A

APPENDIX A

Public Participation Materials

Pine Lake
Management Planning Project
Kick-Off Meeting
October 3, 2009 – 12:30 PM
Hiles Town Hall

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 Pine Lake project.

The Pine Lake P & R District has received two grants totaling over $17,000 from the Wisconsin Department of Natural Resources to partially fund the completion of a comprehensive management plan for Pine Lake. 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 lake and its watershed. Most of the studies will be completed during the spring, summer and fall of 2009. 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, October 3rd at 12:30 pm at the Hiles 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.

Public Meeting Announcement

Title: Pine Lake Management Planning Project Kick-off Meeting

Host: Pine Lake Protection & Rehabilitation District

Date: Saturday, October 3, 2009

Time: 12:30 pm

Place: Hiles Town Hall, 9193 North Main Street, Hiles, WI

The Pine Lake Protection and Rehabilitation District will hold a public meeting to kick-off the management planning project that started earlier this summer. During the meeting, Tim Hoyman, an aquatic ecologist with Onterra, LLC will give a presentation describing the project and the planning process.

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WI. Dept. of Natural Resources
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Email:
Kevin.GauthierSr@Wisconsin.gov

Press Release

For Immediate Release

Pine Lake Receives State Grants to Complete Lake Studies and Management Plan

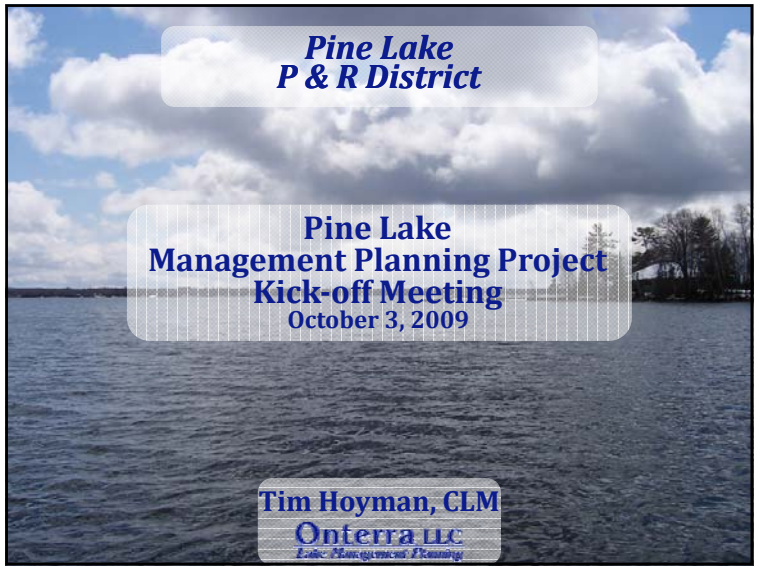
Hiles, WI, September 15, 2009. The Pine Lake Protection and Rehabilitation District has received over $17,000 in funds from the Wisconsin DNR's Lake Management Planning Grant Program. The District was notified during the spring that its applications for funding of a comprehensive lake management planning project were successful. The project rose out of lake residents' concern over the health of their lake.

The project includes studies of the lake's watershed, aquatic plants, and water quality. The studies are being completed through the combined efforts of the Wisconsin DNR and Onterra, LLC, a lake management planning firm based in De Pere, WI. "The project is truly a joint-effort between our firm, the lake district, and the department," said Tim Hoyman, Onterra's lead aquatic ecologist. "The Department of Natural Resources has committed a great deal of staff time to complete a major portion of the aquatic plant studies associated with the project and as a result, has saved the lake district thousands of dollars."

The project also includes an intense public participation component aimed at engaging lake users within the development of the management plan. "As a part of the project, we will engage Pine Lake stakeholders through presentations, project updates, and a survey of their opinions and beliefs," Hoyman said. "It's our goal to create a management plan that meets the needs of the lake and the lake users, which at times can be a very difficult task."

The project's result will be a comprehensive lake management plan for Pine Lake. Development of that plan relies heavily on the results of a survey district members will be asked to complete over the winter. It also relies on the work of the district's Planning Committee. "The Planning Committee helps us create the management plan by distributing the stakeholder survey and recording the results, but more importantly, the committee acts as a focus group by representing the district during the development of the management plan." Hoyman stated. "Creating a management plan by meeting with everyone in the Pine Lake P &R District would be impossible, so we truly rely on the Planning Committee to help us develop the goals and actions that will make up the bulk of the plan. Folks that volunteer for the Planning Committee will learn more about their lake than they thought possible, so it is really a benefit for them too."

The first opportunity for the public to participate in the Pine Lake management planning process will be on Saturday, October 3rd when the group holds a project kick-off meeting at the Hiles Town Hall. The meeting will begin at 12:30 with a presentation by Tim Hoyman. "Tim will discuss details of the project and explain how everyone that uses and cares for the lake can be involved with the development of its management plan," said Terry Kloehn, district chair and coordinator for the planning project. "We are excited to be completing a project such as this and appreciate the DNR's financial assistance and technical guidance."



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 (current & historic)
- 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

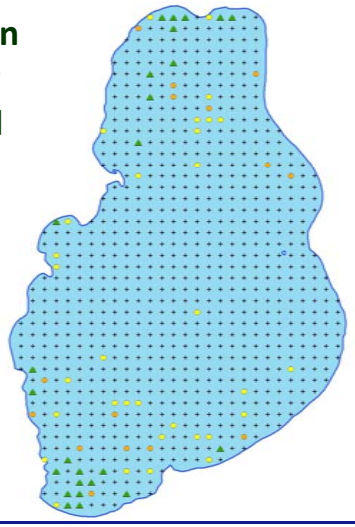
Non-native Aquatic Plants

Curly-leaf Pondweed

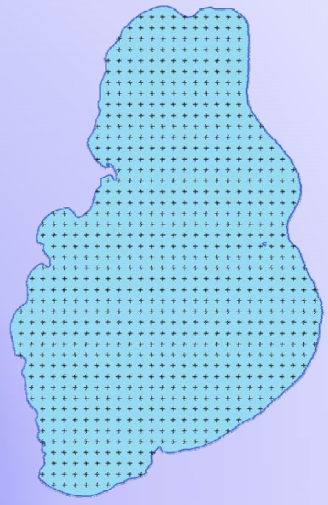
Non-native Aquatic Plants

Eurasian Water Milfoil

Eurasian Water Milfoil



Pine Lake
90-meter resolution
828 points
Completed by WDNR 2009

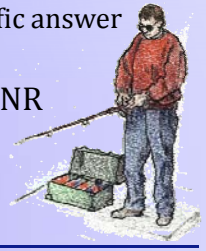


Fisheries Data Integration

- 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



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:

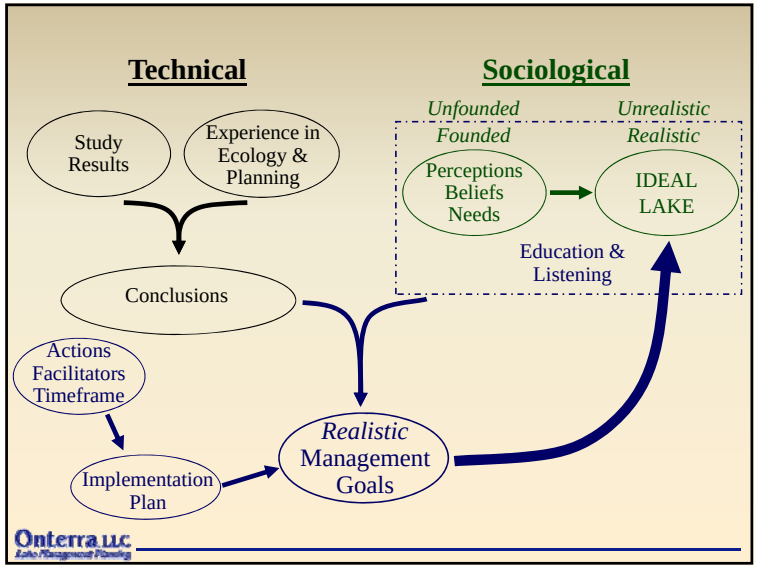
Wisconsin Lakes Partnership

UWEX Extension

Wisconsin Dept. of Natural Resources

The Planning Process

…it's not as easy as you may think.



Presentation Outline

- Lake Management Planning Project Overview
- Study Results
  - Water Quality
  - Watershed
  - Aquatic Plants
  - Miscellaneous Findings
- "Big Picture"
- Goals and Actions Discussion

Onterra LLC
Lake Management Planning

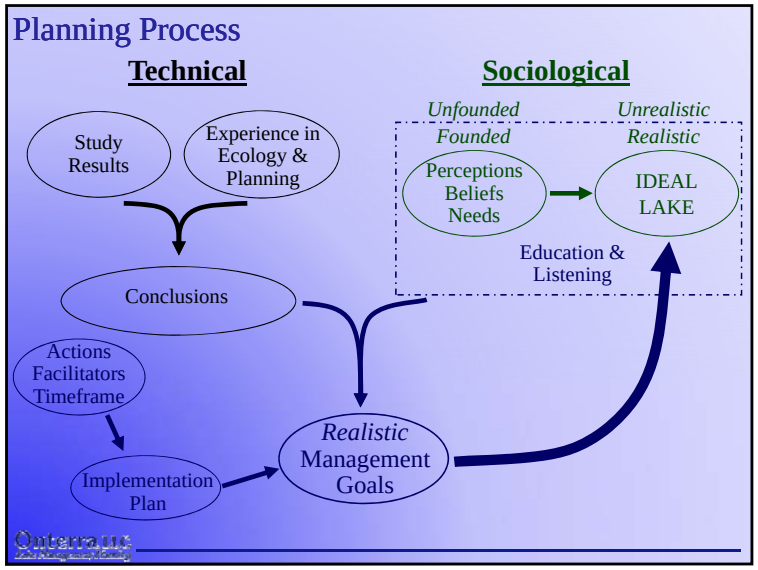
Study and Plan Goals

- Collect & Analyze Data
- Construct Long-Term & Useable Plan

Onterra LLC
Lake Management Planning

The Planning Process

…it's not as easy as you may think.


Planning Process
Technical
Sociological
Study Results
Experience in Ecology & Planning
Unfounded
Founded
Unrealistic
Realistic
Perceptions Beliefs Needs
IDEAL LAKE
Education & Listening
Conclusions
Actions Facilitators Timeframe
Realistic Management Goals
Implementation Plan
Onterra LLC


Water Quality
Phosphorus (Limiting Plant Nutrient)
Chlorophyll-a (Algal Abundance)
Water Clarity (Secchi Disk)
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Lillie Mason Regions
Northwest
Pine Lake
Northeast
Southwest
Central
Southeast
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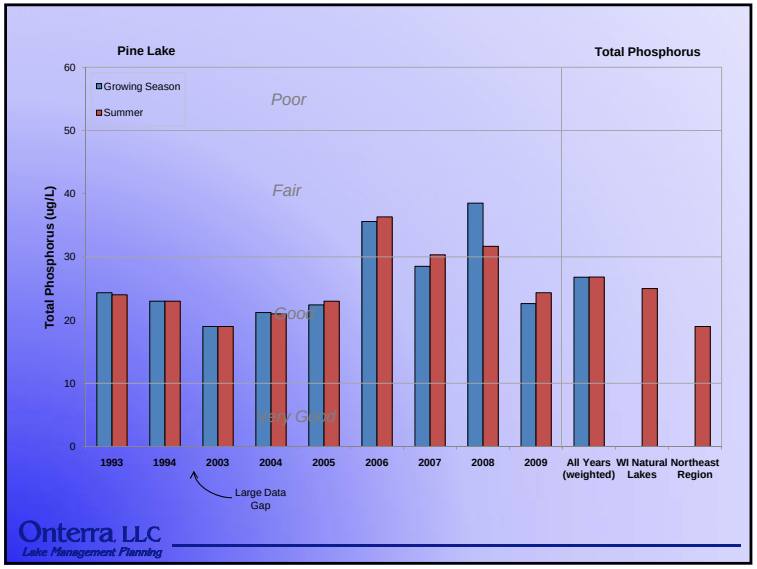
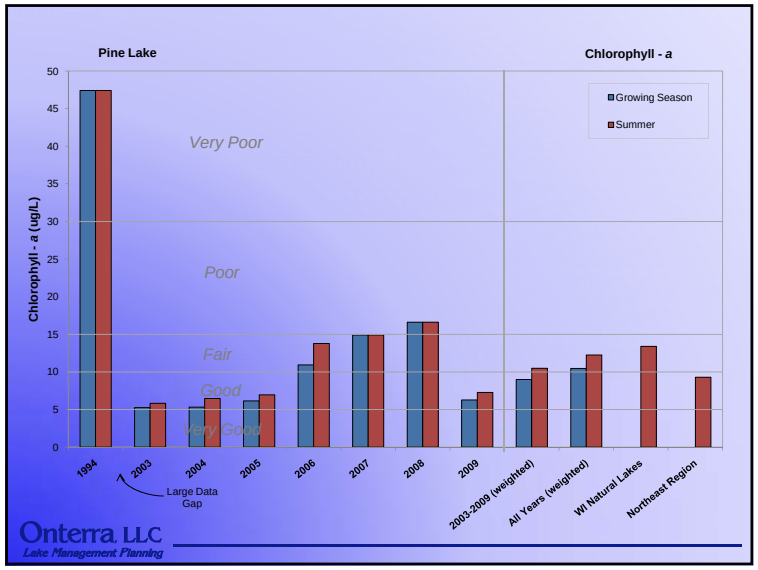
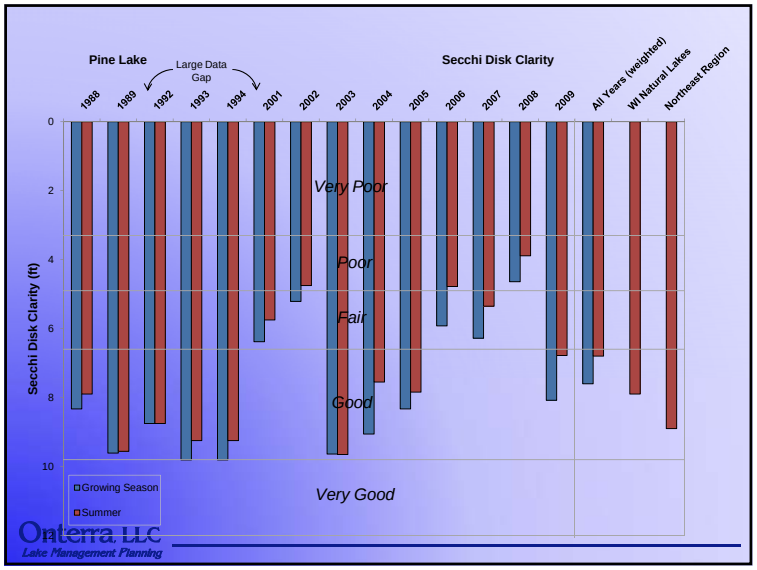
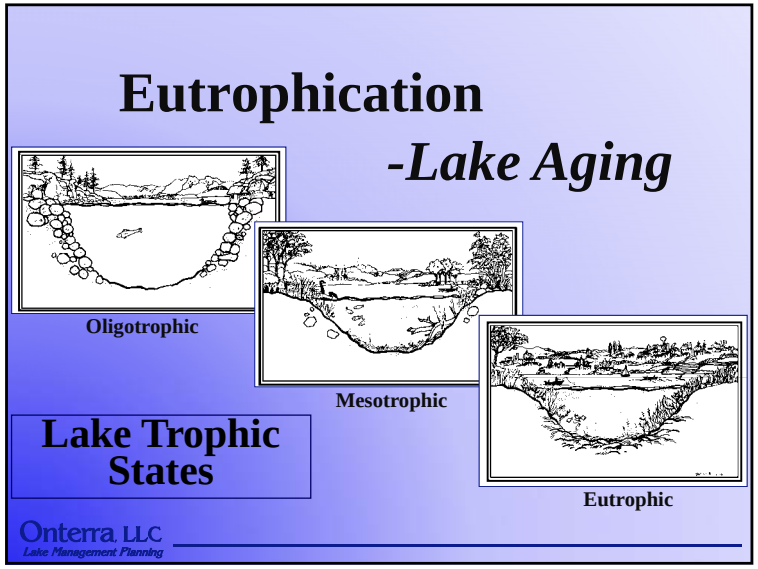

Pine Lake
Total Phosphorus
Growing Season
Summer
Poor
Fair
Good
Very Good
Total Phosphorus (ug/L)
60
50
40
30
20
10
0
1993
1994
2003
2004
2005
2006
2007
2008
2009
All Years (weighted)
WI Natural Lakes
Northeast Region
Large Data Gap
Onterra LLC
Lake Management Planning


Pine Lake
Chlorophyll - a
Chlorophyll - a (ug/L)
Growing Season
Summer
Very Poor
Poor
Fair
Good
Very Good
1994
2003
2004
2005
2006
2007
2008
2009
Large Data Gap
2003-2009 (weighted)
All Years (weighted)
WI Natural Lakes
Northeast Region
Onterra LLC
Lake Management Planning


Pine Lake
Large Data Gap
Secchi Disk Clarity
Secchi Disk Clarity (ft)
1988
1989
1992
1993
1994
2001
2002
2003
2004
2005
2006
2007
2008
2009
All Years (weighted)
WI Natural Lakes
Northeast Region
Very Poor
Poor
Fair
Good
Very Good
Growing Season
Summer
Onterra LLC
Lake Management Planning


Eutrophication
-Lake Aging
Oligotrophic
Mesotrophic
Eutrophic
Lake Trophic States
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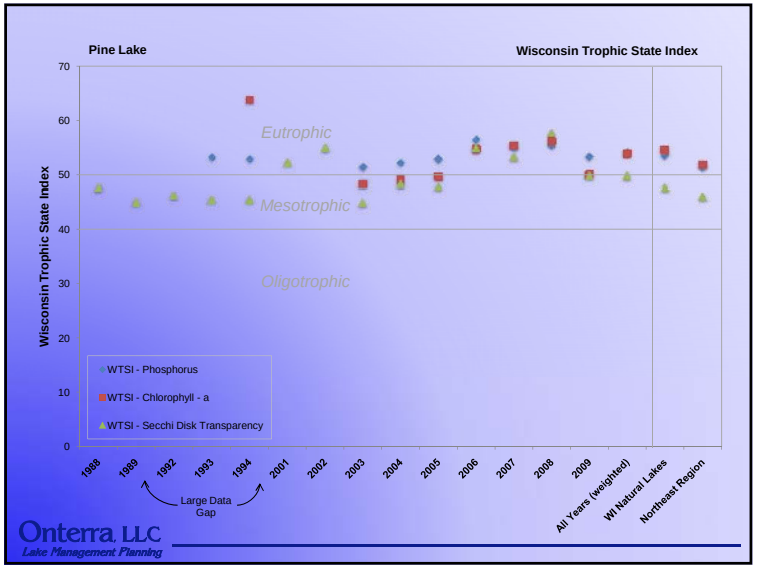
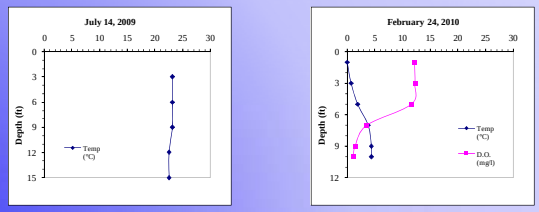
Lake Management Planning


Pine Lake
Wisconsin Trophic State Index
Wisconsin Trophic State Index
Eutrophic
Mesotrophic
Oligotrophic
WTSI - Phosphorus
WTSI - Chlorophyll - a
WTSI - Secchi Disk Transparency
1988
1989
1992
1993
1994
2001
2002
2003
2004
2005
2006
2007
2008
2009
Large Data Gap
All Years (weighted)
WI Natural Lakes
Northeast Region
Onterra LLC
Lake Management Planning

Additional Water Quality Results

- Dissolved Oxygen and Temperature Profiles
  - Lake is very well mixed throughout summer
  - Very limited anoxia occurs near lake bottom during winter
    - Little concern for winter fishkill



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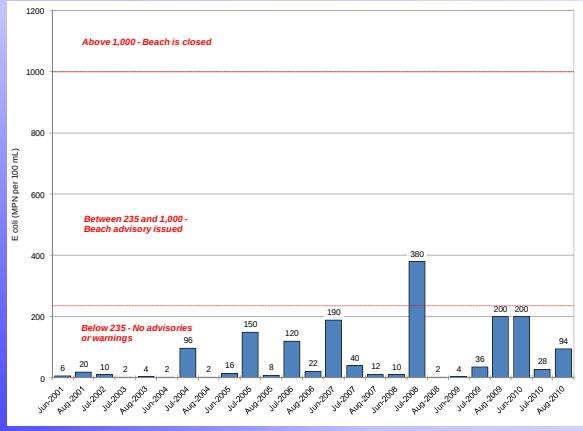
E. Coli Sampling



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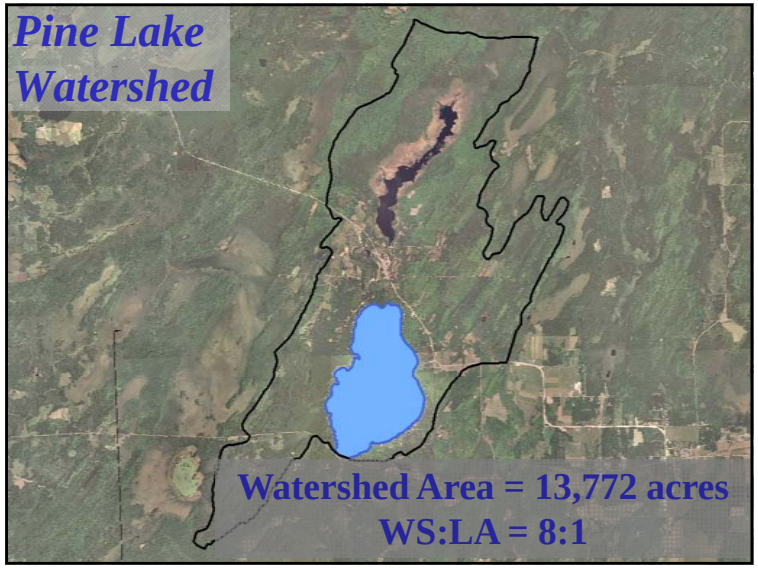
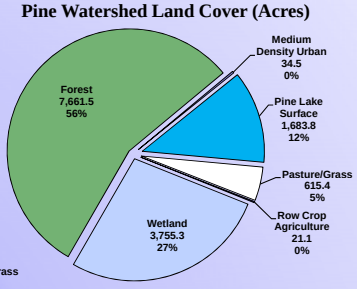
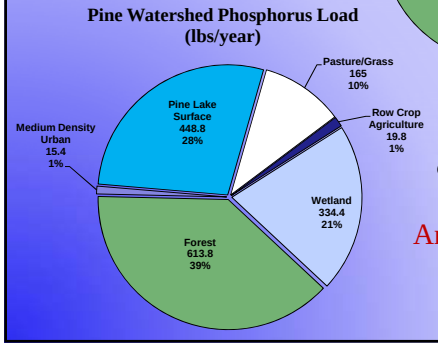
Lake Management Planning

Pine Lake Watershed



Pine Lake Watershed





Watershed Modeling

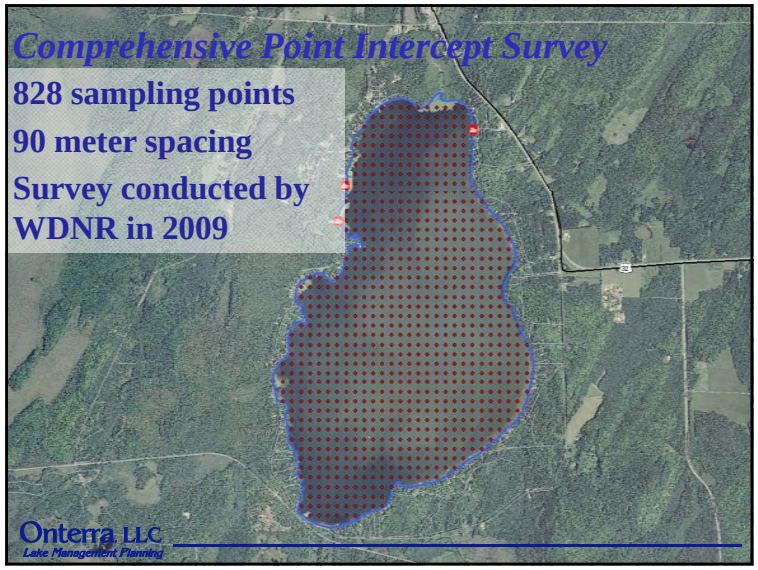
Phosphorus export coefficients

General overview of phosphorus load

Annual Load: 1,597 lbs

Lake Volume16,248 acre-ft

(5.3 billion gallons)



Species List

WDNR 2009 survey

- 34 Native Species
- 2 Non-native Species
  - Curly-leaf pondweed
    - Infrequent
  - Eurasian water milfoil
    - Discussed more later

Life Form	Scientific Name	Common Name	Coefficient of Conservatism (c)
Emergent	*Calla palustris**	Water arum	9
	*Dulichium arundinaceum**	Three-way sedge	9
	Eleocharis palustris	Creeping spikerush	6
	Isoetes sp	Quillwort sp	N/A
	Pontederia cordata †	Pickerelweed	9
	*Sagittaria latifolia**	Common arrowhead	3
	Schoenoplectus acutus	Hardstem bulrush	5
	*Typha angustifolia**	Narrow-leaved cattail	1
	*Typha latifolia**	Broad-leaved cattail	1
	*Zizania palustris**	Northern wild rice	8
FL	*Brasenia schreberi*	Watershield	7
	Nymphaea odorata	White water lily	6
	Nuphar variegata	Spatterdock	6
FL/E	*Sparganium emersum**	Short-stemmed bur-reed	8
	*Sparganium eurycarpum**	Common bur-reed	5
	Sparganium angustifolium	Narrow-leaf bur-reed	9
Submergent	*Chara sp.*	Muskgrasses	7
	Ceratophyllum demersum †	Coontail	3
	Elatine minima	Waterwort	9
	Elodea canadensis	Common waterweed	3
	Heteranthera dubia †	Water stargrass	6
	Myriophyllum sibiricum	Northern water milfoil	7
	Megalodonta beckii	Water marigold	8
	Myriophyllum spicatum	Eurasian water mfoil	Exotic
	Nitella sp.	Stoneworts	7
	Najas flexilis	Slender naiad	6
	Potamogeton stictifolius	Stiff pondweed	8
	Potamogeton illinoensis †	Illinois pondweed	6
	Potamogeton crispus	Curly-leaf pondweed	Exotic
	Potamogeton pusillus	Small pondweed	7
	Potamogeton gramineus	Variable pondweed	7
	Potamogeton zosteriformis	Flat-stem pondweed	6
	Potamogeton praelongus	White-stem pondweed	8
	Potamogeton richardsonii	Clasping-leaf pondweed	5
	Potamogeton amplifolius	Large-leaf pondweed	7
	Potamogeton robbinsii	Fern pondweed	8
	Ranunculus aquatilis	White water-crowfoot	8
	Utricularia vulgaris	Common bladderwort	7
	Vallisneria americana	Wild celery	6
S/E	*Eleocharis acicularis*	Needle spikerush	5
	Juncus pelocarpus	Brown-fruited rush	8
FF	*Lemna minor*	Lesser duckweed	5
	Lemna trisulca	Forked duckweed	6
	Spirodela polyrhiza	Greater duckweed	5

FL = Floating Leaf
FL/E = Floating Leaf and Emergent
S/E = Submergent and Emergent
FF = Free Floating
* = Incidental
† = Species not verified by UW Herbarium

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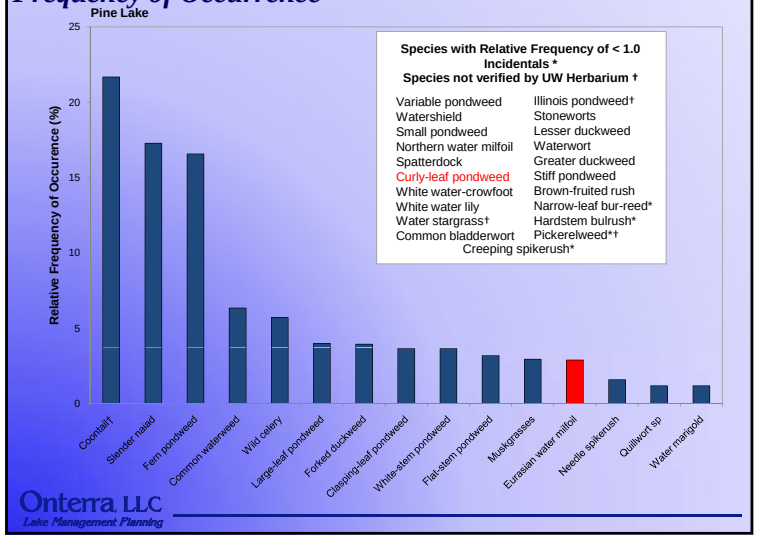
Frequency of Occurrence



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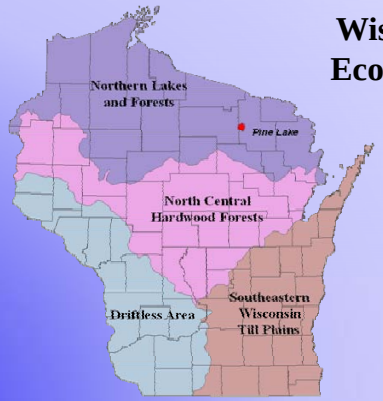
Aquatic Plants



