/2/2012	9.5												
218	44.13085047	-88.03768335	Long	Manitowoc	8/2/2012	6	M	P					1					
219	44.12725127	-88.03780256	Long	Manitowoc	8/2/2012	1.5	M	P					v	v			v	
220	44.14451884	-88.03673033	Long	Manitowoc	8/2/2012	3	M	P				1	2	2	1	v	v	
221	44.14415893	-88.03674226	Long	Manitowoc	8/2/2012	9.5						2						
222	44.14379901	-88.03675419	Long	Manitowoc	8/2/2012	16.5						2						
223	44.14343909	-88.03676613	Long	Manitowoc	8/2/2012	16												
224	44.14307917	-88.03677806	Long	Manitowoc	8/2/2012	14												
225	44.14271925	-88.03678999	Long	Manitowoc	8/2/2012	13												
226	44.14235933	-88.03680192	Long	Manitowoc	8/2/2012	13												
227	44.14199941	-88.03681385	Long	Manitowoc	8/2/2012	13.5												
228	44.14163949	-88.03682579	Long	Manitowoc	8/2/2012	10												
229	44.14127957	-88.03683772	Long	Manitowoc	8/2/2012	7	M	P										
230	44.14091965	-88.03684965	Long	Manitowoc	8/2/2012	3	M	P					2	2				
231	44.13983989	-88.03688544	Long	Manitowoc	8/2/2012	4.5	R	P										
232	44.13947997	-88.03689737	Long	Manitowoc	8/2/2012	17.5						1						
233	44.13912005	-88.0369093	Long	Manitowoc	8/2/2012	23												
234	44.13876013	-88.03692123	Long	Manitowoc	8/2/2012	22												
235	44.13840021	-88.03693316	Long	Manitowoc	8/2/2012	22												
236	44.13804029	-88.03694509	Long	Manitowoc	8/2/2012	21												
237	44.13768037	-88.03695702	Long	Manitowoc	8/2/2012	12												
238	44.13732045	-88.03696895	Long	Manitowoc	8/2/2012	4.5	R	P				1						
239	44.13516093	-88.03704052	Long	Manitowoc	8/2/2012	5	M	P										

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	NOTES	NUSIANCE	Total Rake Fullness	EWM	CERDE	CHARA	NUPVA	NYMOD	STUPE
240	44.13480101	-88.03705244	Long	Manitowoc	8/2/2012	9	M	P						1				
241	44.13444109	-88.03706437	Long	Manitowoc	8/2/2012	9												
242	44.13408117	-88.0370763	Long	Manitowoc	8/2/2012	7	M	P										
243	44.13372125	-88.03708822	Long	Manitowoc	8/2/2012	3	M	P					3	1			v	
244	44.13120181	-88.03717171	Long	Manitowoc	8/2/2012	5	M	P					1					
245	44.13084189	-88.03718363	Long	Manitowoc	8/2/2012	4	M	P					2					
246	44.14451025	-88.03623049	Long	Manitowoc	8/2/2012	8	M	P										
247	44.14415033	-88.03624243	Long	Manitowoc	8/2/2012	14.5												
248	44.14379041	-88.03625436	Long	Manitowoc	8/2/2012	19						2						
249	44.14343049	-88.0362663	Long	Manitowoc	8/2/2012	17						2						
250	44.14307057	-88.03627824	Long	Manitowoc	8/2/2012	14.5												
251	44.14271065	-88.03629017	Long	Manitowoc	8/2/2012	13						1						
252	44.14235073	-88.03630211	Long	Manitowoc	8/2/2012	12						1						
253	44.14199081	-88.03631404	Long	Manitowoc	8/2/2012	11						1						
254	44.1416309	-88.03632598	Long	Manitowoc	8/2/2012	8												
255	44.14127098	-88.03633791	Long	Manitowoc	8/2/2012	3.5	M	P										
256	44.13947138	-88.03639758	Long	Manitowoc	8/2/2012	11												
257	44.13911146	-88.03640951	Long	Manitowoc	8/2/2012	15.5												
258	44.13875154	-88.03642144	Long	Manitowoc	8/2/2012	17												
259	44.13839162	-88.03643338	Long	Manitowoc	8/2/2012	19												
260	44.1380317	-88.03644531	Long	Manitowoc	8/2/2012	19.5												
261	44.13767178	-88.03645724	Long	Manitowoc	8/2/2012	16						1						
262	44.13731186	-88.03646917	Long	Manitowoc	8/2/2012	6	S	P					1					
263	44.13695194	-88.0364811	Long	Manitowoc	8/2/2012	1	S	P					1	1		v		
264	44.1344325	-88.03656462	Long	Manitowoc	8/2/2012	2	M	P					1	2				
