A

APPENDIX A

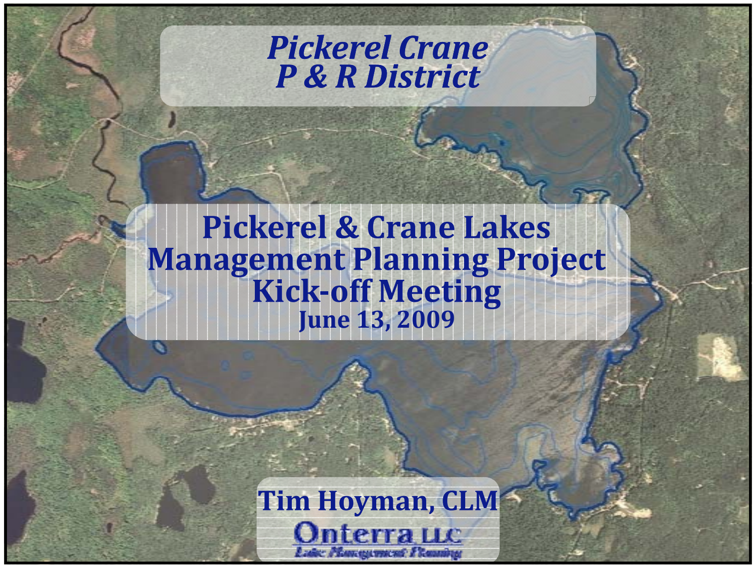
Public Participation Materials

Pickerel and Crane Lakes
Management Planning Project
Kick-Off Meeting
June 13, 2009 – 12:00 PM
Ainsworth Town Hall
N9299 County Highway TT

Aquatic ecologist, Tim Hoyman, speaks to a lake group in Waushara County about their lake management plan. Public participation will be integral part of the Pickerel & Crane Lakes project.

The Pickerel Crane P & R District has received three grants totaling over $27,000 from the Wisconsin Department of Natural Resources to partially fund the completion of a comprehensive management plan for Pickerel and Crane 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 watershed. Most of the studies will be completed during this spring, summer and fall. The tasks associated with the analysis of the data will be completed during the fall and winter. 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 Saturday, June 13th at 12:00 pm at the Ainsworth Town Hall.

Onterra, LLC, a lake management planning firm out of De Pere, has been hired to lead the project. During the meeting Tim Hoyman, an Aquatic Ecologist with Onterra, will describe the project and its importance. His presentation will include a description of the project's components, a quick course on general lake ecology, and a breakdown of how the District's Planning Committee will be involved in the plan's completion. So, please plan on attending the meeting and do not hesitate to ask questions or make comments.



Presentation Outline

- Onterra, LLC
- Why Create a Management Plan?
- Elements of a Lake Management Planning Project
  - Data & Information
  - Planning Process

Onterra, LLC

- Founded in 2005
- Staff
  - Three full-time ecologists
  - Two part-time ecologists
  - Two interns
- Services
  - Science and planning
- Philosophy
  - Promote realistic planning
  - Assist, not direct

Why create a lake management plan?

- To create a better understanding of 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 the lake for future reference and planning.

Elements of an Effective Lake Management Planning Project

Data and Information Gathering

Environmental & Sociological

Planning Process

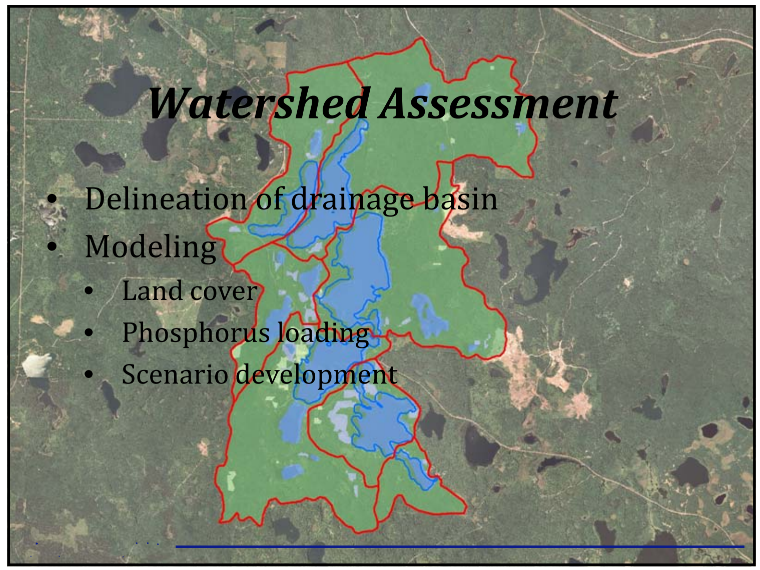
Brings it all together

Data and information gathering

- Study Components
  - Water Quality Analysis
  - Watershed Assessment
  - Aquatic Plant Surveys
  - Fisheries Data Integration
  - Stakeholder Survey

Water Quality Analysis

- General water chemistry
- Nutrient analysis
  - Lake trophic state (Eutrophication)
  - Limiting plant nutrient
- Supporting data for watershed modeling



Watershed Assessment

- Delineation of drainage basin
- Modeling
  - Land cover
  - Phosphorus loading
  - Scenario development

Aquatic Plant Surveys

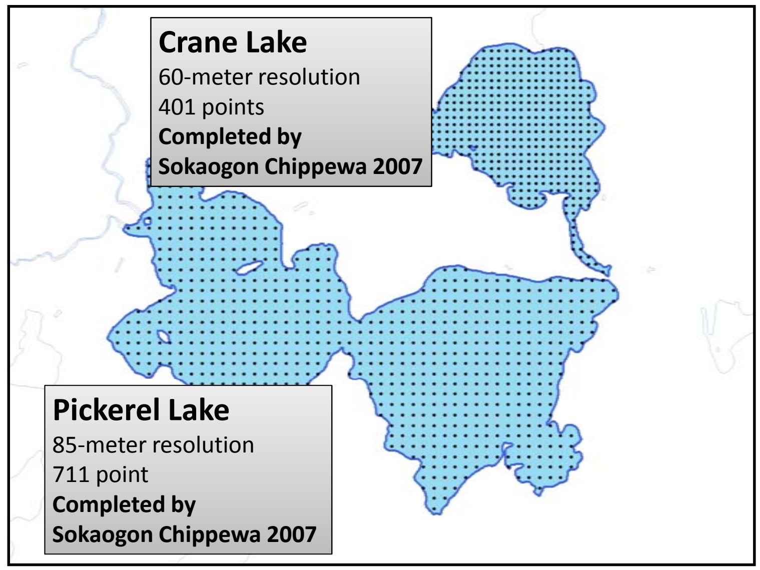
- Concerned with both native and non-native plants
- Multiple surveys used in assessment
  - Curly-leaf pondweed survey
  - Point-intercept survey
  - Plant community mapping
  - Volunteer survey findings

Non-native Aquatic Plants

Curly-leaf Pondweed

Non-native Aquatic Plants

Eurasian Water Milfoil



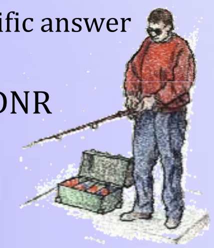
Fisheries Data Integration

- No fish sampling completed
- Assemble data from WDNR, USGS, USFWS, & GLIFWC
- Fish survey results summaries (if available)
- Use information in planning as applicable

Stakeholder Survey

- Standard survey used as base
  - Planning committee develops additional questions and options
  - Must not lead respondent to specific answer through a "loaded" question
- Survey must be approved by WDNR

Completed By District



Planning Process

Planning Committee Meetings

Study Results (including a stakeholder survey)
Conclusions & Initial Recommendations
Management Goals
Management Actions
Timeframe
Facilitator(s)

Implementation Plan

Thank You

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

Wisconsin Lakes Partnership

UW Extension

Wisconsin Dept. of Natural Resources

Planning Meeting II Summary

On August 3, 2010, Tim Hoyman and Eddie Heath met with 10 members of the PCLPRD Planning Committee to develop a management strategy for Pickerel and Crane Lakes. During the meeting, Tim and Eddie described the harvest plan that was completed for the 2010 season. The committee members agreed that the same plan should be used during the 2011 season with potential minor changes to the harvesting lanes dependent upon needs of specific property owners. Any changes would need to be made prior to the completion of the management during the fall of 2010.

Tim and Eddie also described the alternatives available for controlling Eurasian water milfoil in Pickerel Lake (see Summary and Conclusions section for alternatives discussion). They also discussed the potential costs involved with use of herbicides (granular and liquid) to control the Eurasian water milfoil on a lake-wide basis with the goal of restoring and protecting native habitat. The results of that discussion are reflected in the Eurasian water milfoil management strategy located within the Implementation Plan.

The meeting was concluded with a brainstorming session of management challenges facing Pickerel and Crane Lakes. Following the 20 minute brainstorming session, the group refined the lists of challenges and created management goals which are the foundation of the Implementation Plan found at the end of this document.

B

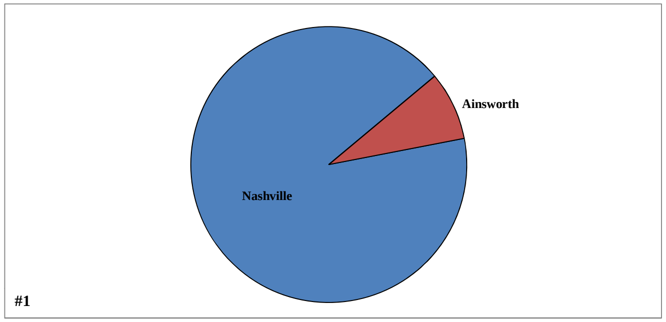
APPENDIX B

Stakeholder Survey Response Charts and Comments

Returned Surveys	300
Sent Surveys	600
Response Rate (%)	50.0

#1 In which municipality is your property located?

	Total	%
Nashville	276	*92.0*
Ainsworth	24	*8.0*
	300	*100.0*



#2 On which lake is your property located (or is closest to)?

	Total	%
Pickerel Lake	232	*92.0*
Crane Lake	68	*8.0*
	300	*100.0*

#3 Does your property include shoreline?

Pickerel Lake District

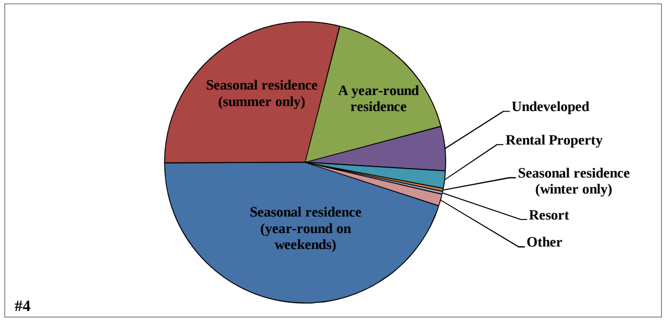
	Total	%
Yes	180	*60.0*
No	120	*40.0*
	300	*100.0*

Crane Lake District

	Total	%
Yes	63	*21.0*
No	237	*79.0*
	300	*100.0*

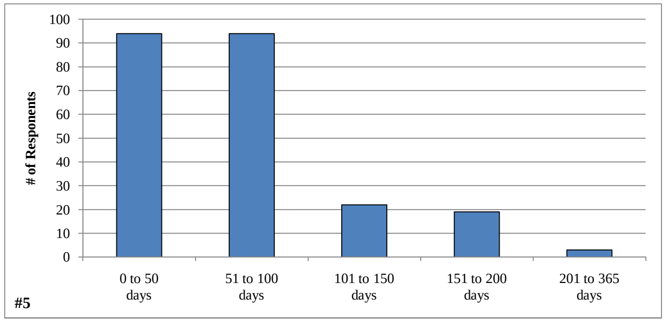
#4 What type of property do you own in the Pickerel Lake District?

	Total	%
Seasonal residence (year-round on weekends)	133	*44.9*
Seasonal residence (summer only)	86	*29.1*
A year-round residence	50	*16.9*
Undeveloped	15	*5.1*
Rental Property	6	*2.0*
Seasonal residence (winter only)	1	*0.3*
Resort	1	*0.3*
Other	4	*1.4*
	296	*100.0*



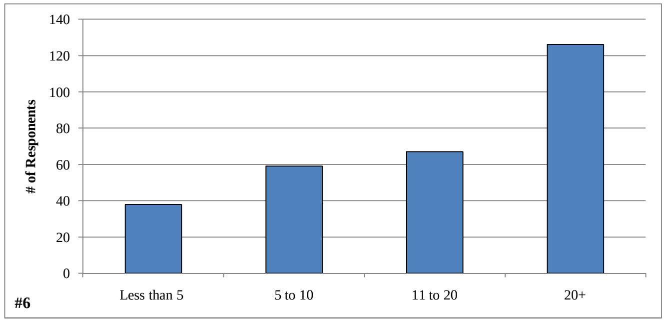
#5 If you are not a year-round resident, approximately how many days each year is your property used by you or others?

	Total	%
0 to 50 days	94	*40.5*
51 to 100 days	94	*40.5*
101 to 150 days	22	*9.5*
151 to 200 days	19	*8.2*
201 to 365 days	3	*1.3*
	232	*100.0*



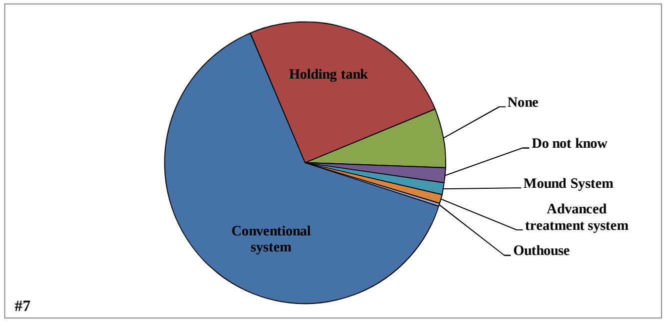
#6 How many years have you owned property in the Pickerel Lake District?

	Total	%
Less than 5	38	*13.1*
5 to 10	59	*20.3*
11 to 20	67	*23.1*
20+	126	*43.4*
	290	*100.0*



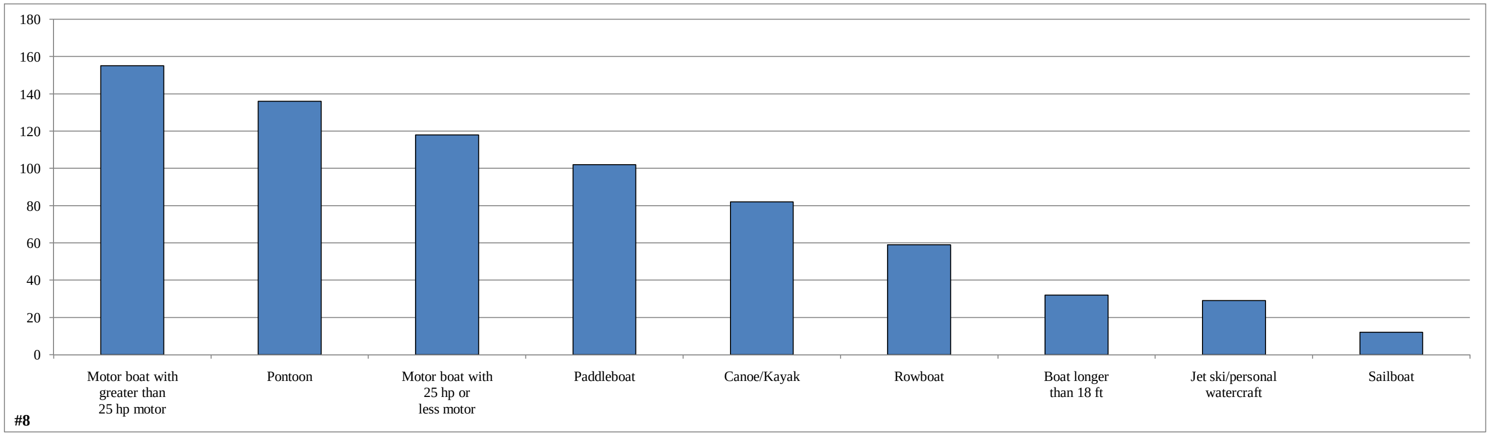
#7 What type of septic system does your property utilize?

	Total	%
Conventional system	187	*63.6*
Holding tank	74	*25.2*
None	20	*6.8*
Do not know	5	*1.7*
Mound System	4	*1.4*
Advanced treatment system	3	*1.0*
Outhouse	1	*0.3*
	294	*100.0*



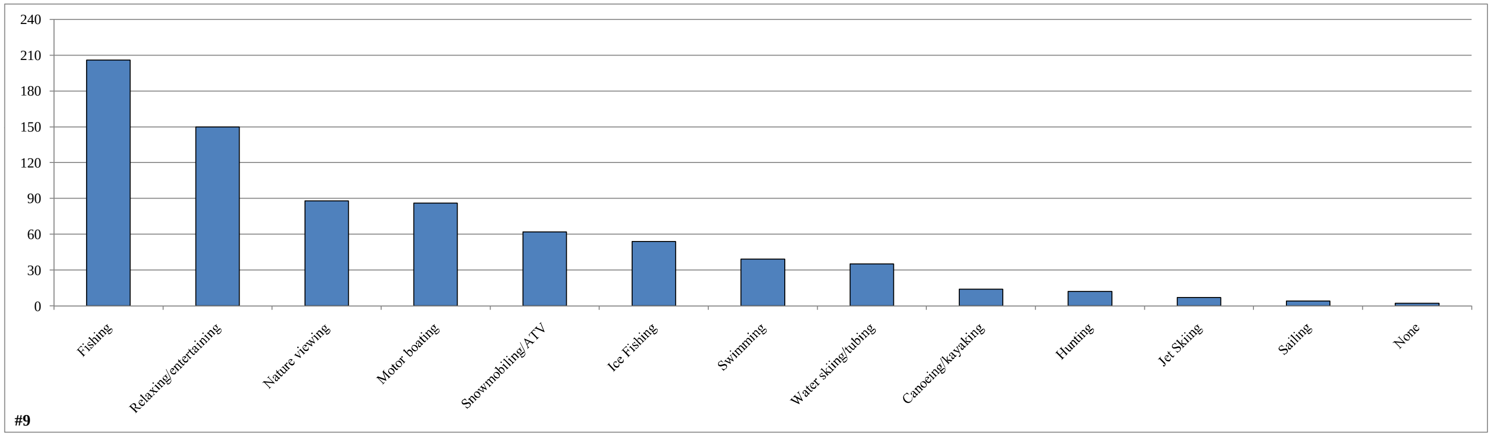
#8 What types of watercraft do you, or others that use your property, currently use on Pickerel/Crane Lake?

	Total
Motor boat with greater than 25 hp motor	155
Pontoon	136
Motor boat with 25 hp or less motor	118
Paddleboat	102
Canoe/Kayak	82
Rowboat	59
Boat longer than 18 ft	32
Jet ski/personal watercraft	29
Sailboat	12



#9 Please rank the activities below that are the most important to you on Pickerel/Crane Lake.

	Total
Fishing	206
Relaxing/entertaining	150
Nature viewing	88
Motor boating	86
Snowmobiling/ATV	62
Ice Fishing	54
Swimming	39
Water skiing/tubing	35
Canoeing/kayaking	14
Hunting	12
Jet Skiing	7
Sailing	4
None	2

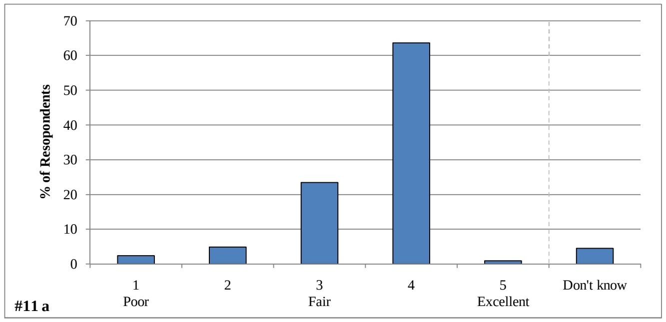


#10 Have you personally fished on Pickerel or Crane Lake in the past 3 years?