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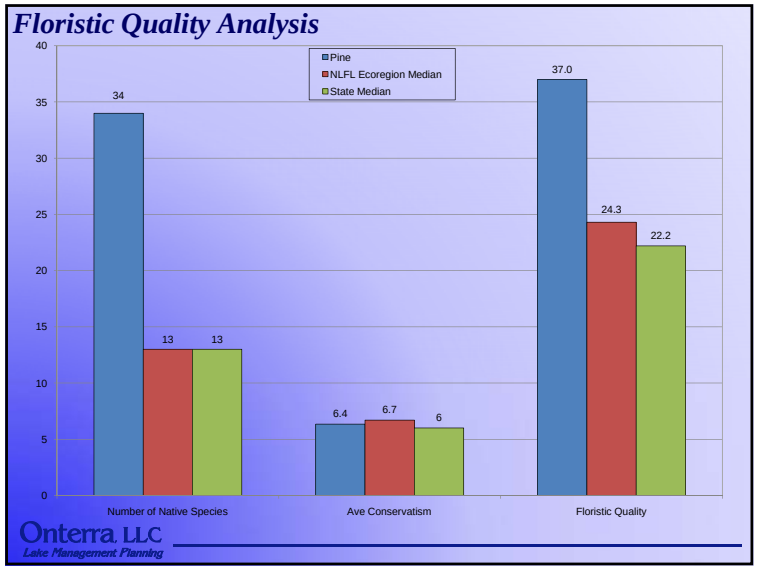
Floristic Quality Analysis
Pine
NLFL Ecoregion Median
State Median
40
35
30
25
20
15
10
5
0
34
13
13
6.4
6.7
6
37.0
24.3
22.2
Number of Native Species
Ave Conservatism
Floristic Quality
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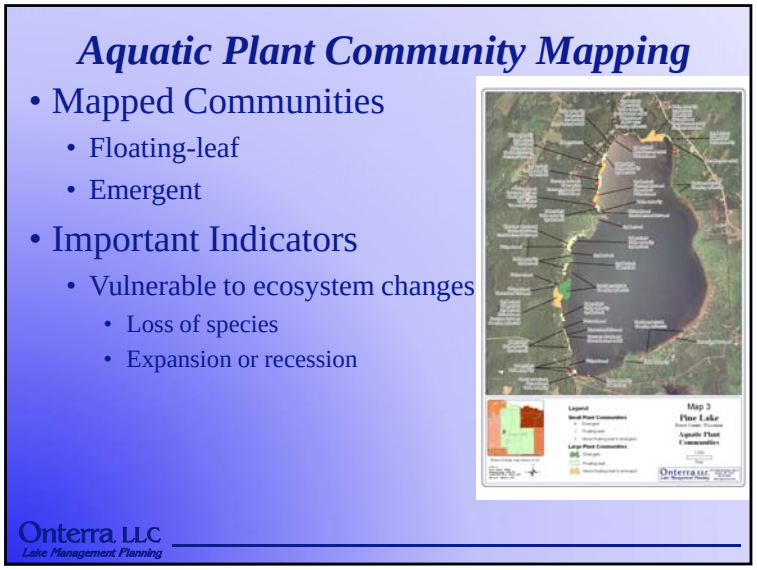
Aquatic Plant Community Mapping
• Mapped Communities
• Floating-leaf
• Emergent
• Important Indicators
• Vulnerable to ecosystem changes
• Loss of species
• Expansion or recession
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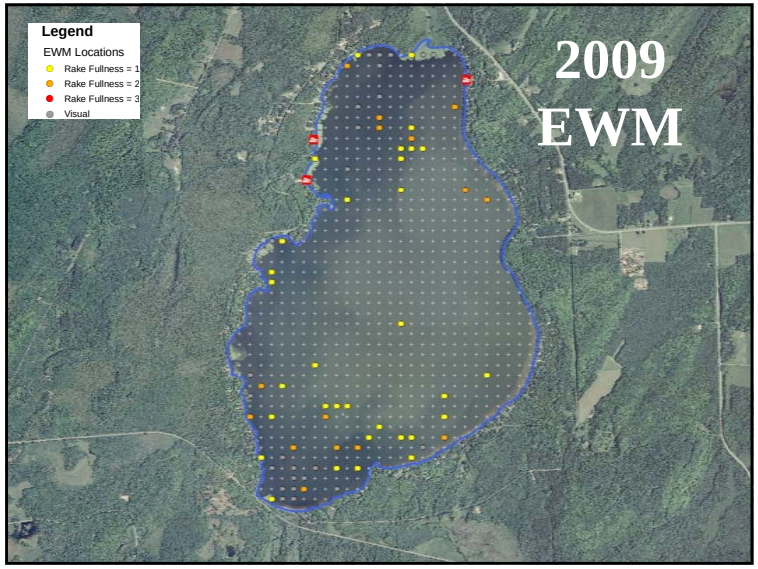
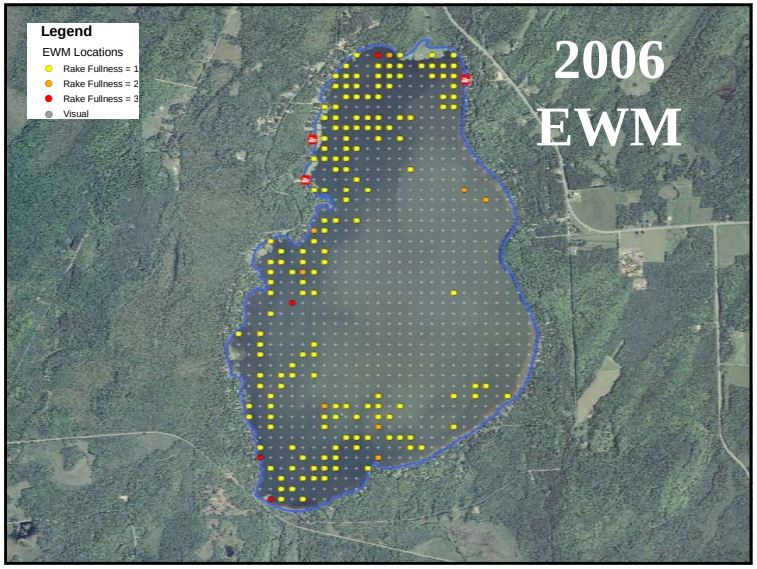
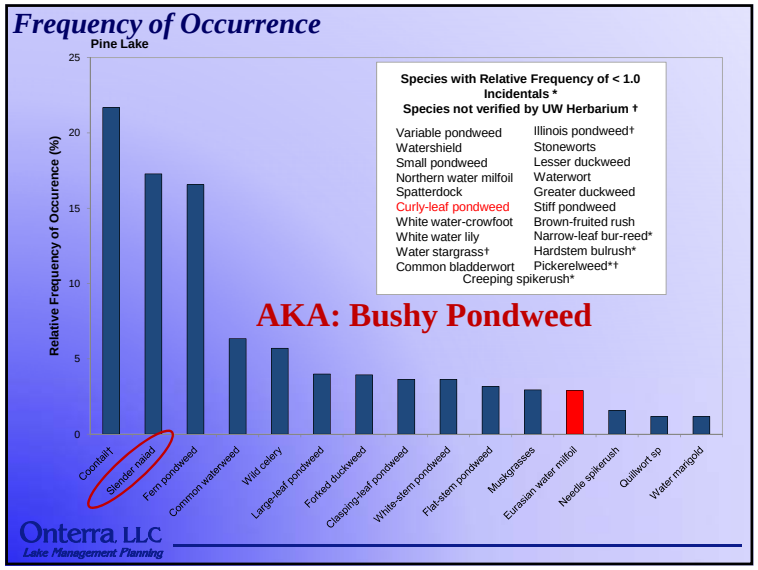
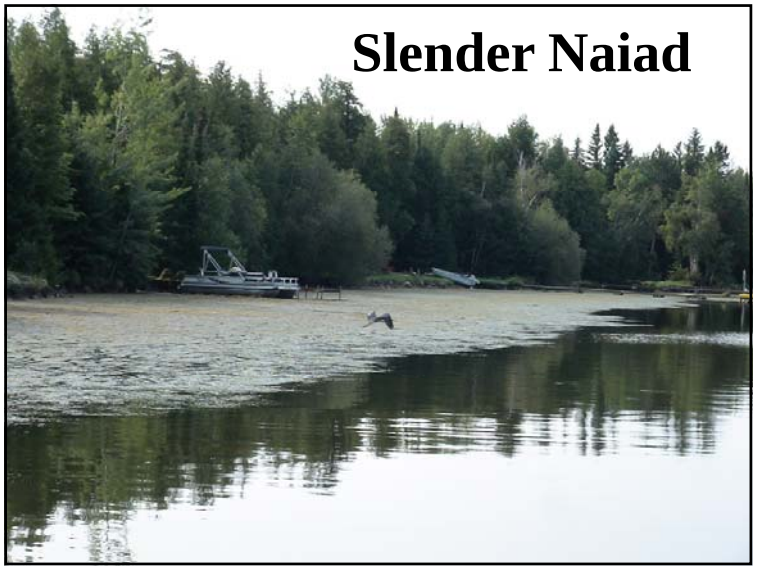
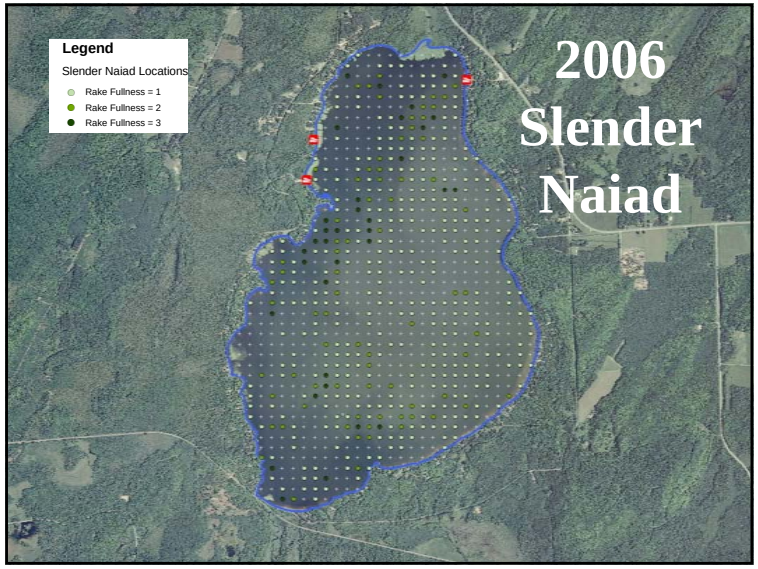
Lake Management Planning

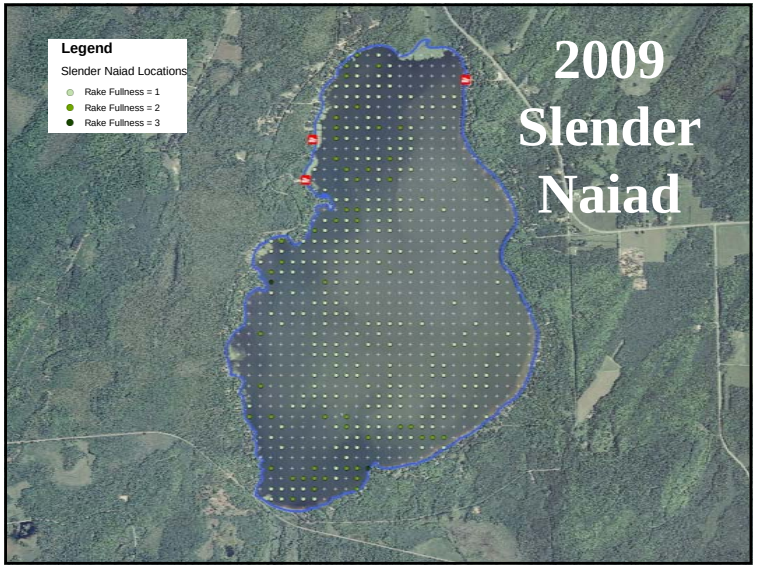

Legend
EWM Locations
Rake Fullness = 1
Rake Fullness = 2
Rake Fullness = 3
Visual
2009
EWM

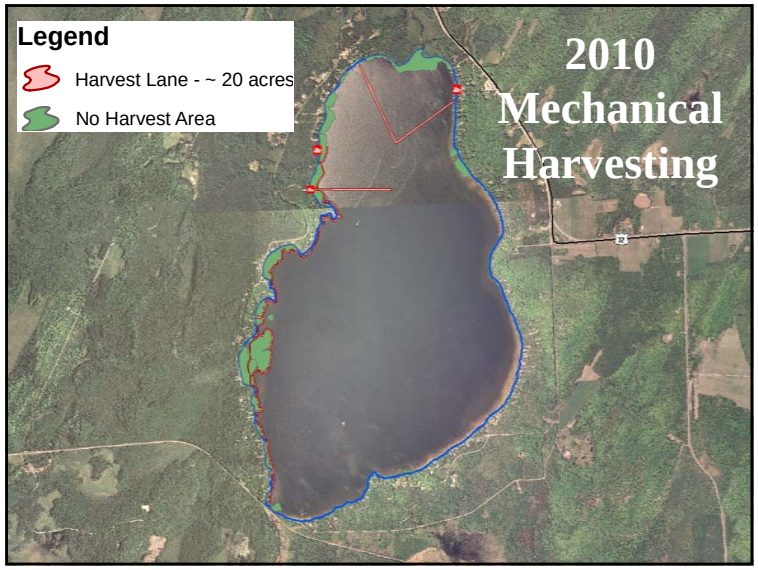

Legend
EWM Locations
Rake Fullness = 1
Rake Fullness = 2
Rake Fullness = 3
Visual
2006
EWM


Frequency of Occurrence
Pine Lake
Relative Frequency of Occurence (%)
25
20
15
10
5
0
Species with Relative Frequency of < 1.0
Incidentals *
Species not verified by UW Herbarium †
Variable pondweed
Watershield
Small pondweed
Northern water milfoil
Spatterdock
Curly-leaf pondweed
White water-crowfoot
White water lily
Water stargrass†
Common bladderwort
Illinois pondweed†
Stoneworts
Lesser duckweed
Waterwort
Greater duckweed
Stiff pondweed
Brown-fruited rush
Narrow-leaf bur-reed*
Hardstem bulrush*
Pickerelweed*†
Creeping spikerush*
AKA: Bushy Pondweed
Coontail
Slender naiad
Fern pondweed
Common waterweed
Wild celery
Large-leaf pondweed
Forked duckweed
Clasping-leaf pondweed
White-stem pondweed
Flat-stem pondweed
Muskgrasses
Eurasian water milfoil
Needle spikerush
Quillwort sp
Water marigold
Onterra LLC
Lake Management Planning


Slender Naiad


Legend
Slender Naiad Locations
Rake Fullness = 1
Rake Fullness = 2
Rake Fullness = 3
2006
Slender
Naiad


Legend
Slender Naiad Locations
Rake Fullness = 1
Rake Fullness = 2
Rake Fullness = 3
2009
Slender
Naiad



Conclusions

- Water quality is as expected for a large, shallow lake.
  - Lake is productive and healthy.
- Overall watershed is in great condition.
  - Land cover exports minimal phosphorus, but lake has a relatively large watershed that is able to drive productivity rate.
  - Largest, *controllable* contributor is likely shoreland properties.

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Conclusions

- Aquatic plant community
  - Based upon standard analysis, native community is of moderately high quality but indicative of a disturbed system.
  - Curly-leaf pondweed was found in two separate P-I surveys. In 2009, the plant was not able to be seen from the surface. Likely not an issue at this time.
  - Eurasian water milfoil has been found in low densities scattered around the lake. Control via available techniques is likely not appropriate.
  - Nuisance levels of native species exist within lake.

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Thank You

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

Wisconsin Lakes Partnership

UWEX Extension

Wisconsin Dept. of Natural Resources

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Lake Management Planning

B

APPENDIX B

Stakeholder Survey Response Charts and Comments

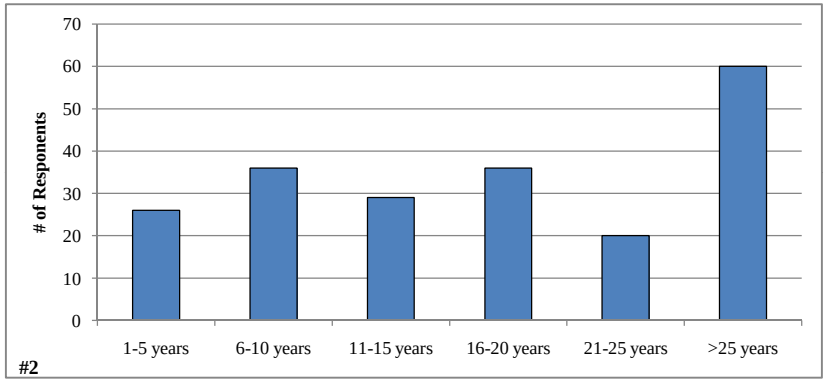
Returned Surveys	222
Sent Surveys	394
Response Rate (%)	56.3

#1 Where is/are your property or properties located in the district?

	Total	*%*
On the lake	150	*68.8*
Off the lake	47	*21.6*
Both on the lake and off the lake	21	*9.6*
	218	*100.0*

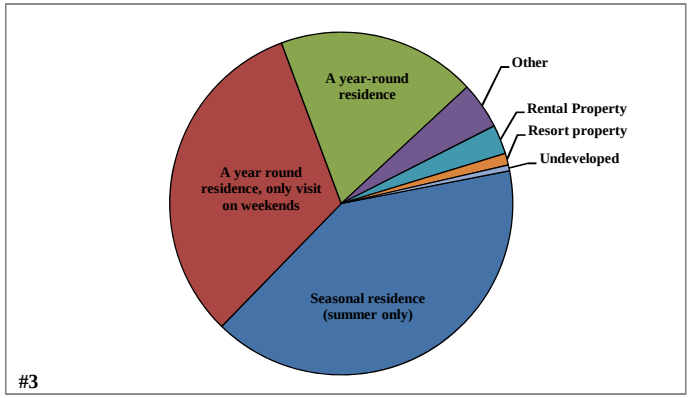
#2 How long have you owned your property in the Pine Lake District?

	Total	*%*
1-5 years	26	*12.6*
6-10 years	36	*17.4*
11-15 years	29	*14.0*
16-20 years	36	*17.4*
21-25 years	20	*9.7*
>25 years	60	*29.0*
	207	*100.0*



#3 What type of property do you own on Pine Lake?

	Total	*%*
Seasonal residence (summer only)	73	*40.3*
A year round residence, only visit on weekends	58	*32.0*
A year-round residence	34	*18.8*
Other	8	*4.4*
Undeveloped	5	*2.8*
Resort property	2	*1.1*
Rental property	1	*0.6*
	181	*100.0*

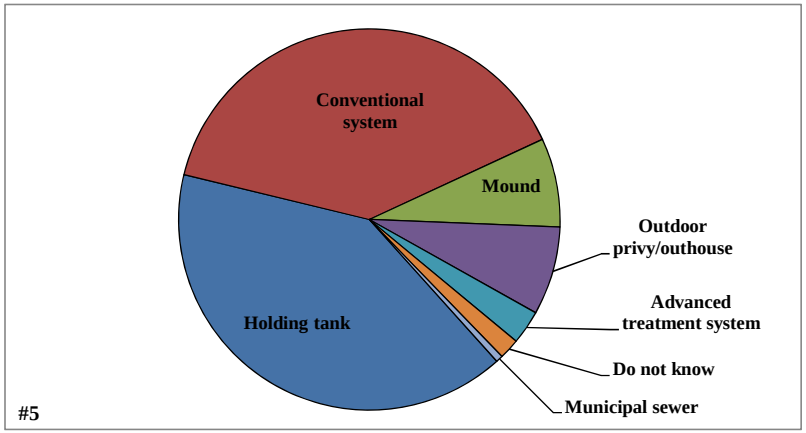


#4 If you are not a year-round resident, how many days each year is your property used by you or others?

Answered Question	126
Average	64.2
Standard deviation	39.3

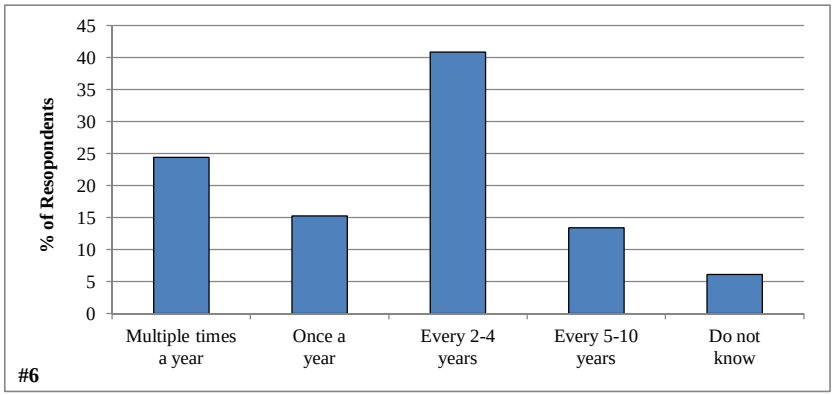
#5 What type of septic system does your property utilize?

	Total	%
Holding tank	70	*40.7*
Conventional system	68	*39.5*
Mound	13	*7.6*
Outdoor privy/outhouse	13	*7.6*
Advanced treatment system	5	*2.9*
Do not know	3	*1.7*
Municipal sewer	1	*0.6*
	172	*100.0*



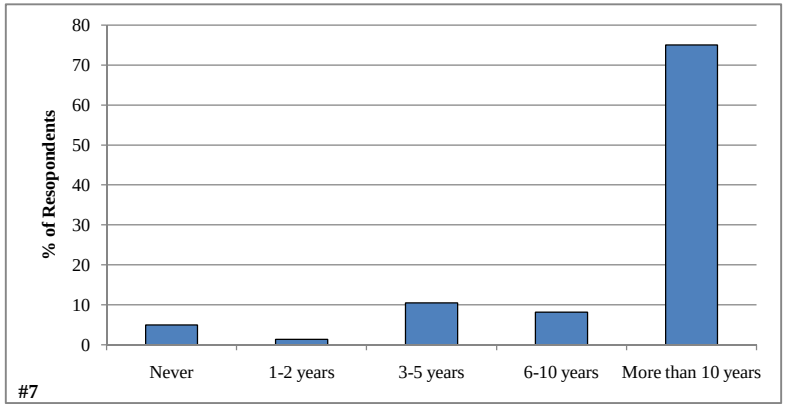
#6 How often is the septic tank on your property pumped?

	Total	%
Multiple times a year	40	*24.4*
Once a year	25	*15.2*
Every 2-4 years	67	*40.9*
Every 5-10 years	22	*13.4*
Do not know	10	*6.1*
	164	*100.0*



#7 For how many years have you fished Pine Lake?

	Total	%
Never	11	*5.0*
1-2 years	3	*1.4*
3-5 years	23	*10.5*
6-10 years	18	*8.2*
More than 10 years	165	*75.0*
	220	*100.0*

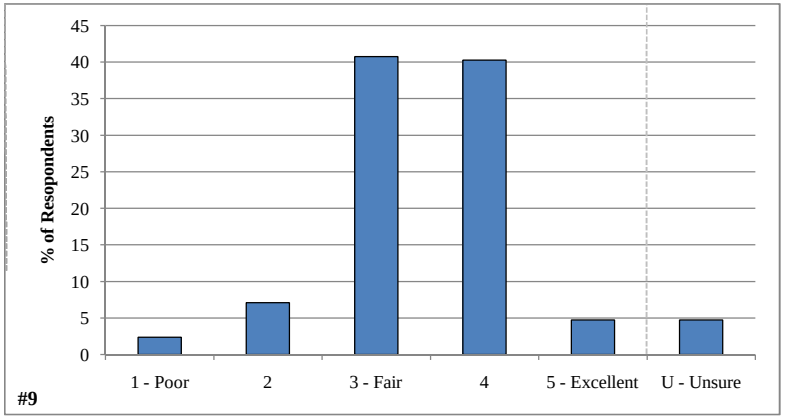


#8 Have you personally fished on Pine Lake in the past 3 years?

	Total	%
Yes	182	*85.8*
No	30	*14.2*
	212	*100.0*

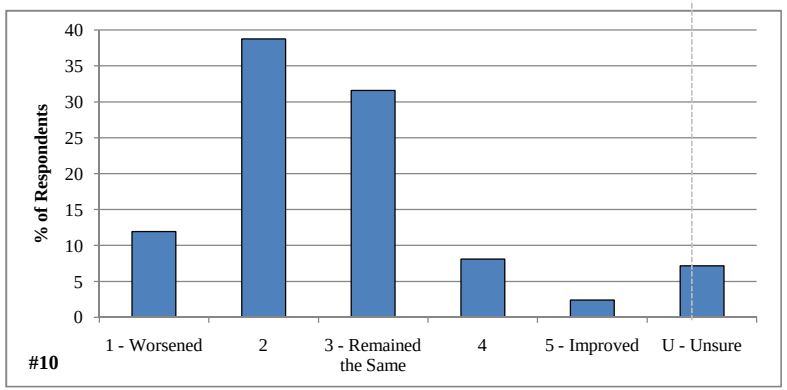
#9 How would you describe the current quality of fishing on Pine Lake?

	Total	%
1 - Poor	5	*2.4*
2	15	*7.1*
3 - Fair	86	*40.8*
4	85	*40.3*
5 - Excellent	10	*4.7*
U - Unsure	10	*4.7*
	211	*100.0*



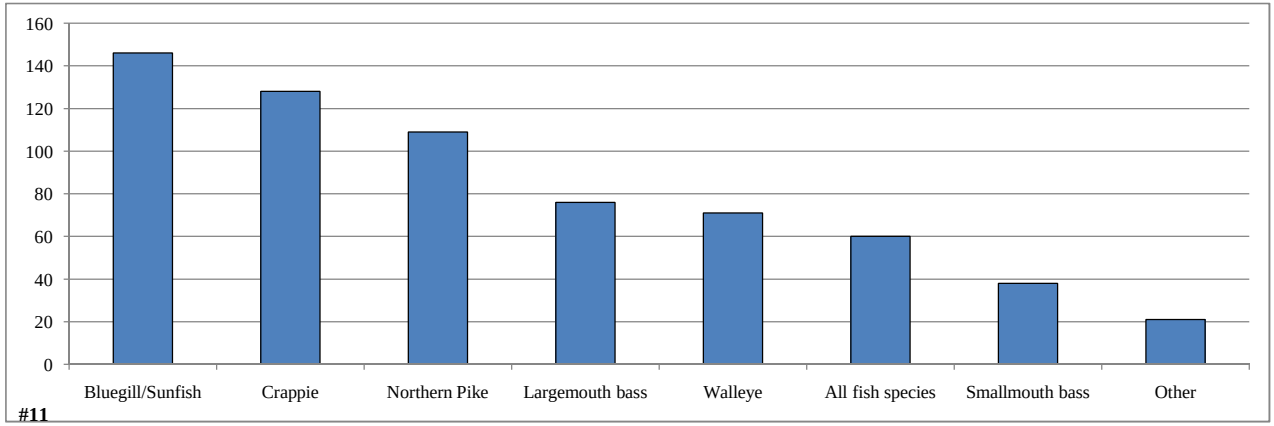
#10 How has the quality of fishing changed on Pine Lake since you obtained your property?

	Total	%
1 - Worsened	25	*12.0*
2	81	*38.8*
3 - Remained the Same	66	*31.6*
4	17	*8.1*
5 - Improved	5	*2.4*
U - Unsure	15	*7.2*
	209	*100.0*



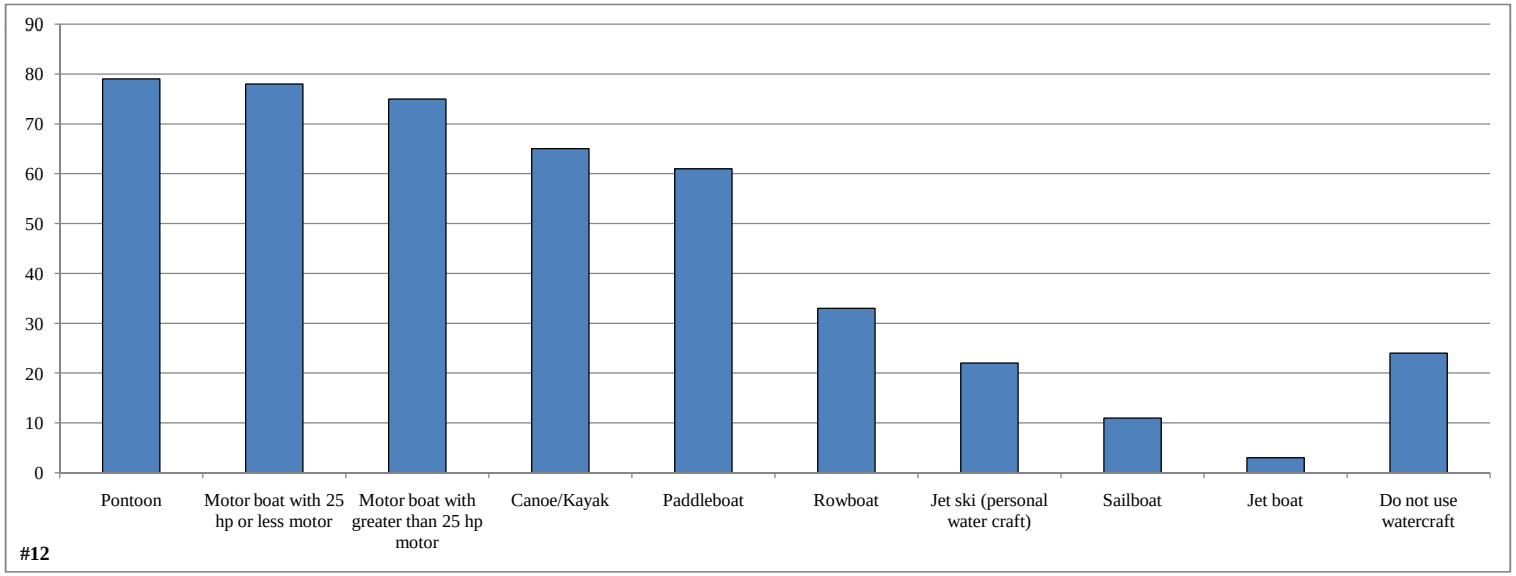
#11 What species of fish do you like to catch on Pine Lake?

	Total
Bluegill/Sunfish	146
Crappie	128
Northern Pike	109
Largemouth bass	76
Walleye	71
All fish species	60
Smallmouth bass	38
Other	21
	649



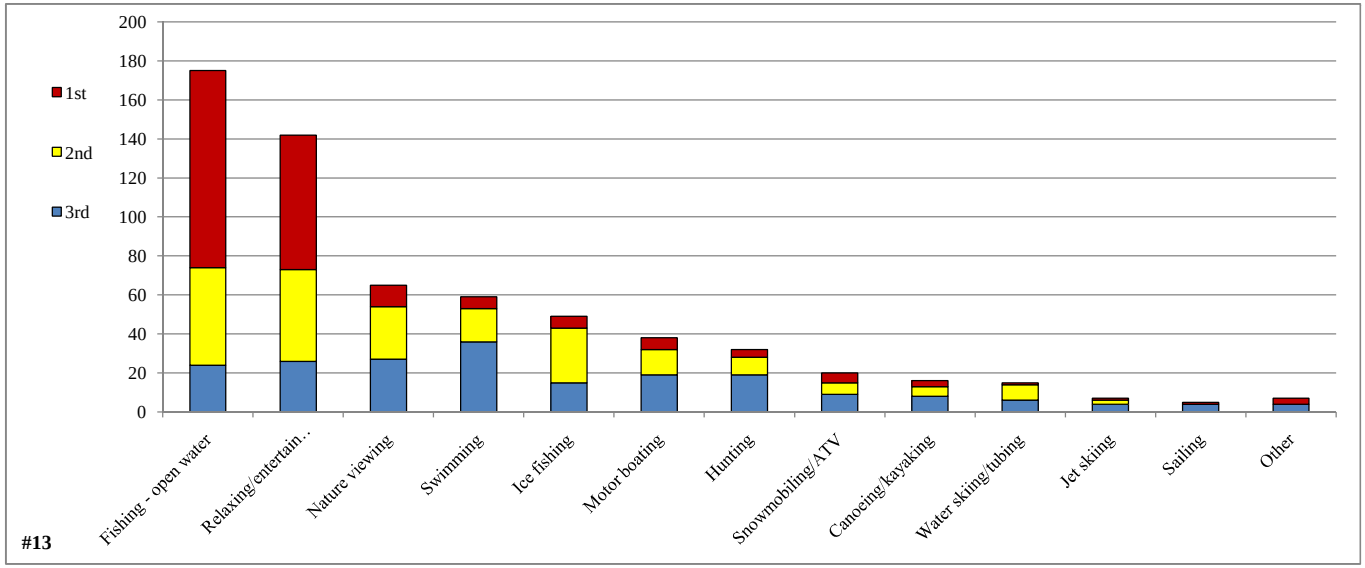
#12 What types of watercraft do you or others that use your property, currently use on the lake?

	Total
Pontoon	79
Motor boat with 25 hp or less motor	78
Motor boat with greater than 25 hp motor	75
Canoe/Kayak	65
Paddleboat	61
Rowboat	33
Jet ski (personal water craft)	22
Sailboat	11
Jet boat	3
Do not use watercraft	24
	424



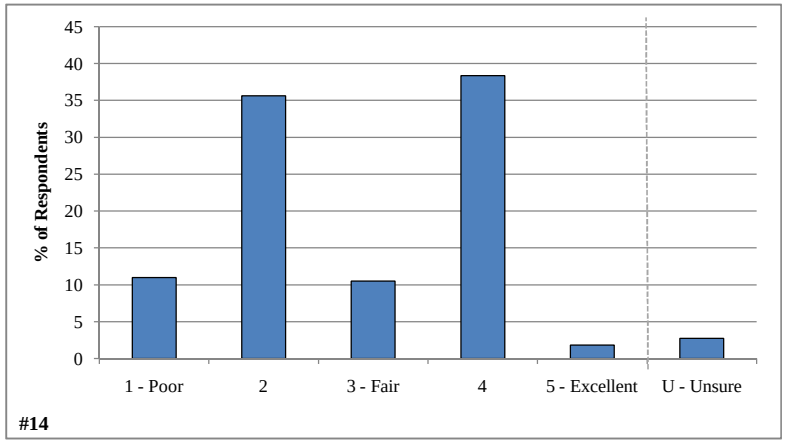
#13 Please rank the activities below that are the most important or enjoyable to you on Pine Lake?

	1st	2nd	3rd	*% ranked*
Fishing - open water	101	50	24	*27.8*
Relaxing/entertaining	69	47	26	*22.5*
Nature viewing	11	27	27	*10.3*
Swimming	6	17	36	*9.4*
Ice fishing	6	28	15	*7.8*
Motor boating	6	13	19	*6.0*
Hunting	4	9	19	*5.1*
Snowmobiling/ATV	5	6	9	*3.2*
Canoeing/kayaking	3	5	8	*2.5*
Water skiing/tubing	1	8	6	*2.4*
Jet skiing	1	2	4	*1.1*
Sailing	1	0	4	*0.8*
Other	3	0	4	*1.1*
	217	212	201	*100.0*



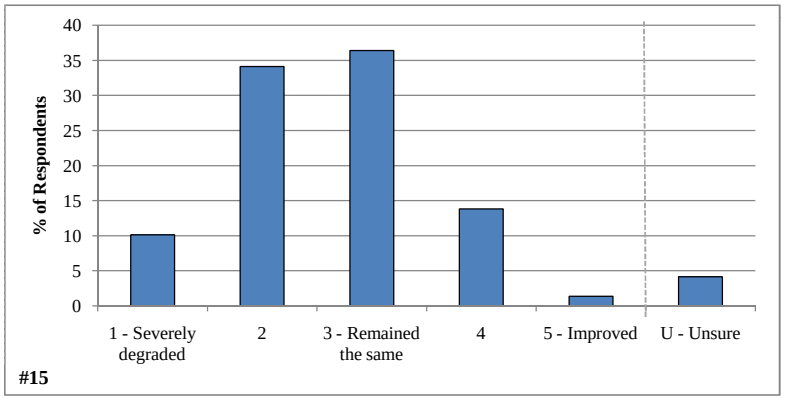
#14 How would you describe the current water clarity of Pine Lake?