265	44.14450165	-88.03573066	Long	Manitowoc	8/2/2012	9												
266	44.14414174	-88.0357426	Long	Manitowoc	8/2/2012	17.5												
267	44.14378182	-88.03575454	Long	Manitowoc	8/2/2012	20												
268	44.1434219	-88.03576647	Long	Manitowoc	8/2/2012	16.5						2						
269	44.14306198	-88.03577841	Long	Manitowoc	8/2/2012	13.5						1						
270	44.14270206	-88.03579035	Long	Manitowoc	8/2/2012	12												
271	44.14234214	-88.03580229	Long	Manitowoc	8/2/2012	12												
272	44.14198222	-88.03581423	Long	Manitowoc	8/2/2012	9												
273	44.1416223	-88.03582616	Long	Manitowoc	8/2/2012	6	M	P				1						
274	44.13946278	-88.03589779	Long	Manitowoc	8/2/2012	5	S	P				3	1					
275	44.13910286	-88.03590972	Long	Manitowoc	8/2/2012	9						1						
276	44.13874294	-88.03592166	Long	Manitowoc	8/2/2012	11												
277	44.13838302	-88.03593359	Long	Manitowoc	8/2/2012	12.5												
278	44.1380231	-88.03594553	Long	Manitowoc	8/2/2012	11												
279	44.13766318	-88.03595746	Long	Manitowoc	8/2/2012	8.5												

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DATE_	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	NOTES	NUSIANCE	Total Rake Fullness	EWM	CERDE	CHARA	NUPVA	NYMOD	STUPE
280	44.13730326	-88.0359694	Long	Manitowoc	8/2/2012	5	M	P					1					
281	44.14449306	-88.03523082	Long	Manitowoc	8/2/2012	4.5	M	P										
282	44.14413314	-88.03524276	Long	Manitowoc	8/2/2012	11.5												
283	44.14377322	-88.03525471	Long	Manitowoc	8/2/2012	18.5												
284	44.1434133	-88.03526665	Long	Manitowoc	8/2/2012	17												
285	44.14305338	-88.03527859	Long	Manitowoc	8/2/2012	14												
286	44.14269346	-88.03529053	Long	Manitowoc	8/2/2012	12.5												
287	44.14233354	-88.03530247	Long	Manitowoc	8/2/2012	10.5												
288	44.14197362	-88.03531441	Long	Manitowoc	8/2/2012	2.5	M	P										
289	44.1416137	-88.03532635	Long	Manitowoc	8/2/2012	3	M	P										
290	44.13909427	-88.03540993	Long	Manitowoc	8/2/2012	5	M	P					2					
291	44.13873435	-88.03542187	Long	Manitowoc	8/2/2012	9	S	P					2	1				
292	44.13837443	-88.03543381	Long	Manitowoc	8/2/2012	6	M	P										
293	44.13801451	-88.03544575	Long	Manitowoc	8/2/2012	5	M	P					1					
294	44.13765459	-88.03545769	Long	Manitowoc	8/2/2012	4	M	P					1					
295	44.14448446	-88.03473099	Long	Manitowoc	8/2/2012	4	M	P					1	1				
296	44.14412454	-88.03474293	Long	Manitowoc	8/2/2012	9.5												
297	44.14376462	-88.03475488	Long	Manitowoc	8/2/2012	13.5												
298	44.1434047	-88.03476682	Long	Manitowoc	8/2/2012	12.5												
299	44.14304478	-88.03477877	Long	Manitowoc	8/2/2012	10.5												
300	44.14268486	-88.03479071	Long	Manitowoc	8/2/2012	10.5												
301	44.14232494	-88.03480266	Long	Manitowoc	8/2/2012	8	M	P										
302	44.14196502	-88.0348146	Long	Manitowoc	8/2/2012	4	S	P										
303	44.14447585	-88.03423115	Long	Manitowoc	8/2/2012	3	M	P					1	1				
304	44.14411593	-88.0342431	Long	Manitowoc	8/2/2012	8	M	P										
305	44.14375602	-88.03425505	Long	Manitowoc	8/2/2012	7.5	M	P										
306	44.1433961	-88.034267	Long	Manitowoc	8/2/2012	7	M	P										
307	44.14303618	-88.03427894	Long	Manitowoc	8/2/2012	8	M	P										
308	44.14267626	-88.03429089	Long	Manitowoc	8/2/2012	7	M	P										
309	44.14231634	-88.03430284	Long	Manitowoc	8/2/2012	5.5	S	P										
310	44.14195642	-88.03431479	Long	Manitowoc	8/2/2012	3	M	P					2			v		