	Total	%
Yes	262	*87.6*
No	37	*12.4*
	299	*100.0*

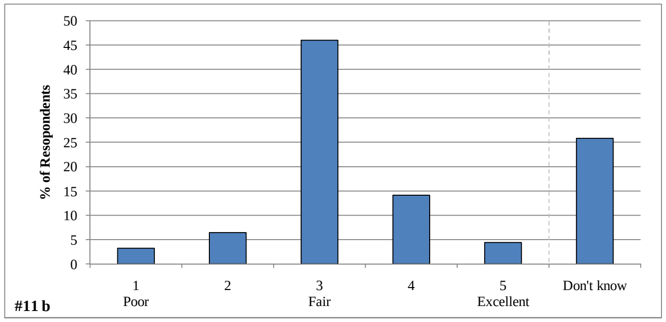
#11 a How would you describe the current quality of fishing on Pickerel Lake?

	Total	%
1 - Poor	15	*2.4*
2	30	*4.9*
3 - Fair	144	*23.5*
4	390	*63.6*
5 - Excellent	6	*1.0*
Don't know	28	*4.6*
	613	*100.0*



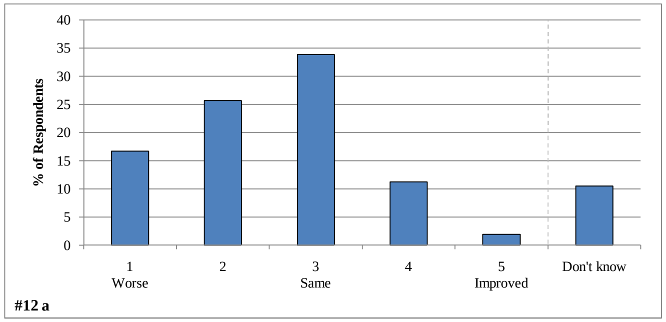
#11 b How would you describe the current quality of fishing on Crane Lake?

	Total	%
1 - Poor	8	*3.2*
2	16	*6.5*
3 - Fair	114	*46.0*
4	35	*14.1*
5 - Excellent	11	*4.4*
Don't know	64	*25.8*
	248	*100.0*



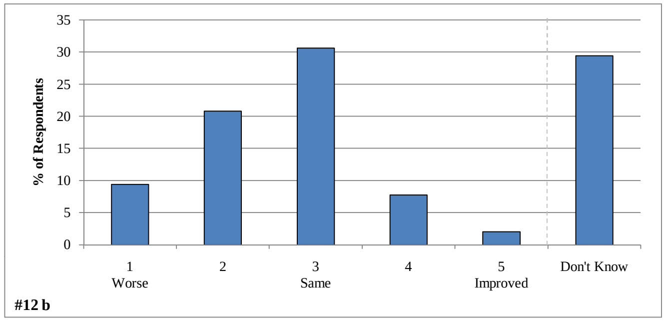
#12 a **How has the quality of fishing changed on Pickerel Lake since you obtained your property?**

	Total	%
1 - Worse	43	*16.7*
2	66	*25.7*
3 - Same	87	*33.9*
4	29	*11.3*
5 - Improved	5	*1.9*
Don't know	27	*10.5*
	257	*100.0*



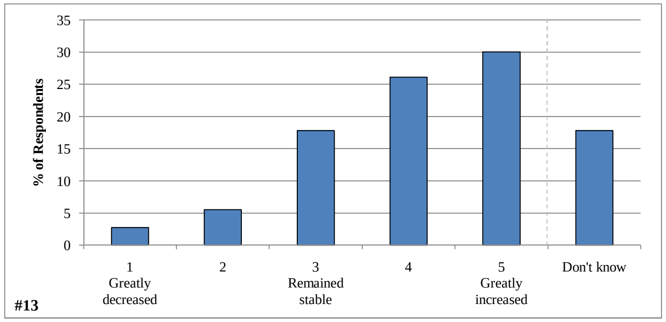
#12 b **How has the quality of fishing changed on Crane Lake since you obtained your property?**

	Total	%
1 - Worse	23	*9.4*
2	51	*20.8*
3 - Same	75	*30.6*
4	19	*7.8*
5 - Improved	5	*2.0*
Don't know	72	*29.4*
	245	*100.0*



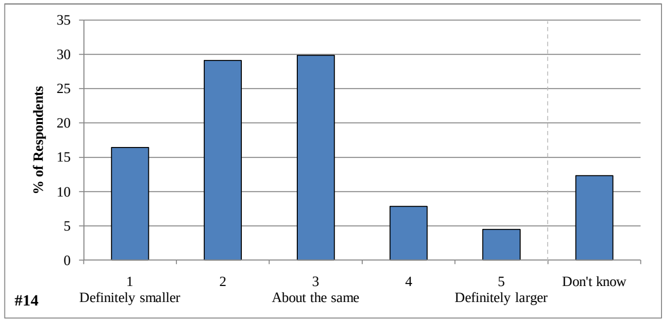
#13 **Since you've owned your property, would you say the largemouth bass population in our lakes has:**

	Total	%
1 - Greatly decreased	7	*2.8*
2	14	*5.5*
3 - Remained stable	45	*17.8*
4	66	*26.1*
5 - Greatly increased	76	*30.0*
Don't Know	45	*17.8*
	253	*100.0*



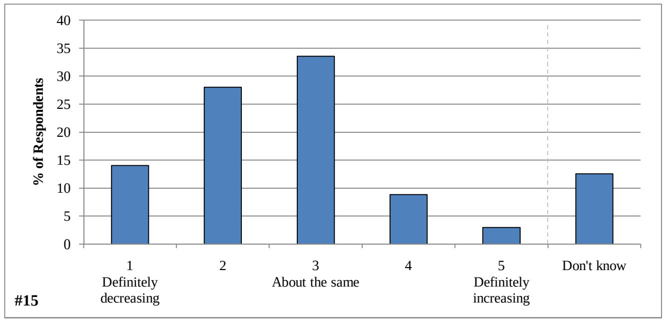
#14 Since you've owned your property, would you say the size of game fish in Pickerel/Crane Lake:

	Total	%
1 - Definitely smaller	44	*16.4*
2	78	*29.1*
3 - About the same	80	*29.9*
4	21	*7.8*
5 - Definitely larger	12	*4.5*
Don't know	33	*12.3*
	268	*100.0*



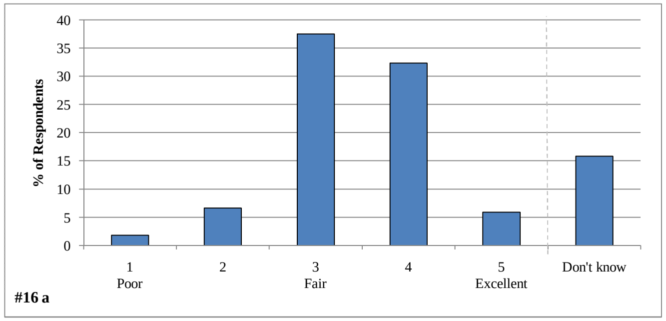
#15 Since you've owned your property, would you say the number of game fish in Pickerel/Crane Lake is:

	Total	%
1 - Definitely decreasing	38	*14.0*
2	76	*28.0*
3 - About the same	91	*33.6*
4	24	*8.9*
5 - Definitely increasing	8	*3.0*
Don't know	34	*12.5*
	271	*100.0*



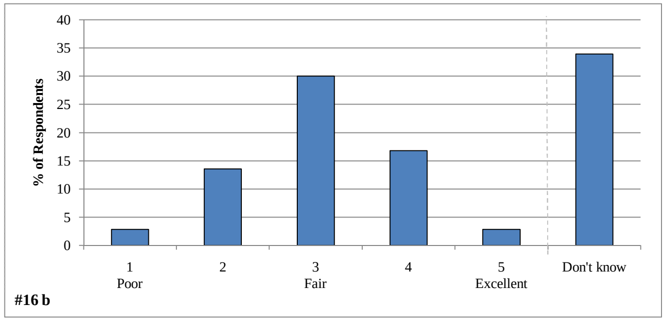
#16 a How would you describe the current water quality of Pickerel Lake?

	Total	%
1 - Poor	5	*1.8*
2	18	*6.6*
3 - Fair	102	*37.5*
4	88	*32.4*
5 - Excellent	16	*5.9*
Don't know	43	*15.8*
	272	*100.0*



#16 b **How would you describe the current water quality of Crane Lake?**

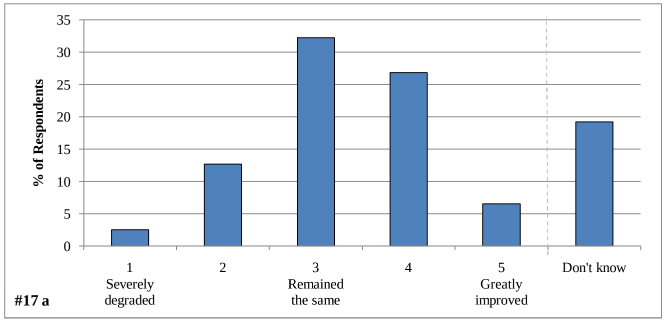
	Total	%
1 - Poor	8	*2.9*
2	38	*13.6*
3 - Fair	84	*30.0*
4	47	*16.8*
5 - Excellent	8	*2.9*
Don't know	95	*33.9*
	280	*100.0*



#17 a

How has the water quality changed in Pickerel Lake since you've owned your property?

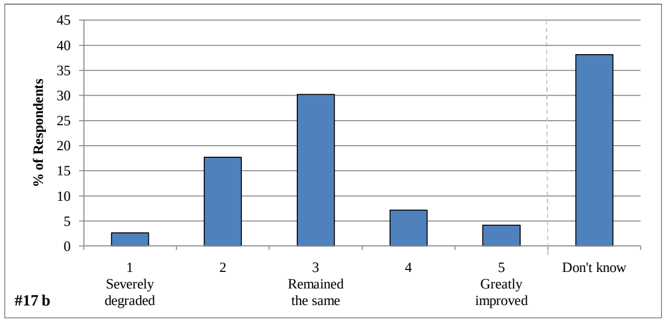
	Total	%
1 - Severely degraded	7	*2.5*
2	35	*12.7*
3 - Remained the same	89	*32.2*
4	74	*26.8*
5 - Greatly improved	18	*6.5*
Don't know	53	*19.2*
	276	*100.0*



#17 b

How has the water quality changed in Crane Lake since you've owned your property?

	Total	%
1 - Severely degraded	7	*2.6*
2	47	*17.7*
3 - Remained the same	80	*30.2*
4	19	*7.2*
5 - Greatly improved	11	*4.2*
Don't know	101	*38.1*
	265	*100.0*



#18 Have you ever heard of aquatic invasive species?

	Total	%
Yes	277	*93.0*
No	21	*7.0*
	298	*100.0*

#19 a Are you aware of aquatic invasive species in Pickerel Lake?

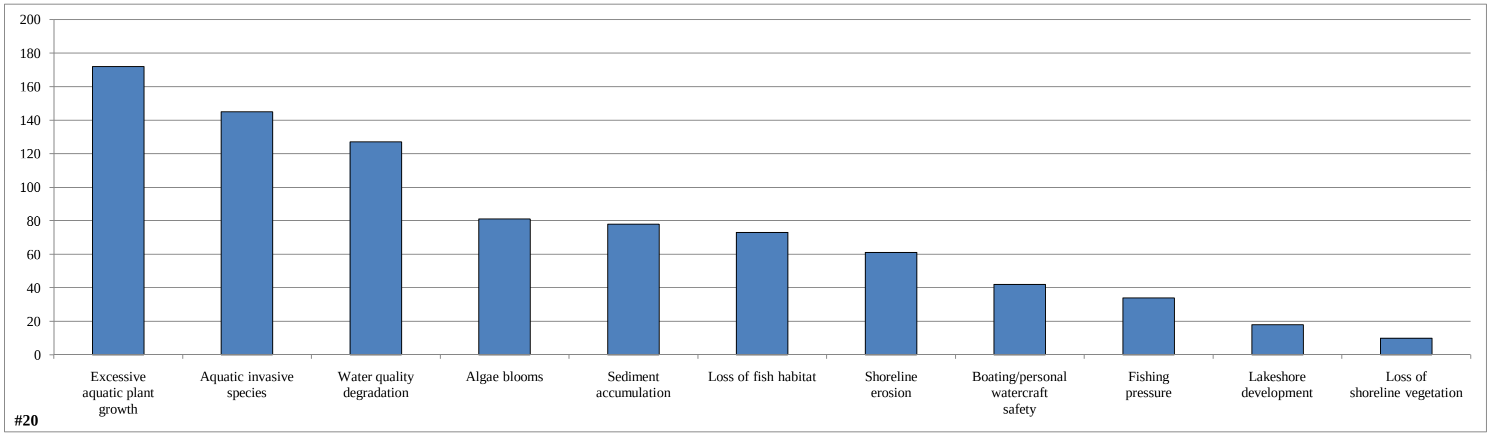
	Total	%
Yes	205	*85.4*
No	35	*14.6*
	240	*100.0*

#19 b Are you aware of aquatic invasive species in Crane Lake?

	Total	%
Yes	69	*31.1*
No	153	*68.9*
	222	*100.0*

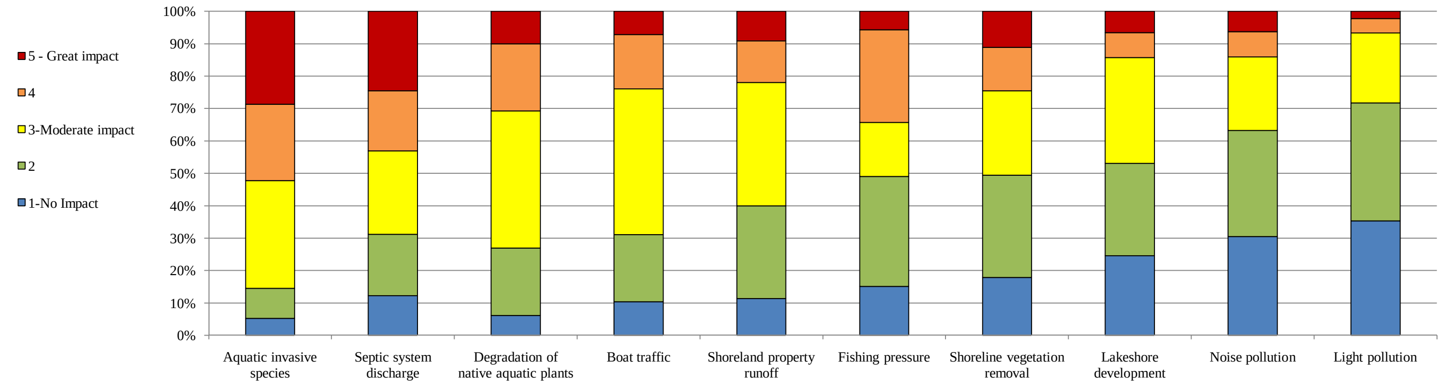
#20 From the list below, please rank your top three concerns regarding Pickerel or Crane Lake.

	Total
Excessive aquatic plant growth	172
Aquatic invasive species	145
Water quality degradation	127
Algae blooms	81
Sediment accumulation	78
Loss of fish habitat	73
Shoreline erosion	61
Boating/personal watercraft safety	42
Fishing pressure	34
Lakeshore development	18
Loss of shoreline vegetation	10



#21 To what level do you believe each of the following factors may be negatively impacting Pickerel or Crane Lake?

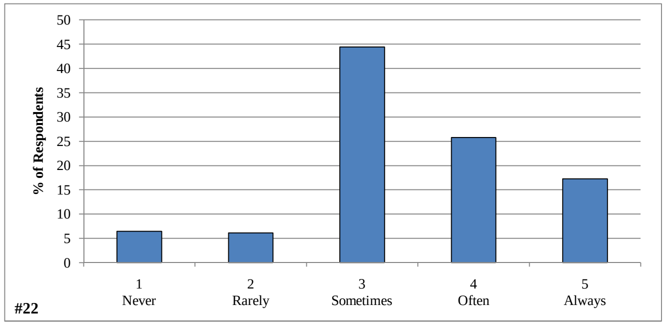
	1-No Impact	2	3-Moderate impact	4	5 - Great impact	*Total*	*Average*
Aquatic invasive species	14	25	89	63	77	*268*	*3.6*
Septic system discharge	33	51	69	50	66	*269*	*3.2*
Degradation of native aquatic plants	16	54	110	54	26	*260*	*3.1*
Boat traffic	29	58	126	47	20	*280*	*2.9*
Shoreland property runoff	31	78	104	35	25	*273*	*2.8*
Fishing pressure	40	90	44	76	15	*265*	*2.8*
Shoreline vegetation removal	48	85	70	36	30	*269*	*2.7*
Lakeshore development	67	78	89	21	18	*273*	*2.4*
Noise pollution	82	88	61	21	17	*269*	*2.3*
Light pollution	95	98	58	12	6	*269*	*2.0*
Other	0	0	0	0	0	*0*	*0.0*



#21

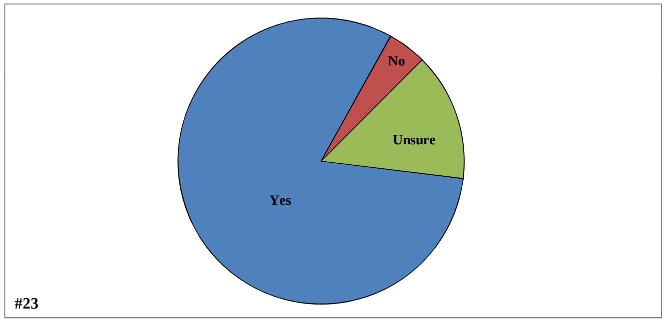
#22 How often does aquatic plant growth negatively impact your enjoyment of Pickerel or Crane Lake?

	Total	%
1 - Never	19	*6.4*
2	18	*6.1*
3 - Sometimes	131	*44.4*
4	76	*25.8*
5 - Always	51	*17.3*
	295	*100.0*



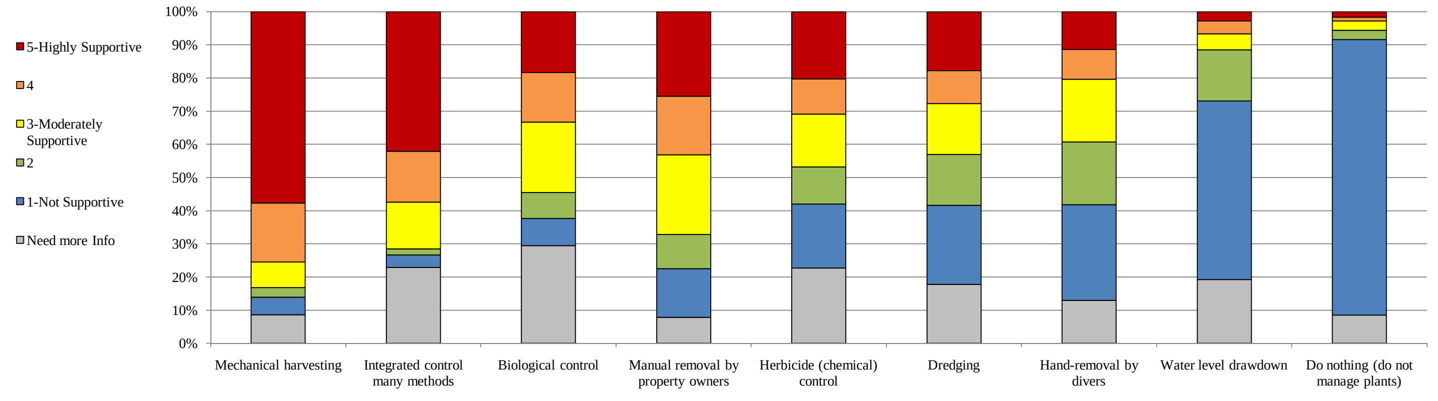
#23 Considering your answer to the question above, do you believe aquatic plant control is needed on Pickerel or Crane Lake?

	Total	%
Yes	241	*81.1*
No	13	*4.4*
Unsure	43	*14.5*
	297	*100.0*



#24 a What is your level of support for the responsible use of the following techniques on Pickerel Lake?