	Total	%
1 - Poor	24	*11.0*
2	78	*35.6*
3 - Fair	23	*10.5*
4	84	*38.4*
5 - Excellent	4	*1.8*
U - Unsure	6	*2.7*
	219	*100.0*



#15 How has the water clarity changed in Pine Lake since you obtained your property?

	Total	%
1 - Severely degraded	22	*10.1*
2	74	*34.1*
3 - Remained the same	79	*36.4*
4	30	*13.8*
5 - Improved	3	*1.4*
U - Unsure	9	*4.1*
	217	*100.0*



#16 Have you ever heard of aquatic invasive species?

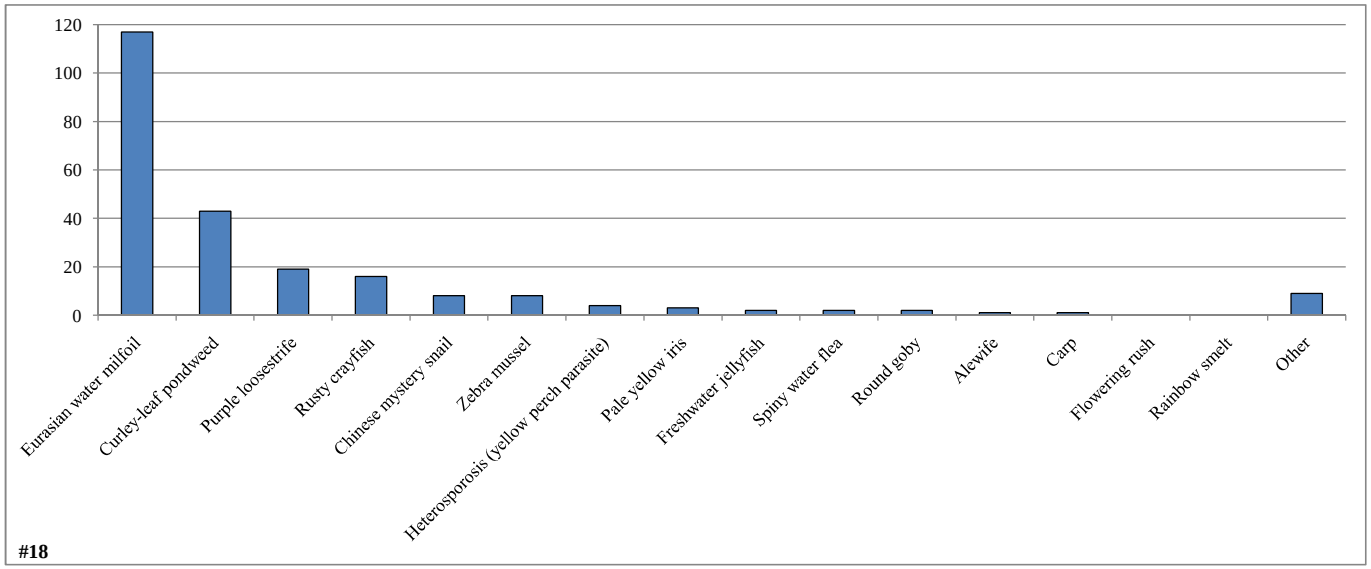
	Total	%
Yes	210	*95.5*
No	10	*4.5*
	220	*100.0*

#17 Are you aware of aquatic invasive species in Pine Lake?

	Total	%
Yes	134	*61.2*
No	85	*38.8*
	219	*100.0*

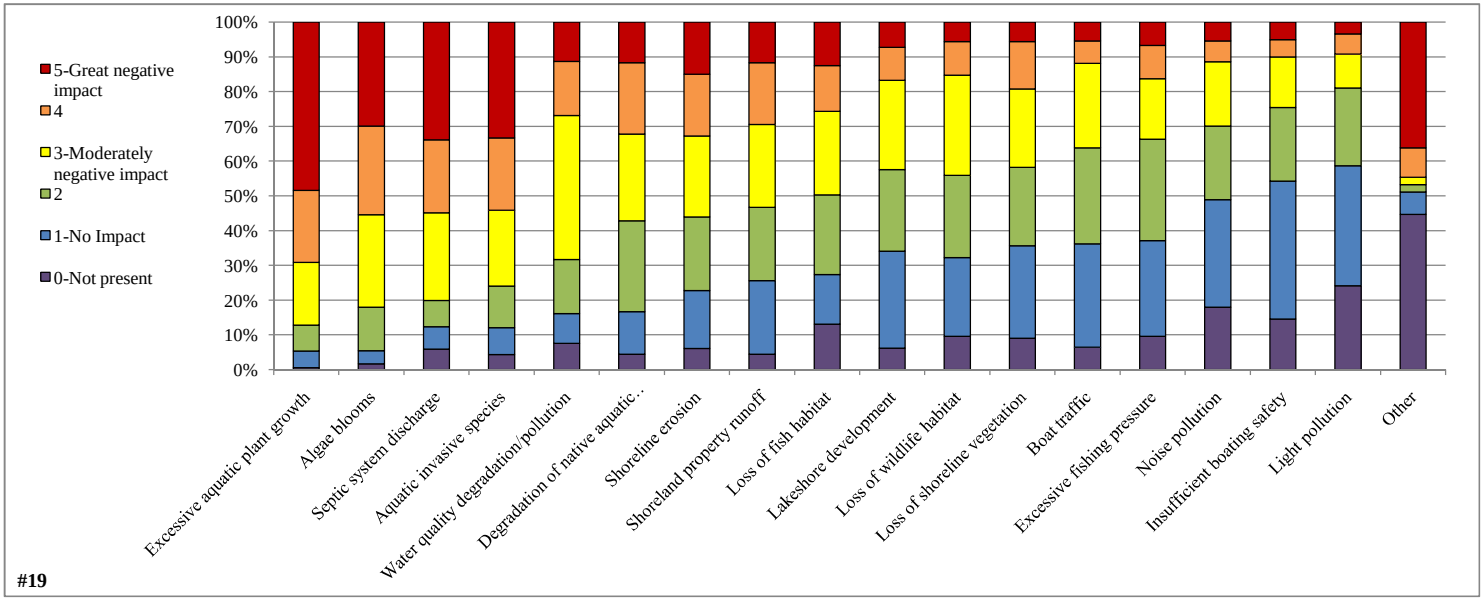
#18 Which aquatic invasive species are you aware of in Pine Lake?

	Total
Eurasian water milfoil	117
Curley-leaf pondweed	43
Purple loosestrife	19
Rusty crayfish	16
Chinese mystery snail	8
Zebra mussel	8
Heterosporosis (yellow perch parasite)	4
Pale yellow iris	3
Freshwater jellyfish	2
Spiny water flea	2
Round goby	2
Alewife	1
Carp	1
Flowering rush	0
Rainbow smelt	0
Other	9



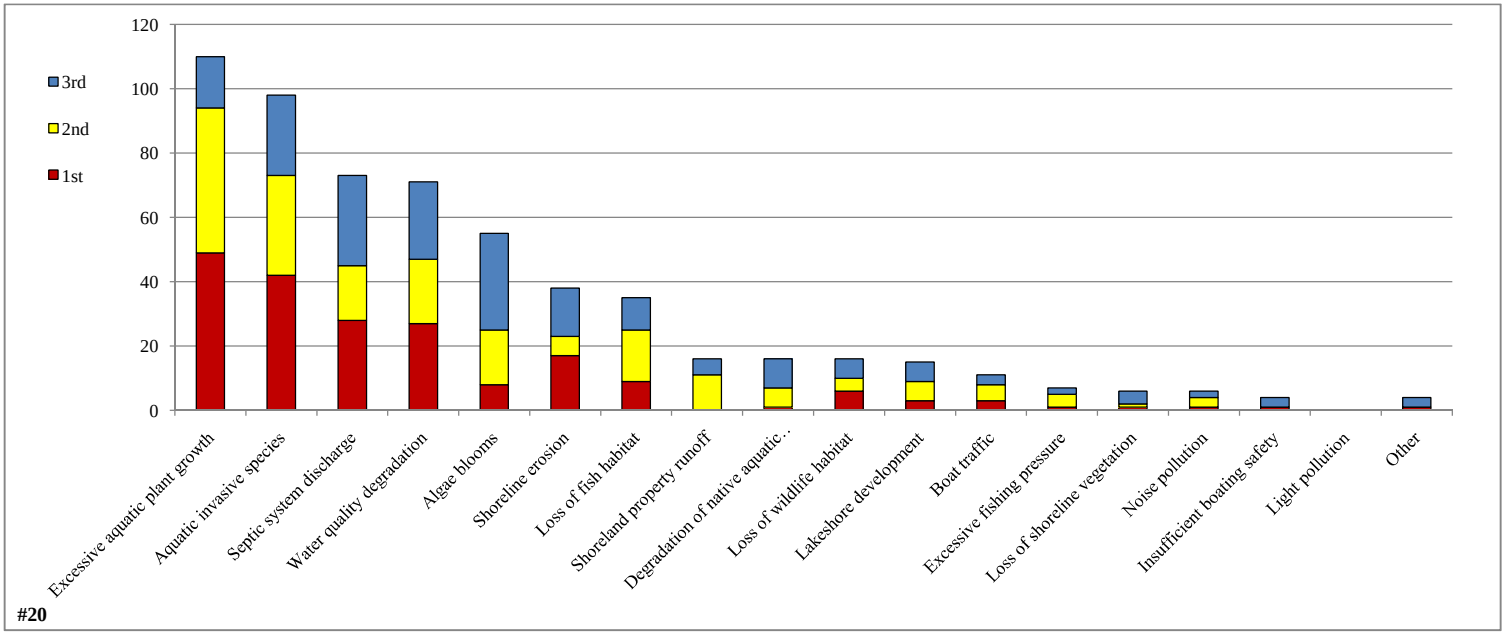
#19 To what level do you believe each of the following factors may be negatively impacting Pine Lake?

	0-Not present	1-No Impact	2	3-Moderately negative impact	4	5-Great negative impact	*Total*	*Average*
Excessive aquatic plant growth	1	9	14	34	39	91	*187*	*4.0*
Algae blooms	3	7	23	49	47	55	*181*	*3.6*
Septic system discharge	11	12	14	47	39	63	*175*	*3.5*
Aquatic invasive species	8	14	22	40	38	61	*175*	*3.5*
Water quality degradation/pollution	14	16	29	77	29	21	*172*	*2.8*
Degradation of native aquatic plants	8	22	47	45	37	21	*172*	*2.8*
Shoreline erosion	11	30	38	42	32	27	*169*	*2.8*
Shoreland property runoff	8	38	38	43	32	21	*172*	*2.6*
Loss of fish habitat	24	26	42	44	24	23	*159*	*2.5*
Lakeshore development	11	50	42	46	17	13	*168*	*2.3*
Loss of wildlife habitat	17	40	42	51	17	10	*160*	*2.2*
Loss of shoreline vegetation	16	47	40	40	24	10	*161*	*2.2*
Boat traffic	12	55	51	45	12	10	*173*	*2.1*
Excessive fishing pressure	17	49	52	31	17	12	*161*	*2.1*
Noise pollution	33	57	39	34	11	10	*151*	*1.8*
Insufficient boating safety	26	71	38	26	9	9	*153*	*1.7*
Light pollution	42	60	39	17	10	6	*132*	*1.5*
Other	21	3	1	1	4	17	*26*	*2.3*



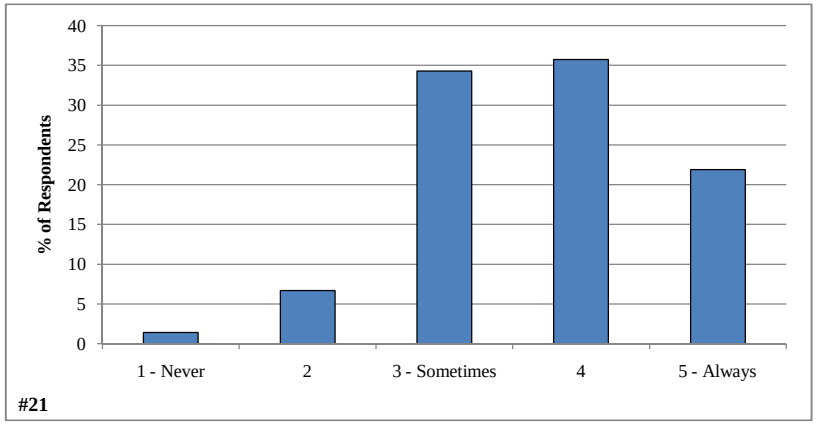
#20 From the list below, please rank your top three concerns regarding Pine Lake.

	1st	2nd	3rd	*% Ranked*
Excessive aquatic plant growth	49	45	16	*18.9*
Aquatic invasive species	42	31	25	*16.9*
Septic system discharge	28	17	28	*12.6*
Water quality degradation	27	20	24	*12.2*
Algae blooms	8	17	30	*9.5*
Shoreline erosion	17	6	15	*6.5*
Loss of fish habitat	9	16	10	*6.0*
Shoreland property runoff	0	11	5	*2.8*
Degradation of native aquatic plants	1	6	9	*2.8*
Loss of wildlife habitat	6	4	6	*2.8*
Lakeshore development	3	6	6	*2.6*
Boat traffic	3	5	3	*1.9*
Excessive fishing pressure	1	4	2	*1.2*
Loss of shoreline vegetation	1	1	4	*1.0*
Noise pollution	1	3	2	*1.0*
Insufficient boating safety	1	0	3	*0.7*
Light pollution	0	0	0	*0.0*
Other	1	0	3	*0.7*
	198	192	191	*100.0*



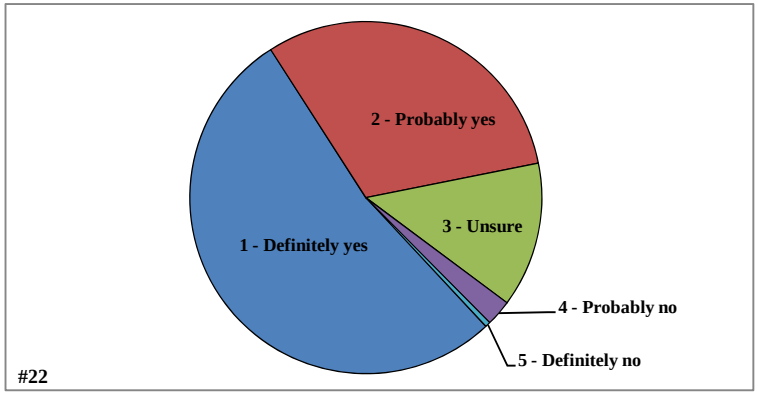
#21 During open water season how often does aquatic plant growth, including algae, negatively impact your enjoyment of Pine Lake?

	Total	%
1 - Never	3	*1.4*
2	14	*6.7*
3 - Sometimes	72	*34.3*
4	75	*35.7*
5 - Always	46	*21.9*
	210	*100.0*



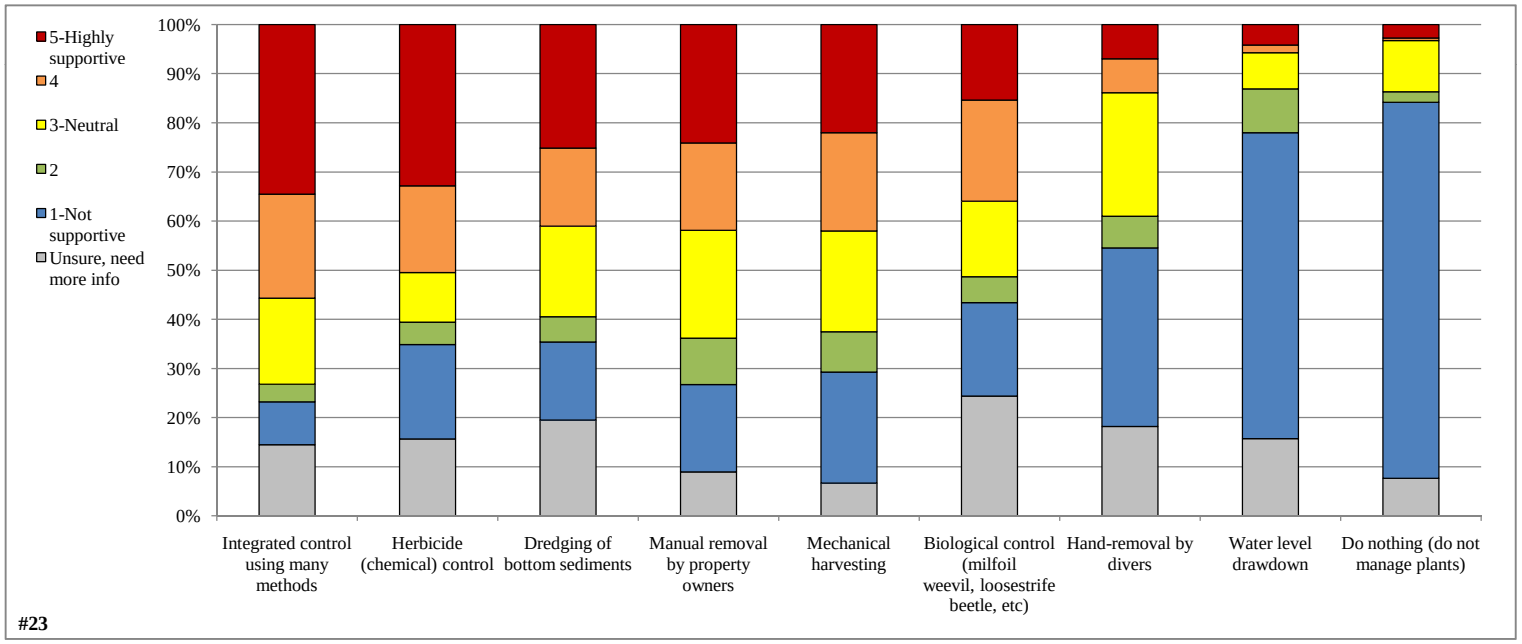
#22 Considering your answer to the question above, do you believe aquatic plant control is needed on Pine Lake?

	Total	%
1 - Definitely yes	111	*52.9*
2 - Probably yes	65	*31.0*
3 - Unsure	28	*13.3*
4 - Probably no	5	*2.4*
5 - Definitely no	1	*0.5*
	210	*100.0*



#23 What is your level of support for the responsible use of the following techniques on Pine Lake?

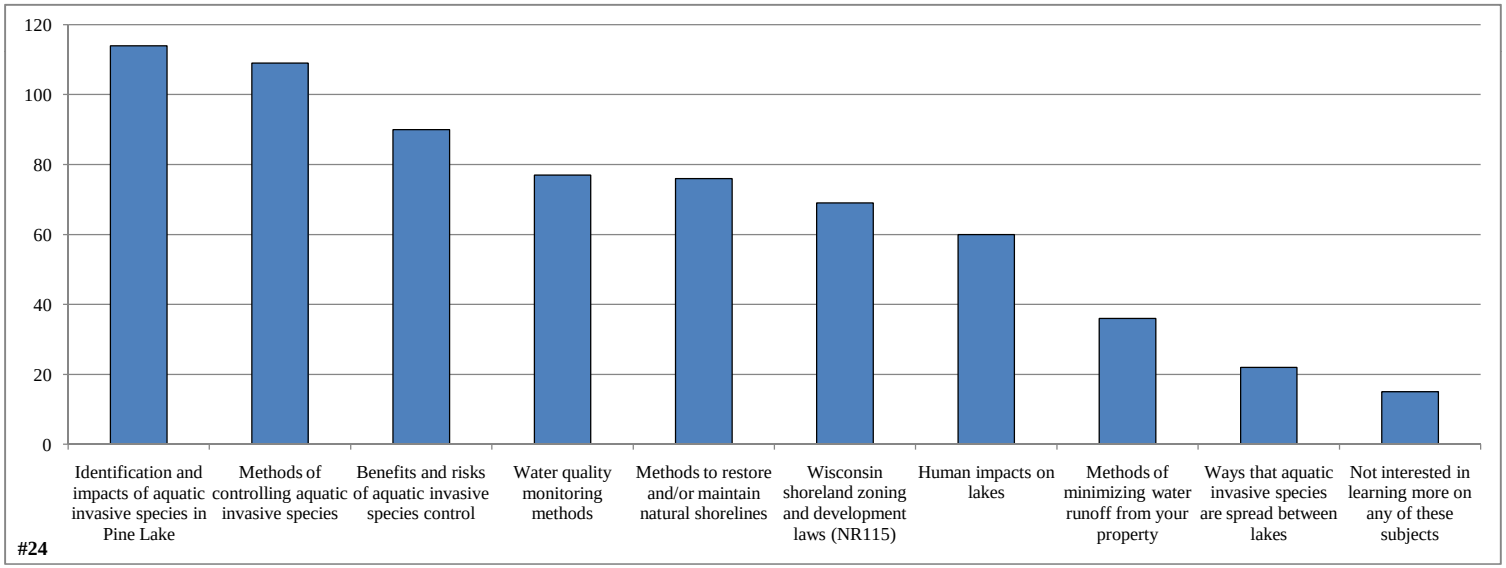
	1-Not supportive	2	3-Neutral	4	5-Highly supportive	Unsure, need more info	*Total*	*Average*
Integrated control using many methods	17	7	34	41	67	28	*166*	*3.8*
Herbicide (chemical) control	38	9	20	35	65	31	*167*	*3.5*
Dredging of bottom sediments	31	10	36	31	49	38	*157*	*3.4*
Manual removal by property owners	34	18	42	34	46	17	*174*	*3.2*
Mechanical harvesting	44	16	40	39	43	13	*182*	*3.1*
Biological control (milfoil weevil, loosestrife beetle, etc)	36	10	29	39	29	46	*143*	*3.1*
Hand-removal by divers	68	12	47	13	13	34	*153*	*2.3*
Water level drawdown	119	17	14	3	8	30	*161*	*1.5*
Do nothing (do not manage plants)	140	4	19	1	5	14	*169*	*1.4*



#23

#24 Which of these subjects would you like to learn more about?

	Total
Identification and impacts of aquatic invasive species in Pine Lake	114
Methods of controlling aquatic invasive species	109
Benefits and risks of aquatic invasive species control	90
Water quality monitoring methods	77
Methods to restore and/or maintain natural shorelines	76
Wisconsin shoreland zoning and development laws (NR115)	69
Human impacts on lakes	60
Methods of minimizing water runoff from your property	36
Ways that aquatic invasive species are spread between lakes	22
Not interested in learning more on any of these subjects	15

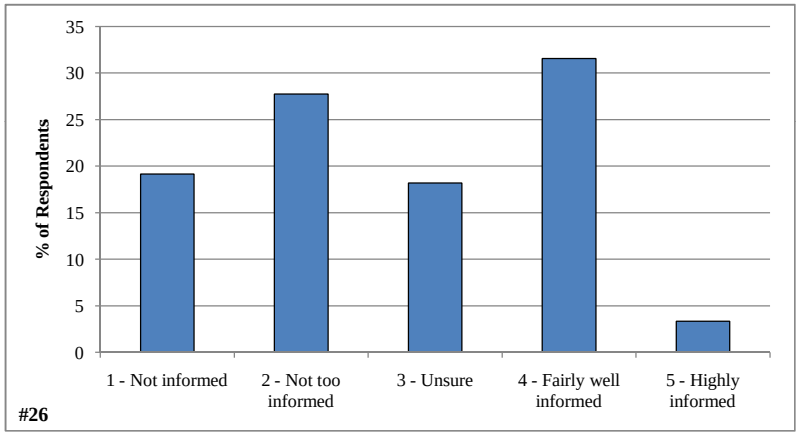


#25 Before receiving this mailing, have you ever heard of the Pine Lake Protection & Rehabilitation District?

	Total	%
Yes	165	*78.9*
No	44	*21.1*
	209	*100.0*

#26 How informed has the Pine Lake Protection & Rehabilitation District kept you, regarding issues with Pine Lake and its management?

	Total	%
1 - Not informed	40	*19.1*
2 - Not too informed	58	*27.8*
3 - Unsure	38	*18.2*
4 - Fairly well informed	66	*31.6*
5 - Highly informed	7	*3.3*
	209	*100.0*

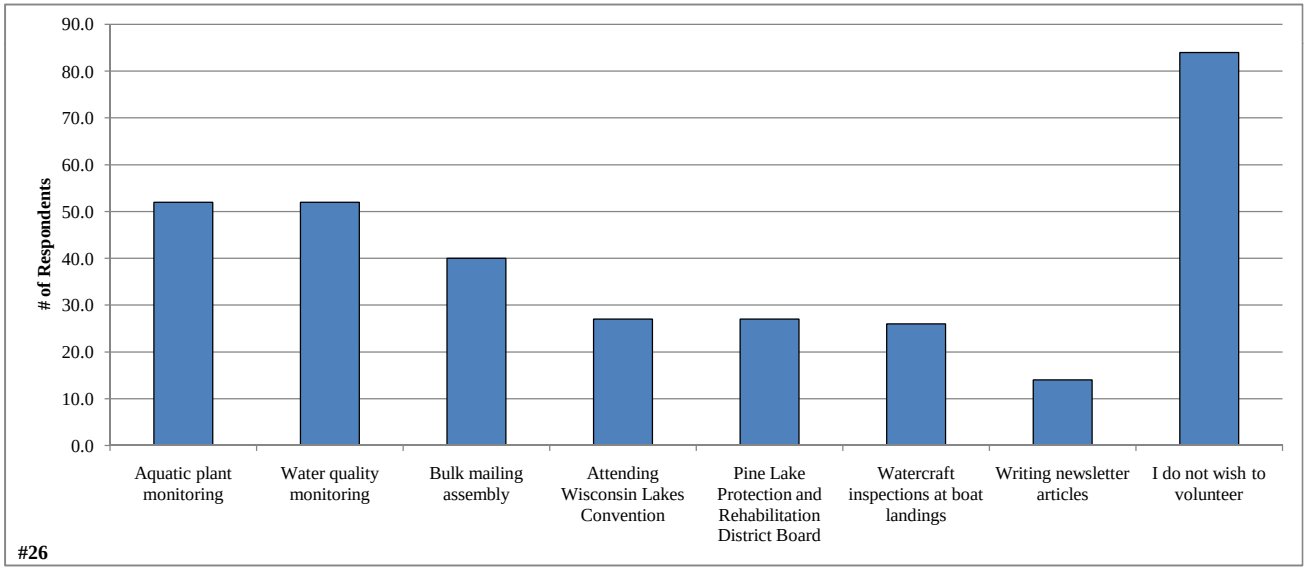


#27 Are you aware that a portion of your real estate tax dollars are used to fund the Pine Lake Protection and Rehabilitation District?

	Total	%
Yes	155	*73.8*
No	55	*26.2*
	210	*100.0*

#28 Please circle the activities you would be willing to participate in if the Pine Lake Protection and Rehabilitation District requires additional assistance.

	Total
Aquatic plant monitoring	52.0
Water quality monitoring	52.0
Bulk mailing assembly	40.0
Attending Wisconsin Lakes Convention	27.0
Pine Lake Protection and Rehabilitation District Board	27.0
Watercraft inspections at boat landings	26.0
Writing newsletter articles	14.0
I do not wish to volunteer	84.0
	322.0



Survey Number	3g Comment	11g Comment	13m Comment	18p Comment	20r Comment
1			Haven't used it. Its undevelopled		
2					
3		Perch		Snails	
4					
6					
7					
8					
9					
11					
12					
13					
14					
15					
16					
17		Perch			
18				Green slime	
19					
20					
21			family here		
22					Water depth silt on bottom
23					
24					Silt washing and staying in and weeds drifting in
25					
26					
27					
28					
29					
30					
31					
32					
33			Used to camp in the past.		
34					
35					
36					
37					
38					Progressive sedimentation of lake bottom
39					
40		Perch			
41					Low water level
42					
43					
44					
45					
46					
47					
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49					
50					
51					
52					
53					

Survey Number	3g Comment	11g Comment	13m Comment	18p Comment	20r Comment
54		Perch			
55					
56					
57					
58		Bullheads			
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62					
63					
64					Ice fishing garbage
65					
66					
67		Perch			
68		Musky			
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72					Forest County lack of enforcement on septic inspections
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Survey Number	3g Comment	11g Comment	13m Comment	18p Comment	20r Comment
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156					
157					
158					
159					
160		Catfish			

Survey Number	3g Comment	11g Comment	13m Comment	18p Comment	20r Comment
161					
162					
163					
164					
165					
166					
167			Just like living here. I do not use the lake.		
168					
169					
170					
171					
172					
173	vacant lot				
174					
175					
176					
177		Perch			
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Survey Number	3g Comment	11g Comment	13m Comment	18p Comment	20r Comment
214					
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Pine Lake Management Planning Project
Stakeholder Survey General Comments

#1
I live on a lake in Marquette County (95 acres & springfed). Our assn. has taught those of us who care to look for invasive species on peoples boats and trailers. We monitor our boat landing to watch for any plant life on boats and trailers. And ask that the owner remove them. We hand out all the pamphlets given to us by the DNR to educate these boat owners. So far-----we are not aware of any AIS in our lake. We send samples of weeds to the DNR for testing.

#3
Comment for 19r……..10am to 4pm recreation.
Comment for 29……To avoid ice damage to shoreline is it better to have a higher lake level or lower lake level?

#5
The excessive amount of weeds in Pine Lake has damaged one of our watercraft and greatly reduces property value. Weed control should be number one priority. When we bought our property we were told there was a plan to manage the weeds and nothing has been done since we purchased the property. From what we've read the excessive weeds may be hurting the fishing as well. Please fix the weed problem!

#7
When we bought our property there was little to no weeds in our area. I believe that the cutting increased seeding around the lake encouraging more growth. The lake appears to be lower than when we bought the property. After rain it will be higher then it appears to decrease. The dam is being opened by unauthorized people.

#8
I feel the board has done a good job of maintaining Pine Lake. I think it is still one of northern Wisconsin's best lakes.

#9
To accurately analyze Pine Lake's health you should probably start upstream with/millpond and Pine Creek. Vegetation growth & beaver dams & silt on Pine Creek doesn't allow for the spring flushing of the north end of Pine Lake. Thanks to somebody for the boat ramp and dock. Mandate septic inspections on lake. Dredge silt detention pond on Pine Creek. With no action mother nature will turn Pine Lake into a marsh.

#13
The weed problem is probably the big concern. Some kind of chemical treatment probably would be better than nothing.

#16
We would like to be informed of meeting dates.

#17
It is time to have an aggressive plan to restore Pine Lake.

#18
The Freedom Tax Account should be appealed. Pay off our loans with this money. We are paying 6% interest on our loans and receiving 2% on the Freedom Tax Account. Put this on annual meeting agenda.

We could always swim years past and now our water has so many weeds and snails a person doesn't go out. The water blooms are grass.

We are grateful for the Lake District and its hard work. We believe more people need to take an active role in the management of Pine Lake. We hear a lot of complaints and no one shows up for the meetings.

#21
I've been coming to Pine Lake all my life. All my family has also. Many have homes on the lake. Since I was a little girl I've seen lots of changes in the fishing and the water quality. I'm hoping we will find something to change this. Chemicals I'm not fond of. The mechanical harvesting I've seen being done for 40 years and I believe it does nothing but multiply the weeds. We really need to do something better. It might not be easy to do some other way but I believe we must try something else.

#22
Comment for 19r…..Water depth/silt on bottom
Comment for 22……The lake is going to choke from the cycle of weeds. There is not enough water movement on the floor of the lake. Daming the lake causes the lake to be a silt bed.

I believe the lake needs to be dredged or the lake needs to be returned to its natural state as part of the Wolf River. I understand we would no longer have a cottage on a lake but would have a cottage on the Wolf River. The Pine Lake Protection and Rehabilitation Committee needs a team of volunteers that seek out lobby and apply for Federal and State Grants.

#25
Wish the DNR would keep our lake level higher than they have been.

#26
Way too much money spent on studies. Not enough on fixing the lake! (DNR)

#27

Just control the weeds, the North and West end are bad. Also, we don't want to become a lake where you can't have fun because of too many rules. Why was the stamp of the American flag upside down on the envelope. Very disrespectful!!!

#30
I feel a more aggressive approach is required to restore Pine Lake back to a premier fishing lake.

Also, to consider dredging north end of lake to increase water flow from creek.

#31
Think the lake was fine till we quit cutting weeds. It is hard to fish through all the weeds and they are taking over the lake. Can't even run your motor across the lake without the weeds getting wrapped around the prop.

WEEDS WEEDS WEEDS. NOT GOOD

#34
Comment on 27…..NONE – THIS IS WHY I PAY!!!!!!

Is this just another useless survey???

#35
I may retire soon. Been goin' to Hiles since the early 50s. Love it!

#37
The board used to have a newsletter that told us what was going on and what the board was doing- now there is no line of communication between the taxpayer and the TAX TAKER!

#38
Comment for 19r……Progressive sedimentation of lake bottom

#39
Comment for 27 was….tax dollars for lake district a poor investment, I would like to see it dissolved.