311	44.14410733	-88.03374327	Long	Manitowoc	8/2/2012	3	M	P					1					
312	44.14374741	-88.03375522	Long	Manitowoc	8/2/2012	4	M	P					v					
313	44.14338749	-88.03376717	Long	Manitowoc	8/2/2012	7	M	P										
314	44.14302757	-88.03377912	Long	Manitowoc	8/2/2012	8	M	P										
315	44.14266765	-88.03379107	Long	Manitowoc	8/2/2012	3.5	M	P					1					
316	44.14230773	-88.03380302	Long	Manitowoc	8/2/2012	2	M	P					3	1		v		
317	44.14301897	-88.0332793	Long	Manitowoc	8/2/2012	2	R	P					1					

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	Total Rake Fullness	CLP	CERDE	ELOCA	ELONU	NUPVA	SPIPO	STUPE
1	44.15394486	-88.05022915	Round Lake	Calumet	1.5	M	P		2		2				1	
2	44.1537469	-88.05023567	Round Lake	Calumet	5	M	P									
3	44.15354895	-88.05024219	Round Lake	Calumet	30.5			DEEP								
4	44.15335099	-88.05024871	Round Lake	Calumet	20			DEEP								
5	44.15315303	-88.05025523	Round Lake	Calumet	10.5		R									
6	44.15295507	-88.05026175	Round Lake	Calumet	4	M	P									
7	44.15394017	-88.04995419	Round Lake	Calumet	10		R									
8	44.15374221	-88.04996071	Round Lake	Calumet	27			DEEP								
9	44.15354425	-88.04996723	Round Lake	Calumet	35			DEEP								
10	44.15334629	-88.04997375	Round Lake	Calumet	40			DEEP								
11	44.15314834	-88.04998027	Round Lake	Calumet	30			DEEP								
12	44.15295038	-88.04998679	Round Lake	Calumet	13		R									
13	44.15275242	-88.04999332	Round Lake	Calumet	7	M	P									
14	44.15255447	-88.04999984	Round Lake	Calumet	2	M	P		1	V	1					
15	44.15393547	-88.04967923	Round Lake	Calumet	14		R									
16	44.15373751	-88.04968576	Round Lake	Calumet	35			DEEP								
17	44.15353956	-88.04969228	Round Lake	Calumet				DEEP								
18	44.1533416	-88.0496988	Round Lake	Calumet				DEEP								
19	44.15314364	-88.04970532	Round Lake	Calumet	50			DEEP								
20	44.15294569	-88.04971184	Round Lake	Calumet				DEEP								
21	44.15274773	-88.04971837	Round Lake	Calumet	30			DEEP								
22	44.15254977	-88.04972489	Round Lake	Calumet	11		R									
23	44.15235181	-88.04973141	Round Lake	Calumet	2	M	P		1				V	1		
24	44.15393077	-88.04940428	Round Lake	Calumet	12		R		1		1		1			
25	44.15373282	-88.0494108	Round Lake	Calumet	38			DEEP								
26	44.15353486	-88.04941732	Round Lake	Calumet				DEEP								
27	44.1533369	-88.04942385	Round Lake	Calumet				DEEP								
28	44.15313895	-88.04943037	Round Lake	Calumet				DEEP								
29	44.15294099	-88.04943689	Round Lake	Calumet				DEEP								
30	44.15274303	-88.04944342	Round Lake	Calumet	43			DEEP								
31	44.15254508	-88.04944994	Round Lake	Calumet				DEEP								
32	44.15234712	-88.04945646	Round Lake	Calumet	13		R		1		1					
33	44.15214916	-88.04946298	Round Lake	Calumet	12		R									
34	44.1519512	-88.04946951	Round Lake	Calumet	7	M	P									
35	44.15392608	-88.04912932	Round Lake	Calumet	4.5	M	P		3	1	1	2	2		1	
36	44.15372812	-88.04913585	Round Lake	Calumet	22			DEEP								
37	44.15353016	-88.04914237	Round Lake	Calumet				DEEP								
38	44.15333221	-88.04914889	Round Lake	Calumet				DEEP								
39	44.15313425	-88.04915542	Round Lake	Calumet				DEEP								
40	44.15293629	-88.04916194	Round Lake	Calumet				DEEP								
41	44.15273834	-88.04916847	Round Lake	Calumet				DEEP								
42	44.15254038	-88.04917499	Round Lake	Calumet				DEEP								
43	44.15234242	-88.04918151	Round Lake	Calumet				DEEP								
44	44.15214447	-88.04918804	Round Lake	Calumet	27			DEEP								