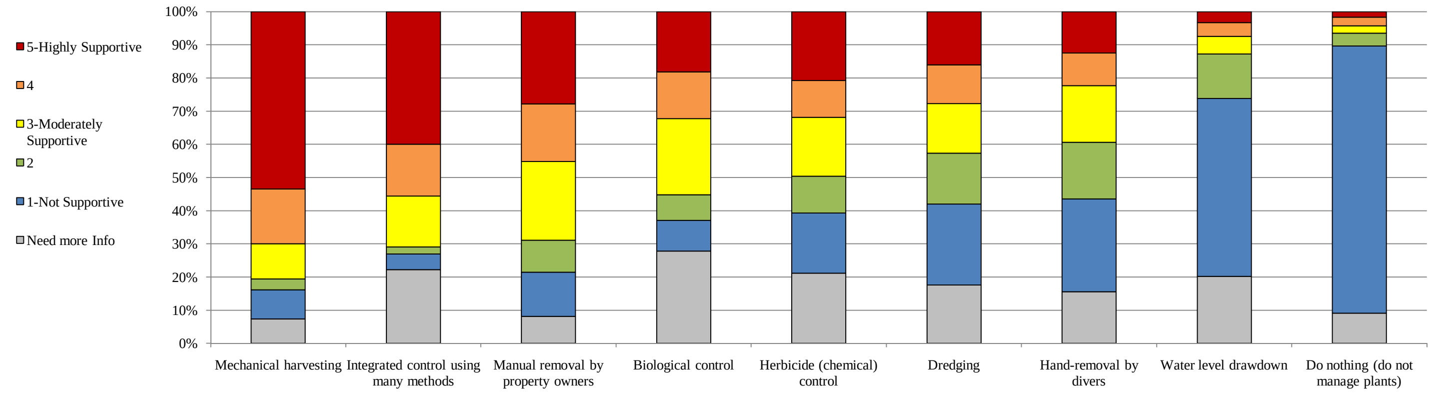
	1-Not Supportive	2	3-Moderately Supportive	4	5-Highly Supportive	Need more Info	*Total*	*Average*
Mechanical harvesting	11	6	16	37	120	18	*190*	*4.3*
Integrated control many methods	8	4	30	33	90	49	*165*	*4.2*
Biological control	17	16	44	31	38	61	*146*	*3.4*
Manual removal by property owners	30	21	49	36	52	16	*188*	*3.3*
Herbicide (chemical) control	40	23	33	22	42	47	*160*	*3.0*
Dredging	48	31	31	20	36	36	*166*	*2.8*
Hand-removal by divers	58	38	38	18	23	26	*175*	*2.5*
Water level drawdown	112	32	10	8	6	40	*168*	*1.6*
Do nothing (do not manage plants)	147	5	5	2	3	15	*162*	*1.2*



#24 a

#24 b What is your level of support for the responsible use of the following techniques on Crane Lake?

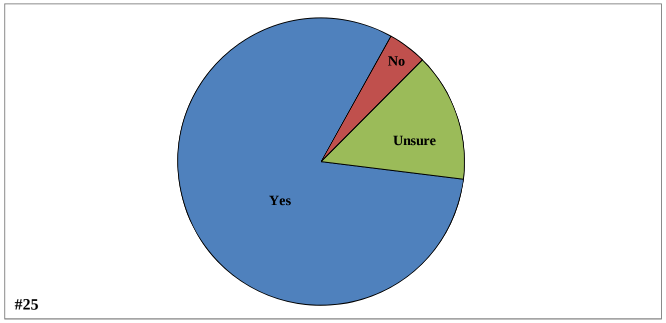
	1-Not Supportive	2	3-Moderately Supportive	4	5-Highly Supportive	Need more Info	*Total*	*Average*
Mechanical harvesting	24	9	29	45	146	20	*253*	*4.1*
Integrated control using many methods	13	6	42	43	110	61	*214*	*4.1*
Manual removal by property owners	36	26	64	47	75	22	*248*	*3.4*
Biological control	25	21	62	38	49	75	*195*	*3.3*
Herbicide (chemical) control	49	30	48	30	56	57	*213*	*3.1*
Dredging	65	41	40	31	43	47	*220*	*2.8*
Hand-removal by divers	74	45	45	26	33	41	*223*	*2.5*
Water level drawdown	143	36	14	11	9	54	*213*	*1.6*
Do nothing (do not manage plants)	187	9	5	6	4	21	*211*	*1.3*



#24 b

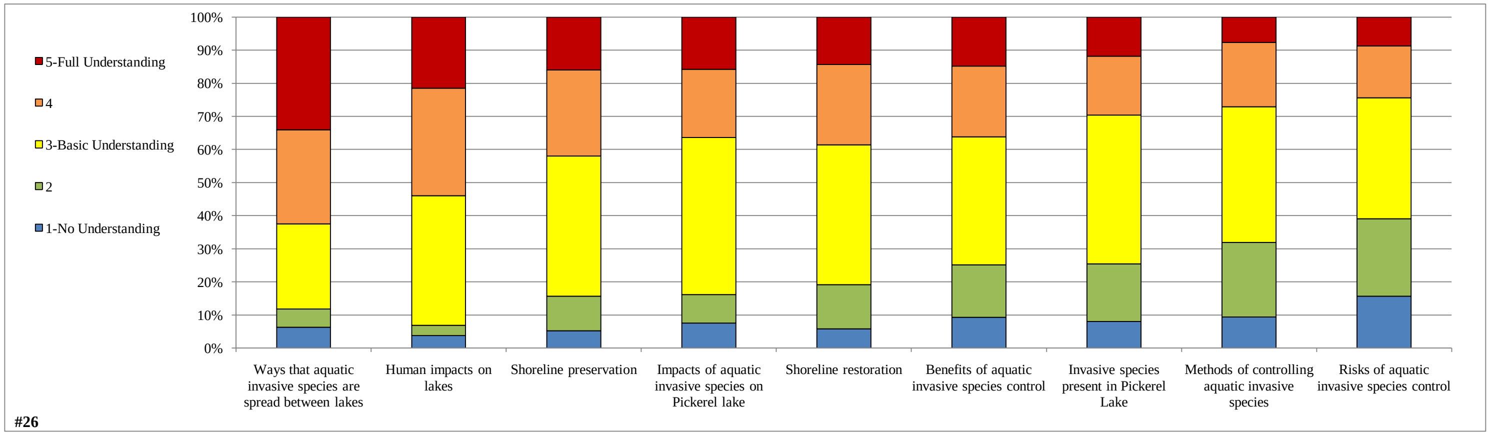
#25 Eradicate Eurasian water milfoil from the west lobe of Pickerel Lake and replace with wild rice?

	Total	%
Yes	171	*59.4*
No	17	*5.9*
Unsure	100	*34.7*
	288	*100.0*



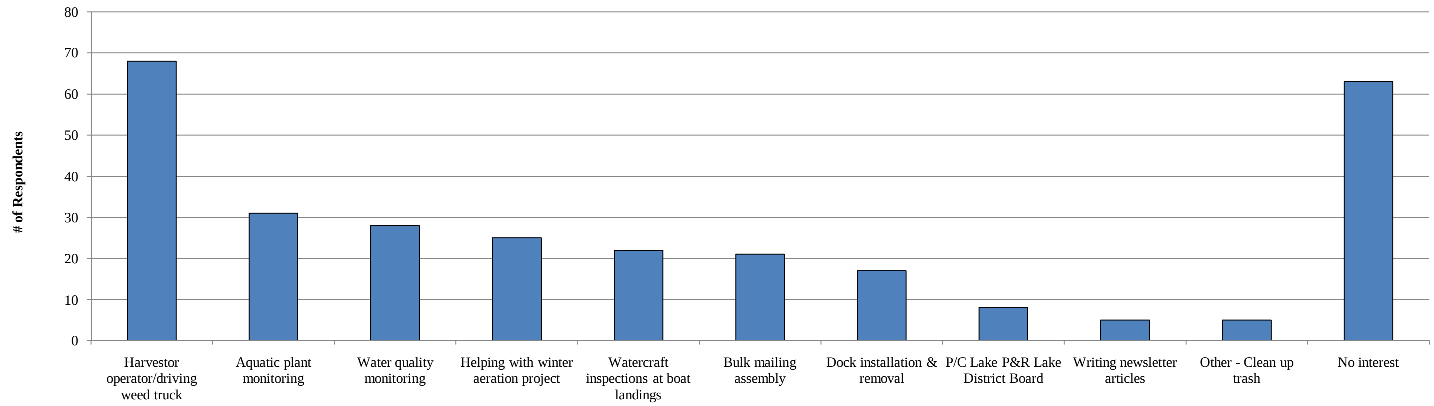
#26 Please describe your level of understanding of each of the following lake management issues.

	1-No Understanding	2	3-Basic Understanding	4	5-Full Understanding	*Total*	*Average*
Ways that aquatic invasive species are spread between lakes	18	16	74	82	98	*288*	*3.8*
Human impacts on lakes	11	9	113	94	62	*289*	*3.6*
Shoreline preservation	15	30	122	75	46	*288*	*3.4*
Impacts of aquatic invasive species on Pickerel lake	22	25	138	60	46	*291*	*3.3*
Shoreline restoration	17	39	124	71	42	*293*	*3.3*
Benefits of aquatic invasive species control	27	46	112	62	43	*290*	*3.2*
Invasive species present in Pickerel Lake	23	50	129	51	34	*287*	*3.1*
Methods of controlling aquatic invasive species	27	65	118	56	22	*288*	*2.9*
Risks of aquatic invasive species control	45	67	105	45	25	*287*	*2.8*



#27 Please circle all the activities in which you would be willing to participate.

	Total
Harvestor operator/driving weed truck	68
Aquatic plant monitoring	31
Water quality monitoring	28
Helping with winter aeration project	25
Watercraft inspections at boat landings	22
Bulk mailing assembly	21
Dock installation & removal	17
P/C Lake P&R Lake District Board	8
Writing newsletter articles	5
Other - Clean up trash	5
No interest	63



#27

C

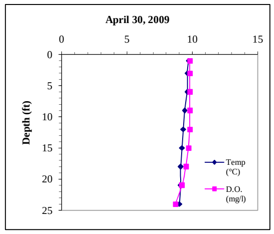
APPENDIX C

Water Quality Data

Crane Lake

Date:	**04-30-09**	**Max Depth (ft):**	26.0
Time:	19:00	**CLS Depth (ft):**	3.0
Weather:	90% Clouds, 62 °F, light breeze	**CLB Depth (ft):**	23.0
Ent:	BTB **Verf:**	**Secchi Depth (ft):**	14.4

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	9.7	9.8	7.5	232
3.0	9.6	9.8	7.8	232
6.0	9.6	9.8	7.9	232
9.0	9.4	9.8	8.2	231
12.0	9.3	9.8	7.1	232
15.0	9.2	9.7	8.2	232
18.0	9.1	9.5	8.1	232
21.0	9.1	9.2	7.9	232
24.0	9.0	8.7	7.8	232



Parameter	CLS	CLB
Total P (µg/L)	14.000	14.000
Dissolved P (µg/L)	ND	ND
Chl a (µg/L)	0.34	NA
TKN (µg/L	380.00	490.00
NO3+NO2-N (µg/L)	ND	29.000
NH3-N (µg/L)	17.000	ND
Total N (µg/L)	380.00	519.00
Lab Cond. (µS/cm)	238	239
Lab pH	8.02	7.87
Alkal (mg/l CaCO3)	117	117
Total Susp Sol (mg/l)	ND	ND
Calcium (mg/l)	15.6	NA

Data collected by TAH and EJH (Onterra)

Crane Lake

Date:	**06-23-09**	**Max Depth (ft):** NA	
Time:	NA	**CLS Depth (ft):** NA	
Weather:	NA	**CLB Depth (ft):** NA	
Ent:	BTB **Verf:**	**Secchi Depth (ft):**	13.0

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)

Parameter	CLS	CLB
Total P (µg/L)	27.000	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	2.74	NA
TKN (µg/L	450.00	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	450.00	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkal (mg/l CaCO3)	NA	NA
Total Susp Sol (mg/l)	NA	NA
Calcium (mg/l)	NA	NA

Data collected by: Phil Hollman (Crane Lake CLMN)

Crane Lake

Date:	**07-24-09**	**Max Depth (ft):** NA	
Time:	NA	**CLS Depth (ft):** NA	
Weather:	NA	**CLB Depth (ft):** NA	
Ent:	BTB **Verf:**	**Secchi Depth (ft):**	9.0

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)

Parameter	CLS	CLB
Total P (µg/L)	27.000	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	8.19	NA
TKN (µg/L	570.00	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	570.00	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkal (mg/l CaCO3)	NA	NA
Total Susp Sol (mg/l)	NA	NA
Calcium (mg/l)	NA	NA

Data collected by: Phil Hollman (Crane Lake CLMN)

Crane Lake

Date: 08-19-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): NA
CLS Depth (ft): NA
CLB Depth (ft): NA
Secchi Depth (ft): 6.0

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)

Parameter	CLS	CLB
Total P (µg/L)	24.000	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	9.38	NA
TKN (µg/L	800.00	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	800.00	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkal (mg/l CaCO3)	NA	NA
Total Susp Sol (mg/l)	NA	NA
Calcium (mg/l)	NA	NA

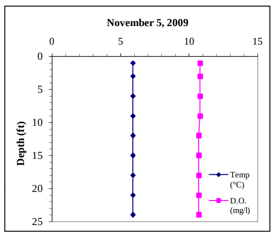
Data collected by: Phil Hollman (Crane Lake CLMN)

Crane Lake

Date: 11-05-09
Time: 1:15
Weather: Breezy, 44 °F, Clear
Ent: BTB **Verf:**

Max Depth (ft): 25.0
CLS Depth (ft): 3.0
CLB Depth (ft): 22.0
Secchi Depth (ft): 11.9

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	5.9	10.8	8.5	223
3.0	5.9	10.8	8.5	223
6.0	5.9	10.8	8.5	223
9.0	5.9	10.8	8.5	223
12.0	5.9	10.7	8.5	223
15.0	5.9	10.7	8.5	223
18.0	5.9	10.7	8.5	223
21.0	5.9	10.7	8.5	223
24.0	5.9	10.7	8.5	223



Parameter	CLS	CLB
Total P (µg/L)	16.000	15.000
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	6.31	NA
TKN (µg/L	490.00	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	490.00	NA
Lab Cond. (µS/cm)	NA	229
Lab pH	NA	8.17
Alkal (mg/l CaCO3)	NA	112
Total Susp Sol (mg/l)	3	2
Calcium (mg/l)	NA	NA

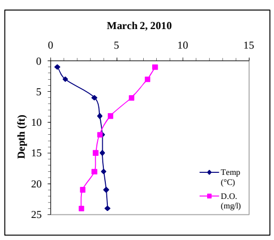
Data collected by: TAH and AAH (Onterra)

Crane Lake

Date: 03-02-10
Time: 9:00
Weather: Calm, 22 °F, 100% sun
Ent: DAC **Verf:**

Max Depth (ft): 26.2
CLS Depth (ft): 3.0
CLB Depth (ft): 24.0
Secchi Depth (ft): 14.0

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	0.5	7.9	7.6	259
3.0	1.1	7.3	7.5	257
6.0	3.3	6.1	7.5	252
9.0	3.7	4.5	7.4	253
12.0	3.9	3.7	7.4	256
15.0	3.9	3.4	7.4	260
18.0	4.0	3.3	7.4	264
21.0	4.2	2.4	7.3	271
24.0	4.3	2.3	7.3	272



Parameter	CLS	CLB
Total P (µg/L)	13.000	15.000
Dissolved P (µg/L)	3.000	7.000
Chl a (µg/L)		
TKN (µg/L	510.00	600.00
NO3+NO2-N (µg/L)		
NH3-N (µg/L)		35.000
Total N (µg/L)	510.00	600.00
Lab Cond. (µS/cm)		
Lab pH		
Alkal (mg/l CaCO3)		
Total Susp Sol (mg/l)		
Calcium (mg/l)		

Data collected by: DAC and BTB (Onterra)

Water Quality Data

2009 Parameter	Surface Count	Surface Mean	Bottom Count	Bottom Mean
Secchi Depth (feet)	6	11.4	NA	NA
Total P (µg/L)	6	20.2	3	14.7
Dissolved P (µg/L)	1	ND	1	ND
Chl a (µg/L)	5	5.4	NA	NA
TKN (µg/L	6	533.3	2	545.0
NO3+NO2-N (µg/L)	4	ND	1	29.0
NH3-N (µg/L)	4	17.0	1	ND
Total N (µg/L)	4	533.3	2	559.5
Lab Cond. (µS/cm)	1	238.0	2	234.0
Lab pH	1	8.0	2	8.0
Alkal (mg/l CaCO3)	1	117.0	2	114.5
Total Susp Sol (mg/l)	1	ND	1	ND
Calcium (µg/L)	1	15.6	NA	NA

Wisconsin Trophic State Index (WTSI)

Year	TP	Chla	SD
1990			46.06
1991			43.37
1992			44.25
1993			47.85
1994			39.57
1995			44.46
1996			46.77
1997			38.47
1998			45.37
2000			46.41
2001			43.79
2002	54.07	56.65	50.57
2003	52.31	49.79	47.00
2004	56.53	59.68	47.26
2005	55.81	57.15	43.00
2006	52.31	56.63	48.91
2009	53.50	49.11	44.93
All Years (weighted)	54.52	56.24	43.85
WI Natural Lakes	53.19	54.23	47.33
Northeast Region	51.05	51.49	45.61

Morphological / Geographical Data

Parameter	Value
Acreage	336.6
Volume (acre-feet)	3922.1
Perimeter (miles)	3.9
Shoreland Development	
Maximum Depth (feet)	25
County	Langlade County
WBIC	388500
Lillie Mason Region(1983)	Northeast Region
Nichols Ecoregion(1999)	NLFF

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			
Open Water			
Pasture/Grass			
Row Crops			
Urban - Rural Residential			
Wetland			

Watershed to Lake Area

	Secchi (feet)				Chlorophyll a (µg/L)				Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season			
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1990	8	6.78	4	8.63								
1991	25	9.74	15	10.4								
1992	14	8.57	10	9.78								
1993	30	7.55	18	7.62								
1994	26	11.56	17	13.53								
1995	27	9.15	16	9.64								
1996	29	8.35	18	8.21								
1997	30	13.82	18	14.6								
1998	8	9.19	5	9.05								
2000	11	8.39	6	8.42								
2001	9	9.78	5	10.1								
2002	6	6.83	4	6.31	3	20.57	2	18.51	5	32.2	3	28
2003	5	8	3	8.08	4	19.47	3	7.42	5	31.2	3	22.33
2004	7	12.54	4	7.94	6	27.59	5	27.72	9	32.56	5	38.4
2005	5	9.7	3	10.67	3	19.79	3	19.79	4	31.25	3	35
2006	4	7.56	3	7.08	4	19.85	3	18.46	4	28.25	3	22.33
2009	4	10.6	3	9.33	4	5.16	3	6.77	4	23	3	26
All Years (weighted)		9.6		10.1		19.4		17.5		30.3		29.6
WI Natural Lakes				7.9				13.4				25
Northeast Region				8.9				9.3				19

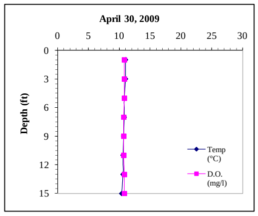
	Phosphorus (µg/L)				Nitrogen (µg/L)			
	Spring Turnover		Fall Turnover		Spring Turnover		Fall Turnover	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean

Pickerel Lake

Date: 04-30-09
Time: 12:44
Weather: 100 % Overcast, 60 °F, light breeze
Ent: BTB **Verf:**

Max Depth (ft): 15.2
PLS Depth (ft): 3.0
PLB Depth (ft): 12.0
Secchi Depth (ft): 8.6

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	11.0	10.8	7.7	214
3.0	11.0	10.8	8.0	215
5.0	10.8	10.8	7.9	215
7.0	10.8	10.7	8.4	215
9.0	10.7	10.7	8.5	215
11.0	10.6	10.7	8.5	214
13.0	10.6	10.8	8.6	205
15.0	10.4	10.8	8.7	214