#40
Comments for 19….I don't believe the runoff years ago from the sawmill could have helped. This restricted somewhat and carried a terrific growing habitat (sawdust) for weeds. Keeping the lake low has been detrimental. No approved/agreed upon weed control plan has not helped.

Comments for 21…..Never can swim in our area. NEVER

Comments for 28….Manual removal, interested in participating.

It does appear that overall weed growth has increased dramatically over the past 3-5 years. There continues to be fewer and fewer clean shallow areas for fish to spawn in (naturally) and this then creates fewer naturally grown species as well as over fishing the few decent spawning areas. Please share with us what we legally, technically (logically) can do to prevent/reduce weed infiltration in our area. Thank you very much for caring enough to do this.

#41
Comment for 19…Fish size limits and bag limits.

Last 10 – 15 years water level too low.
East shore septics need to be updated or holding tanks installed.
Weed control last 10 years very poor.
Dam needs repair and once correct wake level been established to old correct level then make dam tamper proof.
Over last 5 years lack of maintenance has caused devaluation of property values and deterioration of lake water and vegetation quality.

#42
Please require everyone to test their septic system and fix it if it doesn't pass.

#43
Comment on 26….wasn't sure what's the proper name it was called.

I'd like to more informed as to what is going on with the status of the lake, weeds, cutting, etc. I don't the believe the cutting of the weeds is the answer. The milfoil needs to be sprayed or treated with chemicals. If you want to see and example of what years of weed cutting does to a lake, look a Pewaukee Lake in Waukesha County.

#44
I thank this organization for its work. I remember the lake quality 40 years ago, as a kid. This summer the drought is bad.

#45
We are anxious to see something happen before our lake is ruined. We talk about this every year and nothing is ever done. We would like to see some type of action to improve our weed problem ASAP.

#46
Comment on 19r…Too many jetskis

If this functions as an association, then it serves a purpose. If not, lets form an association to address: 1)noise issues, 2) limiting jet skiing during certain hours.

#47

For several years there was a very obstructive member on the board of commissioners. This hurt the district. I hope this does not happen again.

The district is a necessary and valuable tool for the future of Pine Lake.

This survey is a good start to good management.

#50
Have not fished for years.

#51
Comment for 28H……I don't live near the lake so it would be difficult to participate in volunteer work

I would like to see walleye stocked in the lake since it is speared regularly.

Also the stocking of smallmouth bass would be a nice addition.

#54
Keep stakeholders informed of septic inspection progress.

Form working committees for lake district.

#55
1)Over the past years the things that we have tried have not given the results that we could hope for.
2)What role does the Federal Gov have to say in what can be done?
3)Who owns the lake?
4)Finally – the people who own around the lake can't & should not be responsible to pay for all that has to be done.

#58
Would like to address the fact that some portions of the lake are completely weed free, while others continue to be infested with an overabundance of weeds, including many invasive species.

Also would like to have a concerted effort in addressing as well as informing all lake owners about the importance of creating a proper "buffer zone" at lakes edge or shore, such as a (rain garden) or other such ideas. We all need to band together so we will not willingly or unknowingly contribute to any negative impact on the lake.

#60
Comment for 19r…..Spearing
Comment for 20 1st choice……Spearing

#63

Comment for 20r 1st choice…..excessive management
Comment for 23a…..No way for chemical control

From my experience the more the experts work on the problems the worse they get. Leave nature alone. My other lake property has suffered greatly from the plans of the "experts".

#64
Comment on 19r other……Ice fishing pollution and garbage left on lake.

My opinion is that Pine Lake is improving since mechanical harvesting has stopped.

I support that all properties on the lake be required to bring septic systems up to code.

I recommend that the P & R district get into the 21st century & establish a functioning website.

I believe P & R officers intentionally operate in a vacuum to avoid accountability.

#67
Weed cutting needed

#68
I don't believe that the views of the people living on Pine Lake have switched since the last survey. We have a major weed problem in the lake but the DNR refuses to do anything. We are at their mercy. The weeds that were in the last survey are still there. Nothing seems to matter to the DNR.

Since the cutting has stopped the water quality has gotten better, but this is probably due to the 8 year drought more than anything. With the clear water comes more weed growth. This has actually helped the fish as it gives them more places to hide, but it also causes boating problems. It's a catch 22 situation. Your damned if you do or damned if you don't!

Good luck with your determinations as they will affect all of us.

P S lets start using our monies on the lake and not on all the red tape!

#69
So far I have found lake to be great – low boat traffic and seems to be safe. Little too many rocks on the south end but they are natural. Looks like a little to much vegetation on lake only issue.

#70

Response to 19j excessive fishing pressure – only spearing.

In respect to fishermen and swimmers, jet skis should only be allowed to be on the lake from 10am to 4 pm. The people also need to be made aware of the law on how close jet skis are allowed to run along the shoreline and reinforced.

#71
OPEN UP THE CREEK

#72
Comment for 20r second choice…..Forest county lack of enforcement on septic inspections.

For years the lake district board of directors has made genuine attempts for the lake and has been quite successful. The lake district enabling legislation has been very good for Pine Lake. Research is always evolving. The district has been diligent in adopting current best practices.

I do sense that there has been occasional disconnects with the DNR. But generally both entities have worked together for the betterment of Pine Lake. Faulty septic systems (outdated) is a constant concern for the lake health.

#152
Water quality is only fair and without cutting its going back to the way it was years ago.

Getting a board of commissioners that is interested in the lake and willing to work for the lake like they did before the last two groups are doing.

#153
Comment to 19r…..I haven't spent time on the lake to know.
Comment to 20r…..Last time I spent time on the lake the cut weeds were stinky and rotten. No shore left by the bridge and old swim area.

I believe Hiles and Pine Lake are beautiful. I spent a lot of time there as a kid but have not had time to enjoy it for several years

The weeds cut by by the machine created an awful smell and the beach disappeared by the bridge.

#154
Manual removal (of weeds) should be done by people who live on the lake.

#155
(The district) has kept us fairly well informed until newsletter stopped two years ago.

#157

Comment for 19r….Great negative impact – Lake Level

A big that is not covered here is lake level. As the board is aware maintaining the dam and a consistent lake level has been a challenge. We should include management of the lake level in the LMP. It seems to me the level should be highest in the summer and lowest in the fall/winter (before the freeze). This may help in keeping plants down in the summer and reducing ice push/shoreline erosion in the winter. We need to correct any problems with the dam and prevent further tampering.

#158
Comment for 19r….Jet skis (PWC)
Comment for 20r….No northern size limit.

We would love to see a size limit on northern pike. We used to be able to catch decent sized northerns but people keep too many snakes. The DNR says the growth for northerns is too slow. All the more reason to have a size limit we say. That would help to reduce the numbers of stunted bluegills and perch also. This could be a great northern lake with good natural reproduction.

#159
With regard to district board, we are 90 and 91 years old and are limited as to what we can do. Sorry.

#160
Noise pollution …..Fireworks moderately negative impact.

#161
Comment for 19r….great negative impact/ water level on lake on east side too low!

I have attached a letter to Dennis and committee members regarding open burning ordinance and dam/water levels. Hoping to hear from you. Thanks. Marv and Lois Trettin / South East end of lake.

#162
As far as cutting the weeds, that's fine only if they pick up what is cut. In the past they didn't pick all of it up. They cut when its too windy and are not careful enough while unloading the weeds. The weeds that are left are floating around and end up on the shorelines where owners are left with the problem or the weeds end up receding in a new area.

Chemical use I feel would be best because the weeds die and will not recede. The smaller fish would be harvested by the larger fish which would make all species of fish larger. Fishing would be better for all. Panfish would no longer be stunted and less panfish would be floating around because they were too small when they were caught, and were thrown back either dead or badly hooked.

Keeping water level where it belongs is a big to this lake's life. Too many people take boards out of the dam because their septics are bad. This needs to be take care of. I beams should be in place on the dam so no one can remove them and fines to assessed to people who try to remove boards or change the lake level. There should be no exception to this rule because of friends who are on the board.

If you want this lake to survive, action must be taken before it's too lake. It's time to start taking care of our earth instead of just thinking about what we can take from this earth. God only gave us so much and it's running out.

We need only to look around, read the papers, to see what's happening around us. We need to wake up.

#163
Comment for 19r…stunted fish
Comment for 20r….stunted fish

Weeds are a big problem and need to be aggressively controlled.

Fish are stunted and bluegills and perch have black spots (parasites). Is there anything we can do to increase fish size and get rid of parasites?

#164
Comment for 20r……Low water levels

Improvements are needed to restore the dam to proper functioning level, so that water levels are raised to allow better access for boats to reach their docks.

Historically since we have fished on Pine Lake the size of all species of fish has decreased substantially.

#168
My family and I are new to the lake (Dec 09). So far we have really enjoyed the lake and we are not aware of many issues that we believe impact the lake negatively.

#171
We have been coming to Pine Lake for over 20 years. Overall the water quality has been good for swimming, fishing has improved considerably. The weed cutting was not good for us – some of the weeds floated to our shore which was very hard to remove and smelly.

You may get very mixed responses from your survey because the lake has very different characteristics depending upon where you are on the lake.

#174
Septic comment – last time pumped 20 years ago – and it didn't need it according to the septic man.

How informed has the Pine Lake District kept you? – Not too informed/ used to be more informed about 8 years ago.

#176
Comments on 19r…Concerned with properties that still have outhouses directly to soil without containment or mound, etc.

Like the isolated nature of its location (Pine Lake) away from Crandon and Three Lakes, but close enough for a quick drive if needed.

Better phone reception would be a plus.

Some weed management may be ok, but have concerns it would get out of hand. Current weed structure, etc promotes the good fishing. Would like to see a healthier walleye population.

I enjoy the limited boat traffic (except major holidays).

I have concerns when water level gets lower. Impacts my ability to access the lake with watercraft from my boat lifts…. Have to go out quite a ways to get water deep enough when water levels drop.

#177
I have coming here since 1961. The fishing is still good. There are lots of bass and panfish. The walleye fishing isn't good. We need to do something about the weed situation. I believe there is runoff from sewage from older homes and cottages.

#178
I would endorse and support muskie stocking in the lake. I understand this has been approved by the DNR in the past. It would do nothing but good in keeping panfish more regulated and increase value of the lake.

C

APPENDIX C

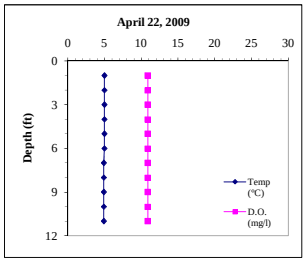
Water Quality Data

Pine Lake

Date: 04-22-09
Time: 13:00
Weather: 50 % Clouds, 44 F, Slight Breeze
Ent: BTB **Verf:**

Max Depth (ft): 12.0
PLS Depth (ft): 3.0
PLB Depth (ft): 10.0
Secchi Depth (ft): 8.6

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	5.0	10.9	6.2	113
2.0	5.0	10.9	6.5	112
3.0	5.0	10.9	6.6	113
4.0	5.0	10.9	6.7	113
5.0	5.0	10.9	6.5	113
6.0	5.0	10.9	6.8	113
7.0	4.9	10.9	6.9	113
8.0	4.9	10.9	6.9	113
9.0	4.9	10.9	7.0	113
10.0	4.9	10.9	6.9	113
11.0	4.9	10.9	6.9	113



Parameter	PLS	PLB
Total P (µg/L)	18.000	22.000
Dissolved P (µg/L)	ND	ND
Chl a (µg/L)	3.23	NA
TKN (µg/L	120.00	490.00
NO3+NO2-N (µg/L)	ND	ND
NH3-N (µg/L)	ND	ND
Total N (µg/L)	120.00	490.00
Lab Cond. (µS/cm)	119	119
Lab pH	7.73	7.71
Alkal (mg/l CaCO3)	50	50
Total Susp Sol (mg/l)	ND	ND
Calcium (mg/l)	11.9	NA

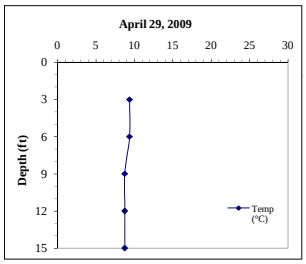
Data collected by TAH and EJH (Onterra)

Pine Lake

Date: 04-29-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 6.8

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	47.0	9.4	NA	NA
6.0	47.0	9.4	NA	NA
9.0	46.0	8.8	NA	NA
12.0	46.0	8.8	NA	NA
15.0	46.0	8.8	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	22.000	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

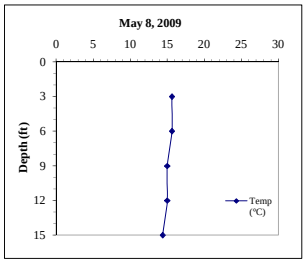
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 05-08-09
Time: NA
Weather: NA
Ent: **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 11.3

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	57.0	15.6	NA	NA
6.0	57.0	15.6	NA	NA
9.0	56.0	15.0	NA	NA
12.0	56.0	15.0	NA	NA
15.0	55.0	14.4	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

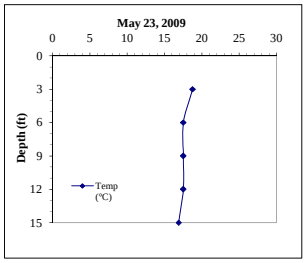
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 05-23-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 10.3

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	62.0	18.8	NA	NA
6.0	60.0	17.5	NA	NA
9.0	60.0	17.5	NA	NA
12.0	60.0	17.5	NA	NA
15.0	59.0	16.9	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

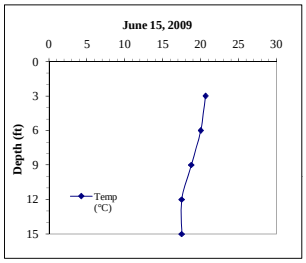
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 06-15-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 8.3

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	65.0	20.6	NA	NA
6.0	64.0	20.0	NA	NA
9.0	62.0	18.8	NA	NA
12.0	60.0	17.5	NA	NA
15.0	60.0	17.5	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	20.000	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	4.06	NA
TKN (µg/L	700.00	NA
NO3+NO2-N (µg/L)	33.000	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	733.00	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

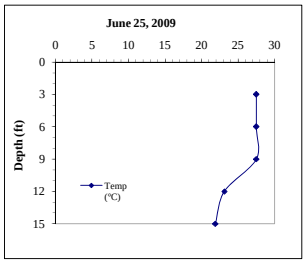
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 06-25-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 9.0

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	76.0	27.5	NA	NA
6.0	76.0	27.5	NA	NA
9.0	76.0	27.5	NA	NA
12.0	69.0	23.1	NA	NA
15.0	67.0	21.9	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

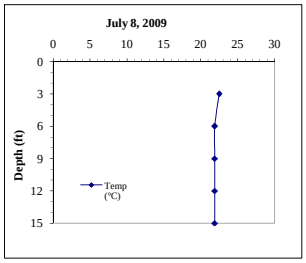
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 07-08-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 8.5

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	68.0	22.5	NA	NA
6.0	67.0	21.9	NA	NA
9.0	67.0	21.9	NA	NA
12.0	67.0	21.9	NA	NA
15.0	67.0	21.9	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

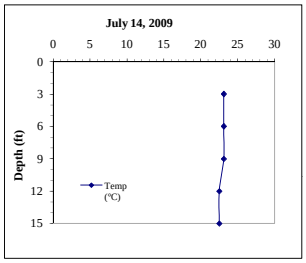
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 07-14-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 7.3

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	69.0	23.1	NA	NA
6.0	69.0	23.1	NA	NA
9.0	69.0	23.1	NA	NA
12.0	68.0	22.5	NA	NA
15.0	68.0	22.5	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	29.0	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	7.2	NA
TKN (µg/L	550.0	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	550.0	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

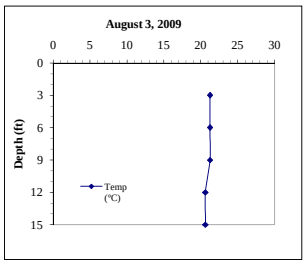
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 08-03-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 6.0

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	66.0	21.3	NA	NA
6.0	66.0	21.3	NA	NA
9.0	66.0	21.3	NA	NA
12.0	65.0	20.6	NA	NA
15.0	65.0	20.6	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

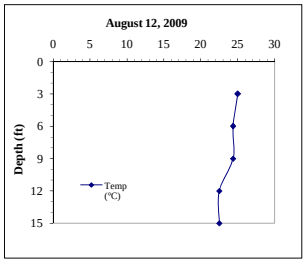
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 08-12-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 6.3

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	72.0	25.0	NA	NA
6.0	71.0	24.4	NA	NA
9.0	71.0	24.4	NA	NA
12.0	68.0	22.5	NA	NA
15.0	68.0	22.5	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

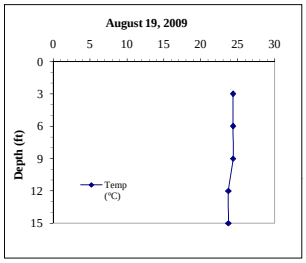
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

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

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 4.5

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	71.0	24.4	NA	NA
6.0	71.0	24.4	NA	NA
9.0	71.0	24.4	NA	NA
12.0	70.0	23.8	NA	NA
15.0	70.0	23.8	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

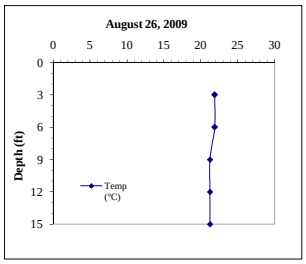
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 08-26-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 4.5

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	67.0	21.9	NA	NA
6.0	67.0	21.9	NA	NA
9.0	66.0	21.3	NA	NA
12.0	66.0	21.3	NA	NA
15.0	66.0	21.3	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	24.0	NA
Dissolved P (µg/L)	NA	NA
Chl a (µg/L)	10.6	NA
TKN (µg/L	**	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	**	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

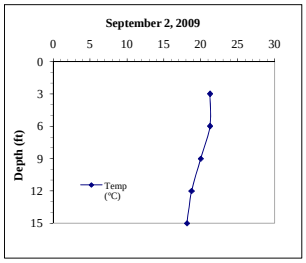
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 09-02-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 7.8

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	66.0	21.3	NA	NA
6.0	66.0	21.3	NA	NA
9.0	64.0	20.0	NA	NA
12.0	62.0	18.8	NA	NA
15.0	61.0	18.1	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

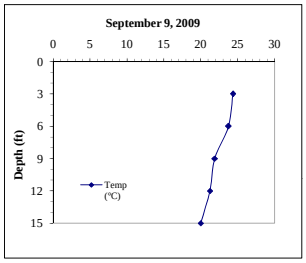
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

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

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 9.8

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	71.0	24.4	NA	NA
6.0	70.0	23.8	NA	NA
9.0	67.0	21.9	NA	NA
12.0	66.0	21.3	NA	NA
15.0	64.0	20.0	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

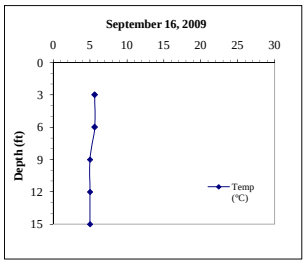
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 10-16-09
Time: NA
Weather: NA
Ent: BTB **Verf:**

Max Depth (ft): 15.0
PLS Depth (ft): 6.0
PLB Depth (ft): NA
Secchi Depth (ft): 11.5

Depth (ft)	Temp (°F)	Temp (°C)	pH	Sp. Cond (µS/cm)
3.0	41.0	5.6	NA	NA
6.0	41.0	5.6	NA	NA
9.0	40.0	5.0	NA	NA
12.0	40.0	5.0	NA	NA
15.0	40.0	5.0	NA	NA



Parameter	PLS	PLB
Total P (µg/L)	NA	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

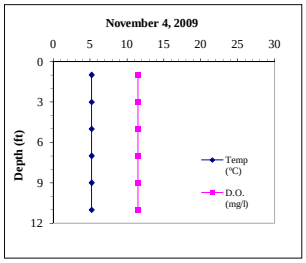
Data collected by: Gerald Wolf (Pine Lake CLMN)

Pine Lake

Date: 11-04-09
Time: 11:15
Weather: 100% Clouds, 38 °F, light wind
Ent: BTB **Verf:**

Max Depth (ft): 12.2
PLS Depth (ft): 3.0
PLB Depth (ft): 10.0
Secchi Depth (ft): 7.8

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	5.2	11.5	8.2	110.0
3.0	5.2	11.5	8.2	110.0
5.0	5.2	11.5	8.3	110.0
7.0	5.2	11.5	8.3	110.0
9.0	5.2	11.5	8.3	110.0
11.0	5.2	11.5	8.3	110.0



Parameter	PLS	PLB
Total P (µg/L)	22.0	21.0
Dissolved P (µg/L)	NA	1.4
Chl a (µg/L)	5.9	NA
TKN (µg/L	530.0	NA
NO3+NO2-N (µg/L)	ND	NA
NH3-N (µg/L)	ND	NA
Total N (µg/L)	530.0	NA
Lab Cond. (µS/cm)	NA	117.0
Lab pH	NA	8.0
Alkal (mg/l CaCO3)	NA	47.5
Total Susp Sol (mg/l)	2.0	2.0
Calcium (mg/l)	NA	NA

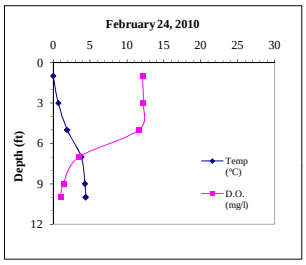
Data collected by: TAH and EJH (Onterra)

Pine Lake

Date: 02-24-10
Time: 10:30
Weather: 95% sun, light snow, windy
Ent: BTB **Verf:**

Max Depth (ft): 12.5
PLS Depth (ft): 3.0
PLB Depth (ft): 10.0
Secchi Depth (ft): 7.3

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	0.0	12.1	7.2	136.0
3.0	0.7	12.2	7.3	136.0
5.0	1.9	11.6	7.3	135.0
7.0	3.8	3.5	6.9	139.0
9.0	4.3	1.4	6.9	144.0
10.0	4.4	1.0	6.9	144.0



Parameter	PLS	PLB
Total P (µg/L)	14.0	16.0
Dissolved P (µg/L)	-	4.0
Chl a (µg/L)		
TKN (µg/L	480.0	600.0
NO3+NO2-N (µg/L)		34.0
NH3-N (µg/L)	27.0	128.0
Total N (µg/L)	480.0	600.0
Lab Cond. (µS/cm)		
Lab pH		
Alkal (mg/l CaCO3)		
Total Susp Sol (mg/l)		
Calcium (mg/l)		

Data collected by: BTB and DAC (Onterra)
Ice: 1.6 ft

Water Quality Data

2009/2010	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	17	8.0	NA	NA
Total P (µg/L)	7	21.3	3	19.7
Dissolved P (µg/L)	1	ND	2	2.7
Chl a (µg/L)	5	6.2	NA	NA
TKN (µg/L	5	476.0	2	545.0
NO3+NO2-N (µg/L)	5	33.0	1	ND
NH3-N (µg/L)	5	ND	1	ND
Total N (µg/L)	5	482.6	2	545.0
Lab Cond. (µS/cm)	1	119.0	2	118.0
Lab pH	1	7.7	2	7.8
Alkal (mg/l CaCO3)	1	49.7	2	48.6
Total Susp Sol (mg/l)	2	2.0	2	2.0
Calcium (µg/L)	1	11.9	NA	NA

Wisconsin Trophic State Index (WTSI)

Year	TP	Chla	SD
1988			47.33
1989			44.58
1992			45.86
1993	52.87		45.05
1994	52.54	63.70	45.05
2001			51.91
2002			54.66
2003	51.05	47.99	44.44
2004	51.83	48.76	47.98
2005	52.54	49.31	47.44
2006	56.10	54.44	54.57
2007	54.70	55.02	52.95
2008	55.03	55.83	57.54
2009	52.98	49.65	49.53
All Years (weighted)	53.74	53.55	49.50
WI Natural Lakes	53.19	54.23	47.33
Northeast Region	51.05	51.49	45.61

Morphological / Geographical Data

Parameter	Value
Acreage	13,772
Volume (acre-feet)	16,248
Perimeter (miles)	
Shoreland Development	
Maximum Depth (feet)	15
County	Forest County
WBIC	406900
Lillie Mason Region(1983)	Northeast Region
Nichols Ecoregion(1999)	NLFF

Watershed Data

WiLMS Class	Acreage	kg/yr	lbs/yr
Forest	7,662	279	614
Open Water	1,684	204	449
Pasture/Grass	615	75	165
Row Crops	21	9	20
Urban - Rural Residential	34	7	15
Wetland	3,755	152	334

Watershed to Lake Area	8:1

	Secchi (feet)				Chlorophyll a (µg/L)				Phosphorus (µg/L)				Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season				Spring Turnover		Fall Turnover	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1988	13	8.33	10	7.9												
1989	7	9.61	4	9.56												
1992	2	8.75	2	8.75												
1993	4	9.81	1	9.25					3	24.33	2	24				
1994	4	9.81	1	9.25	1	47.4	1	47.4	1	23	1	23				
2001	2	6.38	1	5.75												
2002	7	5.21	6	4.75												
2003	16	9.64	10	9.65	3	5.26	2	5.83	2	19	1	19				
2004	18	9.06	10	7.55	4	5.31	3	6.46	5	21.2	3	21				
2005	19	8.33	14	7.84	4	6.14	3	6.96	5	22.4	3	23				
2006	18	5.92	10	4.78	4	10.93	3	13.79	5	35.6	3	36.33				
2007	25	6.28	15	5.35	3	14.9	3	14.9	4	28.5	3	30.33				
2008	14	4.64	9	3.89	3	16.6	3	16.6	4	38.5	3	31.67				
2009	16	8.08	8	6.78	4	6.27	3	7.28	5	22.6	3	24.33				
All Years (weighted)		7.6		6.8		10.5		12.2		26.8		26.8				
WI Natural Lakes				7.9				13.4				25				
Northeast Region				8.9				9.3				19				

Summer 2009 N: 24.333
Summer 2009 P: 604.33

Summer 2009 N:P 25 :1

D

APPENDIX D

Watershed Analysis WiLMS Results

Date: 7/9/2010 Scenario: Pine Lake Current

Lake Id: 406900
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 12087.8 acre
Total Unit Runoff: 13.1 in.
Annual Runoff Volume: 13195.8 acre-ft
Lake Surface Area <As>: 1684 acre
Lake Volume <V>: 16248 acre-ft
Lake Mean Depth <z>: 9.6 ft
Precipitation - Evaporation: 5.3 in.
Hydraulic Loading: 13939.6 acre-ft/year
Areal Water Load <qs>: 8.3 ft/year
Lake Flushing Rate <p>: 0.86 1/year
Water Residence Time: 1.17 year
Observed spring overturn total phosphorus (SPO): 18.0 mg/m^3
Observed growing season mean phosphorus (GSM): 22.6 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre	Low	Most Likely	High	Loading %	Low	Most Likely	High
	(ac)	Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	21.1	0.50	1.00	3.00	1.2	4	9	26
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	615.4	0.10	0.30	0.50	10.3	25	75	125
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	34.5	0.30	0.50	0.80	1.0	4	7	11
Rural Res (>1 Ac)	0.0	0.05	0.10	0.25	0.0	0	0	0
Wetlands	3755.3	0.10	0.10	0.10	20.9	152	152	152
Forest	7661.5	0.05	0.09	0.18	38.5	155	279	558
Lake Surface	1684.0	0.10	0.30	1.00	28.2	68	204	682

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)	900.6	1599.9	3423.6	100.0
Total Loading (kg)	408.5	725.7	1552.9	100.0
Areal Loading (lb/ac-year)	0.53	0.95	2.03	0.0
Areal Loading (mg/m^2-year)	59.95	106.49	227.87	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)	750.4	1149.2	1921.1	100.0
Total NPS Loading (kg)	340.4	521.3	871.4	100.0

Phosphorus Prediction and Uncertainty Analysis Module

Date: 7/9/2010 Scenario: 33
Observed spring overturn total phosphorus (SPO): 18.0 mg/m^3
Observed growing season mean phosphorus (GSM): 22.6 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	14	24	51	1	4
Canfield-Bachmann, 1981 Natural Lake	14	21	38	-2	-9
Canfield-Bachmann, 1981 Artificial Lake	13	20	33	-3	-13
Rechow, 1979 General	4	7	16	-16	-71
Rechow, 1977 Anoxic	18	32	68	9	40
Rechow, 1977 water load<50m/year	9	16	33	-7	-31
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	13	22	48	4	22
Vollenweider, 1982 Combined OECD	11	18	34	-2	-10
Dillon-Rigler-Kirchner	6	11	23	-7	-39
Vollenweider, 1982 Shallow Lake/Res.	9	14	28	-6	-30
Larsen-Mercier, 1976	11	20	43	2	11
Nurnberg, 1984 Oxic	6	11	24	-12	-53

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	15	43	FIT	0	GSM
Canfield-Bachmann, 1981 Natural Lake	7	60	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	6	58	FIT	1	GSM
Rechow, 1979 General	4	13	FIT	0	GSM
Rechow, 1977 Anoxic	20	56	FIT	0	GSM
Rechow, 1977 water load<50m/year	10	28	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	9	34	FIT	0	ANN
Dillon-Rigler-Kirchner	7	19	L	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	7	26	FIT	0	ANN
Larsen-Mercier, 1976	13	35	P Pin	0	SPO
Nurnberg, 1984 Oxic	6	21	FIT	0	ANN

Water and Nutrient Outflow Module

Date: 7/9/2010 Scenario: 21
Average Annual Surface Total Phosphorus: 22.6mg/m^3
Annual Discharge: 1.39E+004 AF => 1.72E+007 m^3
Annual Outflow Loading: 819.2 LB => 371.6 kg