45	44.15194651	-88.04919456	Round Lake	Calumet	12		R									
46	44.15174855	-88.04920108	Round Lake	Calumet	4	M	P			V	V			V		
47	44.15155059	-88.04920761	Round Lake	Calumet	3	M	P		1		1					1
48	44.15392138	-88.04885437	Round Lake	Calumet	3.5	M	P		1		1	1	1			1
49	44.15372342	-88.04886089	Round Lake	Calumet	15		R		1				1			
50	44.15352547	-88.04886742	Round Lake	Calumet	27			DEEP								
51	44.15332751	-88.04887394	Round Lake	Calumet	39			DEEP								
52	44.15312955	-88.04888047	Round Lake	Calumet	50			DEEP								
53	44.1529316	-88.04888699	Round Lake	Calumet	53			DEEP								
54	44.15273364	-88.04889352	Round Lake	Calumet				DEEP								
55	44.15253568	-88.04890004	Round Lake	Calumet				DEEP								
56	44.15233773	-88.04890657	Round Lake	Calumet				DEEP								

Point Number	LATITUDE	LONGITUDE	LAKE_NAME	COUNTY	DEPTH	SEDIMENT	POLE_ROPE	COMMENTS	Total Rake Fullness	CLP	CERDE	ELOCA	ELONU	NUPVA	SPIPO	STUPE
57	44.15213977	-88.04891309	Round Lake	Calumet				DEEP								
58	44.15194181	-88.04891961	Round Lake	Calumet	39			DEEP								
59	44.15174385	-88.04892614	Round Lake	Calumet	19.5		R									
60	44.1515459	-88.04893266	Round Lake	Calumet	3.5	M	P		2		1			2		
61	44.15371873	-88.04858594	Round Lake	Calumet	3.5	R	P		3			2	2			
62	44.15352077	-88.04859246	Round Lake	Calumet	6	M	P		2			2	1			
63	44.15332281	-88.04859899	Round Lake	Calumet	21.5		R									
64	44.15312485	-88.04860552	Round Lake	Calumet	35			DEEP								
65	44.1529269	-88.04861204	Round Lake	Calumet	44			DEEP								
66	44.15272894	-88.04861857	Round Lake	Calumet	47			DEEP								
67	44.15253098	-88.04862509	Round Lake	Calumet	48.5			DEEP								
68	44.15233303	-88.04863162	Round Lake	Calumet	48			DEEP								
69	44.15213507	-88.04863814	Round Lake	Calumet	45			DEEP								
70	44.15193711	-88.04864467	Round Lake	Calumet				DEEP								
71	44.15173916	-88.04865119	Round Lake	Calumet	35			DEEP								
72	44.1515412	-88.04865772	Round Lake	Calumet	13		R									
73	44.15134324	-88.04866424	Round Lake	Calumet	3.5	M	P		1							1
74	44.15331811	-88.04832404	Round Lake	Calumet				TERRESTRIAL								
75	44.15312016	-88.04833056	Round Lake	Calumet	7	M	P									
76	44.1529222	-88.04833709	Round Lake	Calumet	19		R		1				1			
77	44.15272424	-88.04834362	Round Lake	Calumet	14		R									
78	44.15252629	-88.04835014	Round Lake	Calumet	21.5		R									
79	44.15232833	-88.04835667	Round Lake	Calumet	10.5		R									
80	44.15213037	-88.0483632	Round Lake	Calumet	15		R									
81	44.15193242	-88.04836972	Round Lake	Calumet	17		R									
82	44.15173446	-88.04837625	Round Lake	Calumet	14		R		1		1					
83	44.1515365	-88.04838277	Round Lake	Calumet	8	M	P									
84	44.15133854	-88.0483893	Round Lake	Calumet	2.5	M	P		2	1	1					1
85	44.15311546	-88.04805561	Round Lake	Calumet	2.5	M	P		1		1				1	
86	44.1529175	-88.04806214	Round Lake	Calumet	4	M	P									
87	44.15271954	-88.04806867	Round Lake	Calumet	4	M	P		1							1
88	44.15252159	-88.04807519	Round Lake	Calumet	3.5	M	P									
89	44.15232363	-88.04808172	Round Lake	Calumet	2	R	P		1		1					
90	44.15212567	-88.04808825	Round Lake	Calumet	3	S	P		1		1					V
91	44.15192772	-88.04809478	Round Lake	Calumet	3	M	P		1		1		1			1
92	44.15172976	-88.0481013	Round Lake	Calumet	3.5	M	P		1		1					1
93	44.1515318	-88.04810783	Round Lake	Calumet	2.5	M	P		1		1		1			1
94	44.15133385	-88.04811436	Round Lake	Calumet				TERRESTRIAL								