Parameter	PLS	PLB
Total P (µg/L)	22.000	20.000
Dissolved P (µg/L)	ND	ND
Chl a (µg/L)	2.17	NA
TKN (µg/L	700.00	710.00
NO3+NO2-N (µg/L)	ND	ND
NH3-N (µg/L)	ND	ND
Total N (µg/L)	700.00	710.00
Lab Cond. (µS/cm)	221	221
Lab pH	8.17	8.15
Alkal (mg/l CaCO3)	111	110
Total Susp Sol (mg/l)	ND	ND
Calcium (mg/l)	27.0	NA

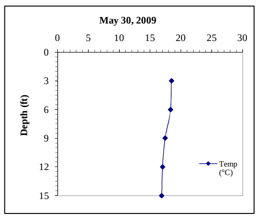
Data collected by TAH and EJH (Onterra)

Pickerel Lake

Date: 05-30-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): NA
PLS Depth (ft): NA
PLB Depth (ft): NA
Secchi Depth (ft): 10.0

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	61.5	18.4		
6.0	61.3	18.3		
9.0	59.9	17.4		
12.0	59.2	17.0		
15.0	59.0	16.9		



Parameter	PLS	PLB
Total P (µg/L)	21.000	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	NA	NA
TKN (µg/L	NA	NA
NO3+NO2-N (µg/L)	NA	NA
NH3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkal (mg/l CaCO3)	NA	NA
Total Susp Sol (mg/l)	NA	NA
Calcium (mg/l)	NA	NA

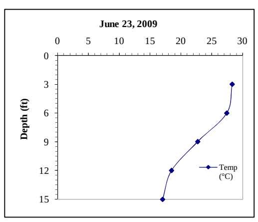
Data collected by: Phil Hollman (Pickerel Lake CLMN)

Pickerel Lake

Date: 06-23-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): NA
PLS Depth (ft): NA
PLB Depth (ft): NA
Secchi Depth (ft): 9.0

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	77.3	28.3		
6.0	75.9	27.4		
9.0	68.3	22.7		
12.0	61.5	18.4		
15.0	59.2	17.0		



Parameter	PLS	PLB
Total P (µg/L)	27.000	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	6.130	NA
TKN (µg/L	870.000	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	870.000	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkal (mg/l CaCO3)	NA	NA
Total Susp Sol (mg/l)	NA	NA
Calcium (mg/l)	NA	NA

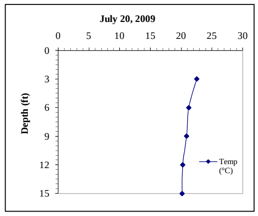
Data collected by: Phil Hollman (Pickerel Lake CLMN)

Pickerel Lake

Date: 07-20-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): NA
PLS Depth (ft): NA
PLB Depth (ft): NA
Secchi Depth (ft): 8.0

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	68.0	22.5		
6.0	66.0	21.3		
9.0	65.4	20.9		
12.0	64.4	20.3		
15.0	64.2	20.1		



Parameter	PLS	PLB
Total P (µg/L)	25.000	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	6.130	NA
TKN (µg/L	750.000	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	35.000	NA
Total N (µg/L)	750.000	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkal (mg/l CaCO3)	NA	NA
Total Susp Sol (mg/l)	NA	NA
Calcium (mg/l)	NA	NA

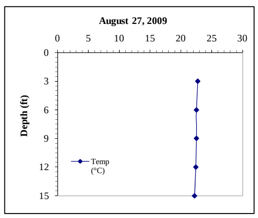
Data collected by: Phil Hollman (Pickerel Lake CLMN)

Pickerel Lake

Date: 08-27-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): NA
PLS Depth (ft): NA
PLB Depth (ft): NA
Secchi Depth (ft): 9.0

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	68.3	22.7		
6.0	68.0	22.5		
9.0	68.0	22.5		
12.0	67.8	22.4		
15.0	67.5	22.2		



Parameter	PLS	PLB
Total P (µg/L)	20.000	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	8.870	NA
TKN (µg/L	980.000	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	980.000	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkal (mg/l CaCO3)	NA	NA
Total Susp Sol (mg/l)	NA	NA
Calcium (mg/l)	NA	NA

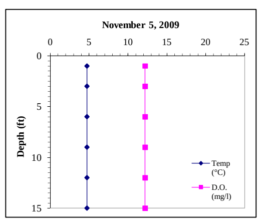
Data collected by: Phil Hollman (Pickerel Lake CLMN)

Pickerel Lake

Date: 11-05-09
Time: 2:25
Weather: Breezy, 44 °F, Clear
Ent: BTB **Verf:**

Max Depth (ft): 16.7
PLS Depth (ft): 3.0
PLB Depth (ft): 15.0
Secchi Depth (ft): 15.0

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	4.7	12.2	9.1	171
3.0	4.7	12.2	9.1	171
6.0	4.7	12.2	9.1	172
9.0	4.7	12.2	9.1	171
12.0	4.7	12.2	9.1	171
15.0	4.7	12.2	9.1	172



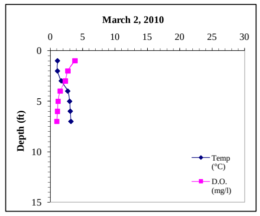
Parameter	PLS	PLB
Total P (µg/L)	15.000	14.000
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	2..38	NA
TKN (µg/L	700.00	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	700.00	NA
Lab Cond. (µS/cm)	NA	180
Lab pH	NA	8.49
Alkal (mg/l CaCO3)	NA	89
Total Susp Sol (mg/l)	ND	ND
Calcium (mg/l)	NA	NA

Data collected by: TAH and AAH (Onterra)

Pickerel Lake

Date:	03-02-10	**Max Depth (ft):**	9.4
Time:	12:20	**PLS Depth (ft):**	3.0
Weather:	Slight breeze, 20 °F, 100% sun	**PLB Depth (ft):**	7.0
Ent:	DAC **Verf:**	**Secchi Depth (ft):**	5.1

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	1.1	3.8	7.8	263
2.0	1.1	2.7	7.7	263
3.0	1.7	2.3	7.6	265
4.0	2.7	1.5	7.6	267
5.0	3.0	1.2	7.6	268
6.0	3.1	1.1	7.6	269
7.0	3.2	1.0	7.6	269



Parameter	PLS	PLB
Total P (µg/L)	16.000	15.000
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	NA	NA
TKN (µg/L	890.00	850.00
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	890.00	850.00
Lab Cond. (µS/cm)	NA	281
Lab pH	NA	7.90
Alkal (mg/l CaCO3)	NA	141
Total Susp Sol (mg/l)	ND	ND
Calcium (mg/l)	NA	NA

Data collected by: BTB and DAC (Onterra). Turbidity was high at 8 feet.

Water Quality Data

2009	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	9.9	NA	NA
Total P (µg/L)	6	21.7	2	17.0
Dissolved P (µg/L)	1	ND	1	ND
Chl a (µg/L)	4	5.8	NA	NA
TKN (µg/L	5	800.0	1	710.0
NO3+NO2-N (µg/L)	5	ND	1	ND
NH3-N (µg/L)	5	35.0	1	ND
Total N (µg/L)	5	800.0	1	710.0
Lab Cond. (µS/cm)	1	221.0	2	200.5
Lab pH	1	8.2	2	8.3
Alkal (mg/l CaCO3)	1	111.0	2	99.5
Total Susp Sol (mg/l)	2	ND	2	ND
Calcium (µg/L)	1	27.0	NA	NA

Wisconsin Trophic State Index (WTSI)			
Year	TP	Chla	SD
1987			50.21
1988			46.27
1989			40.85
1990			44.18
1991			43.00
1992			39.05
1993			40.53
1994			40.45
1995			41.19
1996			43.35
1997			41.54
1998			42.56
1999			41.30
2000			41.00
2001			40.91
2002	52.76	43.37	44.30
2003	53.93	51.37	48.73
2004	52.46	48.21	43.00
2005	51.95	48.36	43.37
2006	51.71	47.30	42.71
2007	50.34	43.47	43.93
2008	51.45	47.70	45.45
2009	52.87	49.40	46.11
All Years (weighted)	52.18	47.64	43.17
WI Natural Lakes	53.19	54.23	47.33
Northeast Region	51.05	51.49	45.61

Morphological / Geographical Data

Parameter	Value
Acreage	1256
Volume (acre-feet)	
Perimeter (miles)	10.25
Shoreland Development	
Maximum Depth (feet)	19
County	Langlade County
WBIC	388100
Lillie Mason Region(1983)	Northeast Region
Nichols Ecoregion(1999)	NLFF

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest			
Open Water			
Pasture/Grass			
Row Crops			
Urban - Rural Residential			
Wetland			

Watershed to Lake Area

	Secchi (feet)				Chlorophyll a (µg/L)				Phosphorus (µg/L)				Phosphorus (µg/L)				Nitrogen (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season				Spring Turnover		Fall Turnover		Spring Turnover		Fall Turnover	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1987	9	6.47	9	6.47																
1988	8	8.94	4	8.5																
1989	8	12.64	4	12.38																
1990	9	10.47	6	9.83																
1991	6	10.83	3	10.67																
1992	10	14.57	6	14.03																
1993	9	12.95	6	12.66																
1994	13	12.24	7	12.73																
1995	12	12.62	10	12.09																
1996	7	10.39	6	10.41																
1997	6	12.53	4	11.8																
1998	2	11.5	1	11																
1999	3	13.5	2	12																
2000	5	13.7	2	12.25																
2001	4	13.25	3	12.33																
2002	8	10.31	5	9.75	4	3.19	3	3.15	5	23.8	3	23.67								
2003	8	8.94	6	7.17	3	7.7	2	9.15	4	25	2	27.5								
2004	8	10.38	6	10.67	5	5.28	4	6.01	6	21	4	22.75								
2005	8	10.94	5	10.4	4	5.57	3	6.13	5	20.6	3	21.33								
2006	5	10.7	4	10.88	3	5.32	3	5.32	3	20.67	3	20.67								
2007	6	10.25	4	10	3	3.19	3	3.19	4	18.75	3	17.33								
2008	3	9	3	9	3	5.61	3	5.61	3	20	3	20								
2009	7	8.8	5	8.6	4	5.83	3	7.04	5	23	3	24								
All Years (weighted)		11.1		10.5		5.2		5.6		21.7		22.0								
WI Natural Lakes				7.9				13.4				25								
Northeast Region				8.9				9.3				19								

D

APPENDIX D

Watershed Analysis WiLMS Results

Date: 5/3/2010 Scenario: Crane Lake current

Lake Id: 388500
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 4345.0 acre
Total Unit Runoff: 13.1 in.
Annual Runoff Volume: 4743.3 acre-ft
Lake Surface Area <As>: 341 acre
Lake Volume <V>: 3922 acre-ft
Lake Mean Depth <z>: 11.5 ft
Precipitation - Evaporation: 5.3 in.
Hydraulic Loading: 4893.9 acre-ft/year
Areal Water Load <qs>: 14.4 ft/year
Lake Flushing Rate <p>: 1.25 1/year
Water Residence Time: 0.80 year
Observed spring overturn total phosphorus (SPO): 14.0 mg/m^3
Observed growing season mean phosphorus (GSM): 23.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	0.0	0.50	1.00	3.00	0.0	0	0	0
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	90	0.10	0.30	0.50	5.2	4	11	18
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)	0.0	0.05	0.10	0.25	0.0	0	0	0
Wetlands	491	0.10	0.10	0.10	9.5	20	20	20
Forest	3764	0.05	0.09	0.18	65.5	76	137	274
Lake Surface	341.0	0.10	0.30	1.00	19.8	14	41	138

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)		0.3	0.5	0.8	
# capita-years	0.0				
% Phosphorus Retained by Soil		98	90	80	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	250.2	461.4	992.7	100.0
Total Loading (kg)	113.5	209.3	450.3	100.0
Areal Loading (lb/ac-year)	0.73	1.35	2.91	0.0
Areal Loading (mg/m^2-year)	82.23	151.67	326.29	0.0
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)	219.7	370.1	688.4	100.0
Total NPS Loading (kg)	99.7	167.9	312.3	100.0

Phosphorus Prediction and Uncertainty Analysis Module

Date: 5/3/2010 Scenario: 14
Observed spring overturn total phosphorus (SPO): 14.0 mg/m^3
Observed growing season mean phosphorus (GSM): 23.0 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	11	21	44	-2	-9
Canfield-Bachmann, 1981 Natural Lake	12	20	37	-3	-13
Canfield-Bachmann, 1981 Artificial Lake	12	19	32	-4	-17
Rechow, 1979 General	5	9	19	-14	-61
Rechow, 1977 Anoxic	15	27	59	4	17
Rechow, 1977 water load<50m/year	9	16	34	-7	-30
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	11	20	43	6	43
Vollenweider, 1982 Combined OECD	10	17	31	-2	-11
Dillon-Rigler-Kirchner	5	10	21	-4	-29
Vollenweider, 1982 Shallow Lake/Res.	8	13	26	-6	-32
Larsen-Mercier, 1976	10	18	39	4	29
Nurnberg, 1984 Oxic	6	11	25	-12	-52

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	13	37	FIT	0	GSM
Canfield-Bachmann, 1981 Natural Lake	6	58	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	6	55	FIT	1	GSM
Rechow, 1979 General	5	16	FIT	0	GSM
Rechow, 1977 Anoxic	17	48	FIT	0	GSM
Rechow, 1977 water load<50m/year	10	29	FIT	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	10	38	FIT	0	SPO
Vollenweider, 1982 Combined OECD	8	31	FIT	0	ANN
Dillon-Rigler-Kirchner	6	18	FIT	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	7	25	FIT	0	ANN
Larsen-Mercier, 1976	12	32	P Pin	0	SPO
Nurnberg, 1984 Oxic	6	21	FIT	0	ANN

Water and Nutrient Outflow Module

Date: 5/3/2010   Scenario: 16
Average Annual Surface Total Phosphorus: 23.0mg/m^3
Annual Discharge: 4.89E+003 AF => 6.04E+006 m^3
Annual Outflow Loading: 292.8 LB =>   132.8 kg

Date: 5/3/2010 Scenario: Pickerel Lake Current

Lake Id: 388100
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 17654.0 acre
Total Unit Runoff: 13.1 in.
Annual Runoff Volume: 19272.3 acre-ft
Lake Surface Area <As>: 1299 acre
Lake Volume <V>: 10768.7 acre-ft
Lake Mean Depth <z>: 8.3 ft
Precipitation - Evaporation: 5.3 in.
Hydraulic Loading: 19846.0 acre-ft/year
Areal Water Load <qs>: 15.3 ft/year
Lake Flushing Rate <p>: 1.84 1/year
Water Residence Time: 0.54 year
Observed spring overturn total phosphorus (SPO): 22.0 mg/m^3
Observed growing season mean phosphorus (GSM): 23.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		|---- Loading (kg/ha-year) ----|				|----- Loading (kg/year) ----|		
Row Crop AG	0.0	0.50	1.00	3.00	0.0	0	0	0
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	265	0.10	0.30	0.50	3.8	11	32	54
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)	0.0	0.05	0.10	0.25	0.0	0	0	0
Wetlands	4264	0.10	0.10	0.10	20.5	173	173	173
Forest	13125	0.05	0.09	0.18	56.9	266	478	956
Lake Surface	1299.0	0.10	0.30	1.00	18.8	53	158	526

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)		0.3	0.5	0.8	
# capita-years	0.0				
% Phosphorus Retained by Soil		98	90	80	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	1105.5	1853.0	3765.4	100.0
Total Loading (kg)	501.4	840.5	1708.0	100.0
Areal Loading (lb/ac-year)	0.85	1.43	2.90	0.0
Areal Loading (mg/m^2-year)	95.39	159.89	324.91	0.0
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)	989.6	1505.3	2606.5	100.0
Total NPS Loading (kg)	448.9	682.8	1182.3	100.0

Phosphorus Prediction and Uncertainty Analysis Module

Date: 5/3/2010   Scenario: 13
Observed spring overturn total phosphorus (SPO): 22.0 mg/m^3
Observed growing season mean phosphorus (GSM): 23.0 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	24	48	1	4
Canfield-Bachmann, 1981 Natural Lake	15	23	40	0	0
Canfield-Bachmann, 1981 Artificial Lake	14	21	35	-2	-9
Rechow, 1979 General	6	10	19	-13	-57
Rechow, 1977 Anoxic	18	30	62	7	30
Rechow, 1977 water load<50m/year	11	19	39	-4	-17
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	14	23	46	1	5
Vollenweider, 1982 Combined OECD	12	19	34	-4	-18
Dillon-Rigler-Kirchner	6	11	21	-11	-50
Vollenweider, 1982 Shallow Lake/Res.	9	15	28	-8	-36
Larsen-Mercier, 1976	13	21	43	-1	-5
Nurnberg, 1984 Oxic	7	12	25	-11	-48

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	15	41	FIT	0	GSM
Canfield-Bachmann, 1981 Natural Lake	7	66	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	7	60	FIT	1	GSM
Rechow, 1979 General	6	17	FIT	0	GSM
Rechow, 1977 Anoxic	19	52	FIT	0	GSM
Rechow, 1977 water load<50m/year	12	33	FIT	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	12	42	FIT	0	SPO
Vollenweider, 1982 Combined OECD	10	35	FIT	0	ANN
Dillon-Rigler-Kirchner	7	18	FIT	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	8	28	FIT	0	ANN
Larsen-Mercier, 1976	14	36	P Pin	0	SPO
Nurnberg, 1984 Oxic	7	22	FIT	0	ANN

Water and Nutrient Outflow Module

Date: 5/3/2010   Scenario: 15
Average Annual Surface Total Phosphorus: 23.0mg/m^3
Annual Discharge: 1.82E+004 AF => 2.25E+007 m^3
Annual Outflow Loading: 1090.6 LB =>   494.7 kg

E

APPENDIX E

2006 Aquatic Plant Survey Data

Point Number	Latitude (decimal degrees	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Nymphaea odorata	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Sparganium fluctuans	Stuckenia pectinata	Vallisneria americana	Filamentous algae
1	45.411884	-88.904283	2.75	M	R		1								V								
2	45.411344	-88.904294	3.5	M	R							1			V							1	
3	45.410805	-88.904304	2.5	M	R										V							3	
4	45.410265	-88.904315	3	M	R		1			1	1		1		1								
5	45.412417	-88.903506	3.5	M	R		2												1				
6	45.411877	-88.903517	4	M	R		3															1	
7	45.411337	-88.903527	4	M	R		2												1			2	
8	45.410797	-88.903538	7.5	M	R		2																
9	45.410257	-88.903548	2	M	R		2								3								
10	45.412410	-88.902740	4	M	R		1					1											
11	45.411870	-88.902750	5.5	M	R		3												1				
12	45.411330	-88.902761	7.5	M	R		3																
13	45.410790	-88.902771	7	M	R		1												1				
14	45.412942	-88.901962	3	M	R			1		1				3	V					1		1	
15	45.412402	-88.901973	4.5	M	R		2						1								1	1	
16	45.411862	-88.901983	7	M	R		3																
17	45.411322	-88.901994	9	M	R		3																
18	45.410782	-88.902004	7	M	R		3			1		1							1				
19	45.412935	-88.901196	3	M	R		2		1		1	1			V							1	
20	45.412395	-88.901206	6.5	M	R		3												1				
21	45.411855	-88.901217	9.5	M	R		3																
22	45.411315	-88.901227	11	M	R		3																
23	45.410775	-88.901238	10	M	R		3																
24	45.410235	-88.901248	3	R	R	NONE																	
25	45.413468	-88.900419	1.5	S	R			1							V				1			1	
26	45.412928	-88.900429	3.25	S	R		1	3															
27	45.412388	-88.900440	8	M	R		3																
28	45.411848	-88.900450	12	M	R		3					1							1				