E

APPENDIX E

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	Myriophyllum spicatum	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
1	45.67342765	-88.99641042	3	S	P				V		2	1	1	V				1					V													V					1				
2	45.67261770	-88.99642489	3	S	P				V														1					V								V								
3	45.67180775	-88.99643937	4	S	P				1														V													V								
4	45.67099779	-88.99645385	3	S	P				2																																				
5	45.67018784	-88.99646832	3	S	P				2	1	1																						1												
6	45.67584735	-88.99521158	3	S	P						1												V	V																					
7	45.67503740	-88.99522608	3	S	P						1																																		
8	45.67422745	-88.99524057	3	S	P						1		1															1															1	
9	45.67341750	-88.99525507	4	S	P						1			V																						V								
10	45.67260754	-88.99526956	4	S	P						1			V																						V								
11	45.67179759	-88.99528406	4	S	P									V																						V								
12	45.67098764	-88.99529855	4	S	P						1										1																				1				
13	45.67017769	-88.99531304	4	S	P		V				1																					V								1				
14	45.66936773	-88.99532754	4	S	P						1																	V																
15	45.66855778	-88.99534203	4	S	P		V		V																											V								
16	45.66774782	-88.99535652	3	S	P						1								1			1					V														1			
17	45.66693787	-88.99537101	3	S	P		2												1			2									1									2				
18	45.67988695	-88.99398361	3	S	P				2	1	1													V																				
19	45.67907699	-88.99399812	3	S	P						2		1									1																			1				
20	45.67664714	-88.99404167	3	S	P																																								
21	45.67583719	-88.99405618	4	S	P					1	1		1																																
22	45.67502723	-88.99407070	4	S	P						2																															1				
23	45.67421728	-88.99408521	4	S	P						2																									V						1				
24	45.67340733	-88.99409972	5	S	P																	2						2												1				1
25	45.67259738	-88.99411423	5	S	P															1												2								1			1	
26	45.67178742	-88.99412874	5	S	P																									V		2										1	
27	45.67097747	-88.99414325	5	S	P																						2					2		1								1	
28	45.67016752	-88.99415776	5	S	P					1					1												V					2										1	
29	45.66935757	-88.99417227	5	S	P		2								1				1			2										1											
30	45.66854761	-88.99418678	5	M	P										1															1		2											
31	45.66773766	-88.99420129	5	M	P										1															V		3											
32	45.66692771	-88.99421579	6	M	P					1																						2											
33	45.66611775	-88.99423030	5	S	P										1															V		3											
34	45.66530780	-88.99424481	4	S	P					1									1													2											
35	45.66449785	-88.99425931	4	S	P					1					1				1											1	1	2								1				
36	45.66368789	-88.99427382	2	S	P		1								1				1						V								1				V			1	1			
37	45.66125803	-88.99431733	3	S	P				1		1																					1											
38	45.68068672	-88.99281359	2	S	P		V		V		1											1																		1				
39	45.67987676	-88.99282813	4	S	P						2		1						1			1																		1				
40	45.67906681	-88.99284266	4	S	P						2		1														2														1			
41	45.67825686	-88.99285719	4	S	P		1				2		1		1				1			2								1	1	1								1	1		1	
42	45.67744691	-88.99287172	4	S	P		1			1					1				1			3																					
43	45.67663696	-88.99288625	5	S	P						2				1							1																						
44	45.67582701	-88.99290078	6	S	P																									1		2		1									1
45	45.67501705	-88.99291531	7	S	P										1							1					1				2												1
46	45.67420710	-88.99292984	7	S	P					1																	V					3										1	
47	45.67339715	-88.99294437	8	M	P					1																						3										1	
48	45.67258720	-88.99295890	8	M	P					2					1																	2											
49	45.67177725	-88.99297343	9	M	P					3																				1		2											
50	45.67096729	-88.99298796	8	M	P					1																						3											
51	45.67015734	-88.99300248	7	M	P					1																				V		2											
52	45.66934739	-88.99301701	7	M	P					1																						3										1	
53	45.66853744	-88.99303153	6	S	P					1																	V					3										1	
54	45.66772748	-88.99304606	6	S	P					2					1						1											2											
55	45.66691753	-88.99306058	6	M	P		1			1					1							2										2										1	
56	45.66610758	-88.99307510	7	S	P					1					1															2		3		1								
57	45.66529762	-88.99308963	7	S	P					1					1							1								V		2											
58	45.66448767	-88.99310415	6	S	P										2				1													2											
59	45.66367772	-88.99311867	5	S	P					1					1																	2											
60	45.66286776	-88.99313319	5	S	P		V								1				1			2					2																
61	45.66205781	-88.99314771	4	S	P								1																															
62	45.66124785	-88.99316223	4	S	P						1		1									1						1															
63	45.66043790	-88.99317675	4	S	P		1		2		1		1									1																					
64	45.68067652	-88.99165810	3	S	P		1		V	1									1			2					1			1		1								1			
65	45.67986657	-88.99167265	5	S	P					1												1								V		3										1	
66	45.67905662	-88.99168720	7	M	P					1					1				1			2								2		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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
67	45.67824667	-88.99170174	7	M	P					1					1							1					V						3										1	
68	45.67743672	-88.99171629	7	M	P					2																							3											
69	45.67662677	-88.99173084	8	M	P										1																		3											
70	45.67581681	-88.99174539	10	M	P					3	1																1		1															1
71	45.67500686	-88.99175993	8	M	P					2																							3										1	
72	45.67419691	-88.99177448	8	M	P					2					1							1					1						3		1									1
73	45.67338696	-88.99178903	8	M	P										2														V			2											1
74	45.67257701	-88.99180357	8	M	P					1					1												2						3										1	
75	45.67176706	-88.99181811	8	M	P					2																							3											1
76	45.67095710	-88.99183266	8	M	P					1																			V				2										1	
77	45.67014715	-88.99184720	8	M	P					2																							2											
78	45.66933720	-88.99186174	7	M	P		1			1																	1		V				3		V								
79	45.66852725	-88.99187629	7	M	P																						V		2				3		V								
80	45.66771729	-88.99189083	7	M	P					2					1												2		V				3		V								1
81	45.66690734	-88.99190537	7	M	P										2														V				3		V								
82	45.66609739	-88.99191991	7	M	P					1					1							1					V		V				3										1	
83	45.66528743	-88.99193445	7	M	P					3																	1						2											
84	45.66447748	-88.99194898	6	M	P					1					1							1											3											
85	45.66366753	-88.99196352	6	S	P		V			2					1												V		V				2											
86	45.66285757	-88.99197806	6	S	P										1												V						2										1	
87	45.66204762	-88.99199260	6	S	P					2					1												V		V				2									1	1	
88	45.66123767	-88.99200713	5	S	P		V			1					1					1		1					1		1				2										1	
89	45.66042771	-88.99202167	4	S	P		V								1				1			1																				1			
90	45.67985637	-88.99051717	6	S	P										1																		3											
91	45.67904642	-88.99053173	9	M	P					2					1							1											2		1									
92	45.67823646	-88.99054630	8	M	P					2												1					1						3											
93	45.67742651	-88.99056086	8	M	P					2																							3											
94	45.67661656	-88.99057543	8	M	P					1					1							1											3										1	
95	45.67580661	-88.99058999	9	M	P					3																	2						1											1
96	45.67499666	-88.99060456	8	M	P					2												1											3											1
97	45.67418671	-88.99061912	9	M	P					2					1																		2									1		
98	45.67337676	-88.99063368	9	M	P					1					1												2			1			2											
99	45.67256681	-88.99064824	8	M	P					2					2															V			2											1
100	45.67175685	-88.99066280	8	M	P					2											1											2		1										1
101	45.67094690	-88.99067736	8	M	P					1																	2						2											
102	45.67013695	-88.99069192	8	M	P					2					1												2						2											
103	45.66932700	-88.99070648	8	M	P					1					2															V			3											V
104	45.66851704	-88.99072104	8	M	P					1					1												V						3											
105	45.66770709	-88.99073560	8	M	P					2									1			1											3		V								1	
106	45.66689714	-88.99075015	9	M	P					3					1												2																	
107	45.66608719	-88.99076471	8	M	P					1																			V				2											
108	45.66527723	-88.99077927	8	M	P					1																	V						3											
109	45.66446728	-88.99079382	7	S	P		2			2					1												2			1			2											
110	45.66365733	-88.99080838	7	S	P					1										1													3											
111	45.66284738	-88.99082293	6	S	P		V																				2						2		V								
112	45.66203742	-88.99083748	6	S	P		V			1									1			2					1															1	
113	45.66122747	-88.99085204	5	S	P		V												1			1					2			V			2									1		
114	45.66041752	-88.99086659	5	S	P		V			1												2					2															1		
115	45.68065610	-88.98934710	3	S	P							1	1									1																				1		
116	45.67984615	-88.98936169	9	M	P					2												1											2											
117	45.67903620	-88.98937627	9	M	P					2									1			1					2					2	2										1	
118	45.67822625	-88.98939085	8	M	P					2																	1			2			2										1	
119	45.67741630	-88.98940544	8	M	P					2					1												V						3											
120	45.67660635	-88.98942002	9	M	P					2									1														2		1									1
121	45.67579640	-88.98943460	9	M	P					1					1																		3											
122	45.67498644	-88.98944918	9	M	P					2												1					2			1														1
123	45.67417649	-88.98946376	9	M	P					2																							2											
124	45.67336654	-88.98947833	9	M	P					2																	2			1			2											1
125	45.67255659	-88.98949291	9	M	P					2																	V						3											
126	45.67174664	-88.98950749	8	M	P					3					1																		2		2									
127	45.67093669	-88.98952207	8	M	P					1																	V						3											
128	45.67012674	-88.98953664	8	M	P					2																	V			V			3											
129	45.66931678	-88.98955122	8	M	P					2																							3										1	
130	45.66850683	-88.98956579	9	M	P					1					1							1										2	2									1	1
131	45.66769688	-88.98958037	10	M	P					2												1								1			2											1
132	45.66688693	-88.98959494	8	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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
133	45.66607698	-88.98960952	8	M	P					2																	V						3												
134	45.66526702	-88.98962409	8	M	P					2																				1			3												
135	45.66445707	-88.98963866	8	M	P					1					1												V			V			3											1	
136	45.66364712	-88.98965323	7	S	P										1												2						3												
137	45.66283717	-88.98966780	6	S	P																						V			V			2											1	
138	45.66202721	-88.98968237	6	S	P		V				1				1							2					2																		
139	45.66121726	-88.98969694	6	S	P		2			1												1					2														1				
140	45.66040731	-88.98971151	4	S	P						1		1									1						1													1	1			
141	45.68712547	-88.98807478	2	M	P		1		2	1					1	1			1					V							1												
142	45.68631552	-88.98808939	4	R	P					2					1				1			1											2								2				
143	45.68550557	-88.98810399	4	M	P					1																																	1	1
144	45.68469562	-88.98811860	3	R	P				1	1					1																					1				1				1
145	45.68226577	-88.98816241	3	S	P																																			1	1			
146	45.68145582	-88.98817701	6	R	P					1									1			2																		1				1
147	45.68064587	-88.98819161	9	S	P					1												1										1	2											
148	45.67983592	-88.98820621	11	M	P																																							
149	45.67902597	-88.98822081	10	M	P					2												1					V						1											1	
150	45.67821602	-88.98823541	9	M	P					1																	1						3												
151	45.67740607	-88.98825001	10	M	P					2																				1			2												
152	45.67659612	-88.98826460	10	M	P					2																	2			2															
153	45.67578617	-88.98827920	10	M	P					2					1							1					1						2		2										
154	45.67497622	-88.98829380	11	M	P					2																					1			1										
155	45.67416627	-88.98830839	9	M	P					1																				2			2		1										
156	45.67335632	-88.98832299	9	M	P					2												1					2			2			1												
157	45.67254637	-88.98833758	9	M	P					3												1					V						2												
158	45.67173641	-88.98835218	9	M	P					2												1					V						2												
159	45.67092646	-88.98836677	9	M	P		1			1																	1					1	2		1										
160	45.67011651	-88.98838137	9	M	P					1					1							1					V						3												
161	45.66930656	-88.98839596	11	M	P					1												1										2													
162	45.66849661	-88.98841055	10	M	P					2												1										2													
163	45.66768666	-88.98842514	9	M	P																						2						2												
164	45.66687670	-88.98843973	9	M	P					3																	2						1												
165	45.66606675	-88.98845432	8	M	P																												3												
166	45.66525680	-88.98846891	9	M	P					3					2												V						2												
167	45.66444685	-88.98848350	9	M	P					3																							2												
168	45.66363690	-88.98849809	8	M	P					2																	2			2			1		1									1	
169	45.66282694	-88.98851267	6	S	P		V			1												2					2																1	
170	45.66201699	-88.98852726	6	S	P						1				1							2					1																	1	
171	45.66120704	-88.98854185	5	S	P																	2					V																	
172	45.66039708	-88.98855643	4	S	P						1		1									1																					1		
173	45.69197491	-88.98683141	2	R	P				1					V												V													V					
174	45.69116497	-88.98684604	2	S	P		V		1										1			1		1		V		1								V			1			1		1
175	45.69035502	-88.98686066	3	S	P		1		1	1						1			1																	1				1				
176	45.68954507	-88.98687529	4	S	P					1					1												1					1	2							1				
177	45.68873512	-88.98688991	4	S	P		2			1																	1						1												
178	45.68792517	-88.98690453	5	M	P										1																	2	3											
179	45.68711522	-88.98691916	5	M	P					2					1							1										1												
180	45.68630528	-88.98693378	5	M	P					2					1																		3												
181	45.68549533	-88.98694840	5	S	P					1																						1	2											
182	45.68468538	-88.98696302	4	R	P										1							2																			1				1
183	45.68306548	-88.98699226	3	S	P						1																	V													V				
184	45.68225553	-88.98700688	6	S	P					2					1							1					1						2												
185	45.68144558	-88.98702150	9	S	P					1												1	1				1					1	1										1	
186	45.68063563	-88.98703612	10	M	P					1												1										1	1											
187	45.67982568	-88.98705073	11	M	P					1												1																							
188	45.67901573	-88.98706535	10	M	P					2												1										2												
189	45.67820578	-88.98707996	11	M	P					1												1																							
190	45.67739583	-88.98709458	11	M	P					1												2																							
191	45.67658588	-88.98710919	11	M	P					1												1	1																						
192	45.67577593	-88.98712381	11	M	P					2												1																							
193	45.67496598	-88.98713842	10	M	P					2											1	1																							
194	45.67415603	-88.98715303	9	M	P					2					1							1					2			2			1												
195	45.67334608	-88.98716765	10	M	P					1																	V						2												
196	45.67253613	-88.98718226	9	M	P					1					2							1											2												
197	45.67172618	-88.98719687	9	M	P					1					1							1					2					2	1											1
198	45.67091623	-88.98721148	10	M	P					1					1												1						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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
199	45.67010627	-88.98722609	10	M	P					1																						2												
200	45.66929632	-88.98724070	12	M	P																																							
201	45.66848637	-88.98725531	11	M	P					1												1									2												
202	45.66767642	-88.98726991	8	S	P		1			1												1					2							1							1	
203	45.66686647	-88.98728452	7	S	P		2			1					1							2					1						1									1
204	45.66605652	-88.98729913	7	S	P					2					1												2				1		2									1
205	45.66524657	-88.98731373	8	S	P										1																		3										
206	45.66443661	-88.98732834	9	S	P																												3										
207	45.66362666	-88.98734294	8	S	P																						1						2								1	
208	45.66281671	-88.98735755	6	S	P																										V		2								1	
209	45.66200676	-88.98737215	6	S	P					1												2					1					1									1	
210	45.66119680	-88.98738675	4	S	P						1																														1		
211	45.66038685	-88.98740135	3	S	P						1				1													V														
212	45.69358455	-88.98564640	2	S	P																															2				1			
213	45.69277461	-88.98566104	3	S	P						1		1									1																		1		
214	45.69196466	-88.98567569	3	S	P						1																					1								1	1		
215	45.69115471	-88.98569033	4	M	P																	1										3								1			1
216	45.69034476	-88.98570497	5	M	P					1					1				1			2									1	1	3										1
217	45.68953482	-88.98571961	5	M	P					1					1							2										2								1			1
218	45.68872487	-88.98573425	5	M	P														1			2																				1
219	45.68791492	-88.98574889	6	M	P					2									1		1										1		3							1			
220	45.68710497	-88.98576353	6	M	P					2					3							2										1	1									
221	45.68629502	-88.98577817	7	M	P					2					1																		3										
222	45.68548507	-88.98579281	7	M	P					2																							3										
223	45.68467512	-88.98580744	6	R	P																										2		2									1
224	45.68386518	-88.98582208	5	R	P					1												1																		1			1
225	45.68305523	-88.98583672	4	S	P																																			1			
226	45.68224528	-88.98585135	9	S	P					1												2											2									1	
227	45.68143533	-88.98586599	11	M	P																																						
228	45.68062538	-88.98588062	11	M	P					1												1										2	1									
229	45.67981543	-88.98589526	11	M	P					2												1					1							1									
230	45.67900548	-88.98590989	11	M	P					1												1																					
231	45.67819553	-88.98592452	12	M	P					2												1													1								
232	45.67738558	-88.98593915	12	M	P					1												1																					
233	45.67657563	-88.98595378	12	M	P					1																																	
234	45.67576568	-88.98596841	12	M	P					1												1																					
235	45.67495573	-88.98598304	11	M	P					2												1										1	1									
236	45.67414578	-88.98599767	11	M	P																																						
237	45.67333583	-88.98601230	10	M	P					1												2					2																
238	45.67252588	-88.98602693	10	M	P					2												1					2						1									
239	45.67171593	-88.98604156	10	M	P					1												1										2										
240	45.67090598	-88.98605618	10	M	P																	1										2										
241	45.67009603	-88.98607081	11	M	P					2												1										2										
242	45.66928608	-88.98608544	12	M	P																																						
243	45.66847612	-88.98610006	11	M	P					2												1									1												
244	45.66766617	-88.98611469	8	R	P		1			1																							2								2			1	
245	45.66685622	-88.98612931	6	S	P						1										1												1											1
246	45.66604627	-88.98614393	8	S	P					2												1					2						1										1	
247	45.66523632	-88.98615856	9	S	P																						2						2										
248	45.66442637	-88.98617318	8	S	P		2			2					1							1					2				1		2										
249	45.66361642	-88.98618780	7	S	P																						V						2									1	
250	45.66280646	-88.98620242	7	S	P		1								1							1					1						2									1	
251	45.66199651	-88.98621704	6	S	P						1		1									1						V															
252	45.66118656	-88.98623166	4	S	P		V				1		1																												1	1		
253	45.69438423	-88.98447598	3	S	P		2			1												2																			1			
254	45.69357429	-88.98449064	4	M	P																	2					V																1
255	45.69276434	-88.98450530	4	M	P																	1										2									1	1
256	45.69195439	-88.98451996	5	M	P																	1					V				1		2										1
257	45.69114444	-88.98453462	6	M	P					2					1							1										1	1										
258	45.69033450	-88.98454928	6	M	P					2																							3											1
259	45.68952455	-88.98456393	6	M	P					1					1							1										1	1		1								
260	45.68871460	-88.98457859	6	M	P					1					1							1									1		1										
261	45.68790465	-88.98459325	7	M	P																												2										
262	45.68709470	-88.98460790	1	M	P					1																					1		3										
263	45.68628476	-88.98462256	2	M	P		V			1					1							2										1	1										
264	45.68547481	-88.98463721	10	M	P					2												1											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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
265	45.68466486	-88.98465187	9	M	P					1												1											3												1
266	45.68385491	-88.98466652	7	M	P		1			2												1								2			1		1									1
267	45.68304496	-88.98468117	11	M	P					1												2																						
268	45.68223501	-88.98469583	12	M	P					1												1																						1
269	45.68142506	-88.98471048	11	M	P					1												1																						
270	45.68061512	-88.98472513	11	M	P																	1											2										
271	45.67980517	-88.98473978	12	M	P																	1																					
272	45.67899522	-88.98475443	12	M	P					1												1																					
273	45.67818527	-88.98476908	12	M	P																																					
274	45.67737532	-88.98478373	12	M	P																																					
275	45.67656537	-88.98479837	12	M	P					2												1																					
276	45.67575542	-88.98481302	12	M	P																																					
277	45.67494547	-88.98482767	11	M	P					1												1																					
278	45.67413552	-88.98484231	11	M	P					2																																	
279	45.67332557	-88.98485696	11	M	P					1					1							1												1									
280	45.67251562	-88.98487160	11	M	P																																					
281	45.67170567	-88.98488625	11	M	P					1					1							1																					1
282	45.67089572	-88.98490089	11	M	P					1																							1										
283	45.67008577	-88.98491553	12	M	P					1												1																					
284	45.66927582	-88.98493018	12	M	P																																					
285	45.66846587	-88.98494482	12	M	P																																					
286	45.66765591	-88.98495946	11	M	P		1			1																								2									1
287	45.66684596	-88.98497410	11	M	P					1												2																					1
288	45.66603601	-88.98498874	11	M	P					1												2											2										
289	45.66522606	-88.98500338	8	M	P					1												1												2									1	1
290	45.66441611	-88.98501802	6	S	P						1											1																			1			1
291	45.66360616	-88.98503266	7	S	P						1											1						1															1
292	45.66279621	-88.98504729	6	S	P					1										1		2																					
293	45.66198625	-88.98506193	5	S	P						1																														1		1
294	45.66117630	-88.98507656	4	S	P						1																																
295	45.69518390	-88.98330552	3	M	P		1								1	1			2			1										2								1			2
296	45.69437395	-88.98332020	4	S	P																	1																					1
297	45.69356401	-88.98333488	4	S	P																	1						V															1
298	45.69275406	-88.98334956	5	M	P																	1						V						1									1
299	45.69194411	-88.98336423	5	M	P					1												2									1			2							1			1
300	45.69113416	-88.98337891	7	M	P		V			1					1							2												1		1							
301	45.69032422	-88.98339358	7	M	P					2					1																		3										1
302	45.68951427	-88.98340826	7	M	P		V			2					1				1			1												2		1								1
303	45.68870432	-88.98342293	7	M	P					2																								2										
304	45.68789437	-88.98343761	7	M	P					1												1												3										
305	45.68708443	-88.98345228	7	M	P																	1									1			2										1
306	45.68627448	-88.98346695	8	M	P					1																								3										
307	45.68546453	-88.98348162	9	M	P					1												2												1										
308	45.68465458	-88.98349629	12	M	P																																					
309	45.68384463	-88.98351096	12	M	P																																					
310	45.68303469	-88.98352563	11	M	P					1									1			2												1										
311	45.68222474	-88.98354030	11	M	P					2												2																						
312	45.68141479	-88.98355497	11	M	P					1												1												2										
313	45.68060484	-88.98356964	11	M	P					1												1												1										
314	45.67979489	-88.98358430	12	M	P					1												1																						
315	45.67898494	-88.98359897	13	M	P																	1																						
316	45.67817499	-88.98361364	13	M	P																																					
317	45.67736504	-88.98362830	13	M	P																	1																						
318	45.67655509	-88.98364297	13	M	P					2									1																									
319	45.67574514	-88.98365763	12	M	P																																					
320	45.67493520	-88.98367229	12	M	P										1																												
321	45.67412525	-88.98368696	12	M	P																																					
322	45.67331530	-88.98370162	11	M	P					2												1																						1
323	45.67250535	-88.98371628	12	M	P																																					
324	45.67169540	-88.98373094	12	M	P																																					
325	45.67088545	-88.98374560	12	M	P					1												1									1												
326	45.67007550	-88.98376026	11	M	P					1												1																					1	
327	45.66926554	-88.98377492	12	M	P																																					
328	45.66845559	-88.98378958	13	M	P																																					
329	45.66764564	-88.98380423	12	M	P																																					
330	45.66683569	-88.98381889	11	M	P					1																					1					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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
331	45.66602574	-88.98383355	12	M	P																	1																					
332	45.66521579	-88.98384820	10	M	P					1												1										1												
333	45.66440584	-88.98386286	7	R	P		2			1					1							1								2										1			
334	45.66359589	-88.98387751	6	M	P					1												2																					
335	45.66278594	-88.98389217	6	M	P		1			1									1			2					1																
336	45.66197599	-88.98390682	5	M	P																	2																			1			
337	45.66116603	-88.98392147	4	S	P																												1											
338	45.69517361	-88.98214973	4	M	P		V												1																						2			1
339	45.69436366	-88.98216443	4	M	P																						1														1			1
340	45.69355371	-88.98217912	5	M	P					2																	2				2													1
341	45.69274377	-88.98219382	5	M	P					1												1											2											
342	45.69193382	-88.98220851	7	M	P					2					1							1											2		1								
343	45.69112387	-88.98222320	7	M	P					1												1											3		1								
344	45.69031393	-88.98223789	7	M	P					1												1											2		1								1
345	45.68950398	-88.98225258	8	M	P					2												1											2		2								
346	45.68869403	-88.98226727	8	M	P					1												1								1			2		1								2
347	45.68788408	-88.98228196	8	M	P					2					1															2			2		2								
348	45.68707414	-88.98229665	8	M	P					1												1											2										
349	45.68626419	-88.98231134	8	M	P					2												2										1	2										
350	45.68545424	-88.98232603	9	M	P					2																				1			2										1	
351	45.68464429	-88.98234072	11	M	P					1												1																					1	
352	45.68383435	-88.98235540	11	M	P					1												1											1										
353	45.68302440	-88.98237009	11	M	P					1												1											2										
354	45.68221445	-88.98238478	11	M	P					1																																	
355	45.68140450	-88.98239946	12	M	P																																						
356	45.68059455	-88.98241415	12	M	P																																						
357	45.67978460	-88.98242883	12	M	P																	1																					
358	45.67897466	-88.98244351	13	M	P																																						
359	45.67816471	-88.98245819	13	M	P																																						
360	45.67735476	-88.98247288	13	M	P					2																							1										
361	45.67654481	-88.98248756	13	M	P																																						
362	45.67573486	-88.98250224	13	M	P					1																																	
363	45.67492491	-88.98251692	13	M	P					1																																	
364	45.67411496	-88.98253160	12	M	P					2					1							1																					
365	45.67330501	-88.98254628	12	M	P																																						
366	45.67249506	-88.98256095	12	M	P					1												1																					
367	45.67168511	-88.98257563	12	M	P																																						
368	45.67087516	-88.98259031	12	M	P																																						
369	45.67006521	-88.98260498	12	M	P																																						
370	45.66925526	-88.98261966	11	M	P			2		1												1											1										
371	45.66844531	-88.98263433	11	M	P																																						
372	45.66763536	-88.98264901	11	M	P					2												1													1								
373	45.66682541	-88.98266368	11	M	P					1																						1	2										
374	45.66601546	-88.98267836	11	M	P					1												1										1												
375	45.66520551	-88.98269303	10	M	P		1			1												2										1												
376	45.66439556	-88.98270770	8	M	P																												2											
377	45.66358561	-88.98272237	6	M	P																												3											
378	45.66277566	-88.98273704	5	S	P																	3																					1
379	45.69516330	-88.98099394	3	S	P		V			2					1				1			1											1								1			1
380	45.69435336	-88.98100865	4	S	P		V			1					1				2			2											2											2
381	45.69354341	-88.98102336	5	M	P					1												1											1											1
382	45.69273346	-88.98103807	6	M	P					1									1			1								1			2											1
383	45.69192352	-88.98105278	7	M	P		V			1												1											2		1									1
384	45.69111357	-88.98106749	7	M	P					2																							3										1	
385	45.69030362	-88.98108220	8	M	P		2			1									1			1											2											1
386	45.68949368	-88.98109691	8	M	P		2			1												2											2											1
387	45.68868373	-88.98111162	8	M	P					2																				1			2										
388	45.68787378	-88.98112632	8	M	P					1					1																		2										
389	45.68706384	-88.98114103	8	M	P																	1										1	2										
390	45.68625389	-88.98115573	10	M	P					2										1		1											2										1	
391	45.68544394	-88.98117044	10	M	P					1												1											1										1	
392	45.68463399	-88.98118514	11	M	P																												1											
393	45.68382405	-88.98119985	11	M	P																	1											1											
394	45.68301410	-88.98121455	12	M	P					1												1								1			1		1								
395	45.68220415	-88.98122925	11	M	P					1												1											1		2								
396	45.68139420	-88.98124395	12	M	P					1											1	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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
397	45.68058425	-88.98125865	12	M	P															1																								
398	45.67977431	-88.98127335	12	M	P																																								
399	45.67896436	-88.98128805	13	M	P					1												1																							
400	45.67815441	-88.98130275	13	M	P																																								
401	45.67734446	-88.98131745	13	M	P																																								
402	45.67653451	-88.98133215	14	M	P																																								
403	45.67572456	-88.98134685	13	M	P																																								
404	45.67491461	-88.98136154	13	M	P																										2														
405	45.67410466	-88.98137624	13	M	P					1												1																							
406	45.67329472	-88.98139094	13	M	P					1												1																							
407	45.67248477	-88.98140563	13	M	P																																								
408	45.67167482	-88.98142032	13	M	P			1																																				
409	45.67086487	-88.98143502	12	M	P																																								
410	45.67005492	-88.98144971	12	M	P																																								
411	45.66924497	-88.98146440	12	M	P					1																																			
412	45.66843502	-88.98147909	11	M	P					1												1																2							
413	45.66762507	-88.98149378	11	M	P					1												1																							
414	45.66681512	-88.98150848	11	M	P					1												1													1										
415	45.66600517	-88.98152316	11	M	P		1			2												1											2			2								
416	45.66519522	-88.98153785	11	M	P					2												1											2											
417	45.66438527	-88.98155254	9	M	P					1																								2									1	1
418	45.66357532	-88.98156723	7	M	P																													3										
419	45.69515299	-88.97983815	4	M	P		V								1																			2										1
420	45.69434304	-88.97985288	4	M	P																	1											1	1										
421	45.69353310	-88.97986761	5	M	P																	1												2										
422	45.69272315	-88.97988233	6	M	P																	1											1	2										
423	45.69191320	-88.97989706	7	M	P																												1	3										
424	45.69110326	-88.97991179	9	M	P					2																								3										
425	45.69029331	-88.97992651	8	M	P					1																								3										
426	45.68948336	-88.97994124	9	M	P					1											1										1			3										
427	45.68867342	-88.97995596	8	M	P					2																								2			1							
428	45.68786347	-88.97997068	8	M	P					1												1												2										
429	45.68705352	-88.97998541	9	M	P																	2																						
430	45.68624358	-88.98000013	10	M	P					1																																		
431	45.68543363	-88.98001485	11	M	P					1												2												1										
432	45.68462368	-88.98002957	11	M	P																																								
433	45.68381373	-88.98004429	11	M	P																																								
434	45.68300379	-88.98005901	12	M	P			1														1																							
435	45.68219384	-88.98007373	12	M	P					1												1																							
436	45.68138389	-88.98008845	12	M	P					1												1																							
437	45.68057394	-88.98010316	11	M	P																																								
438	45.67976400	-88.98011788	12	M	P					1												1												1		1								
439	45.67895405	-88.98013260	13	M	P																																								
440	45.67814410	-88.98014731	13	M	P					1												1																							
441	45.67733415	-88.98016203	13	M	P																																								
442	45.67652420	-88.98017674	13	M	P																																								
443	45.67571425	-88.98019146	13	M	P																																								
444	45.67490431	-88.98020617	12	M	P																																								
445	45.67409436	-88.98022088	13	M	P																	1																							
446	45.67328441	-88.98023559	13	M	P																																								
447	45.67247446	-88.98025031	13	M	P					1										1		1																							
448	45.67166451	-88.98026502	13	M	P																																								
449	45.67085456	-88.98027973	12	M	P					1					1							1										1													
450	45.67004461	-88.98029444	12	M	P					1												1																							
451	45.66923466	-88.98030915	12	M	P					1												1																							
452	45.66842471	-88.98032385	11	M	P					1										1		1																							
453	45.66761476	-88.98033856	11	M	P					2												1											2											
454	45.66680481	-88.98035327	11	M	P					1												1																							
455	45.66599486	-88.98036797	11	M	P																																								
456	45.66518491	-88.98038268	10	M	P					1												1											2			1								
457	45.66437496	-88.98039739	8	M	P																													2										
458	45.66356501	-88.98041209	6	M	P															1													1	1							1			
459	45.69514266	-88.97868236				TERRESTRIAL																																			1				
460	45.69433271	-88.97869711	4	M	P					1																								2										2
461	45.69352277	-88.97871185	5	M	P																										2			2										1
462	45.69271282	-88.97872659	5	M	P					2																	V							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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
463	45.69190288	-88.97874134	8	M	P					2												1											3												
464	45.69109293	-88.97875608	8	M	P					2																							2												
465	45.69028299	-88.97877082	10	M	P					1												1											2									1			
466	45.68947304	-88.97878556	10	M	P					1												2											1												
467	45.68866309	-88.97880030	8	M	P																	1											2												
468	45.68785315	-88.97881504	9	M	P		1			1												1																				2			
469	45.68704320	-88.97882978	10	M	P		1															1										1	1											
470	45.68623325	-88.97884452	11	M	P					1												1																								
471	45.68542331	-88.97885926	12	M	P					1					1																														
472	45.68461336	-88.97887400	12	M	P		1																																						
473	45.68380341	-88.97888873	12	M	P					1												1									2														
474	45.68299346	-88.97890347	12	M	P																	1																								
475	45.68218352	-88.97891821	12	M	P					1																																				
476	45.68137357	-88.97893294	12	M	P																																									
477	45.68056362	-88.97894767	12	M	P																																									
478	45.67975367	-88.97896241	13	M	P					1												1														2									
479	45.67894373	-88.97897714	13	M	P																																									
480	45.67813378	-88.97899187	14	M	P					1																																				
481	45.67732383	-88.97900661	13	M	P																																									
482	45.67651388	-88.97902134	13	M	P																																									
483	45.67570393	-88.97903607	13	M	P																																									
484	45.67489399	-88.97905080	13	M	P					1																																				
485	45.67408404	-88.97906553	14	M	P		1			1												1																								
486	45.67327409	-88.97908026	13	M	P																																									
487	45.67246414	-88.97909498	13	M	P														1																											
488	45.67165419	-88.97910971	13	M	P																																									
489	45.67084424	-88.97912444	12	MM	P																																									
490	45.67003429	-88.97913916	12	M	P																																									
491	45.66922434	-88.97915389	12	M	P					1												1											V												
492	45.66841439	-88.97916861	11	M	P					2												1																								
493	45.66760444	-88.97918334	11	M	P																	1																								
494	45.66679449	-88.97919806	12	M	P																																									
495	45.66598454	-88.97921278	11	M	P																	2																								
496	45.66517459	-88.97922751	10	M	P		1			1												1											1	2											
497	45.66436464	-88.97924223	7	M	P																										1			2								1			1	1
498	45.66355469	-88.97925695	5	S	P						1																															1				1
499	45.69513232	-88.97752657	2	M	P		1			2								1	1					3	3	V								1										
500	45.69432238	-88.97754133	4	M	P					2					1				1	1							V							2											2
501	45.69351243	-88.97755609	6	M	P					1																							2												
502	45.69270249	-88.97757085	7	M	P					2																	2						2											1	
503	45.69189254	-88.97758561	8	M	P																	1											2		2									
504	45.69108259	-88.97760037	11	M	P																																								
505	45.69027265	-88.97761513	10	M	P															2													2		1									
506	45.68946270	-88.97762989	11	M	P		1			1												1											1												
507	45.68865276	-88.97764465	10	M	P		2			1												1											1												
508	45.68784281	-88.97765940	11	M	P		1			1												1											1												
509	45.68703286	-88.97767416	11	M	P																																								
510	45.68622292	-88.97768892	11	M	P					1												1																								
511	45.68541297	-88.97770367	12	M	P																																								
512	45.68460302	-88.97771842	12	M	P																																								
513	45.68379308	-88.97773318	12	M	P																																								
514	45.68298313	-88.97774793	13	M	P																	1																								
515	45.68217318	-88.97776268	12	M	P																																								
516	45.68136324	-88.97777743	12	M	P																																								
517	45.68055329	-88.97779219	12	M	P																																								
518	45.67974334	-88.97780694	12	M	P																																								
519	45.67893339	-88.97782169	13	M	P																																								
520	45.67812345	-88.97783643	13	M	P																	1																								
521	45.67731350	-88.97785118	13	M	P																																								
522	45.67650355	-88.97786593	13	M	P																																								
523	45.67569360	-88.97788068	14	M	P																																								
524	45.67488365	-88.97789542	13	M	P																																								
525	45.67407371	-88.97791017	13	M	P					1																																			
526	45.67326376	-88.97792492	13	M	P																																								
527	45.67245381	-88.97793966	13	M	P																																								
528	45.67164386	-88.97795440	13	M	P																																								