Point Number	Latitude (decimal degrees	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Nymphaea odorata	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Sparganium fluctuans	Stuckenia pectinata	Vallisneria americana	Filamentous algae
29	45.411308	-88.900461	13	M	R		3																
30	45.410768	-88.900471	12	M	R		3																
31	45.410228	-88.900482	9	M	R		3																
32	45.414000	-88.899642	4	M	R		1	1		1		1										1	
33	45.413460	-88.899652	5.5	M	R		3					1							1			1	
34	45.412920	-88.899663	9	M	R		3						2										
35	45.412380	-88.899673	14	M	R	NONE																	
36	45.411840	-88.899683	15	M	R	NONE																	
37	45.411300	-88.899694	14	M	R	NONE																	
38	45.410760	-88.899704	14.5	M	R	NONE																	
39	45.410220	-88.899715	11	M	R		3												1				
40	45.409680	-88.899725	6	M	R		3					1							1				
41	45.414533	-88.898864	3	M	R					3		1											
42	45.413993	-88.898875	6	M	R		3																
43	45.413453	-88.898885	9	M	R		3																
44	45.412913	-88.898896	13	M	R	NONE																	
45	45.412373	-88.898906	15	M	R	NONE																	
46	45.411833	-88.898917	14.5	M	R	NONE																	
47	45.411293	-88.898927	15	M	R	NONE																	
48	45.410753	-88.898938	15	M	R	NONE																	
49	45.410213	-88.898948	9.5	M	R		3																
50	45.415605	-88.898077	2.5	M	R					2													
51	45.415065	-88.898087	3.5	S	R					1		1											
52	45.414525	-88.898098	6	M	R		3																
53	45.413985	-88.898108	7	M	R		3																
54	45.413445	-88.898119	13	M	R		2					1											
55	45.412905	-88.898129	15	M	R	NONE																	
56	45.412365	-88.898140	15	M	R		1																

Point Number	Latitude (decimal degrees	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Nymphaea odorata	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Sparganium fluctuans	Stuckenia pectinata	Vallisneria americana	Filamentous algae
57	45.411825	-88.898150	15	M	R	NONE																	
58	45.411285	-88.898161	15	M	R	NONE																	
59	45.410745	-88.898171	6	R	R		3						2						1				
60	45.410206	-88.898182	7	M	R		3					1											
61	45.409666	-88.898192	4	M	R		2					1			V				1			2	
62	45.416138	-88.897299	3.5	M	R			1		1		1										1	
63	45.415598	-88.897310	4.5	M	R		1	3				1							1			1	
64	45.415058	-88.897320	7	M	R		3																
65	45.414518	-88.897331	9	M	R		3						1			1							
66	45.413978	-88.897342	13.5	M	R		1																
67	45.413438	-88.897352	15	M	R	NONE																	
68	45.412898	-88.897363	15	M	R	NONE																	
69	45.412358	-88.897373	16.5	M	R	NONE																	
70	45.411818	-88.897384	16	M	R	NONE																	
71	45.411278	-88.897394	15	M	R		1												1				
72	45.410738	-88.897405	8	R	R		1						2			1			1				
73	45.410198	-88.897415	5	S	R		1	1					1	3								1	
74	45.409658	-88.897426	4	S	R		1															1	
75	45.416670	-88.896522	3.5	M	R		1			1		1	1										
76	45.416130	-88.896533	4	M	R		1	3				1					1					1	
77	45.415590	-88.896543	8	M	R		3												1				
78	45.415051	-88.896554	13	M	R		3																
79	45.414511	-88.896564	14	M	R		3																
80	45.413971	-88.896575	15	M	R	NONE																	
81	45.413431	-88.896585	16	M	R	NONE																	
82	45.412891	-88.896596	16	M	R	NONE																	
83	45.412351	-88.896606	17	S	R	NONE																	
84	45.411811	-88.896617	17	M	R	NONE																	

Point Number	Latitude (decimal degrees	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Nymphaea odorata	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Sparganium fluctuans	Stuckenia pectinata	Vallisneria americana	Filamentous algae
85	45.411271	-88.896627	16	S	R	NONE																	
86	45.410731	-88.896638	15	S	R		1																
87	45.410191	-88.896648	13.5	R	R		1																
88	45.409651	-88.896659	9	M	R		3					1											
89	45.409111	-88.896669	9	M	R		3					1											
90	45.408571	-88.896680	6	M	R		3					1		1								2	
91	45.417203	-88.895745	3	M	R					1		1					1					3	
92	45.416663	-88.895756	4.5	M	R		3			1		1	1									1	
93	45.416123	-88.895766	6.5	M	R		3					1	1								1		
94	45.415583	-88.895777	10.5	M	R		3						1						1				
95	45.415043	-88.895787	14	M	R														1				
96	45.414503	-88.895798	15.5	M	R	NONE																	
97	45.413963	-88.895808	16	M	R	NONE																	
98	45.413423	-88.895819	16.5	M	R	NONE																	
99	45.412883	-88.895829																					
100	45.412343	-88.895840																					
101	45.411803	-88.895850																					
102	45.411263	-88.895861	18.5	M	R	NONE																	
103	45.410723	-88.895871	16	M	R	NONE																	
104	45.410183	-88.895882	12.5	R	R	NONE																	
105	45.409643	-88.895892	15	M	R		1																
106	45.409103	-88.895903	14	M	R	NONE																	
107	45.408563	-88.895913	7	M	R		3																
108	45.417196	-88.894978	4	M	R		2	1				1	1					2			1	1	
109	45.416656	-88.894989	7	M	R		3												2				
110	45.416116	-88.894999	9.5	M	R	NONE	3						2						2				
111	45.415576	-88.895010	14	M	R	NONE																	
112	45.415036	-88.895020	15	M	R	NONE																	

Point Number	Latitude (decimal degrees	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Nymphaea odorata	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Sparganium fluctuans	Stuckenia pectinata	Vallisneria americana	Filamentous algae
113	45.414496	-88.895031	16	M	R	NONE																	
114	45.413956	-88.895041																					
115	45.413416	-88.895052																					
116	45.412876	-88.895063																					
117	45.412336	-88.895073																					
118	45.411796	-88.895084																					
119	45.411256	-88.895094																					
120	45.410716	-88.895105																					
121	45.410176	-88.895115																					
122	45.409636	-88.895126	16	M	R	NONE																	
123	45.409096	-88.895136	15	M	R	NONE																	
124	45.408556	-88.895147	14.5	M	R	NONE																	
125	45.408016	-88.895157	11	M	R		3					1	1						1			1	
126	45.417188	-88.894212	5.5	M	R		2					1	1			1		1	2		1	1	
127	45.416648	-88.894222	8	M	R		3						1						1				
128	45.416108	-88.894233	14	M	R	NONE																	
129	45.415568	-88.894243	15	M	R	NONE																	
130	45.415028	-88.894254	15.5	M	R	NONE																	
131	45.414488	-88.894264																					
132	45.413948	-88.894275																					
133	45.413408	-88.894285																					
134	45.412868	-88.894296																					
135	45.412328	-88.894306																					
136	45.411788	-88.894317																					
137	45.411248	-88.894328																					
138	45.410708	-88.894338																					
139	45.410168	-88.894349																					
140	45.409629	-88.894359																					

Point Number	Latitude (decimal degrees	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Nymphaea odorata	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Sparganium fluctuans	Stuckenia pectinata	Vallisneria americana	Filamentous algae
141	45.409089	-88.894370	18	M	R	NONE																	
142	45.408549	-88.894380	15	M	R	NONE																	
143	45.408009	-88.894391	15	M	R	NONE																	
144	45.407469	-88.894401	4.5	M	R		1	3				1										2	
145	45.417181	-88.893445	6	M	R		3					1	1						1				
146	45.416641	-88.893455	10	M	R		3					1							1				
147	45.416101	-88.893466	15	M	R	NONE																	
148	45.415561	-88.893477	16	M	R	NONE																	
149	45.415021	-88.893487	16.5	M	R	NONE																	
150	45.414481	-88.893498																					
151	45.413941	-88.893508																					
152	45.413401	-88.893519																					
153	45.412861	-88.893529																					
154	45.412321	-88.893540																					
155	45.411781	-88.893550																					
156	45.411241	-88.893561																					
157	45.410701	-88.893571																					
158	45.410161	-88.893582																					
159	45.409621	-88.893593	20	M	R	NONE																	
160	45.409081	-88.893603	19	M	R	NONE																	
161	45.408541	-88.893614	17	M	R	NONE																	
162	45.408001	-88.893624	16	M	R		3												1				
163	45.417173	-88.892678	3	M	R		3	2		1		1											
164	45.416633	-88.892689	9.5	M	R		3					1											
165	45.416093	-88.892699	15	M	R		2																
166	45.415553	-88.892710	16	M	R	NONE																	
167	45.415013	-88.892720	17	M	R	NONE																	
168	45.414473	-88.892731	18	M	R	NONE																	

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169	45.413933	-88.892741																					
170	45.413393	-88.892752																					
171	45.412854	-88.892763																					
172	45.412314	-88.892773																					
173	45.411774	-88.892784																					
174	45.411234	-88.892794																					
175	45.410694	-88.892805																					
176	45.410154	-88.892815																					
177	45.409614	-88.892826																					
178	45.409074	-88.892836	19	M	R	NONE																	
179	45.408534	-88.892847	19	M	R	NONE																	
180	45.407994	-88.892858	16	M	R	NONE																	
181	45.407454	-88.892868	7	M	R		3					1	1										
182	45.406914	-88.892879	4	M	R		2					3											
183	45.406374	-88.892889	4	M	R		3					1										2	
184	45.417166	-88.891911	3	S	R		1	2				1	1										
185	45.416626	-88.891922	5	S	R		3	2		1		1	1			1	1		1				
186	45.416086	-88.891933	13	S	R		1												1				
187	45.415546	-88.891943	17	M	R	NONE																	
188	45.415006	-88.891954	18.5	M	R	NONE																	
189	45.414466	-88.891964	20	M	R	NONE																	
190	45.413926	-88.891975																					
191	45.413386	-88.891985																					
192	45.412846	-88.891996																					
193	45.412306	-88.892006																					
194	45.411766	-88.892017																					
195	45.411226	-88.892028																					
196	45.410686	-88.892038																					

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197	45.410146	-88.892049																					
198	45.409606	-88.892059																					
199	45.409066	-88.892070	23	M	R	NONE																	
200	45.408526	-88.892080	23	M	R	NONE																	
201	45.407986	-88.892091	18	M	R	NONE																	
202	45.407446	-88.892102	15	M	R							1											
203	45.406906	-88.892112	10	M	R		2																
204	45.406366	-88.892123	6	M	R		1					1	1									1	
205	45.405826	-88.892133	1.5	M	R							1											
206	45.417158	-88.891145	1.5	S	R			1															
207	45.416618	-88.891155	5	M	R		3	1															
208	45.416078	-88.891166	8	M	R		3					1	1			1							
209	45.415539	-88.891176	19.5	M	R	NONE																	
210	45.414999	-88.891187	24	M	R	NONE																	
211	45.414459	-88.891198	25	M	R	NONE																	
212	45.413919	-88.891208																					
213	45.413379	-88.891219																					
214	45.412839	-88.891229																					
215	45.412299	-88.891240																					
216	45.411759	-88.891250																					
217	45.411219	-88.891261																					
218	45.410679	-88.891272																					
219	45.410139	-88.891282																					
220	45.409599	-88.891293																					
221	45.409059	-88.891303	25	M	R	NONE																	
222	45.408519	-88.891314	23	M	R	NONE																	
223	45.407979	-88.891324	22	M	R	NONE																	
224	45.407439	-88.891335	17	M	R		3																

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225	45.406899	-88.891345	9.5	M	R		3																
226	45.406359	-88.891356	8	M	R		3																
227	45.405819	-88.891367	4	M	R		2					1											
228	45.416611	-88.890389	4	M	R			3															
229	45.416071	-88.890399	12	M	R		3																
230	45.415531	-88.890410	20	M	R	NONE																	
231	45.414991	-88.890420	24	M	R	NONE																	
232	45.414451	-88.890431	25	M	R	NONE																	
233	45.413911	-88.890441																					
234	45.413371	-88.890452																					
235	45.412831	-88.890463																					
236	45.412291	-88.890473																					
237	45.411751	-88.890484																					
238	45.411211	-88.890494																					
239	45.410671	-88.890505																					
240	45.410131	-88.890515																					
241	45.409591	-88.890526	25	M	R	NONE																	
242	45.409051	-88.890537	21	M	R	NONE																	
243	45.408511	-88.890547	21	M	R	NONE																	
244	45.407971	-88.890558	18	M	R		1												1				1
245	45.407431	-88.890568	17	M	R		2												1				
246	45.406891	-88.890579	6	M	R			3															
247	45.406351	-88.890589	6	M	R		1					1		2									
248	45.405812	-88.890600	3	M	R		1	3				1										1	1
249	45.417144	-88.889611	1.5	M	R		1															1	
250	45.416604	-88.889622	4.5	M	R		1	1					1									1	
251	45.416064	-88.889632	10	M	R		1					1							1				
252	45.415524	-88.889643	21	M	R							1											

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253	45.414984	-88.889654	25	M	R	NONE																	
254	45.414444	-88.889664	25	M	R	NONE																	
255	45.413904	-88.889675	25	M	R	NONE																	
256	45.413364	-88.889685	25	M	R	NONE																	
257	45.412824	-88.889696	25	M	R	NONE																	
258	45.412284	-88.889707	25	M	R	NONE																	
259	45.411744	-88.889717	25	M	R	NONE																	
260	45.411204	-88.889728	25	M	R	NONE																	
261	45.410664	-88.889738	25	M	R	NONE																	
262	45.410124	-88.889749	25	M	R	NONE																	
263	45.409584	-88.889759	25	M	R	NONE																	
264	45.409044	-88.889770	25	M	R	NONE																	
265	45.408504	-88.889781	25	M	R	NONE																	
266	45.407964	-88.889791	19	M	R		3												1			1	
267	45.407424	-88.889802	19	M	R	NONE																	
268	45.406344	-88.889823	3.5	M	R		1					1										1	1
269	45.417136	-88.888845	2.5	M	R			1	1													2	
270	45.416596	-88.888855	5	M	R																	2	
271	45.416056	-88.888866	10	M	R		1						3										
272	45.415516	-88.888876	20	M	R	NONE																	
273	45.414976	-88.888887	23	M	R	NONE																	
274	45.414436	-88.888898	25	M	R	NONE																	
275	45.413896	-88.888908	25	M	R	NONE																	
276	45.413356	-88.888919	25	M	R	NONE																	
277	45.412816	-88.888929	25	M	R	NONE																	
278	45.412276	-88.888940	25	M	R	NONE																	
279	45.411736	-88.888950	25	M	R	NONE																	
280	45.411196	-88.888961	25	M	R	NONE																	

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281	45.410656	-88.888972	25	M	R	NONE																	
282	45.410116	-88.888982	24	M	R	NONE																	
283	45.409576	-88.888993	22	M	R	NONE																	
284	45.409036	-88.889003	20	M	R	NONE																	
285	45.408496	-88.889014	18	M	R	NONE																	
286	45.407957	-88.889025	17	M	R	NONE																	
287	45.407417	-88.889035	18	M	R							1							1				1
288	45.406877	-88.889046	5	S	R		1	1					1										
289	45.417129	-88.888078	2	M	R		1					1							1			1	1
290	45.416589	-88.888088	6	M	R																	2	
291	45.416049	-88.888099	11	M	R		1																
292	45.415509	-88.888110	18	M	R	NONE																	
293	45.414969	-88.888120	21	M	R	NONE																	
294	45.414429	-88.888131	25	M	R	NONE																	
295	45.413889	-88.888141	25	M	R	NONE																	
296	45.413349	-88.888152	25	M	R	NONE																	
297	45.412809	-88.888163	25	M	R	NONE																	
298	45.412269	-88.888173	25	M	R	NONE																	
299	45.411729	-88.888184	25	M	R	NONE																	
300	45.411189	-88.888194	25	M	R	NONE																	
301	45.410649	-88.888205	23	M	R	NONE																	
302	45.410109	-88.888216	25	M	R	NONE																	
303	45.409569	-88.888226	22	M	R	NONE																	
304	45.409029	-88.888237	20	M	R	NONE																	
305	45.408489	-88.888247	20	M	R	NONE																	
306	45.407949	-88.888258	15	M	R		1					1							1				1
307	45.407409	-88.888269	18	M	R	NONE																	
308	45.406869	-88.888279	4	R	R	NONE																	

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309	45.417121	-88.887311	2.25	M	R												1					3	
310	45.416581	-88.887322	4.5	M	R		1					1										3	
311	45.416041	-88.887332	7	M	R		1												1			1	
312	45.415501	-88.887343	8	M	R		3					1							1				
313	45.414961	-88.887354	17	M	R	NONE																	
314	45.414421	-88.887364	18	M	R	NONE																	
315	45.413881	-88.887375	25	M	R	NONE																	
316	45.413341	-88.887385	24	M	R	NONE																	
317	45.412801	-88.887396	25	M	R	NONE																	
318	45.412261	-88.887407	25	M	R	NONE																	
319	45.411721	-88.887417	25	M	R	NONE																	
320	45.411181	-88.887428	25	M	R	NONE																	
321	45.410641	-88.887438	25	M	R	NONE																	
322	45.410101	-88.887449	22	M	R	NONE																	
323	45.409562	-88.887460	22	M	R		1																
324	45.409022	-88.887470	19	M	R	NONE																	
325	45.408482	-88.887481	20	M	R														1				
326	45.407942	-88.887491	18	M	R							1											
327	45.407402	-88.887502	9	M	R		3																
328	45.406862	-88.887513	3	R	R	NONE																	
329	45.406322	-88.887523	4	M	R		1								1							1	
330	45.405782	-88.887534	2	M	R		2								1							1	
331	45.405242	-88.887544	3.5	M	R				3					1	1								
332	45.416574	-88.886555	2.5	M	R							1										2	
333	45.416034	-88.886566	4	M	R		2	3															
334	45.415494	-88.886576	3	S	R			3				1		1									
335	45.414954	-88.886587	5	M	R		3					1											
336	45.414414	-88.886598	6	S	R			3											1				

Point Number	Latitude (decimal degrees	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Nymphaea odorata	Potamogeton praelongus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Sparganium fluctuans	Stuckenia pectinata	Vallisneria americana	Filamentous algae
337	45.413874	-88.886608	20	M	R	NONE																	
338	45.413334	-88.886619	20	M	R	NONE																	
339	45.412794	-88.886629	22	M	R	NONE																	
340	45.412254	-88.886640	25	M	R	NONE																	
341	45.411714	-88.886651	23	M	R	NONE																	
342	45.411174	-88.886661	23	M	R	NONE																	
343	45.410634	-88.886672	22.5	M	R	NONE																	
344	45.410094	-88.886682	22.5	M	R	NONE																	
345	45.409554	-88.886693	9	S	R		2					1							1				
346	45.409014	-88.886704	11	M	R									1									1
347	45.408474	-88.886714	11	M	R		3																
348	45.407934	-88.886725	6	M	R		3	1				1		1									
349	45.407394	-88.886735	5	R	R	NONE																	
350	45.406854	-88.886746	6	M	R		3					1	1										1
351	45.406314	-88.886757	3.75	S	R							1										1	
352	45.405774	-88.886767	4.25	M	R				1			1											
353	45.405234	-88.886778	4.25	M	R							1		1									
354	45.404694	-88.886788	2	S	R										V							1	
355	45.404154	-88.886799	3.5	M	R		V	1				1			V								
356	45.403614	-88.886810	4.5	M	R		1					1											
357	45.403074	-88.886820	4	S	R							1											
358	45.402534	-88.886831	3	M	R									2	V							2	
359	45.414946	-88.885820	3	S	R			3															
360	45.414406	-88.885831	4	M	R		3	1															
361	45.413866	-88.885841	7.5	M	R		3						1									2	
362	45.413326	-88.885852	9.5	M	R		3					1											
363	45.412786	-88.885863	18	M	R		1																
364	45.412246	-88.885873	20	M	R	NONE																	

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365	45.411706	-88.885884	22	M	R	NONE																	
366	45.411166	-88.885895	23	M	R	NONE																	
367	45.410627	-88.885905	21	M	R	NONE																	
368	45.410087	-88.885916	6	M	R		2						1									1	
369	45.409547	-88.885926	3.75	R	R	NONE																	
370	45.409007	-88.885937	5	M	R		3	1															
371	45.408467	-88.885948	9	M	R		3																
372	45.407927	-88.885958	8	M	R		3																
373	45.407387	-88.885969	6	M	R		3																
374	45.406847	-88.885979	4	S	R			1														1	
375	45.406307	-88.885990	6	M	R		1					1											1
376	45.405767	-88.886001	7	M	R		3																
377	45.402527	-88.886064	3	M	R		1	3															
378	45.401987	-88.886075	3	M	R		1		2					2									
379	45.414399	-88.885064	4	M	R		2					2										2	
380	45.413859	-88.885075	5.5	M	R		1					2		1							1	1	
381	45.413319	-88.885085	3	S	R		1					1											
382	45.412779	-88.885096	3.5	M	R		1			1												1	1
383	45.412239	-88.885107	4	S	R		1																
384	45.411699	-88.885117	14	S	R	NONE																	
385	45.411159	-88.885128	9	S	R		1																
386	45.410619	-88.885139	12	M	R		3																
387	45.410079	-88.885149	4	S	R									1									
388	45.408459	-88.885181	4	M	R			2				1											
389	45.407919	-88.885192	6	M	R		1	1				1	1	2									
390	45.407379	-88.885202	5	M	R		1							1					1			1	
391	45.406839	-88.885213	6	M	R		3											2					
392	45.406299	-88.885224	5	M	R		2																

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393	45.405759	-88.885234	2.5	M	R			1				1										1	
394	45.401979	-88.885308	2.5	M	R			1	1					2								2	
395	45.401439	-88.885319	2.5	M	R		1		1					2	1					1		V	
396	45.411691	-88.884351	5.5	M	R		2					1							2				
397	45.411152	-88.884361	3.5	R	R	NONE																	
398	45.407372	-88.884436	3.5	M	R		3	1				1										1	
399	45.406832	-88.884446	3.5	M	R		1		1			1		1									
400	45.401432	-88.884553	5	M	R		1	3				1										1	
401	45.400885	-88.883797	3.5	M	R	NONE																	

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
1	45.396904	-88.933855	4	M	P					1				1	1		V	2								1					1		
2	45.396139	-88.933869	7	M	P					2				2																	3		
3	45.404544	-88.932625				not navigable												V															
4	45.397659	-88.932755	7	M	P			1		2	1			V	3				1														
5	45.396894	-88.932769	7	M	P					1				1	1				1							3					2		
6	45.396129	-88.932783	9	M	P				1	1					2											2					3		
7	45.395364	-88.932798	6	M	P		V			3	2				1																1		
8	45.404534	-88.931539				not navigable												V															
9	45.398414	-88.931654	2.5	S	P			1						1	3											1							
10	45.397649	-88.931669	7	M	P			1		1					3											1					1		
11	45.396884	-88.931683	8	M	P					1					1				1							2					2		
12	45.396119	-88.931698	9	M	P					2					1											1					3		
13	45.395354	-88.931712	10.5	M	P														2				1										
14	45.394589	-88.931726	10	M	P				1	1	1			1	3				1			2				1	V				2		
15	45.409113	-88.930366	4.5	M	P			2		1				1				V								1	1				1		
16	45.408348	-88.930381	7	M	P			2		1					1											1					1		
17	45.407583	-88.930395	4.5	M	P			2		1				1												3					1		
18	45.405288	-88.930439	2	M	P			1																									
19	45.404523	-88.930453	5	M	P			3	1	3			1					V															
20	45.398404	-88.930569	4	S	P										2											1							
21	45.397639	-88.930583	3.5	R	P				1										1												1		
22	45.396874	-88.930597	6	M	P					1					3							1				1					2		
23	45.396109	-88.930612	6	M	P					1					3																1		
24	45.395344	-88.930626	8	M	P				1	1					3				2							1					1		
25	45.394579	-88.930641	8	M	P			1		1				1	3							1				1					2		
26	45.393814	-88.930655	7	M	P			1		2				V	3											1					1		
27	45.409868	-88.929266	5	M	P			1		3				1	3												1				2		
28	45.409103	-88.929280	6	M	P					1				3	1											1					2		
29	45.408338	-88.929295	6	M	P									1	1											3					1		
30	45.407573	-88.929309	4.5	M	P					1				1	1											2					3		
31	45.406808	-88.929324	5	M	P			1		1								V								3					1		
32	45.406043	-88.929338	6	M	P			1							1											3					2		
33	45.405278	-88.929353	5	M	P			3		2	1											1				3	1						
34	45.404513	-88.929367	5	M	P			1		2					3								1			1							
35	45.403748	-88.929382	4.5	M	P		V		1	1					3							V	V			1							
36	45.402983	-88.929396	4	M	P		V			2					3											1							
37	45.402218	-88.929410	4	S	P					1					3																		
38	45.401453	-88.929425	4.5	M	P		V			1				1	3																		
39	45.399158	-88.929468	1.75	S	P					2				V	3																		
40	45.398393	-88.929483	5.5	M	P			1		2					3							1				2					1		
41	45.397628	-88.929497	7.5	M	P					2					3							1									1		

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42	45.396098	-88.929526	7.5	M	P					1					3											1					1		
43	45.395333	-88.929540	7	M	P					1					3																1		
44	45.394569	-88.929555	3.5	M	P			1		3					1		V														1		
45	45.409858	-88.928180	3.5	M	P									1												3					1		
46	45.409093	-88.928194	6	M	P			2						2								V				V					1		
47	45.408328	-88.928209	6	M	P										1											3					1		
48	45.407563	-88.928223	4.5	M	P									1	1											1					1		
49	45.406798	-88.928238	5	S	P				1	1					1								1			2					2		
50	45.406033	-88.928252	4.5	M	P				1																	2					1		
51	45.405268	-88.928267	4.5	M	P					1					3							V					V				1		
52	45.404503	-88.928281	4.5	M	P				1						2								1								1		
53	45.403738	-88.928296	5	M	P										3	1				1			1			1					1		
54	45.402973	-88.928310	7	M	P					1					2																1		
55	45.402208	-88.928325	5	M	P										3																		
56	45.401443	-88.928339	5.5	M	P					1					2							1	1			2					2		
57	45.400678	-88.928353	5	S	P					1					3											1							
58	45.399148	-88.928382	5	M	P			1		1					3																		
59	45.398383	-88.928397	5.5	M	P				1	1					3				1												1		
60	45.397618	-88.928411	5.5	M	P		V		1						2																2		
61	45.396853	-88.928426	6	M	P		V			1					2											1							
62	45.396088	-88.928440	4	S	P				1					1	1																1		
63	45.395323	-88.928455	7	M	P			1		1					3																1		
64	45.394558	-88.928469	3.5	M	P					1				1																	1		
65	45.409848	-88.927094	5	M	P			1		1				2				1					1			1							
66	45.409083	-88.927108	5	M	P																										1		
67	45.408318	-88.927123	7	M	P			V											1												1		
68	45.407553	-88.927137	7.5	M	P					1				1								1	1			1					1		
69	45.406788	-88.927152	5	M	P		V			3				1	2				V							1					2		
70	45.406023	-88.927166	7	M	P										3								V			1					1		
71	45.405258	-88.927181	6	M	P					V					1																		
72	45.404493	-88.927195	6	M	P										2											1					1		
73	45.403728	-88.927210	6	M	P										2								1								1		
74	45.402963	-88.927224	5	M	P		V		1	1					3				V							1					1		
75	45.402198	-88.927239	6.5	M	P					1					3											1					1		
76	45.401433	-88.927253	6.5	S	P					2					3																		
77	45.400668	-88.927268	7	R	P			1		1					3											1							
78	45.399903	-88.927282	5	R	P					1					2																1		
79	45.399138	-88.927297	5	M	P					V					3																1		
80	45.398373	-88.927311	7	M	P			1						1	2											1					1		
81	45.397608	-88.927326	7	M	P										3							1				1							
82	45.396843	-88.927340	6	M	P					2					3																1		

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83	45.396078	-88.927354	6	R	P				1						2																V		
84	45.395313	-88.927369	7	M	P					1					3				1							1					1		
85	45.394548	-88.927383	6	M	P			1		1					2											1							
86	45.393783	-88.927398	4	M	P										2		V																
87	45.409837	-88.926008	5	M	P			1	1					3																			
88	45.409072	-88.926022	6.5	M	P					V																3							
89	45.408307	-88.926037	6	M	P				1					V	1											3					V		
90	45.407543	-88.926051	5	M	P									1	1							2				3					1		
91	45.406778	-88.926066	4.5	M	P			1	1					1								V									1		
92	45.406013	-88.926080	6	M	P					1					3								1								2		
93	45.405248	-88.926095	6.5	M	P										1																		
94	45.404483	-88.926109	7.5	M	P										1				1			1	1								2		
95	45.403718	-88.926124	6	M	P										3											1					2		
96	45.402953	-88.926138	8	M	P										1								V			V							
97	45.402188	-88.926153	7	M	P														1			1											
98	45.401423	-88.926167	6.5	M	P										1																		
99	45.400658	-88.926182	7.5	M	P					1					3																1		
100	45.399893	-88.926196	9	M	P					1					3							1											
101	45.399128	-88.926211	6	M	P										2							2											
102	45.398363	-88.926225	6	M	P						1				3							V	1										
103	45.397598	-88.926240	6	M	P										3							V									1		
104	45.396833	-88.926254	6	M	P										2							2											
105	45.396068	-88.926269	7	M	P					1					3							1				2							
106	45.395303	-88.926283	8	M	P									V	3																		
107	45.394538	-88.926298	6	M	P						1			V	3											1							
108	45.393773	-88.926312	6	M	P										3							V											
109	45.393008	-88.926327	5	M	P										2																		
110	45.408297	-88.924951	3	M	P			1	3					1																			
111	45.407532	-88.924965	3.5	M	P					1	1				1		1									1	1				1		
112	45.406002	-88.924994	5.5	M	P		1			2				1	3																		
113	45.405237	-88.925009	5.5	M	P										2							1									3		
114	45.404472	-88.925023	6.5	M	P										1								1										
115	45.403707	-88.925038	6.5	M	P																		V										
116	45.402942	-88.925052	6.5	M	P										3																2		
117	45.402177	-88.925067	6.5	M	P					1					3																2		
118	45.401413	-88.925081	8	M	P					1					3																		
119	45.400648	-88.925096	7	M	P			1		1					3																		
120	45.399883	-88.925110	8	M	P					1					3								2										
121	45.399118	-88.925125	7.5	M	P					1				1	3																		
122	45.398353	-88.925139	9	M	P			1		1					3								1			1							
123	45.397588	-88.925154	9	M	P										3								1										

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
124	45.396823	-88.925168	5.5	S	P			1	1						1																1		
125	45.396058	-88.925183	6	M	P			1		1					3								1										
126	45.395293	-88.925197	7	M	P				1	1					3																1		
127	45.394528	-88.925212	7	M	P			1						1	3							2											
128	45.393763	-88.925226	8	M	P										3							1											
129	45.392998	-88.925241	6	M	P										1																		
130	45.405992	-88.923908	6	M	P					2				2	3											1							
131	45.405227	-88.923923	6	M	P										3											1					1		
132	45.404462	-88.923937	7	M	P																	1				2							
133	45.403697	-88.923952	6	M	P										3											2							
134	45.402932	-88.923966	6	M	P										1							1				1							
135	45.402167	-88.923981	6	M	P					1					3											2					1		
136	45.401402	-88.923995	6	M	P					1					1											V							
137	45.400637	-88.924010	5.5	M	P			1		1					2							V				1					1		
138	45.399872	-88.924024	4.5	M	P				2	1					3											1							
139	45.399107	-88.924039	5	M	P			1	1	1				1	3											2	1						
140	45.398342	-88.924054	6	M	P			1	1	1					3											1							
141	45.397577	-88.924068	5	M	P					1				1	3											1					1		
142	45.396812	-88.924083	5	R	P			1							3											1							
143	45.396047	-88.924097	5	M	P										3											1					1		
144	45.395282	-88.924112	4	M	P			1							3							2									1		
145	45.394518	-88.924126	5	M	P			1		1				V	3								1										
146	45.393753	-88.924141	4	M	P					V					3							2											
147	45.392988	-88.924155	5	M	P					2					3																		
148	45.392223	-88.924170	4	M	P										2		2																
149	45.406747	-88.922808	3.5	M	P					1				2	3																2		
150	45.405982	-88.922822	5	M	P				2	1				2	3											2					1		
151	45.405217	-88.922837	6	M	P									1	1																V		
152	45.404452	-88.922851	5.5	M	P										3							2					1						
153	45.403687	-88.922866	5	M	P										2											3					2		
154	45.402922	-88.922880	5	M	P			1							3								1			3					1		
155	45.402157	-88.922895	6	S	P																	1											
156	45.401392	-88.922910	5	M	P			2		3					1										1	2							
157	45.400627	-88.922924	5.5	S	P										1											1							
158	45.399862	-88.922939	5	M	P					V					3							V											
159	45.399097	-88.922953	5.5	M	P			2						1	3							1	1										
160	45.398332	-88.922968	5.5	M	P									V	3											1							
161	45.397567	-88.922982	11.5	M	P			2		1					3											1							
162	45.396802	-88.922997	5	M	P			1	1	2												V				1							
163	45.396037	-88.923011	5	M	P			1		1					3											1							
164	45.395272	-88.923026	4.5	M	P			1		1					3				1			2				1							

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
165	45.394507	-88.923040	5.5	M	P					1					3				1								V				1		
166	45.393742	-88.923055	5	M	P					1					3							2									1		
167	45.392977	-88.923069	5	M	P										3							2											
168	45.392212	-88.923084	4	M	P										1							2											
169	45.406737	-88.921722	4.5	M	P					1				2	3				V							2							
170	45.405972	-88.921736	4	M	P					1					3				1							2					1		
171	45.405207	-88.921751	5.5	M	P										1																		
172	45.404442	-88.921765	6.5	M	P										1				1							3					2		
173	45.403677	-88.921780	5.5	M	P										1							2				V							
174	45.402912	-88.921795	4.5	M	P										1				V							3							
175	45.402147	-88.921809	5.5	S	P																										1		
176	45.401382	-88.921824	3	S	P			1	1						1																1		
177	45.400617	-88.921838	5	S	P										1																		
178	45.399852	-88.921853	6	M	P									1	3																		
179	45.399087	-88.921867	5	M	P					1				1	2				V														
180	45.398322	-88.921882	5	M	P				1					V	3																		
181	45.397557	-88.921896	15	M	P																												
182	45.396792	-88.921911	4	M	P			1		1				1	3																		
183	45.396027	-88.921926	5	M	P					1					3								1			1							
184	45.395262	-88.921940	5	M	P										3																		
185	45.394497	-88.921955	5	M	P										3				V												V		
186	45.393732	-88.921969	5	M	P					1					3				1												1		
187	45.392967	-88.921984	5	M	P							1			3																		
188	45.392202	-88.921998	5	S	P			1				1			1				V														
189	45.406726	-88.920636	4	M	P				1					2	3											1					1		
190	45.405961	-88.920650	5.25	M	P										1																		
191	45.405196	-88.920665	6	M	P					1					1				V														
192	45.404431	-88.920680	6	M	P																												
193	45.403666	-88.920694	6	M	P										1				V							3							
194	45.402901	-88.920709	6	M	P					1					1											3					2		
195	45.402137	-88.920723	5.75	M	P										2																		
196	45.400607	-88.920752	6	M	P			1							3				V			V											
197	45.399842	-88.920767	5.5	M	P			1	1	1	1				3																1		
198	45.399077	-88.920781	5	M	P					1				2	3																		
199	45.398312	-88.920796	5	M	P				1	1					3											3							
200	45.397547	-88.920811	14.5	M	P			1		1					3																		
201	45.396782	-88.920825	5	M	P			1	1	1				1	1											3					2		
202	45.396017	-88.920840	5.5	M	P					2					3				V							1							
203	45.395252	-88.920854	5	M	P										3																2		
204	45.394487	-88.920869	5	M	P					1					3							V	V				V						
205	45.393722	-88.920883	5	M	P										3							1				1							

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206	45.392957	-88.920898	5	M	P										3											1					V		
207	45.392192	-88.920913	5.5	S	P										1											1							
208	45.405951	-88.919564	5.5	M	P									1	3																		
209	45.405186	-88.919579	5.25	M	P																												
210	45.404421	-88.919594	5	M	P			1							1				1														
211	45.403656	-88.919608	5	M	P										2				2			V											
212	45.402891	-88.919623	4.5	M	P			1		3					1											1							
213	45.402126	-88.919637	4.5	M	P				3						1															1			
214	45.401361	-88.919652	2	M	P					V	1				3																1		
215	45.400596	-88.919666	5	M	P					1				V	3																V		
216	45.399831	-88.919681	6	M	P			1							3				V							1							
217	45.399066	-88.919696	6	M	P			1		2					3							1									1		
218	45.398301	-88.919710	5.5	M	P									1	3							1	V			V					1		
219	45.397536	-88.919725	20	M	R										1																		
220	45.396771	-88.919739	5	M	P			1		2				1	1				1							3							
221	45.396006	-88.919754	5	M	P			1		1				1	3											3					V		
222	45.395241	-88.919769	7.25	M	P									1	3				V								V						
223	45.394477	-88.919783	4.5	M	P					1					3							V				3					1		
224	45.393712	-88.919798	5	M	P			1		1					3				1														
225	45.392947	-88.919812	6	M	P					1					3				1			V											
226	45.392182	-88.919827	5	M	P					1		1			3				1			1				2					1		
227	45.405176	-88.918493	4.5	S	P										1																		
228	45.404411	-88.918508	5.75	S	P										1				1														
229	45.403646	-88.918522	6	S	P				1						1											1							
230	45.402881	-88.918537	5	S	P			1		1					1											2					1		
231	45.402116	-88.918551	4	R	P			1	1	1					2											1							
232	45.401351	-88.918566	4.5	M	P			1		1					3							V											
233	45.400586	-88.918581	5.5	M	P						1			1	2								1										
234	45.399821	-88.918595	6	M	P			1							3											1				1			
235	45.399056	-88.918610	7	M	P			1					1		3								1			1							
236	45.398291	-88.918624	6	M	P					V				V	3											V							
237	45.397526	-88.918639	20	M	R																												
238	45.396761	-88.918654	6	M	P										3							V											
239	45.395996	-88.918668	5.5	M	P			1							3								V			1					V		
240	45.395231	-88.918683	5.5	M	P					1					3																		
241	45.394466	-88.918697	6.5	M	P			1		1					3								V			1							
242	45.393701	-88.918712	5.5	M	P										2								1										
243	45.392936	-88.918727	6	M	P										3							1											
244	45.392171	-88.918741	5	S	P									V	3								1		V	1				1			
245	45.404401	-88.917422	4	S	P			1							3											1							
246	45.403636	-88.917436	4	M	P					1					3											V							

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247	45.402871	-88.917451	5.5	S	P			1		V					2											1							
248	45.402106	-88.917466	5	S	P			1																		1							
249	45.401341	-88.917480	5	M	P			1		1					3											1					V		
250	45.400576	-88.917495	5.5	M	P										3																V		
251	45.399811	-88.917509	5.5	M	P				1	1			1	1	3								V			1							
252	45.399046	-88.917524	5.5	M	P										3																		
253	45.398281	-88.917539	7	M	P			1		1					3								1										
254	45.397516	-88.917553	19	M	R																												
255	45.396751	-88.917568	7.5	M	P			1							3																		
256	45.395986	-88.917582	5.5	M	P			1							3								1										
257	45.395221	-88.917597	5.5	M	P									1	3								V										
258	45.394456	-88.917612	5	M	P										3								1										
259	45.393691	-88.917626	5	M	P										3								1										
260	45.392926	-88.917641	5	M	P										3											1							
261	45.392161	-88.917655	2.5	M	P			1					1	V	2							1											
262	45.401330	-88.916394	4	M	P			1		1			1		2																		
263	45.400565	-88.916409	5	M	P									V	2																V		
264	45.399800	-88.916423	5	M	P					1			1		3																		
265	45.399035	-88.916438	5.5	M	P		1			V				1	3																		
266	45.398271	-88.916453	6	M	P			1						V	3								V									1	
267	45.397506	-88.916467	20	M	R																												
268	45.396741	-88.916482	6	M	P					1					3								1			1							
269	45.395976	-88.916497	5.5	M	P										3								1								1		
270	45.395211	-88.916511	5	M	P					1					3								1										
271	45.394446	-88.916526	5.5	M	P					1					3								V			1	1						
272	45.393681	-88.916540	4	M	P										2								1								V		
273	45.392916	-88.916555	4	M	P					1					3							V									V		
274	45.392151	-88.916570	4	M	P										3												1						
275	45.402085	-88.915294	4	M	P					V				V	1			V															
276	45.401320	-88.915308	5	R	P			1						1	1											1							
277	45.400555	-88.915323	5	M	P			2		2					2											1							
278	45.399790	-88.915338	6	M	P					1				1	3								1										
279	45.399025	-88.915352	5	M	P			1	1	V				1	3								1				1						
280	45.398260	-88.915367	7	M	P										3											1							
281	45.397495	-88.915382	15	M	P			1							1																		
282	45.396730	-88.915396	8	M	P			1							2							1	V										
283	45.395965	-88.915411	6.5	M	P					1					3								1			1							
284	45.395200	-88.915425	6	M	P					2					2											1					V		
285	45.394435	-88.915440	6	M	P			1		1					3											1					1		
286	45.393670	-88.915455	5	M	P										3							V											
287	45.392905	-88.915469	5	M	P					1					2							1				1							