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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
529	45.67083391	-88.97796915	12	M	P																																							
530	45.67002396	-88.97798389	12	M	P																																							
531	45.66921401	-88.97799863	12	M	P					1																																		
532	45.66840406	-88.97801337	11	M	P					1																							2			1								
533	45.66759412	-88.97802812	12	M	P																																						
534	45.66678417	-88.97804286	12	M	P																																						
535	45.66597422	-88.97805760	11	M	P					1									1			2																				1	1
536	45.66516427	-88.97807233	9	M	P		1			1					1							1										1											
537	45.66435432	-88.97808707	7	M	P					1																				1			2										1
538	45.66354437	-88.97810181	4	S	P		1																																	1	1		
539	45.69512197	-88.97637078	2	M	P		V			2					1			1	1	1				3	3						1		2							1	1			
540	45.69431203	-88.97638556	4	M	P														1														2		V								1
541	45.69350208	-88.97640034	6	M	P																											V	3										
542	45.69269214	-88.97641512	8	M	P					2																							3											
543	45.69188219	-88.97642989	9	M	P					2																	1						3		2									
544	45.69107224	-88.97644467	11	M	P					1												1											2											
545	45.69026230	-88.97645944	11	M	P					1												1											1									1	
546	45.68945235	-88.97647422	12	M	P																																						
547	45.68864241	-88.97648899	11	M	P																																						
548	45.68783246	-88.97650377	12	M	P		1																																				
549	45.68702252	-88.97651854	13	M	P																																						
550	45.68621257	-88.97653331	12	M	P																																						
551	45.68540262	-88.97654808	12	M	P																																						
552	45.68459268	-88.97656285	12	M	P																																						
553	45.68378273	-88.97657762	12	M	P																	1																						
554	45.68297278	-88.97659239	12	M	P																																						
555	45.68216284	-88.97660716	12	M	P					1																																		
556	45.68135289	-88.97662193	13	M	P																																						
557	45.68054294	-88.97663670	12	M	P																																						
558	45.67973300	-88.97665146	12	M	P																																						
559	45.67892305	-88.97666623	12	M	P																																						
560	45.67811310	-88.97668100	13	M	P																																						
561	45.67730315	-88.97669576	13	M	P																																						
562	45.67649321	-88.97671053	13	M	P																																						
563	45.67568326	-88.97672529	13	M	P																																						
564	45.67487331	-88.97674005	13	M	P																																						
565	45.67406336	-88.97675482	13	M	P					2												1																						
566	45.67325341	-88.97676958	12	M	P																																						
567	45.67244347	-88.97678434	12	M	P					1																																		
568	45.67163352	-88.97679910	12	M	P																																						
569	45.67082357	-88.97681386	13	M	P																																						
570	45.67001362	-88.97682862	12	M	P																																						
571	45.66920367	-88.97684338	11	M	P					2												1																						
572	45.66839372	-88.97685814	11	M	P					1												1											1	1										
573	45.66758377	-88.97687289	11	M	P																																						
574	45.66677383	-88.97688765	11	M	P					1												1																						
575	45.66596388	-88.97690241	11	M	P					1												1																					1	
576	45.66515393	-88.97691716	11	M	P																	2																						
577	45.66434398	-88.97693192	7	M	P		V			1					1				1	1		1											1	2		2							1
578	45.66353403	-88.97694667	3	S	P																																						
579	45.69511161	-88.97521500	2	M	P		V			1					1			V	1	1				2	2															V				1
580	45.69430166	-88.97522979	4	M	P																						V			1			1										1
581	45.69349172	-88.97524458	6	M	P																						V						2										1
582	45.69268177	-88.97525938	8	M	P					2																							3											1
583	45.69187183	-88.97527417	9	M	P					1																							2											
584	45.69106188	-88.97528896	11	M	P														1			1														1								
585	45.69025194	-88.97530376	12	M	P																																						
586	45.68944199	-88.97531855	13	M	P																																						
587	45.68863205	-88.97533334	15	M	P																																						
588	45.68782210	-88.97534813	15	M	P																																						
589	45.68701216	-88.97536292	14	M	P																																						
590	45.68620221	-88.97537771	14	M	P																																						
591	45.68539226	-88.97539249	14	M	P																																						
592	45.68458232	-88.97540728	13	M	P																																						
593	45.68377237	-88.97542207	13	M	P																																						
594	45.68296243	-88.97543685	13	M	P					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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
595	45.68215248	-88.97545164	13	M	P					1																																		
596	45.68134253	-88.97546643	12	M	P																																								
597	45.68053259	-88.97548121	13	M	P																																								
598	45.67972264	-88.97549599	12	M	P																																								
599	45.67891269	-88.97551078	13	M	P																																								
600	45.67810274	-88.97552556	13	M	P																																								
601	45.67729280	-88.97554034	13	M	P																																								
602	45.67648285	-88.97555512	13	M	P																																								
603	45.67567290	-88.97556990	13	M	P																																								
604	45.67486296	-88.97558468	13	M	P					1																																			
605	45.67405301	-88.97559946	12	M	P																																								
606	45.67324306	-88.97561424	12	M	P																																								
607	45.67243311	-88.97562902	12	M	P																																								
608	45.67162316	-88.97564380	12	M	P					1												1																							
609	45.67081322	-88.97565857	12	M	P					1												1																							
610	45.67000327	-88.97567335	12	M	P																	1																							
611	45.66919332	-88.97568812	11	M	P																										1		1											
612	45.66838337	-88.97570290	11	M	P																	1																							
613	45.66757342	-88.97571767	11	M	P					1												1																							
614	45.66676347	-88.97573245	11	M	P					1												1																							
615	45.66595352	-88.97574722	11	M	P					1												1													1										
616	45.66514358	-88.97576199	10	M	P															1		2																							
617	45.66433363	-88.97577676	5	S	P																							1													1				
618	45.69510123	-88.97405921	3	M	P				2	1								V	1	1					2		V							1		V				V				
619	45.69429129	-88.97407402	4	M	P					1																					1			2										1
620	45.69348135	-88.97408883	6	M	P																										1			2		1								1
621	45.69267140	-88.97410364	9	M	P					2									1												2			2											1
622	45.69186146	-88.97411845	11	M	P																	1																							
623	45.69105151	-88.97413326	12	M	P																																								
624	45.69024157	-88.97414807	15	M	P																																								
625	45.68943162	-88.97416288	14	M	P					1												1													1										
626	45.68862168	-88.97417768	14	M	P																																								
627	45.68781173	-88.97419249	14	M	P																																								
628	45.68700179	-88.97420730	14	M	P																																1								
629	45.68619184	-88.97422210	14	M	P																																								
630	45.68538189	-88.97423691	14	M	P																																								
631	45.68457195	-88.97425171	14	M	P																																								
632	45.68376200	-88.97426651	13	M	P																																								
633	45.68295206	-88.97428132	13	M	P					1												1																							
634	45.68214211	-88.97429612	13	M	P																																								
635	45.68133216	-88.97431092	13	M	P																																								
636	45.68052222	-88.97432572	13	M	P																																								
637	45.67971227	-88.97434052	13	M	P																																								
638	45.67890232	-88.97435532	12	M	P																																								
639	45.67809238	-88.97437012	12	M	P																																								
640	45.67728243	-88.97438492	12	M	P																																								
641	45.67647248	-88.97439972	11	M	P																																								
642	45.67566254	-88.97441451	11	M	P																																								
643	45.67485259	-88.97442931	11	M	P																																								
644	45.67404264	-88.97444411	11	M	P																																								
645	45.67323269	-88.97445890	12	M	P																																								
646	45.67242275	-88.97447370	12	M	P																																								
647	45.67161280	-88.97448849	12	M	P																																								
648	45.67080285	-88.97450328	11	M	P					1									1			1																							
649	45.66999290	-88.97451808	11	M	P																	1																						1		
650	45.66918295	-88.97453287	11	M	P																																								
651	45.66837301	-88.97454766	11	M	P		1			1												1													1										
652	45.66756306	-88.97456245	11	M	P					1												1									1														
653	45.66675311	-88.97457724	10	M	P		1															1									2					2								1	
654	45.66594316	-88.97459203	11	M	P					1																																			
655	45.66513321	-88.97460682	5	S	P		2				1			1				1		1		2											1	1							1			1	1
656	45.66432326	-88.97462161	1	S	P						1		1									1																							1
657	45.69509085	-88.97290342	3	S	P					2									2						V									2		1						1			1
658	45.69428090	-88.97291825	5	S	P					1										2							1							2								1			1
659	45.69347096	-88.97293308	6	S	P					1									1	1														2								1		1	1
660	45.69266102	-88.97294790	7	S	P					1									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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
661	45.69185107	-88.97296273	8	M	P					1									1			1								1														
662	45.69104113	-88.97297756	7	S	P		2			1												1								2			2		1						2			
663	45.69023118	-88.97299238	4	S	P						1		1														1														1		
664	45.68942124	-88.97300721	4	S	P								1																											1				1
665	45.68861129	-88.97302203	5	S	P								1																											1				
666	45.68780135	-88.97303685	6	S	P																																							
667	45.68699140	-88.97305168	8	S	P																																							
668	45.68618146	-88.97306650	11	S	P																																							
669	45.68537151	-88.97308132	14	M	P																	1																						
670	45.68456157	-88.97309614	13	S	P																																							
671	45.68375162	-88.97311096	13	S	P																																							
672	45.68294167	-88.97312578	13	S	P																																		1				
673	45.68213173	-88.97314060	13	S	P																																							
674	45.68132178	-88.97315542	13	S	P																																							
675	45.68051184	-88.97317024	13	S	P																																		1				
676	45.67970189	-88.97318505	13	S	P					1												1																						
677	45.67889194	-88.97319987	14	S	P					1																																		
678	45.67808200	-88.97321468	13	S	P																																							
679	45.67727205	-88.97322950	13	S	P																																							
680	45.67646210	-88.97324431	12	S	P																																							
681	45.67565216	-88.97325913	12	S	P																	1																						
682	45.67484221	-88.97327394	12	S	P																																							
683	45.67403226	-88.97328875	12	S	P																																							
684	45.67322232	-88.97330357	12	M	P																																							
685	45.67241237	-88.97331838	12	S	P					1									1			1												1										
686	45.67160242	-88.97333319	12	S	P																																							
687	45.67079247	-88.97334800	12	S	P																																							
688	45.66998253	-88.97336281	11	S	P																																							
689	45.66917258	-88.97337762	11	S	P																																							
690	45.66836263	-88.97339242	11	S	P																																							
691	45.66755268	-88.97340723	11	S	P					1																				1														
692	45.66674273	-88.97342204	11	S	P																																							
693	45.66593279	-88.97343685	7	S	P					1																				1			2									1	
694	45.66512284	-88.97345165	3	S	P						1		1																												1			
695	45.68779095	-88.97188122	2	S	P						1		1																															
696	45.68698101	-88.97189606	5	R	P																																							
697	45.68617106	-88.97191090	5	S	P																																						1		
698	45.68536112	-88.97192573	5	S	P																																							
699	45.68455117	-88.97194057	8	S	P		2																				2																
700	45.68374123	-88.97195541	2	S	P																																							
701	45.68293128	-88.97197025	12	S	P																																							
702	45.68212134	-88.97198508	13	S	P																																							
703	45.68131139	-88.97199992	13	S	P																																							
704	45.68050144	-88.97201475	13	S	P																	1																						
705	45.67969150	-88.97202958	14	S	P																																							
706	45.67888155	-88.97204442	13	S	P					1												1																						
707	45.67807161	-88.97205925	14	S	P																																							
708	45.67726166	-88.97207408	13	S	P																																							
709	45.67645171	-88.97208891	12	S	P																																							
710	45.67564177	-88.97210374	12	S	P					1																									1		2							
711	45.67483182	-88.97211857	12	S	P																																							
712	45.67402187	-88.97213340	11	S	P																																							
713	45.67321193	-88.97214823	11	S	P					2									1			1																						
714	45.67240198	-88.97216306	12	S	P																	1																						
715	45.67159203	-88.97217789	12	S	P																																							
716	45.67078208	-88.97219271	12	S	P																																							
717	45.66997214	-88.97220754	11	S	P			1																																				
718	45.66916219	-88.97222236	12	S	P					1									1			1												1										1
719	45.66835224	-88.97223719	12	S	P																																							
720	45.66754229	-88.97225201	11	S	P					1												1																						1	
721	45.66673235	-88.97226684	8	S	P					2																	2															1			
722	45.66592240	-88.97228166	5	S	P																																					1		1	
723	45.68697060	-88.97074044	2	S	P																							V																
724	45.68616066	-88.97075529	3	S	P																																							
725	45.68535071	-88.97077015	5	S	P																																					1			
726	45.68454077	-88.97078500	6	S	P								1																													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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
727	45.68373082	-88.97079986	11	S	P																																							
728	45.68292088	-88.97081471	13	S	P																																							
729	45.68211093	-88.97082956	13	S	P																																							
730	45.68130099	-88.97084441	13	S	P																																							
731	45.68049104	-88.97085926	13	S	P																																							
732	45.67968109	-88.97087412	13	S	P																	1																							
733	45.67887115	-88.97088896	14	S	P																																							
734	45.67806120	-88.97090381	14	S	P																																							
735	45.67725126	-88.97091866	14	S	P																																							
736	45.67644131	-88.97093351	14	S	P																																							
737	45.67563136	-88.97094836	13	S	P																																							
738	45.67482142	-88.97096320	12	S	P					1																																			
739	45.67401147	-88.97097805	11	S	P					1									1			1											V											
740	45.67320153	-88.97099289	12	S	P																																							
741	45.67239158	-88.97100774	11	S	P																																							
742	45.67158163	-88.97102258	13	S	P																																							
743	45.67077168	-88.97103743	12	S	P																																							
744	45.66996174	-88.97105227	11	S	P					1												1								1													1	
745	45.66915179	-88.97106711	11	S	P																	1																						
746	45.66834184	-88.97108195	8	S	P																1					2															2				
747	45.66753190	-88.97109679	6	S	P																	1																						
748	45.66672195	-88.97111163	4	S	P																																					1				
749	45.66591200	-88.97112647	2	S	P																							1								1								
750	45.68534029	-88.96961456	3	S	P						1																														1				
751	45.68453035	-88.96962944	5	S	P																																				1				
752	45.68372041	-88.96964431	9	S	P		2			1									1			1														1					1				
753	45.68291046	-88.96965918	12	S	P																																								
754	45.68210052	-88.96967404	13	S	P																																								
755	45.68129057	-88.96968891	13	S	P																																								
756	45.68048062	-88.96970378	14	S	P																																								
757	45.67967068	-88.96971865	15	S	P																																								
758	45.67886073	-88.96973351	15	S	P																																								
759	45.67805079	-88.96974838	15	S	P																																								
760	45.67724084	-88.96976324	16	S	P																																								
761	45.67643090	-88.96977811	15	S	P																																								
762	45.67562095	-88.96979297	16	S	P																																								
763	45.67481100	-88.96980784	14	S	P																																								
764	45.67400106	-88.96982270	13	S	P																																								
765	45.67319111	-88.96983756	12	S	P																																								
766	45.67238117	-88.96985242	14	S	P																																								
767	45.67157122	-88.96986728	12	S	P																																								
768	45.67076127	-88.96988214	10	S	P					1					1				1			1																							
769	45.66995133	-88.96989700	9	S	P		1			1												1											1											
770	45.66914138	-88.96991186	7	S	P					1									1			1																			1				1
771	45.66833143	-88.96992672	6	S	P																																					1				
772	45.66752148	-88.96994158	6	S	P																																									
773	45.66671154	-88.96995643	2	S	P								1									1																							
774	45.68451992	-88.96847387	2	S	P								1																													1				
775	45.68370998	-88.96848876	5	S	P												1																									1	1			1
776	45.68290003	-88.96850364	6	S	P																																									
777	45.68209009	-88.96851853	7	S	P														1															1								1				
778	45.68128014	-88.96853341	7	S	P																													1								1				
779	45.68047020	-88.96854830	6	R	P																																					1				
780	45.67966025	-88.96856318	6	S	P																																					1				
781	45.67885031	-88.96857806	5	R	P																																					1				1
782	45.67804036	-88.96859295	6	S	P			1																																	1				
783	45.67723042	-88.96860783	11	M	P					1									1			1													1										1
784	45.67642047	-88.96862271	17	M	P																																								
785	45.67561053	-88.96863759	17	M	P																																								
786	45.67480058	-88.96865247	17	M	R																																								
787	45.67399063	-88.96866735	16	M	R																																								
788	45.67318069	-88.96868223	15	M	P																																								
789	45.67237074	-88.96869710	13	M	P																																								
790	45.67156080	-88.96871198	10	M	P					2									1			1											1											
791	45.67075085	-88.96872686	8	S	P																																							1	2
792	45.66994090	-88.96874173	7	S	P																							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	Potamogeton crispus	Brasenia schreberi	Ceratophyllum demersum	Chara sp.	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Heteranthera dubia	Juncus pelocarpus	Lemna minor	Lemna trisulca	Megalodonta beckii	Myriophyllum sibiricum	Najas flexilis	Nitella sp.	Nuphar variegata	Nymphaea odorata	Pontederia cordata	Potamogeton amplifolius	Potamogeton gramineus	Potamogeton illinoensis	Potamogeton praelongus	Potamogeton pusillus	Potamogeton richardsonii	Potamogeton robbinsii	Potamogeton strictifolius	Potamogeton zosteriformis	Ranunculus aquatilis	Schoenoplectus acutus	Sparganium angustifolium	Spirodela polyrhiza	Utricularia vulgaris	Vallisneria americana	Isoetes sp	Aquatic moss	Freshwater sponge	Filamentous algae
793	45.66913096	-88.96875661	6	S	P																							1												1				
794	45.66832101	-88.96877148	6	S	P																																								
795	45.66751106	-88.96878636	2	S	P																																								
796	45.68369954	-88.96733321				NO INFORMATION																																							
797	45.68288959	-88.96734811	3	S	P						1		1																				1								1				
798	45.68207965	-88.96736301	5	S	P																																								
799	45.68126970	-88.96737791	5	S	P																							1												1				
800	45.67802992	-88.96743751	4	S	P																																			1				1
801	45.67721998	-88.96745241	6	R	P																																			1				
802	45.67641003	-88.96746731	10	S	P																																								
803	45.67560009	-88.96748221	13	S	P																																								
804	45.67479014	-88.96749710	15	S	P																																								
805	45.67398020	-88.96751200	15	S	P																																								
806	45.67317025	-88.96752689	14	S	P																																								
807	45.67236031	-88.96754179	10	S	P																																								
808	45.67155036	-88.96755668	8	S	P					1	1									1		1										1											2
809	45.67074041	-88.96757157	6	S	P					1																																1				1
810	45.66993047	-88.96758647	6	S	P																																					1				
811	45.66912052	-88.96760136	5	S	P																																								
812	45.66831057	-88.96761625	3	S	P																																								
813	45.67639958	-88.96631191	4	S	P								1																													1				
814	45.67558964	-88.96632682	5	R	P																																					1				
815	45.67477969	-88.96634174	6	R	P																																					1				
816	45.67396975	-88.96635665	8	S	P																																					1				
817	45.67315980	-88.96637156	8	S	P																																								
818	45.67234986	-88.96638647	8	M	P																																					1				
819	45.67153991	-88.96640138	6	S	P																																								
820	45.67072997	-88.96641629	6	S	P																																					1				
821	45.66992002	-88.96643120	3	S	P																																					1				
822	45.66911007	-88.96644611	2	S	P						V																	V												1				
823	45.67476923	-88.96518637	2	S	P																																					1				1
824	45.67395929	-88.96520130	3	S	P																																					1				
825	45.67314934	-88.96521623	5	S	P																																					1				
826	45.67233940	-88.96523116	3	S	P																																					1				
827	45.67152945	-88.96524608	2	S	P																																								
828	45.67071951	-88.96526101	2	S	P																																					1				

F

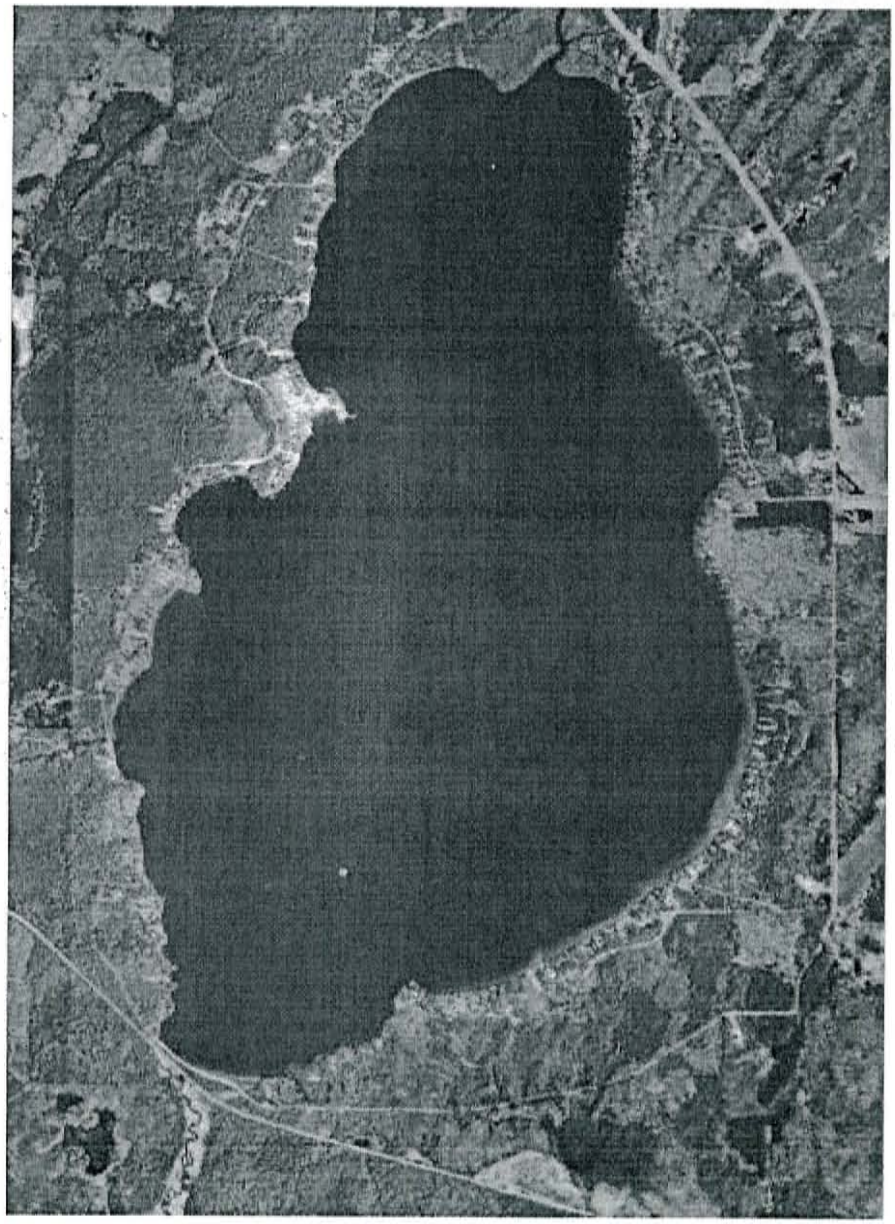
APPENDIX F

2003 WDNR Comprehensive Fisheries Survey Report

Wisconsin Department of Natural Resources
Comprehensive Fisheries Survey Report

Pine Lake, Forest County

2003



DRAFT

Lake and Location:

Pine Lake, Forest County, T37N-R12E-Sec 22 (WBIC 406900)

Physical/Chemical Attributes:

Morphometry: 1,670 acres, maximum depth 14 feet
Lake Type: Drainage (two inlets, one outlet to Wolf River)
Basic Water Chemistry: Soft water - alkalinity 35 mg/l, conductance 90 umhos
Littoral substrate: 40% sand, 35% muck, 15% gravel, and 10% rock
Aquatic vegetation: Common to dense
Shoreline character: 90% upland, 10% wetland
Level of shoreline development: High (avg. 1 structure < every 150 feet of shoreline)
Winterkill: Occasional partial kills reported
Other features: Dam at outlet with 1ft. head

Purpose of Survey: Assess status of gamefish, panfish and non-game species. Develop management recommendations.

Dates of Field Work: April 23, 2003 to September 24, 2003

Survey and Data Personnel: Matt Andre, Dave Brum, Kevin Gauthier, Ben Heimbach, Joe Hennesey, Marty Kiepke, Joelle Underwood, Jordan Weeks, Keith Worrall, Bob Young

Report Author: Bob Young, Fisheries Biologist, Woodruff

Report Date: March 4, 2004

I. SUMMARY

Pine Lake was surveyed in 2003 with a variety of sampling gear to assess the status of all major fish communities. Sampling began with early spring fyke netting and electroshocking, targeted at adult gamefish abundance, and concluded with fall electroshocking for gamefish young-of-year recruitment. Included between those periods was late spring electroshocking for adult bass, late spring fyke netting targeted at panfish, and summer mini-fyke netting for panfish and non-game species.

A diverse fish community consisting of 5 gamefish, 7 panfish and 6 non-game species was sampled during the survey period. Walleye was the most commonly encountered gamefish, followed by northern pike (NP) and largemouth bass (LMB). Stocking supports the walleye population, as there is little evidence of natural reproduction. The estimated adult walleye density of 0.8 per acre is well below average for even stocked lakes, but average size of walleyes is good. Walleye growth is well above average. There is a fairly low density, naturally reproducing population of LMB growing at normal rates. Northern pike are numerous, naturally reproducing, and growing at average rates. Few NP seem to reach quality size and the majority captured appeared to be relatively thin.

Among the panfish, a naturally reproducing, large population of bluegills with a fair to marginal size structure and poor growth rates is presently in Pine Lake. Pumpkinseed and black crappie are less numerous but have similar population characteristics. Rockbass and yellow perch are quite scarce. The relatively poor

size structure and growth rates of most panfish are likely related to inherent lake characteristics (dense aquatic plants), and possibly high angling pressure on larger sizes.

Management recommendations are as follows:

Largemouth bass - No active management of largemouth bass in Pine Lake is recommended at this time. The current regulation of 5 daily bag, 14 inches minimum length is adequate. More restrictive bass harvest regulations in the future, coupled with increased plant harvesting, could result in a larger bass population, a reduction of bluegill numbers and corresponding improvement in bluegill sizes and growth.

Northern pike - No active management of northern pike is recommended at this time.

Walleye - Walleye stocking by WDNR should be resumed in Pine Lake, every other year at a rate of 50 small fingerlings per acre. Larger, fall walleye fingerlings should be stocked when available from the Forest County Walleye Association cooperative rearing pond, at a rate of up to 20 per acre. The current regulation of 15-inch minimum size is appropriate for this low-density population with good growth rates.

Black Crappie, Bluegill, Pumpkinseed - No direct, active management of bluegill, pumpkinseed or black crappie in Pine Lake is recommended at this time. Encouraging more panfish predators, especially largemouth bass, could eventually improve panfish size structure by reducing the number of smaller individuals, thereby increasing growth rates of remaining fish. A significant reduction of aquatic plants to decrease cover and make panfish more vulnerable to predation would also help improve panfish size structure and growth.

Other panfish - No active management of other panfish in Pine Lake is recommended at this time.

General Lake Condition and Habitat -The lake association should refine its aquatic plant-harvesting plan to encourage both an increased harvest and cutting of well defined "lanes". Research on other similar lakes has shown that maintaining open lanes is a good method of providing predator fish better access to over-abundant panfish.

II. PAST MANAGEMENT AND SURVEYS

Known Stocking History
Bluegill – adults&fingerlings, 1941
LM Bass – fry&fingerlings, 1943, 1945, 1950, 1960
N. Pike - fry&fingerlings, 1942-50, 1953, 1965
Perch – fingerlings, 1939, 1941
SM Bass – fingerlings, 1942
Shiner – adults, 1942
Sucker – adults, 1942
Walleye – > 17 million fry&fingerlings, 1937-43, 1945, 27 of 52 years 1952 - 2003

Past Surveys and Findings

Fish surveys were conducted with a variety of sampling gears in 1949, 1956, 1962, 1979, 1980, 1981, 1985-87, and 1991. Results have been similar for all surveys and primarily showed: 1) a high density, average to slow growing panfish population consisting mainly of bluegills, pumpkinseed, crappie and perch 2) a stable population of largemouth bass with normal growth rates, supported by natural reproduction 3) a stable population of northern pike with normal growth rates, supported by natural reproduction 4) a low density population of walleyes with normal growth rates, supported almost entirely by stocking 5) high angling use and 6) abundant to dense aquatic plant growth.

III. METHODS

Pine Lake - Forest County
2003 Sample Summary

Dates	Gear Type	Sampling Effort	Primary Objective	Other Objectives
April 23 – 28, 2003	Fyke Nets	9 – 4 Foot , 48 Lifts	Gamefish Population Estimates (Marking)	Collect Gamefish; Lengths, Mark and Aging Data. Gamefish and Nongamefish Catch per Unit Effort.
April 28, 2003	Electrofish	All Shoreline 6.4 Mi.	Adult Walleye Recapture (1st Run)	Collect Gamefish; Mark, Lengths and and Aging Data. Nongamefish CPE
May 7, 2003	Electrofish	All Shoreline 6.4 Mi..	Bass PE Marking Run (2nd Run)	Collect Gamefish: Mark, lengths and Aging Data. Nongamfish CPE
May 15, 2003	Electrofish	All Shoreline 6.4 Mi..	Bass PE Marking Run (3rd Run)	Collect Gamefish Aging Data, Mark And Lengths
May 29, 2003	Electrofish	All Shoreline 6.4 Mi..	Bass Recapture Run (4th Run)	Collect Gamefish Lengths and Mark
June 2-5, 2003	Fyke Nets	6 – 4 Foot, 18 Lifts	Panfish Survey, CPE	Collect Panfish Aging Data and Lengths.
July 29-30, 2003	Fyke Nets	8 - 3 Foot, 8 Lifts	Gamefish YOYand Nongamefish CPE	Identify species, Lengths, and CPE
September 24, 2003	Electrofish	All Shoreline 6.4 Mi. plus 2, .5 mi. index sta. and 2, 1.5 mi. gamefish stations	Gamefish Recruitment (5th Run)	CPE All Gamefish; baseline monitoring

Fyke net, Pine Lake

Running a fyke net, Pine Lake

Collecting data, Pine Lake

Electroshocking boat

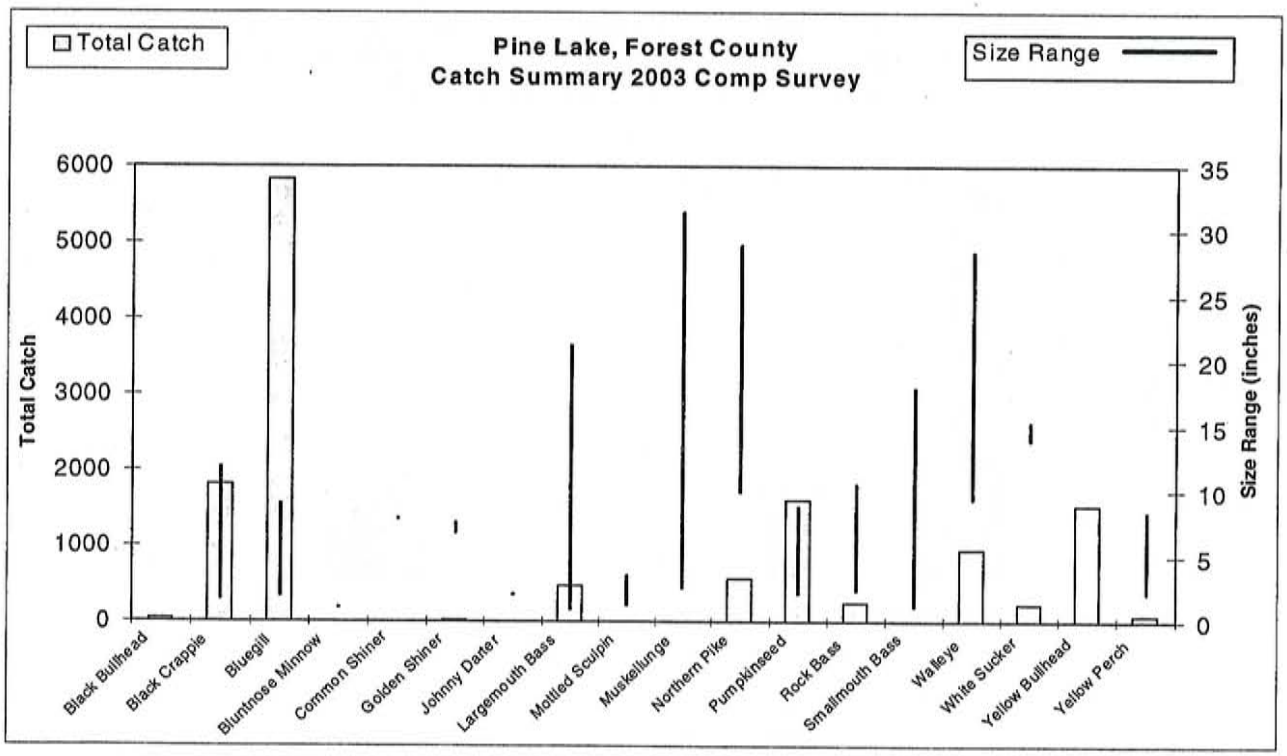
IV. SURVEY RESULTS

Results are summarized below. Corresponding data tables are in the Appendix.