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288	45.402840	-88.914193	4	M	P									V	2																		
289	45.402075	-88.914208	4	M	P										3							V									1		
290	45.401310	-88.914222	4	M	P					V					3							V									V		
291	45.400545	-88.914237	4	M	P					1					3							V				V					V		
292	45.399780	-88.914252	5	M	P				1	1					3																		
293	45.399015	-88.914266	7	M	P			1							1							1											
294	45.398250	-88.914281	7.5	M	P					1					2															1			
295	45.397485	-88.914296	15.5	M	P										2												1						
296	45.396720	-88.914310	8	M	P									1	3				1				1										
297	45.395955	-88.914325	7	M	P			1		1			1		2																		
298	45.395190	-88.914340	6	M	P					1				V	3											V							
299	45.394425	-88.914354	5	M	P					1					3											1	1						
300	45.393660	-88.914369	6.5	S	P										3							V	1				1						
301	45.392895	-88.914384	4.25	R	P			1		1					1																		
302	45.402829	-88.913107	5	M	P										1																		
303	45.402064	-88.913122	3	M	P										2							1								1			
304	45.401299	-88.913137	4	M	P										2							1	1										
305	45.400534	-88.913151	4	M	P								1		3																1		
306	45.399770	-88.913166	6	M	P					1				1	2																1		
307	45.399005	-88.913181	6	M	P									V	2							V									1		
308	45.398240	-88.913195	7	M	P									1	1							1											
309	45.397475	-88.913210	9	R	P			1						1	1							1					V				1		
310	45.396710	-88.913225	7	M	P			1							3								1										
311	45.395945	-88.913239	7.5	M	P			1							3								1			1							
312	45.395180	-88.913254	7	M	P					1					3							V											
313	45.394415	-88.913269	7	S	P										1																1	1	
314	45.393650	-88.913283	4	R	P				1						1																V		
315	45.402819	-88.912021	3.5	M	P					1					3																		
316	45.402054	-88.912036	6	M	P					1				V	3																V		
317	45.401289	-88.912051	5.5	M	P										1																		
318	45.400524	-88.912065	5	M	P				1	1				V	2							V				1					V		
319	45.399759	-88.912080	4.5	M	P					1					2							1											
320	45.398994	-88.912095	6	M	P				1	2				1	3											1					1		
321	45.398229	-88.912109	5	M	P			1					1		3																		
322	45.397464	-88.912124	13	M	P					1					1																		
323	45.396699	-88.912139	8	M	P			2						V	1							V									1		
324	45.395934	-88.912153	9	M	P			1							1																		
325	45.395169	-88.912168	6	S	P				1																								
326	45.400514	-88.910980	3	M	P						1				2												1						
327	45.399749	-88.910994	4	M	P										3											1							
328	45.398984	-88.911009	4.5	M	P					1					2											2							

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
329	45.398219	-88.911024	5	R	P			1		1					2											2					V		
330	45.397454	-88.911038	6	R	P				1						1																		
331	45.396689	-88.911053	10	M	P			2		1					1												1						
332	45.395924	-88.911068	21	M	R																												
333	45.397444	-88.909952	9	M	P					3					1																		
334	45.396679	-88.909967	8.5	M	P		1			3					1																		
335	45.395914	-88.909982	12	M	P					1					1																		
336	45.395149	-88.909997	8.5	M	P		3			1					2																		
337	45.393619	-88.910026	2	S	P			1						V	1											1							
338	45.397433	-88.908867	2	R	P					1					1																		
339	45.396668	-88.908881	10	M	P			1															V				V						1
340	45.395903	-88.908896	10	M	P			2							2												1						
341	45.395138	-88.908911	11.5	M	P			1		2					3																		1
342	45.394373	-88.908926	8.5	M	P			1		1					2											1							
343	45.393608	-88.908940	5.5	M	P			1		1					3																		
344	45.397423	-88.907781	7	M	P			2		1					2							V					1						
345	45.396658	-88.907796	9.5	M	P			3							1																		
346	45.395893	-88.907810	10	M	P			1							2																		
347	45.395128	-88.907825	6	R	P			1							1								1										
348	45.394363	-88.907840	9	M	P			1							3																		
349	45.393598	-88.907855	7	M	P			1		3													2				1						
350	45.392833	-88.907869	8	M	P			3							1																		
351	45.392068	-88.907884	4.5	S	P										1																		
352	45.398177	-88.906680	6	S	P					1				V	3							1											
353	45.397412	-88.906695	8	S	P			3		2					1								1			1	1						
354	45.396647	-88.906710	10	M	P			2		2					1												1						
355	45.395882	-88.906725	9.5	M	P			3		1													1										
356	45.395118	-88.906739	10	M	P			3							1																		
357	45.394353	-88.906754	10	M	P			3							1								1										
358	45.393588	-88.906769	10	M	P			3		2					1																		
359	45.392823	-88.906784	9	M	P			3							1																		
360	45.392058	-88.906798	8.5	M	P			1		1																3							
361	45.391293	-88.906813	6.5	M	P			1							3								1										
362	45.390528	-88.906828	6	S	P			1		1				V	2																		
363	45.398167	-88.905594	9	M	P			1							3																		
364	45.397402	-88.905609	9	M	P			3		1					3							1											
365	45.396637	-88.905624	9	M	P			3		1					1												1						
366	45.395872	-88.905639	10	M	P			3							1											1							
367	45.395107	-88.905654	10	M	P			3							1																		
368	45.394342	-88.905668	10	M	P			3															1										
369	45.393577	-88.905683	11	M	P			3																									

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
370	45.392812	-88.905698	9.5	M	P			3															1										
371	45.392047	-88.905713	8.5	M	P			3		1					1								2										
372	45.391282	-88.905727	7.5	M	P			3							3												V						
373	45.390517	-88.905742	7	M	P			2		1					3											2	1						
374	45.389752	-88.905757	6	M	P			1		2				1	2							1				2							
375	45.388987	-88.905772	6	S	P										2							1											
376	45.388222	-88.905786	5.5	S	P										2								V										
377	45.398922	-88.904494	5.5	S	P			1							2																1		
378	45.398157	-88.904509	7	M	P			1		3					2											1							
379	45.397392	-88.904523	9.5	M	P			2		2					1								1										
380	45.396627	-88.904538	11	M	P			1																		1	1						
381	45.395862	-88.904553	10	M	P			3							1																		
382	45.395097	-88.904568	10	M	P			3																									
383	45.394332	-88.904583	10	M	P			3																									
384	45.393567	-88.904597	10.5	M	P			3															1										
385	45.392802	-88.904612	10	M	P			3							1																		
386	45.392037	-88.904627	9	M	P			3																									
387	45.391272	-88.904642	8.5	M	P			3							1								1										
388	45.390507	-88.904656	8	M	P			1		1					2								V										
389	45.389742	-88.904671	7	M	P								V		3																		
390	45.388977	-88.904686	7	M	P										1							1											
391	45.388212	-88.904701	5.5	M	P					1					3											V					1		
392	45.398911	-88.903408	7	M	P			1		1					3																		
393	45.398146	-88.903423	7	M	P										3								V										
394	45.397381	-88.903438	9	M	P			3																									
395	45.396616	-88.903452	10	M	P			3							1																		
396	45.395851	-88.903467	11	M	P			3							1																		
397	45.395086	-88.903482	11	M	P			3							1																		
398	45.394321	-88.903497	11	M	P			3							1								1										
399	45.393556	-88.903512	10.5	M	P			3															1										
400	45.392791	-88.903526	10	M	P			3																									
401	45.392026	-88.903541	9.5	M	P			3																									
402	45.391261	-88.903556	9	M	P			1							3								2										
403	45.390496	-88.903571	9	M	P			3		1												1											
404	45.389731	-88.903586	6.5	M	P										3											1				1			
405	45.388967	-88.903600	6	M	P					V			1		3								V		V	1							
406	45.388202	-88.903615	6.5	M	P			1		1					2							2				1							
407	45.387437	-88.903630	6	M	P			2		1				V	2											1					1		
408	45.399666	-88.902307	5.25	M	P					1					3																		
409	45.398901	-88.902322	6	M	P			1							1											3					1		
410	45.398136	-88.902337	8	M	P					1					3											2							

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
411	45.397371	-88.902352	10	M	P																												
412	45.396606	-88.902367	6	M	P			3							1								1										
413	45.395841	-88.902381	12	M	P			1																									
414	45.395076	-88.902396	11	M	P			3																									
415	45.394311	-88.902411	11	M	P			3															2										
416	45.393546	-88.902426	11.5	M	P			3																									
417	45.392781	-88.902441	11	M	P			3																									
418	45.392016	-88.902456	10	M	P			3							1								V										
419	45.391251	-88.902470	9.5	M	P			3							1																		
420	45.390486	-88.902485	5	M	P										1													V					
421	45.389721	-88.902500	9.5	M	P			3		1					1												1						
422	45.388956	-88.902515	8	M	P					1					3											1				1	1		
423	45.388191	-88.902530	6.5	M	P			1							3								V								1		
424	45.387426	-88.902544	8	M	P			3		1					2																		
425	45.386661	-88.902559	7	S	P					V			V		3											V							
426	45.385896	-88.902574	6	M	P					V					3							1											
427	45.385131	-88.902589	6	R	P										3																		
428	45.400420	-88.901207	6	M	P					2					3																		
429	45.399655	-88.901222	7.5	M	P			2		3					3											3	1				1		
430	45.398890	-88.901236	7	M	P			2		1					3								2			1							
431	45.398125	-88.901251	9.5	M	P			2		1					3								2										
432	45.397360	-88.901266	8	M	P			3																									
433	45.396595	-88.901281	11	M	P			3		2			1																				
434	45.395830	-88.901296	10.5	M	P			3																									
435	45.395065	-88.901311	12.5	M	P			3																									
436	45.394300	-88.901325	12.5	M	P			3																									
437	45.393535	-88.901340	14	M	P																												
438	45.392771	-88.901355	13.5	M	P			1																									
439	45.392006	-88.901370	13.5	M	P																												
440	45.391241	-88.901385	12	M	P			1							3																		
441	45.390476	-88.901399	5.5	R	P			1	2													1											
442	45.389711	-88.901414	9	M	P			3		1					1																		
443	45.388946	-88.901429	9.5	M	P			3		1					1								1										
444	45.388181	-88.901444	7.5	M	P			3		1					1								1										
445	45.387416	-88.901459	6.5	M	P			1		1					3																V		
446	45.386651	-88.901474	7	M	P					1					3								V										
447	45.385886	-88.901488	6	M	P								1		3							1				1					2		
448	45.385121	-88.901503	5	M	P				1					1								3				3							
449	45.384356	-88.901518	4.5	M	P					2					3							2									1		
450	45.383591	-88.901533	5	M	P			1		1					3							1				1							
451	45.401175	-88.900106	5	M	P				1	1					3							1				1							

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
452	45.400410	-88.900121	6	M	P			2	2	2				V	3											2							
453	45.399645	-88.900136	6	M	P			2							2								V				V						
454	45.398880	-88.900151	9	M	P			3																		V							
455	45.398115	-88.900165	9	M	P			3																									
456	45.397350	-88.900180	12	M	P																												
457	45.396585	-88.900195	11.5	M	P			3		1					1								2										
458	45.395820	-88.900210	12.5	M	P			3																									
459	45.395055	-88.900225	12.5	M	P			3							1																		
460	45.394290	-88.900240	13.5	M	P			3																									
461	45.393525	-88.900254	15	M	P																												
462	45.392760	-88.900269	14.5	M	P																												
463	45.391995	-88.900284	14.5	M	P																												
464	45.391230	-88.900299	13.5	M	P			3																									
465	45.390465	-88.900314	8	R	P					1					3								1						V		1		
466	45.389700	-88.900329	8	M	P									V	3								2		1				V				
467	45.388935	-88.900343	10.5	M	P			2		3					3												1						
468	45.388170	-88.900358	6	M	P			3						V	2								V								3		
469	45.387405	-88.900373	7	M	P					1				V	3																V		
470	45.386640	-88.900388	8	M	P			1		1				V	3								1										
471	45.385875	-88.900403	5.5	M	P										3							V				1					V		
472	45.385110	-88.900418	5.5	M	P									1	3							2		1		1					3		
473	45.384345	-88.900432	5	M	P					1				V	2							2				3					1		
474	45.401164	-88.899020	4.5	S	P			1	1	1					3												1						
475	45.400399	-88.899035	4	M	P			2	1	1			1		3							1				2							
476	45.399634	-88.899050	6.5	M	P				1	1					3							1	2										
477	45.398869	-88.899065	6.5	M	P			1		1					3							V											
478	45.398104	-88.899080	9	M	P			3																									
479	45.397339	-88.899094	9.5	M	P			3		1			1																				
480	45.396574	-88.899109	11	M	P			3																									
481	45.395809	-88.899124	11	M	P			3															1										
482	45.395045	-88.899139	11	M	P			3																									
483	45.394280	-88.899154	12	M	P			3																									
484	45.393515	-88.899169	15	M	P			1							1																		
485	45.392750	-88.899184	15	M	P			2																									
486	45.391985	-88.899198	14	M	P			3							2																		
487	45.391220	-88.899213	11	M	P			3							1								2										
488	45.390455	-88.899228	9	M	P			2							3								1										
489	45.389690	-88.899243	7	M	P								2		3																		
490	45.388925	-88.899258	6	M	P			3					1	3	3								2			1	1						
491	45.388160	-88.899273	8	M	P			3		3			1		1																		
492	45.387395	-88.899288	6.5	M	P			3					1													2					2		

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
493	45.386630	-88.899302	5	M	P										3																1		
494	45.385865	-88.899317	6	M	P			1	1	1			1	1	3							3				1					3		
495	45.385100	-88.899332	5	M	P			3							3											1					1		
496	45.401154	-88.897934	4	S	P									V	3							V									2		
497	45.400389	-88.897949	4	S	P				2						1																		
498	45.399624	-88.897964	9	M	P			3	1	1					3								3										
499	45.398859	-88.897979	10	M	P			3		2					1							2					1						
500	45.398094	-88.897994	9	M	P			2		2												2	2			3							
501	45.397329	-88.898009	12	M	P			3															V										
502	45.396564	-88.898024	10.5	M	P			3		2					2								3										
503	45.395799	-88.898038	13	M	P			3		1													1										
504	45.395034	-88.898053	12	M	P			3															2										
505	45.394269	-88.898068	15	M	P																												
506	45.393504	-88.898083	13	M	P			3																			1						
507	45.392739	-88.898098	15	M	P																												
508	45.391974	-88.898113	10.5	M	P			3																									
509	45.391209	-88.898128	9	M	P			3		1					3																		
510	45.390444	-88.898142	8	M	P			1		2					3																		
511	45.389679	-88.898157	7	M	P			3		3			1	1	2								1			3							
512	45.388914	-88.898172	5	M	P					1					3																1		
513	45.388149	-88.898187	5	M	P				1	1				2	3								2			1					2		
514	45.387384	-88.898202	6	M	P					2					3								1										
515	45.386619	-88.898217	6	M	P			1							3							V				1					V		
516	45.385854	-88.898232	4.5	M	P					1			2	2	3																		
517	45.400378	-88.896863	4	S	P			2							1																		
518	45.399613	-88.896878	8	M	P			2		2					3								2										
519	45.398848	-88.896893	5	M	P			2							2								V										
520	45.398083	-88.896908	9	M	P			3															2				1						
521	45.397318	-88.896923	10.5	M	P			3															3				1						
522	45.396553	-88.896938	13	M	P			3																									
523	45.395789	-88.896953	12.5	M	P			3							1																		
524	45.395024	-88.896967	12.5	M	P			3							1																		
525	45.394259	-88.896982	12.5	M	P			3																									
526	45.393494	-88.896997	12.5	M	P			3							3																		
527	45.392729	-88.897012	9.5	M	P			3		1			1		3								1										
528	45.391964	-88.897027	9.5	M	P										3																		
529	45.391199	-88.897042	8	M	P			2		1					3							V											
530	45.390434	-88.897057	8	M	P			1		2					3																		
531	45.389669	-88.897072	7	M	P			1		2					3							V											
532	45.388904	-88.897087	7	M	P									V	2							V											
533	45.388139	-88.897101	8.5	M	P				1						3											3							

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
534	45.387374	-88.897116	6	M	P			3		1				2	3							1			2	3					3		
535	45.386609	-88.897131	5	S	P			1		1			1	1	2																1		
536	45.400368	-88.895777	6	R	P			1							1							V											
537	45.399603	-88.895792	8	M	P			2							3								2										
538	45.398838	-88.895807	8.5	M	P			3		2					3																		
539	45.398073	-88.895822	8.5	M	P			3		1					1																		
540	45.397308	-88.895837	9.5	M	P			3															3										
541	45.396543	-88.895852	10	M	P			3							1																		
542	45.395778	-88.895867	8.5	M	P			3																									
543	45.395013	-88.895882	10.5	M	P			3																									
544	45.394248	-88.895897	13	M	P			3																									
545	45.393483	-88.895912	10	M	P			3							1								1										
546	45.392718	-88.895926	9	M	P			3		1					1				V														
547	45.391953	-88.895941	8.5	M	P			1							3				V				1										
548	45.391188	-88.895956	8.5	M	P										3																		
549	45.390423	-88.895971	10	M	P			1							3							V											
550	45.389658	-88.895986	6	R	P																1												
551	45.388893	-88.896001	9	M	P										3																		
552	45.388128	-88.896016	6.5	M	P			1							3							V											
553	45.387363	-88.896031	7	M	P					2					3							V				1					2		
554	45.400357	-88.894692	5	S	P			1		1					3																		
555	45.399592	-88.894706	7	M	P			1		1					3																		
556	45.398827	-88.894721	7.5	M	P			1		1					3											1							
557	45.398062	-88.894736	9	M	P			2							3																		
558	45.397297	-88.894751	10	M	P			3							1																		
559	45.396532	-88.894766	11	M	P			3																									
560	45.395768	-88.894781	11	M	P			3															3										
561	45.395003	-88.894796	10	M	P			3																									
562	45.394238	-88.894811	9.5	M	P			3															1										
563	45.393473	-88.894826	10	M	P			3																									
564	45.392708	-88.894841	10.5	M	P			2																									
565	45.391943	-88.894856	10	M	P			2		2					3																		
566	45.391178	-88.894871	11	M	P			3		1			1		3								2		2		2						
567	45.390413	-88.894885	4	S	P																							V					
568	45.389648	-88.894900	4.5	S	P										1													V					
569	45.388883	-88.894915	4.5	S	P																												
570	45.388118	-88.894930	5.5	S	P				1						1																		
571	45.387353	-88.894945	6	M	P					3			1									V				3							
572	45.400347	-88.893606	5	M	P				1						3																		
573	45.399582	-88.893621	6.5	M	P			2		2					3											1							
574	45.398817	-88.893636	7	M	P			1		1					3								3										