CATCH SUMMARY

A diverse fish community consisting of 5 gamefish, 7 panfish and 6 non-game species was sampled during the survey period (Figure1). Walleye was the most commonly encountered gamefish, followed by northern pike (NP) and largemouth bass (LMB). Among the panfish, bluegill were relatively much more abundant than pumpkinseed, black crappie, rock bass, or yellow perch.

Figure 1.



GAMEFISH RELATIVE ABUNDANCE

Early spring fyke netting, just after ice-out, yielded relatively more walleyes and northern pike than bass and muskies (Figure 2). Late spring fyke netting found relatively more northern pike than bass and walleye. Spring electroshocking (first 4 runs combined) collected good numbers of largemouth bass, compared to northern pike, walleye and smallmouth bass (Figure 3). Fall electroshocking yielded relatively few game fish, and no young-of-year walleye.

Figure 2.

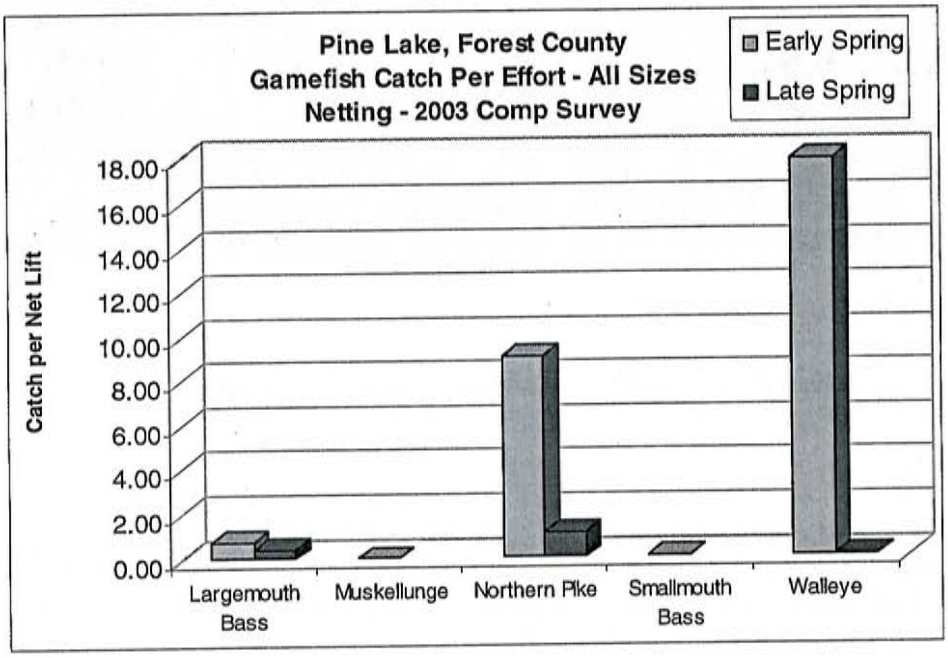
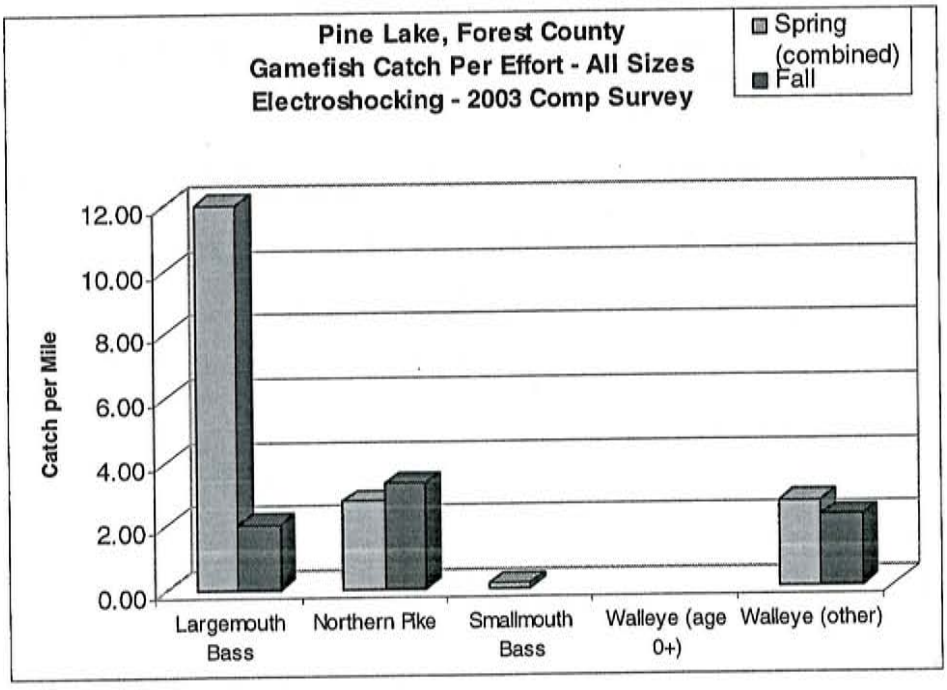


Figure 3.

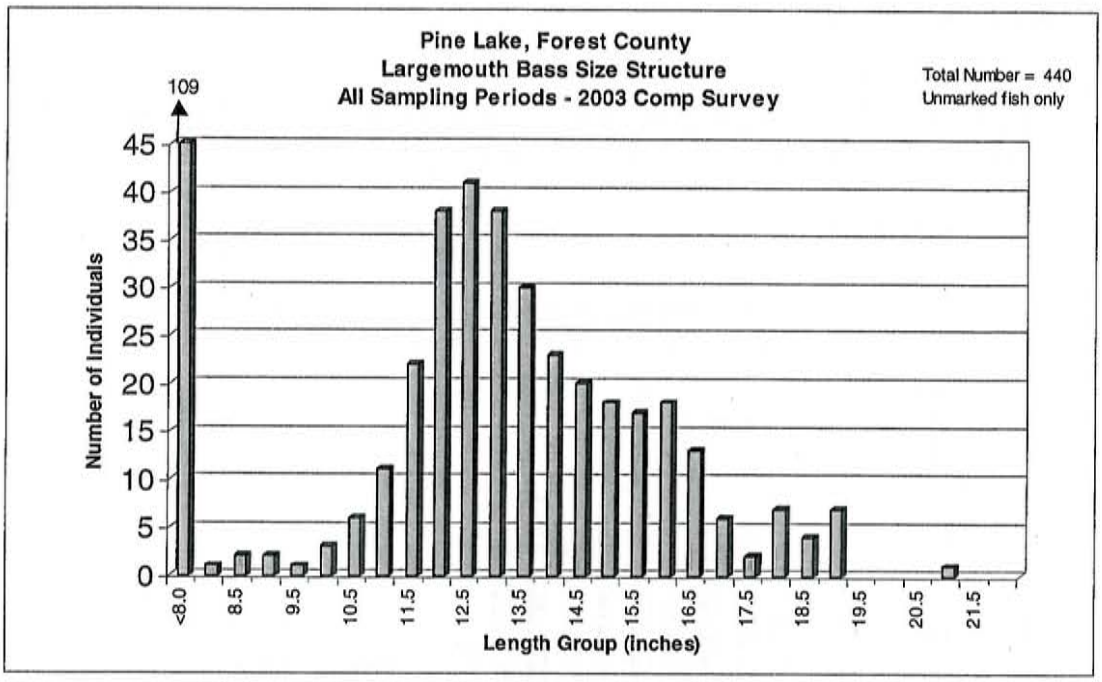


LARGEMOUTH BASS

Size Structure

A total of 440 largemouth bass (LMB) were measured for total length (TL) during the survey period (Figure 4). For the 337 LMB larger than 8.0 inches TL, the modal (most common) size was 12.5-12.9 inches, and the average was 13.1 inches TL. We found good numbers of LMB above the legal minimum size of 14 inches.

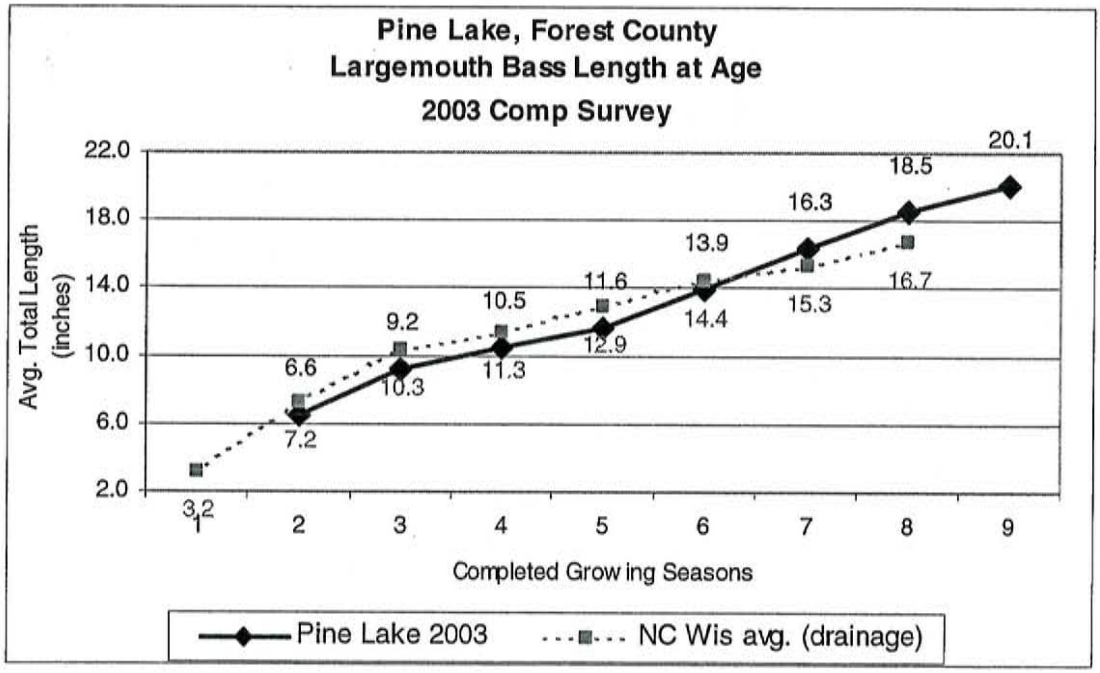
Figure 4.



Growth

A total of 106 largemouth bass (LMB) were aged by examining scales. Growth as inferred from length at age was near the average for similar north central Wisconsin lakes (Figure 5).

Figure 5.

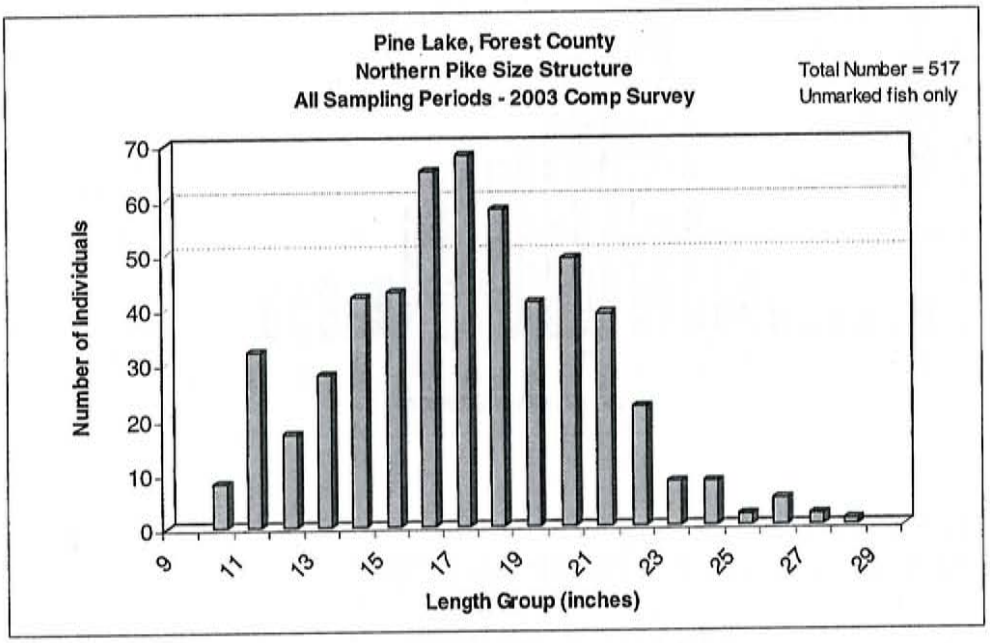


Abundance
A mark/recapture, Chapman-modified, Schnabel sampling method used to calculate abundance estimated the adult LMB population at 2752 fish, or 1.6 per acre. Based on 95% confidence intervals, the actual numbers could range from 1665 to 4913 fish, or 1.0 to 2.9 fish per acre. The coefficient of variation for the estimate was 25.8%, well within the acceptable maximum of 40%.

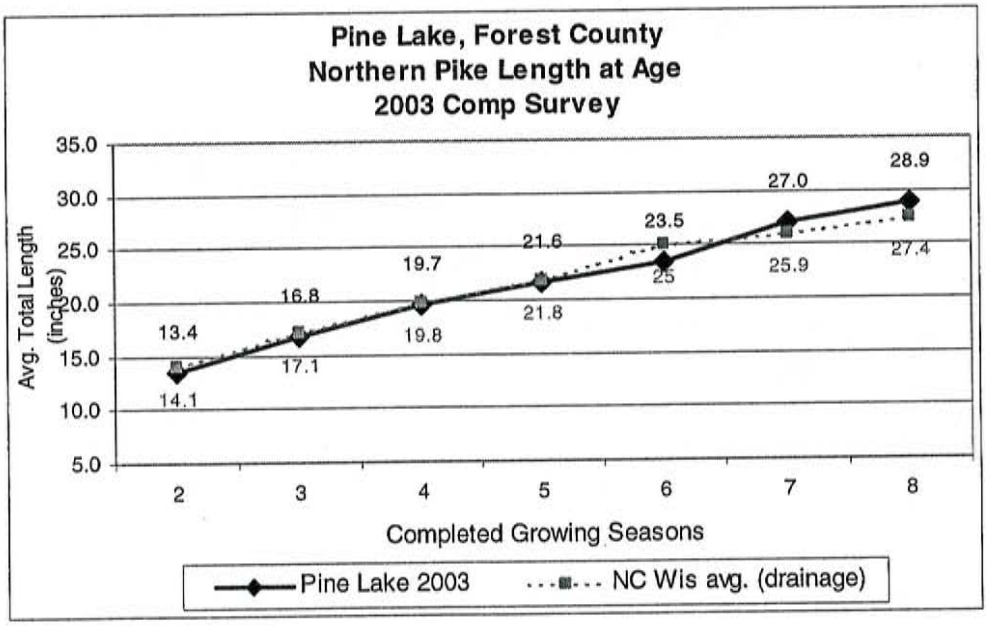
NORTHERN PIKE

Size Structure and Condition
A total of 517 northern pike (NP) were measured for total length (TL) during the survey period (Figure 6). The modal size was 18 inches, and the average was 17.1 inches TL. Although we found good numbers of pike, they appeared to be relatively thin compared to those in other area lakes.

Figure 6.



Growth
Figure 7.



Abundance

A mark/recapture, Chapman-modified, Schnabel sampling method used to calculate abundance estimated the adult NP population at 18674 fish, or 11.2 per acre. Only 4 marked fish were subsequently recaptured. Based on 95% confidence intervals, the actual numbers could range from 7324 to 74691 fish, or 4.4 to 44.7 fish per acre. The coefficient of variation for the estimate was 50%, above the acceptable maximum of 40%. In spite of the poor estimate, we know NP are quite numerous in Pine Lake.

SMALLMOUTH BASS

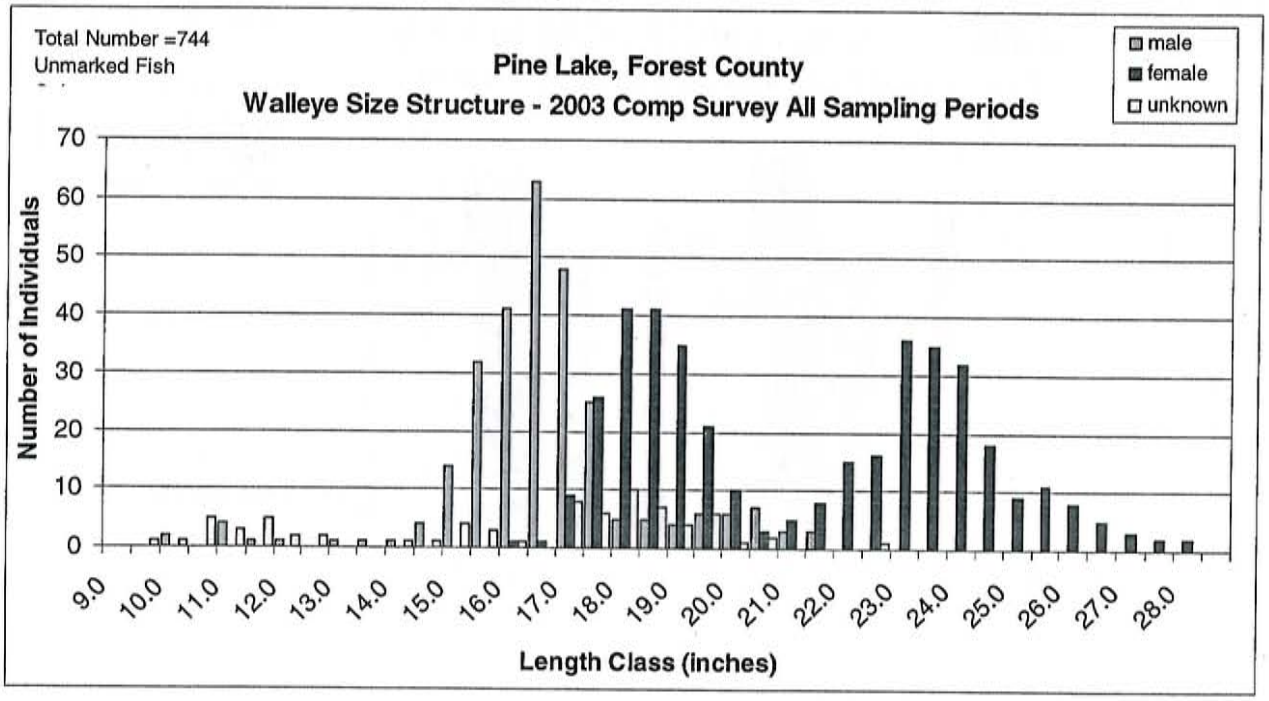
Only 7 smallmouth bass were captured during the entire survey period, ranging in size from 1.2 to 17.9 inches.

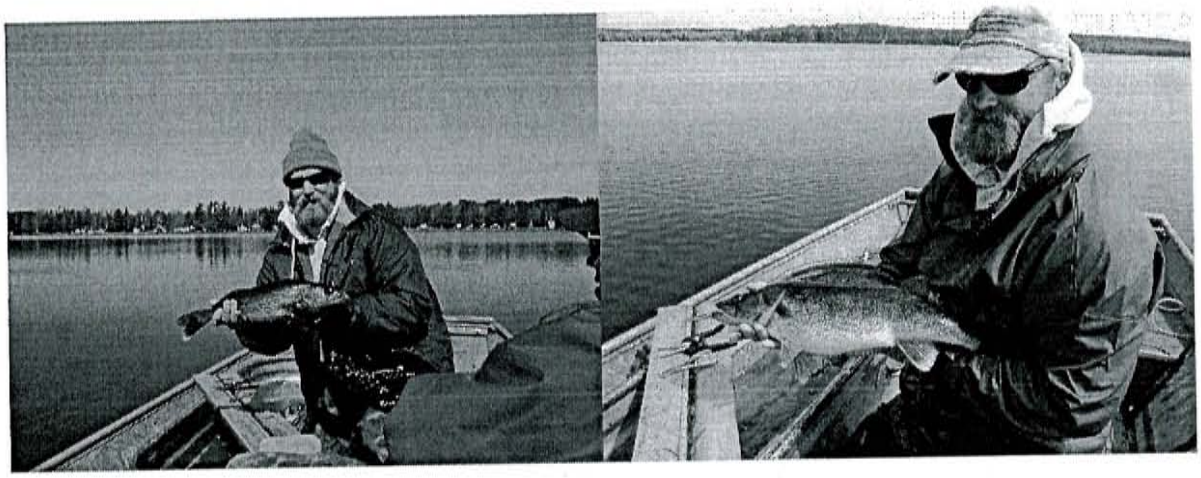
WALLEYE

Size Structure

A total of 744 walleye were measured for total length (TL) during the survey period. The modal size was 17 inches, and the average was 19.3 inches TL (Figure 8). Average walleye sizes in 2003 were somewhat better than in 1985, but overall, average size appears stable when compared to past surveys (Figure 9).

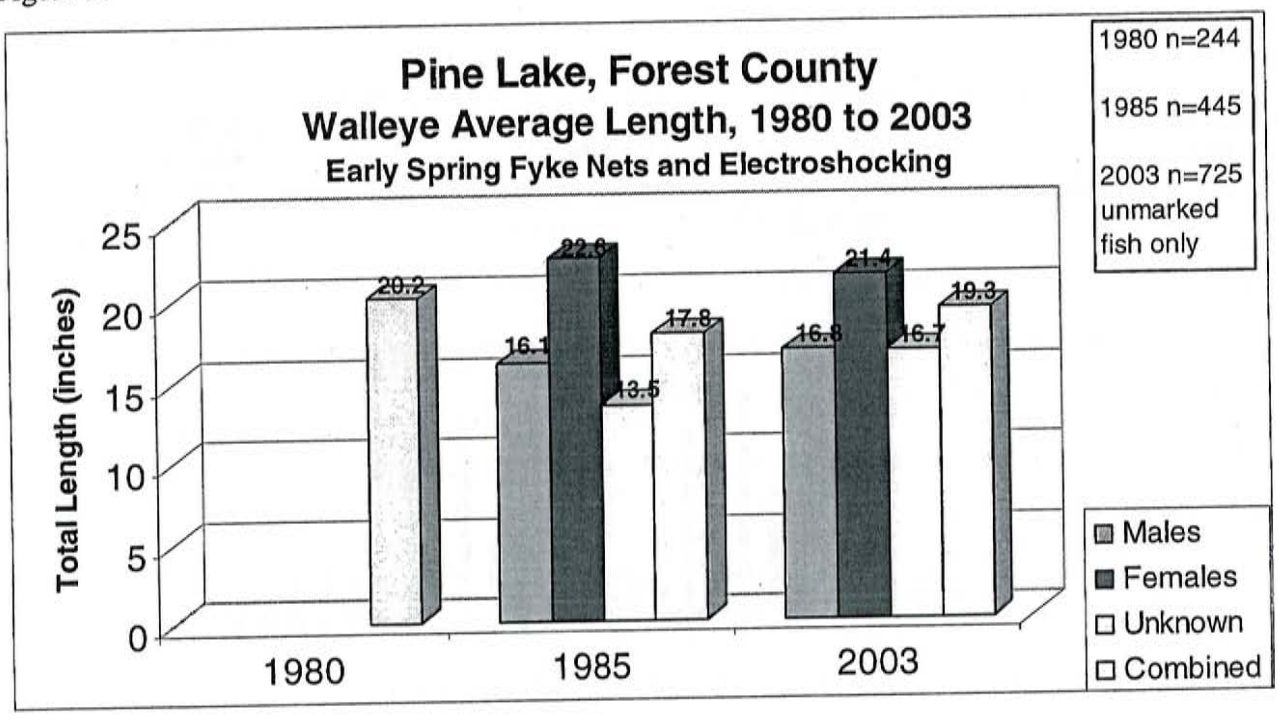
Figure 8.





Pine Lake walleye

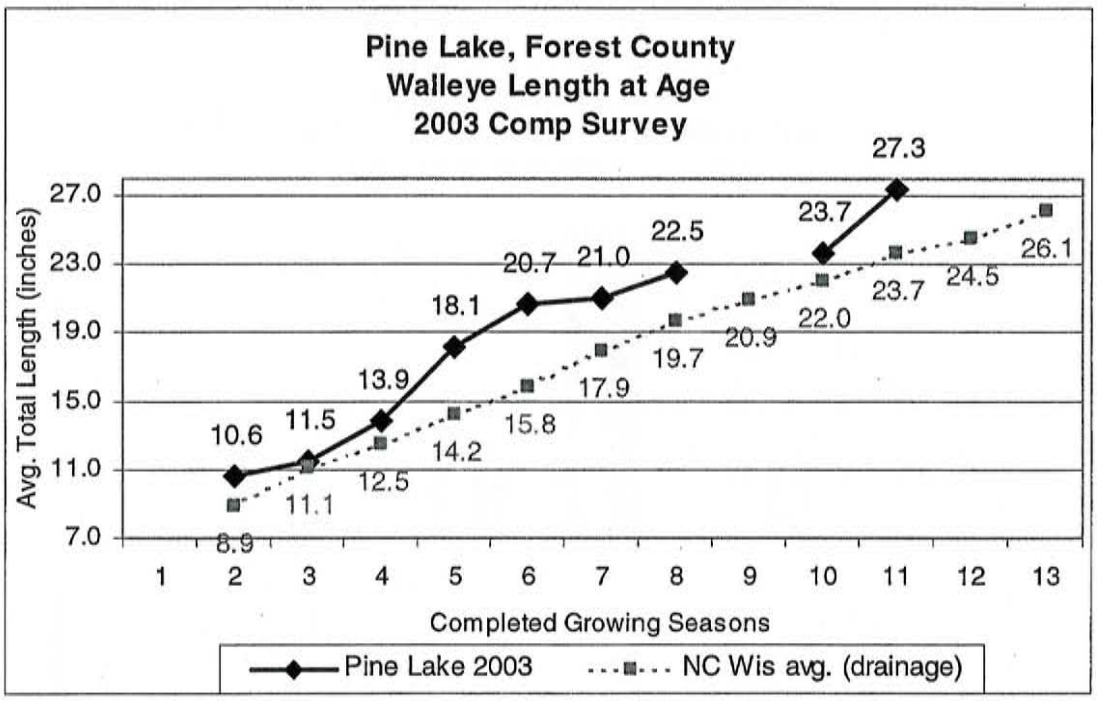
Figure 9.



Growth

A total of 226 walleye were aged by examining scales. Growth as inferred from length at age was well above the average for similar north central Wisconsin lakes (Figure 10).

Figure 10.

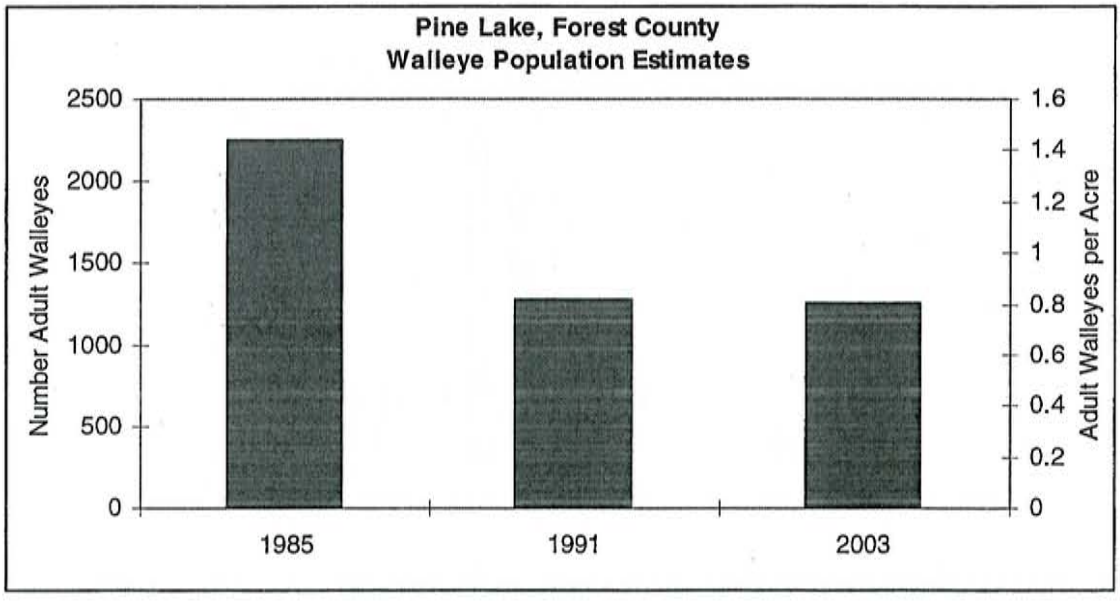


Abundance

A mark/recapture, Chapman-modified, Petersen sampling method used to calculate abundance estimated the adult walleye population at 1261 fish, or 0.8 per acre. Based on 95% confidence intervals, the actual numbers could range from 961 to 1562 fish, or 0.6 to 0.9 fish per acre. The coefficient of variation for the estimate was 12.1%, well below the acceptable maximum of 40%.

The 2003 estimate was nearly identical to that of 1991, while the 1985 estimate was relatively higher (Figure 11).

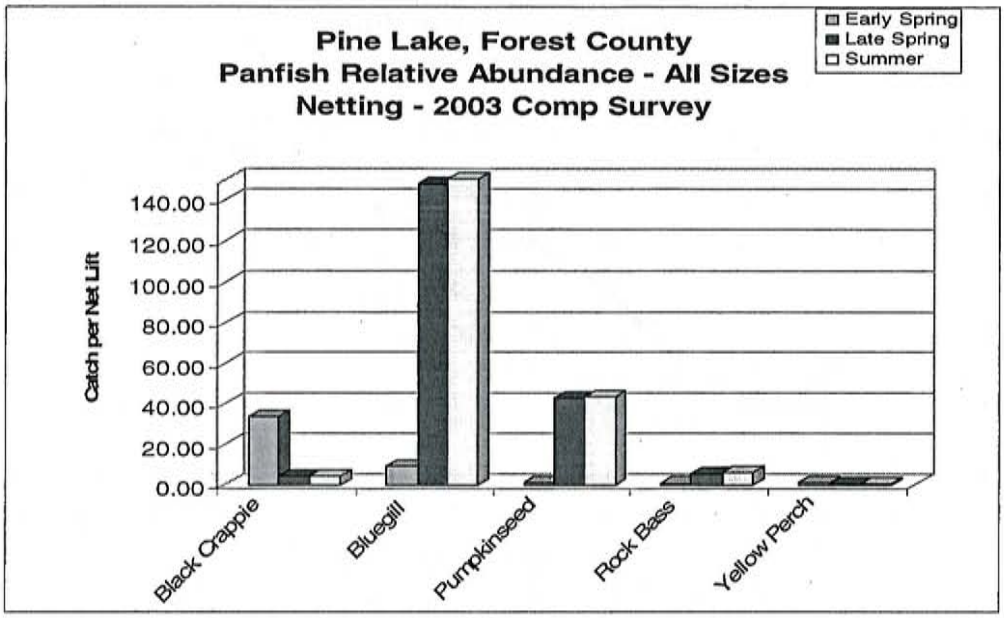
Figure 11.



PANFISH RELATIVE ABUNDANCE

Bluegill were relatively much more numerous than the other panfish, especially in the late spring and summer nets, which were targeted at centrarchid panfish (Figure 12). Rock bass were common in areas of rocky substrate but scarce elsewhere. Yellow perch were quite scarce throughout the survey at all sites.

Figure 12.



BLACK CRAPPIE

Size Structure

A total of 335 crappies were measured for TL in spring fyke nets. Modal size was 8 inches, while the maximum was 10.8 inches (Figure 13). Black crappie size quality as determined by proportional and relative stock indices was somewhat poor, with 47% larger than a "quality" size of 8 inches, and only 6% larger than a "preferred" size of 10 inches (Figure 14).

Figure 13.