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
575	45.398052	-88.893651	9	M	P			3																									
576	45.397287	-88.893665	11	M	P																												
577	45.396522	-88.893680	10.5	M	P			3							1																		
578	45.395757	-88.893695	10.5	M	P			3																									
579	45.394992	-88.893710	9.5	M	P			3																									
580	45.394227	-88.893725	9.5	M	P			3							1																		
581	45.393462	-88.893740	8.5	M	P			3					1																				
582	45.392697	-88.893755	8	M	P			3		2													1										
583	45.391932	-88.893770	14.5	M	P			1																		1							
584	45.391167	-88.893785	11	M	P					1					3																		
585	45.390402	-88.893800																															
586	45.389637	-88.893815																															
587	45.388872	-88.893830																															
588	45.387342	-88.893859																															
589	45.386577	-88.893874																															
590	45.400336	-88.892520																															
591	45.399571	-88.892535																															
592	45.398806	-88.892550																															
593	45.398041	-88.892565																															
594	45.397276	-88.892580																															
595	45.396511	-88.892595																															
596	45.395746	-88.892610																															
597	45.394982	-88.892624																															
598	45.394217	-88.892639																															
599	45.393452	-88.892654																															
600	45.392687	-88.892669																															
601	45.391922	-88.892684																															
602	45.391157	-88.892699																															
603	45.390392	-88.892714																															
604	45.389627	-88.892729																															
605	45.388862	-88.892744																															
606	45.388097	-88.892759																															
607	45.387332	-88.892774																															
608	45.385802	-88.892804																															
609	45.399561	-88.891449																															
610	45.398796	-88.891464																															
611	45.398031	-88.891479																															
612	45.397266	-88.891494																															
613	45.396501	-88.891509	9	M	P			3															1				1						
614	45.395736	-88.891524	9	M	P			3																									
615	45.394971	-88.891539	8.5	M	P			3															1										

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
616	45.394206	-88.891554	8	M	P			3							3								2										
617	45.393441	-88.891569	8	M	P			3		1			1	1									V			3							
618	45.392676	-88.891584	9.5	M	P										3																		
619	45.391911	-88.891599	10.5	M	P										3								1			1							
620	45.391146	-88.891613	9.5	M	P			2							3								1										
621	45.390381	-88.891628	7	M	P			2		1					3								V			1					1		
622	45.389616	-88.891643	7	M	P										3								1			1							
623	45.388851	-88.891658	6.5	M	P			1		1					3																		
624	45.388086	-88.891673	7	M	P					2					3												V						
625	45.387321	-88.891688	5.5	M	P					2				1	2							1				3					3		
626	45.386556	-88.891703	5	M	P										3											2							
627	45.385791	-88.891718	3.5	M	P									V	3			V													V		
628	45.399550	-88.890363	7	M	P			3		2																1							
629	45.398785	-88.890378	5.5	M	P			1		1					3								2								2		
630	45.398020	-88.890393	7	M	P			2							3								V				1						
631	45.397255	-88.890408	8	M	P			3						V	2												V						
632	45.396490	-88.890423	8.5	M	P										3								V										
633	45.395725	-88.890438	8	M	P			1							3								1										
634	45.394960	-88.890453	8	M	P			2							3								V										
635	45.394195	-88.890468	8	M	P			1							3								V			1							
636	45.393431	-88.890483	8	M	P			3																									
637	45.392666	-88.890498	8	M	P			2						2	2								V										
638	45.391901	-88.890513	7	M	P			1							3										2	1							
639	45.391136	-88.890528	8	M	P			2							3								1										
640	45.390371	-88.890543	6	M	P					1													1			3					V		
641	45.389606	-88.890558	5.5	M	P			3																									
642	45.388841	-88.890573	5.5	M	P					2					2											2					3		
643	45.388076	-88.890588	6	M	P			3		3																3	1				1		
644	45.387311	-88.890603	5	M	P					3					1											2					1		
645	45.386546	-88.890618	4.5	M	P					1												3				2					3		
646	45.385781	-88.890633	4	M	P					1					3							2				3					2		
647	45.385016	-88.890648	5	M	P					V					2											V					V		
648	45.400305	-88.889262	3	S	P				2					V	1							V											
649	45.399540	-88.889277	6	M	P			3		2					2								1										
650	45.398775	-88.889292	6.5	M	P			2							3								1			1							
651	45.398010	-88.889307	7	M	P									V	3								1			1							
652	45.397245	-88.889322	7	M	P										3								2										
653	45.396480	-88.889337	7	M	P			3		2				V									2			2							
654	45.395715	-88.889352	7	M	P			3						V	1								2										
655	45.394950	-88.889367	7	M	P			3		2			1	1	2								1										
656	45.394185	-88.889382	7	M	P			3		2				V	3								V			V							

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
657	45.393420	-88.889397	6.5	M	P										3								V										
658	45.392655	-88.889412	7	M	P			2							1																		
659	45.391890	-88.889427	7	M	P			3		3					3											1	1						
660	45.391125	-88.889442	9	M	P			3																									
661	45.390360	-88.889457	9	M	P			3		1					1												1						
662	45.389595	-88.889472	3.5	R	P					2				V	3												1				3		
663	45.388830	-88.889487	11	R	P										1																		
664	45.388065	-88.889502	7	M	P										3							V									3		
665	45.387300	-88.889517	4.5	M	P			2		1					3							1				1					1		
666	45.386535	-88.889532	5	M	P										3							2									1		
667	45.385770	-88.889547	5	M	P			1							2							2				V					2		
668	45.400294	-88.888176	3.5	S	P				1						2							V											
669	45.399529	-88.888191	6	M	P			1		1					3								1										
670	45.398764	-88.888206	7	M	P			1		1				V	3								V										
671	45.397999	-88.888221	7	M	P					1					3								V										
672	45.397234	-88.888236	7	M	P			1		1					3								1										
673	45.396469	-88.888251	8	M	P			2					1																				
674	45.395704	-88.888266	9	M	P			3																									
675	45.394939	-88.888281	7	M	P			2		1					3											1							
676	45.394174	-88.888296	9	S	P			1																									
677	45.393409	-88.888311	9.5	M	P	site just harvested		3																									
678	45.388820	-88.888401	6	R	P					2			1	1	3												1				3		
679	45.388055	-88.888416	5	M	P					2					3							1	1			1					2		
680	45.387290	-88.888431	3	R	P																	V											
681	45.386525	-88.888446	5	M	P					2					3							2									V		
682	45.385760	-88.888461	4	M	P					3					3							V				3					V		
683	45.400284	-88.887091	3.5	M	P										3																1		
684	45.399519	-88.887106	5	M	P			1		1					3																		
685	45.398754	-88.887121	6	M	P			1		1					3								V			1							
686	45.397989	-88.887136	6	M	P					1					3								V			1							
687	45.397224	-88.887151	7	M	P			1		1					3								V										
688	45.396459	-88.887166	13	R	P			1																									
689	45.395694	-88.887181	3.5	R	P										1																1		
690	45.388809	-88.887316	6.5	M	P			2		3					3							V											
691	45.388044	-88.887331	7	M	P			1	1	1				V	3											1	1						
692	45.387279	-88.887346	7	S	P			1							1																		
693	45.386514	-88.887361	6	M	P			1		2			1		3											1					2		
694	45.400273	-88.886005	3.5	M	P			1		1				1	3																		
695	45.399508	-88.886020	5	M	P			1		1					3											1					V		
696	45.398743	-88.886035	4	M	P			1		3					3								1								V		
697	45.397978	-88.886050	6	M	P			1	1						3											V	1						

Point Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Ceratophyllum demersum	Chara sp.	Elodea canadensis	Heteranthera dubia	Lemna trisulca	Myriophyllum heterophyllum	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Potamogeton amplifolius	Potamogeton friesii	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton zosteriformis	Schoenoplectus acutus	Schoenoplectus tabernaemontani	Sparganium angustifolium	Vallisneria americana	Sparganium sp.	Elodea nuttallii
698	45.397213	-88.886065	6	S	P			1	1	1					3																		
699	45.396448	-88.886080	7	M	P									V	3																		
700	45.395683	-88.886095	7	M	P			3							3																		
701	45.400262	-88.884919	4	S	P									V	1																		
702	45.399497	-88.884934	5	M	P			1		3					3																		
703	45.398732	-88.884949	5	M	P			1		1					3																1		
704	45.397967	-88.884964	10.5	M	P			1							1																		
705	45.397202	-88.884979	2	R	P										1																		
706	45.396438	-88.884994	6	M	P			3		1					1											1	3						
707	45.400252	-88.883833	4	S	P					1					2																1		
708	45.399487	-88.883848	4	M	P			1		1		1																					
709	45.398722	-88.883863	7.5	M	P			3		2																	2						
710	45.399476	-88.882762	3.5	M	P			2		2					3			V				V											
711	45.398711	-88.882777	P			3		1				V	3								1												

F

APPENDIX F

WDNR Fisheries Survey Summary

To: Pickerel – Crane Lake Association
From: Greg Matzke, Fisheries Biologist
Date: 8/25/2011

This summer our fisheries crew conducted a survey to assess the bass regulation on Pickerel and Crane Lakes. We spent one evening electro fishing each lake to gather a large enough sample of bass to look at relative abundance, size structure and growth of bass in the Pickerel – Crane chain of lakes.

On June 6th, 2011 we electro fished 6.54 miles of shoreline on Pickerel Lake. During this survey we captured 95 largemouth bass ranging in size from 7.0 to 18.7 inches in length (Figure 1). Two nights later we conducted the same survey on Crane Lake covering 3.38 miles of shoreline. During the Crane Lake survey we captured 79 largemouth bass ranging in size from 4.6 to 18.4 inches in length (Figure 3). The fish captured during these surveys were measured to index size structure and scales were removed to estimate age and index growth. Below are the findings from these surveys.

Relative Abundance:

During the survey of Pickerel lake our catch rate was 14.53 largemouth bass/ mile electro fished. The highest catch rate of the two electro fishing runs in 1991 was 7.09 largemouth bass/ mile. The current catch rate is more than double the catch rate before the 18-inch size limit which indicates a significant increase in largemouth bass abundance from 1991 to 2011. A catch rate of 14.5 bass/ mile does not indicate that there is an over abundance of bass in Pickerel Lake.

The catch rate was higher in Crane Lake than Pickerel. During the survey of Crane Lake we caught 23.37 largemouth bass/ mile electro fished. Crane Lake was not surveyed for bass in 1991 so comparisons could not be drawn to the pre 18-inch size limit era.

Size Structure:

During the 2011 survey of Pickerel Lake we found that 95% of the largemouth bass captured were $\geq$ 12.0 inches and 33% of the bass captured were $\geq$ 15.0 inches in total length. This showed a significant increase in largemouth bass size structure compared to an electro fishing survey conducted in 1991 (before the 18-inch minimum size limit) where only 38% of the bass were $\geq$ 12.0 inches and 9% were $\geq$ 15.0 inches in total length (Figure 2).

Crane Lake showed a slightly worse size structure than Pickerel with 68% of the largemouth bass being $\geq$ 12.0 inches and 20% being $\geq$ 15.0 inches. Even though this value is lower than that of Pickerel it still shows a quality size structure of largemouth bass. Crane Lake was not surveyed for bass in 1991 so comparisons could not be drawn.

Growth:

Bass in the Pickerel-Crane chain showed very average growth rates when compared to other Northern WI waters (Figure 4). On average it takes largemouth bass 5 years to reach 12 inches long and 10 years to reach the minimum size limit of 18 inches.

My Thoughts:

I was not surprised to see the increased size structure of the current bass population when compared to the size structure in 1991. After all, by increasing the size limit to 18-inches and restricting the harvest of smaller fish you should see more older/larger individuals in the population. There also was a significant winter kill on Pickerel Lake during 1985-86, which could account for a lower size structure present in 1991.

I was surprised to see that the largemouth bass growth rates remained very close to average for our region. When you increase the density of fish you also increase competition for food within the species which normally decreases growth rates. The Pickerel – Crane chain of lakes displays perfectly adequate growth rates, which allows the lake to produce fish above the minimum size limit.

Is it time for a regulation change?

The current regulation was put in place for two reasons. The first, to increase the size structure and abundance of bass. The second, to increase the pan fish size structure by increasing the predation on overabundant pan fish by largemouth bass.

Based on the assessment of the bass population done this year there is no reason to think that the 18-inch size limit is hurting the largemouth bass population. In fact, the 18-inch minimum size limit has actually done to the bass population exactly what it was put in place to do, increase the size structure and abundance of bass. Since the growth rates show no signs of stunting and size structure has increased roughly 3-fold since implementation of the 18-inch minimum there is no biological reason to change the current size limit.

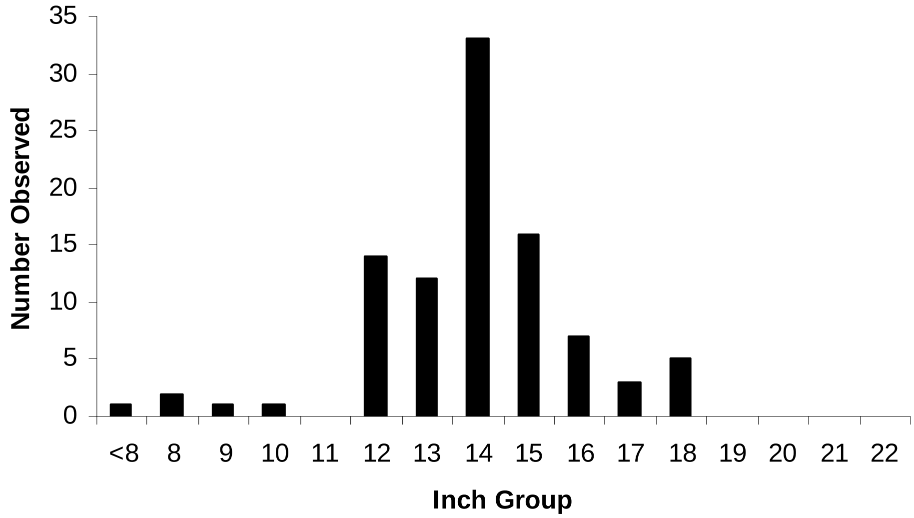
I realize that the lake association has been strongly in favor of removing the 18-inch size limit for a number of years, and for that reason we are not going to close the door on this matter. I plan to analyze the second reason that the 18-inch size limit was put in place, to increase panfish size structure, in 2012. We will look to see if the 18-inch size limit has helped the pan fish size structure in the chain of lakes. If I can find scientific data to prove that the 18-inch size limit is not helping the pan fish community I may be able to write a science-based regulation change proposal next year.

As for right now, the 18-inch size limit is helping the bass fishery and most likely is having positive impacts on the pan fish community. Pickerel and Crane Lakes both exhibit a very good bass fishery and I urge you to look at the bright side, the increased abundance and size structure of bass, instead of the down side which is a decreased harvest opportunity.

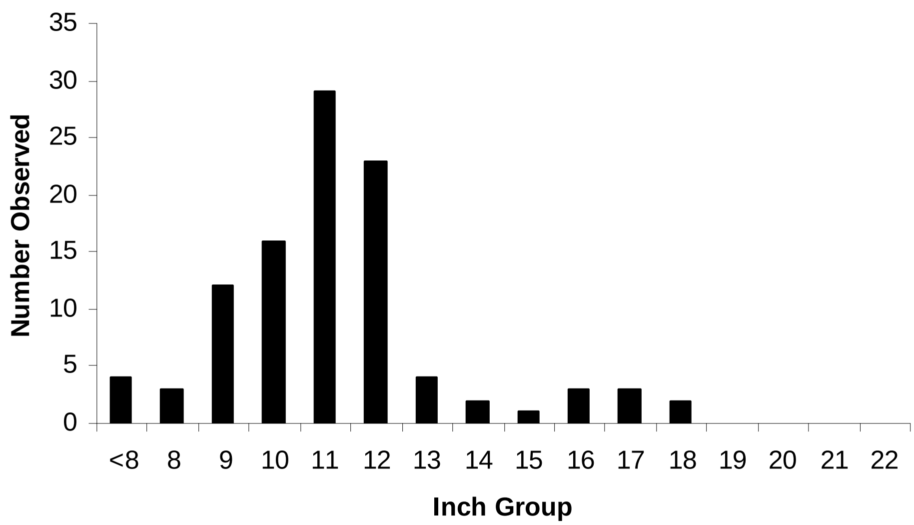
I thank you for taking the time to read about this years fish surveys on Pickerel and Crane Lakes. If the lake association has any further questions please feel free to call or email.

Gregory Matzke
Fisheries Biologist
Florence & Forest Counties

Appendix



<u>Figure 1.</u> Length frequency of largemouth bass captured during the electro fishing survey of Pickerel Lake on June 6th, 2011.



<u>Figure 2.</u> Length frequency of largemouth bass captured during the electro fishing survey of Pickerel Lake on 5/21 & 6/5, 1991.

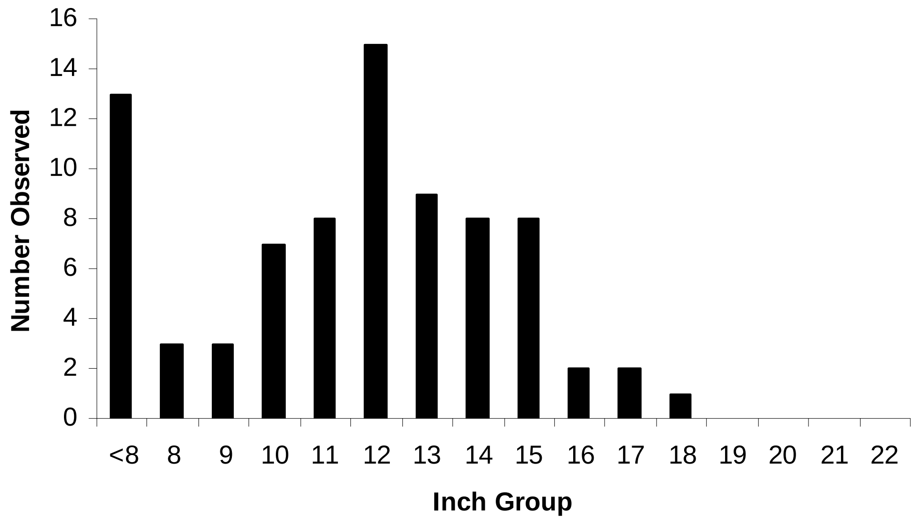


Figure 3. Length frequency of largemouth bass captured during the electro fishing survey of Crane Lake on June 8th, 2011.

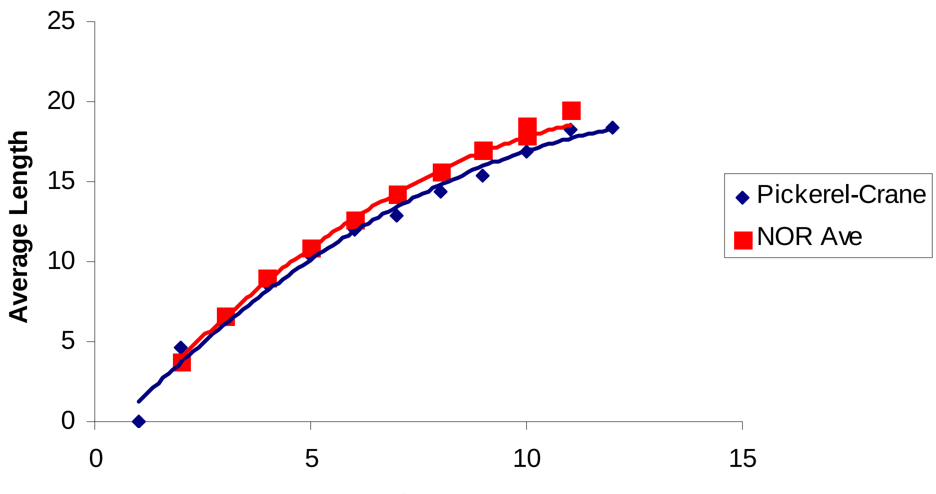


Figure 4. Growth rates of largemouth bass collected from the Pickerel – Crane chain of lakes in 2011 compared to the average growth rates for Northern Wisconsin.