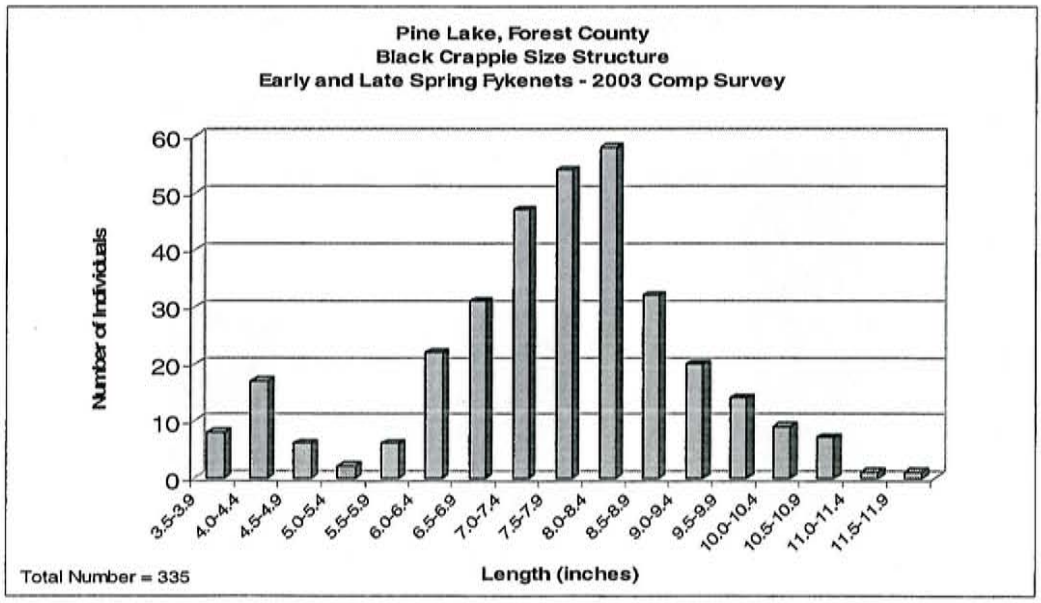
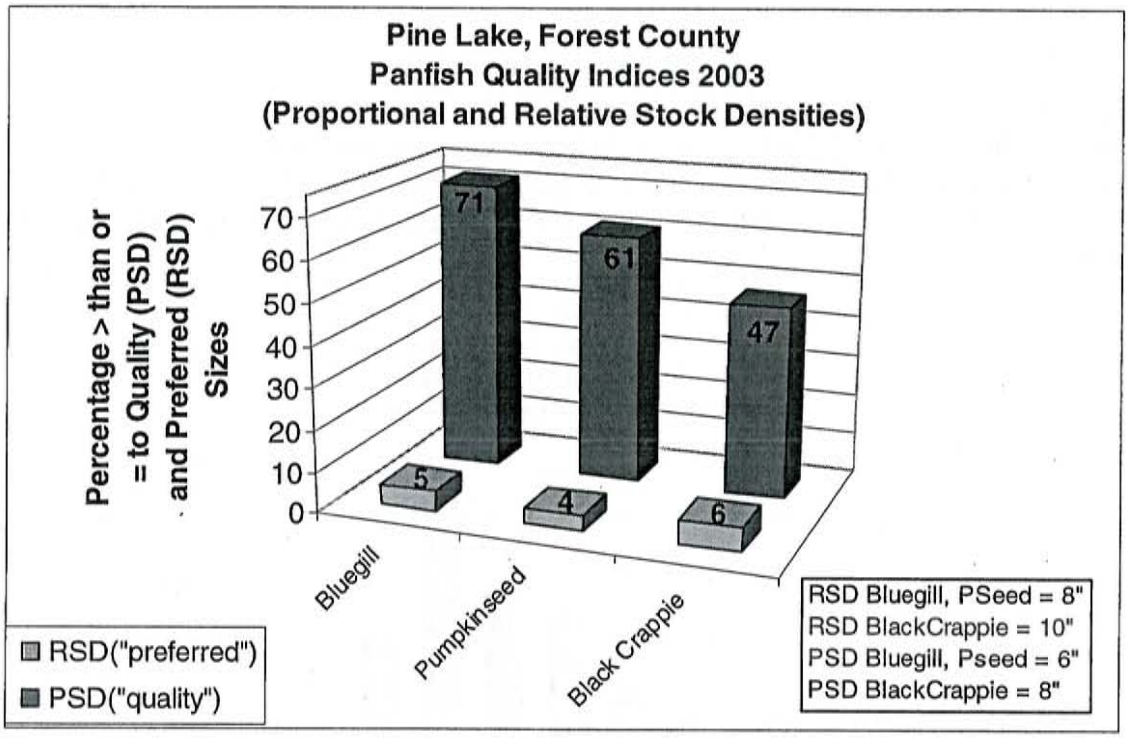


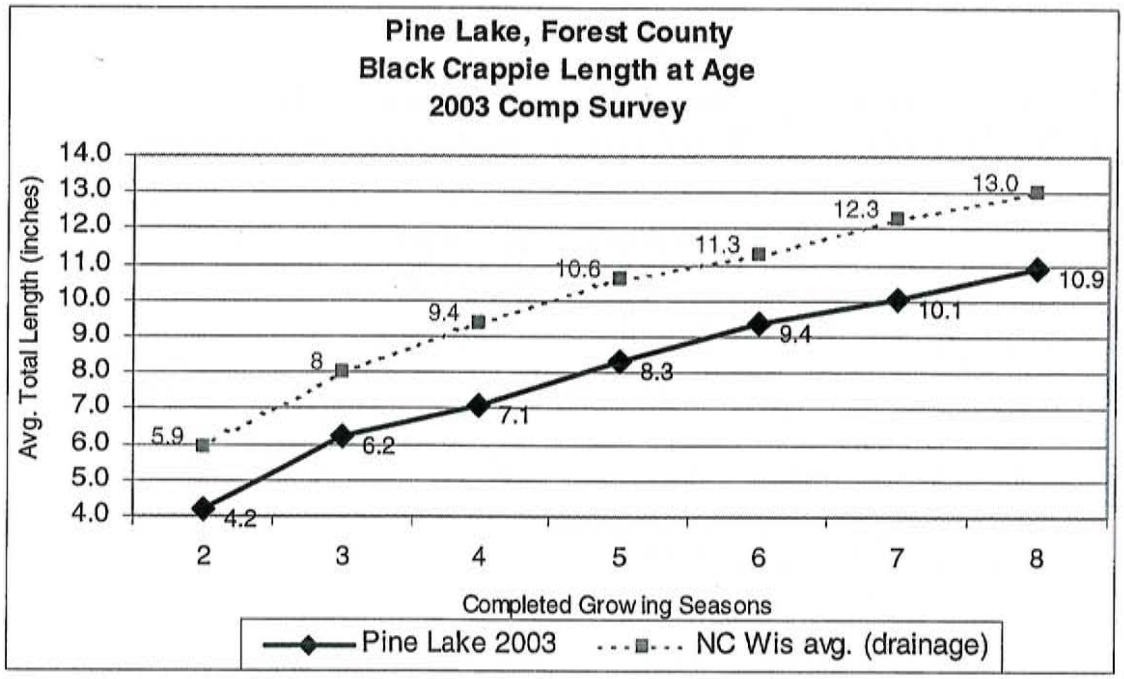
Figure 14.



Growth

A total of 127 black crappie were aged by examining scales. Growth as inferred from length at age was well below the average for similar north central Wisconsin lakes (Figure 15).

Figure 15.

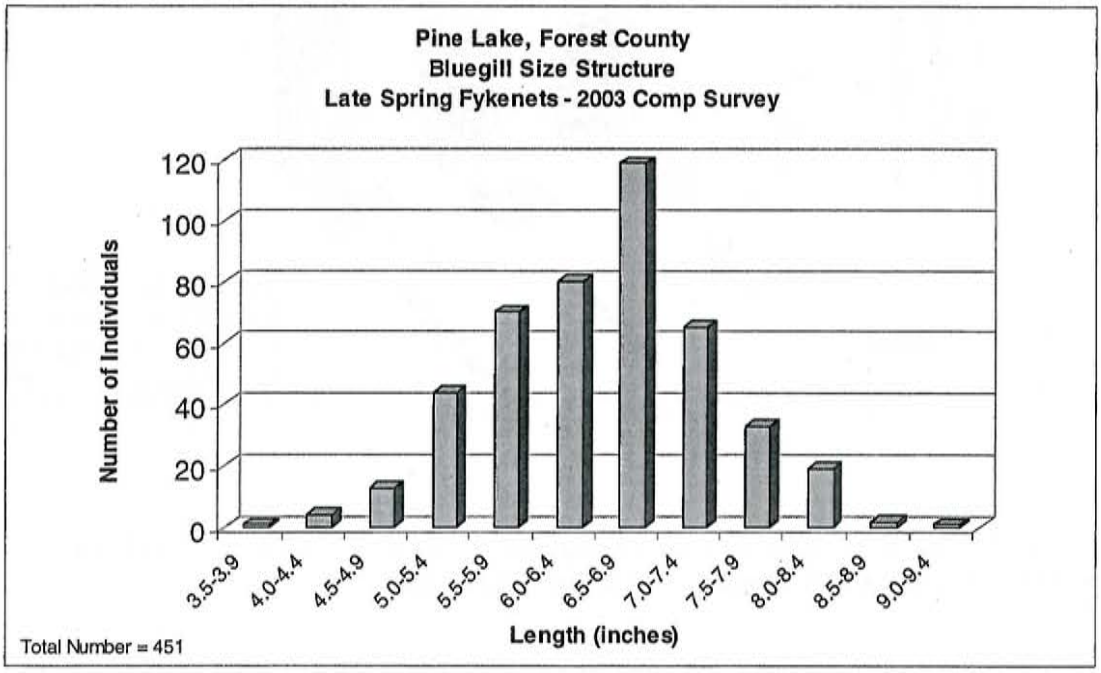


BLUEGILL

Size Structure

A total of 451 bluegills were measured for TL in late spring fyke nets. Modal size was 6.7 inches, while the maximum was 9 inches (Figure 16). Bluegill size quality as determined by proportional and relative stock indices revealed 71% were larger than a "quality" size of 6 inches, but only 5% larger than a "preferred" size of 8 inches (Figure 14).

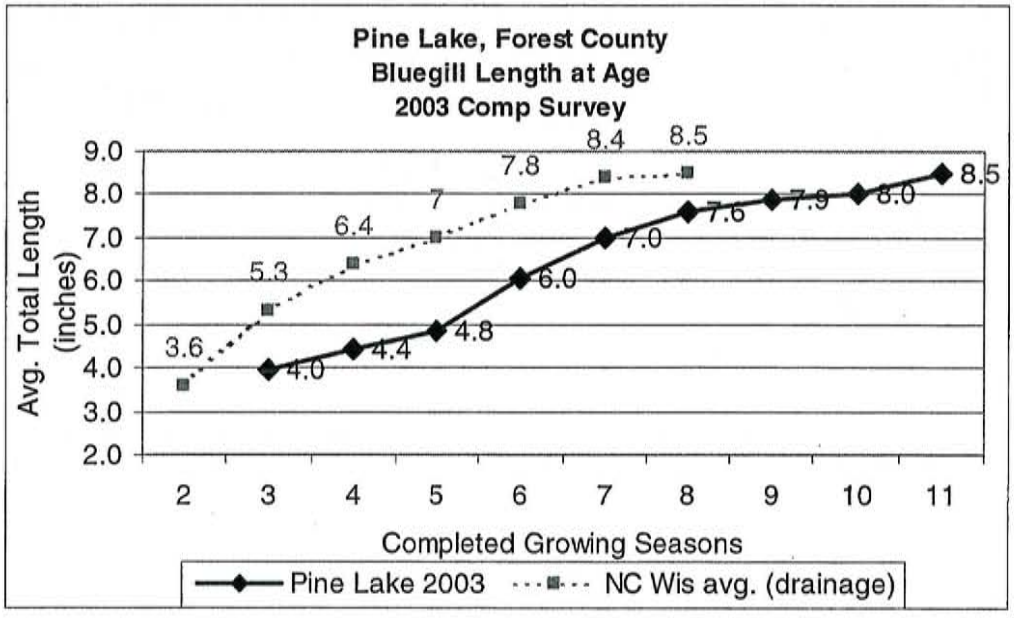
Figure 16.



Growth

A total of 92 bluegill were aged by examining scales. Growth as inferred from length at age was well below the average for similar north central Wisconsin lakes (Figure 17).

Figure 17.

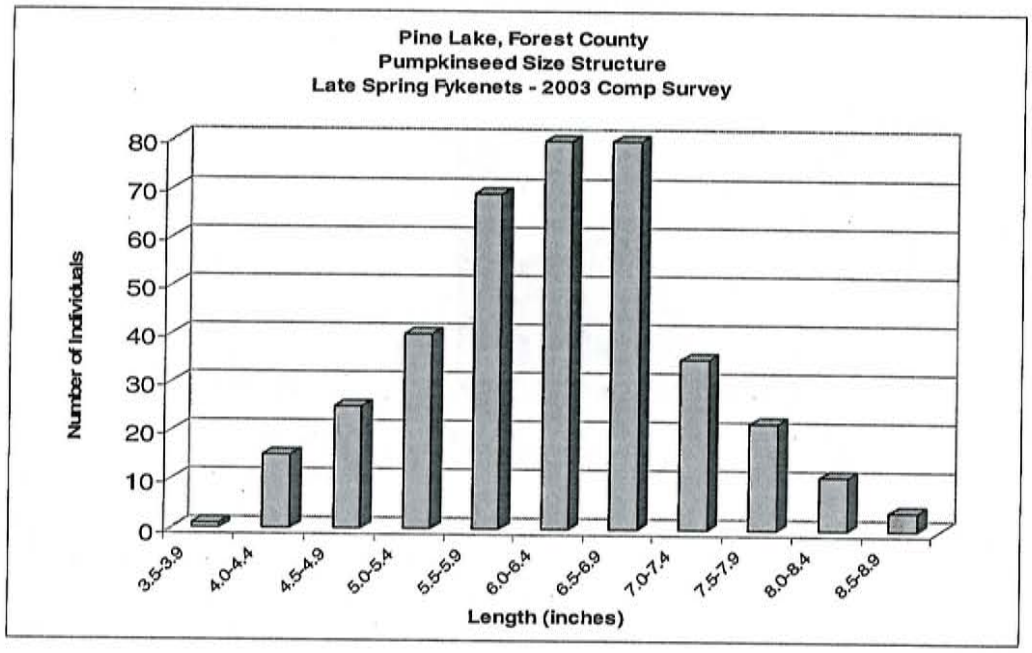


PUMPKINSEED

Size Structure

A total of 382 pumpkinseed sunfish were measured for TL in late spring fyke nets (Figure 18). Those that appeared to be bluegill x pumpkinseed hybrids were counted as pumpkinseeds. Modal size was 6.5 inches, while the maximum was 9 inches. Pumpkinseed size quality as determined by proportional and relative stock indices revealed 61% were larger than a "quality" size of 6 inches, but only 4% larger than a "preferred" size of 8 inches (Figure 14).

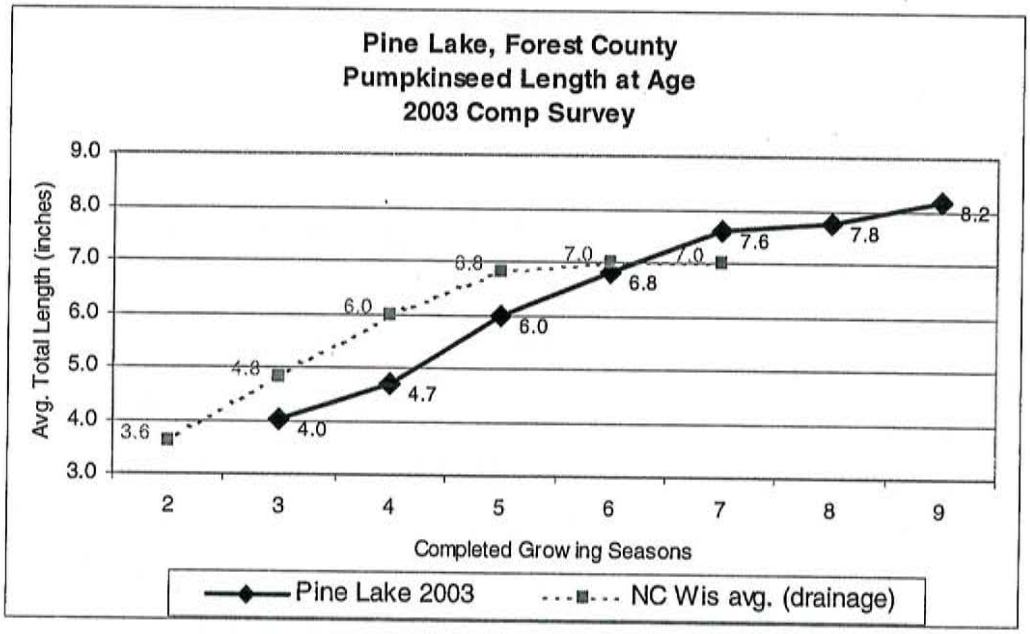
Figure 18.



Growth

A total of 93 pumpkinseed were aged by examining scales. Growth as inferred from length at age was generally well below the average for similar north central Wisconsin lakes (Figure 19).

Figure 19.

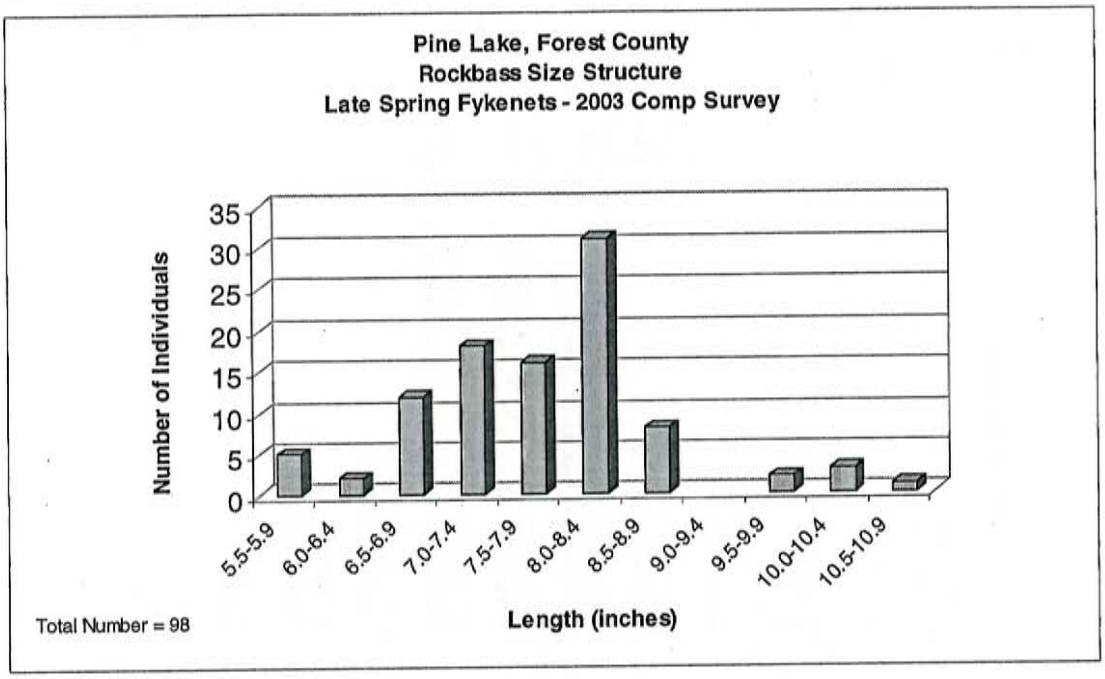


ROCKBASS

Size Structure

A total of 98 rockbass were measured for TL in late spring fyke nets (Figure 20). Modal size was 8 inches, while the maximum was 11 inches.

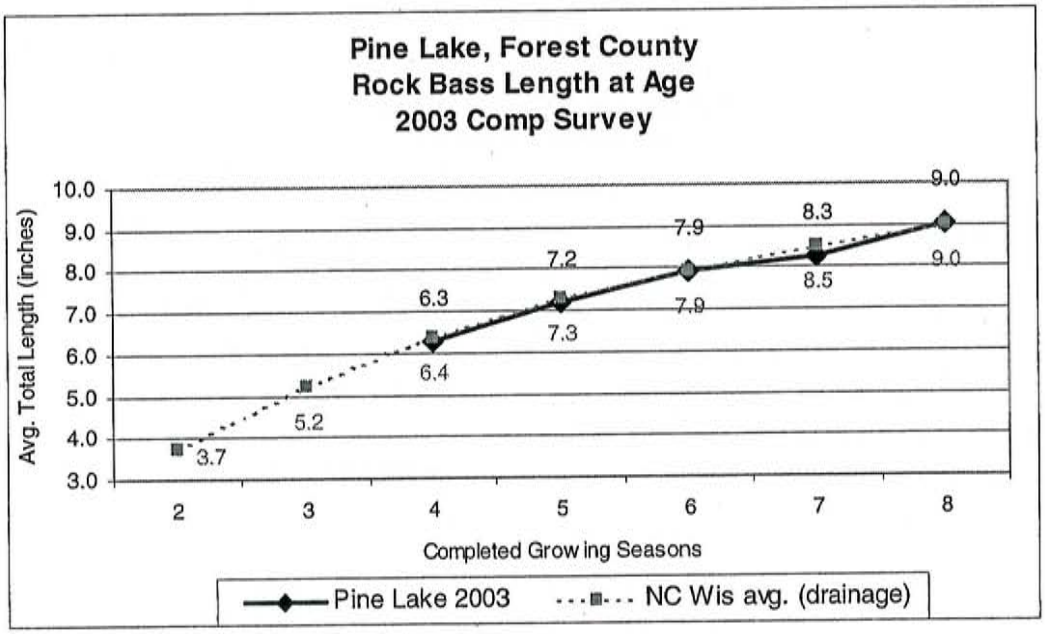
Figure 20.



Growth

A total of 55 rockbass were aged by examining scales. Growth as inferred from length at age was similar to the average for comparable north central Wisconsin lakes (Figure 21).

Figure 21.



YELLOW PERCH

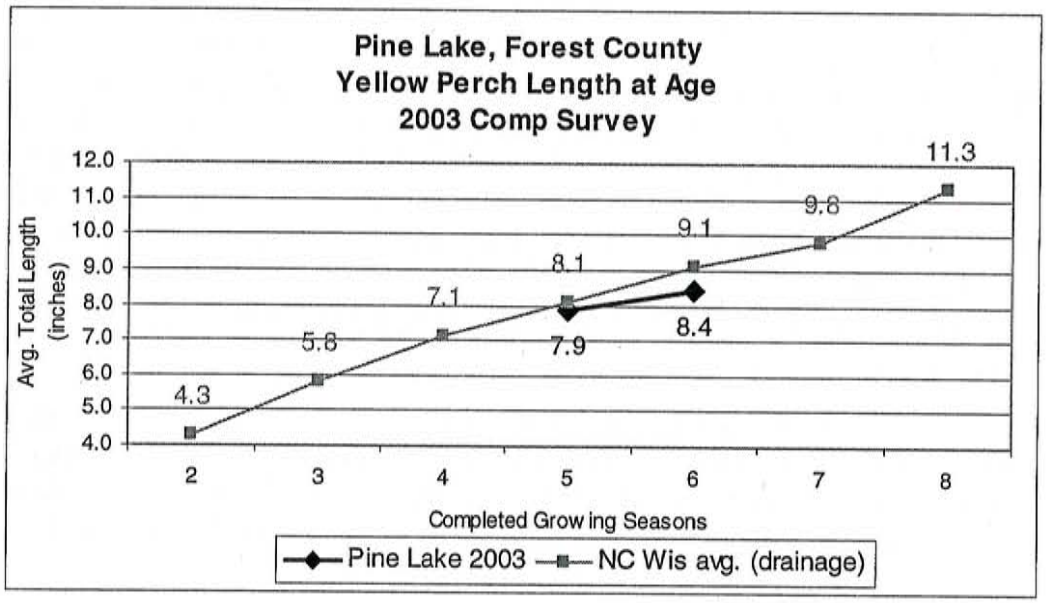
Size Structure

Very few yellow perch were captured during the survey period, and too few were measured for a representative sample of size.

Growth

A total of 4 yellow perch were aged by examining scales. Growth as inferred from length at age for this small sample was below the average for similar north central Wisconsin lakes (Figure 22).

Figure 22.



V. DISCUSSION AND RECOMMENDATIONS

GAMEFISH

Largemouth Bass – A naturally reproducing, fair sized population with good size structure and average growth rates is presently in Pine Lake.

Recommendation: No active management of largemouth bass in Pine Lake is recommended at this time. The current regulation of 5 daily bag, 14 inches minimum length is adequate. The lake association may want to consider developing local support for a more restrictive bass harvest regulation in the future. A one bag, 18" minimum length limit on bass would encourage a greater bass population size and could result in better predatory control of small bluegill. A reduction of bluegill numbers and corresponding increase in bluegill growth rates would be desirable for Pine Lake panfish anglers. See related recommendations for panfish.

Northern Pike – A naturally reproducing, relatively large population with poor size structure and condition, and average growth rates is presently in Pine Lake. In spite of a large forage base, few pike are growing to quality sizes in Pine Lake. Experience with other northern Wisconsin lakes has shown that a lake's attributes may limit pike growth and condition. In Pine Lake, large expanses of dense aquatic plant growth can

effectively hide small fish from predators like pike, and the warm summer temperatures may cause physical stress and affect condition. Angling can also contribute to poor size structure by removing mostly larger individuals.

Recommendation: No active management of northern pike in Pine Lake is recommended at this time. The current regulation of 5 bag, no minimum size is appropriate. A greater reduction of aquatic plant density and coverage by harvesting would help to increase predation on panfish by northern pike, which could help stimulate pike growth rates and condition.

Walleye – A low-density, fast growing walleye population supported by stocking exists in Pine Lake. No young-of-year (YOY) walleye were captured in 2003 or earlier fall electroshocking runs during non-stocked years, indicating no apparent natural reproduction. However, there may be limited walleye natural reproduction and recruitment to larger sizes in some years, as there is spawning habitat available, especially in the southern part of the lake. The current adult population estimate of 0.8 per acre is only half of the northern Wisconsin average for stocked lakes, of 1.9 per acre. Although adult walleye density remains low, it is a popular fishery that offers serious anglers the chance for very nice walleyes. Notably, the lake has not had a significant number of walleye stocked since 1998. The peaks in numbers of fish in the size structure (Figure 8) correspond with the walleye stockings of 1991-92, 1995 and 1998. We know that stocking has produced a larger, more fishable population size in the past (1985) which was nearly twice that of the current population level.

Recommendation: Walleye stocking should be resumed in Pine Lake, every other year at a rate of 50 small fingerlings per acre. Larger, fall walleye fingerlings should be stocked when available from the Forest County Walleye Association cooperative rearing pond, at a rate up to 20 per acre. The current regulation of 15-inch minimum size is appropriate for this low-density population with good growth rates.

PANFISH

Black Crappie, Bluegill and **Pumpkinseed** – A naturally reproducing, large population of bluegills with a fair to marginal size structure and poor growth rates is presently in Pine Lake. Pumpkinseed and black crappie are less numerous but have similar population characteristics.

The shallow nature of the lake basin and resulting abundant aquatic vegetation provides an excess of habitat and hiding cover for bluegills and other panfish. The general lack of larger panfish may be a result of high harvest rates of larger individuals, and slow growth rates from overabundance. The outbreak of *Columnaris* disease and resulting fish kill in summer 2003 may help to improve future panfish size structure by having thinned the population.

Recommendation: No direct, active management of bluegill, pumpkinseed or black crappie in Pine Lake is recommended at this time. Encouraging a higher density of panfish predators, especially largemouth bass, could eventually improve panfish size structure by reducing the number of smaller individuals, thereby increasing growth rates of remaining fish. A significantly increased annual harvest of aquatic plants to reduce cover and make panfish more vulnerable to predation would also help. An increase in plant harvesting would be necessary prior to changing bass minimum size regulations to encourage more bass/fewer panfish.

Other Panfish - Rockbass and yellow perch were relatively very low in abundance compared to bluegill, pumpkinseed and crappies (Figure 12).

Recommendation: No active management of other panfish in Pine Lake is recommended at this time.

GENERAL LAKE CONDITION and HABITAT

As mentioned above, submerged aquatic plants are very abundant in Pine Lake due to its shallow nature and extensive littoral zone. Reduction of aquatic plant coverage and density can only help improve panfish sizes and condition.

Recommendation: The lake association should refine its aquatic plant-harvesting plan to encourage increased harvest and cutting of well defined "lanes". Research on other similar lakes has shown that maintaining open lanes is a good method of providing predator fish better access to over-abundant panfish.

APPENDIX

Appendix Table numbering corresponds with Figures in the SURVEY RESULTS section.

Table 1. Pine Lake, Forest County 2003 Comprehensive Fisheries Survey Catch Summary

Fish Species		Catch (and Size Range in Inches) by Sampling Period																	
		Early Spring Netting			Spring Electrofishing			Late Spring Netting			Summer Netting			Fall Electrofishing			Total Catch	
Common Name	*Scientific Name*	Catch	MinSize	MaxSize	Catch	MinSize	MaxSize	Catch	MinSize	MaxSize	Catch	MinSize	MaxSize	Catch	MinSize	MaxSize	Catch	MinSize
Black Bullhead	*Ictalurus melas*	3	ND	ND				19	ND	ND	19	ND	ND				41	
Black Crappie	*Pomoxis nigromaculatus*	1600	3.5	11.9				73	3.9	10.8	75	1.8	10.8	71	2.3	10.7	1819	1.8
Bluegill	*Lepomis macrochirus*	420	ND	ND				2657	3.9	9.0	2711	2.0	9.0	48	2.9	7.0	5836	2.0
Bluntnose Minnow	*Pimephales notatus*										1	1.1	1.1				1	1.1
Common Shiner	*Notropis cornutus*							1	ND	ND	1	7.9	7.9				2	7.9
Golden Shiner	*Notemigonus crysoleucas*	4	ND	ND				8	ND	ND	8	6.8	7.6				20	6.8
Johnny Darter	*Etheostoma nigrum*													1	2.1	2.1	1	2.1
Largemouth Bass	*Micropterus salmoides*	37	11.0	18.9	308	5.5	21.2	7	5.7	6.1	99	1.0	7.4	13	2.2	19.4	464	1.0
Mottled Sculpin	*Cottus bairdi*										2	1.3	1.8	2	2.1	3.5	4	1.3
Muskellunge	*Esox masquinongy*	1	31.5	31.5							1	2.6	2.6				2	2.6
Northern Pike	*Esox lucius*	437	10.0	28.9	70	12.5	26.9	20	12.3	24.8	20	12.0	24.8	21	16.0	22.4	568	10.0
Pumpkinseed	*Lepomis gibbosus*	48	ND	ND				768	3.9	8.8	786	2.2	8.8	5	2.7	5.4	1607	2.2
Rock Bass	*Ambloplites rupestris*	36	ND	ND				94	5.7	10.6	106	2.4	10.6	2	7.5	9.0	238	2.4
Smallmouth Bass	*Micropterus dolomieui*	3	1.2	17.9	3	13.6	17.0				1	1.2	1.2				7	1.2
Walleye	*Stizostedeon vitreum vitreum*	862	10.0	28.4	68	9.5	24.9	1	27.3	27.3	1	27.3	27.3	14	13.0	22.9	946	9.5
White Sucker	*Catostomus commersoni*	227	ND	ND				1	ND	ND	1			2	14.0	15.3	231	14.0
Yellow Bullhead	*Ictalurus natalis*	1140	ND	ND				189	ND	ND	195						1524	
Yellow Perch	*Perca flavescens*	62	ND	ND				4	3.5	8.4	5	2.2	8.4	11	2.7	7.3	82	2.2

ND = No Data

Table 2. Gamefish CPE's - Netting - Pine L		
	Early Spring	Late Spring
Largemouth Bass	0.77	0.39
Muskellunge	0.02	
Northern Pike	9.10	1.11
Smallmouth Bass	0.04	
Walleye	17.96	0.06

Table 3. Gamefish CPE's - Shocking - Pine L		
	Spring (combined)	Fall
Largemouth Bass	47.98	2.02
Northern Pike	10.90	3.27
Smallmouth Bass	0.62	
Walleye (age 0+)		
Walleye (other)	10.59	2.18

Table 4. LMB Pine Lake 2003 Length Frequency				
unmarked fish only				
INCH				
GROUP	04/23 - 06/05/03	7/29-30/03	9/24/03	Totals
<8.0	14	92	3	109
8			1	1
8.5	1		1	2
9	2			2
9.5	1			1
10	3			3
10.5	6			6
11	11			11
11.5	22			22
12	38			38
12.5	40		1	41
13	38			38
13.5	30			30
14	22		1	23
14.5	19		1	20
15	18			18
15.5	16		1	17
16	18			18
16.5	13			13
17	6			6
17.5	2			2
18	7			7
18.5	3		1	4
19	6		1	7
19.5				
20				
20.5				
21	1			1
21.5				
TOTALS	337	92	11	440

Table 5. Largemouth Bass length at age (inches		
	Pine Lake 2003	NC Wis avg. (drainage)
age	survey avg length	length
1		3.2
2	6.6	7.2
3	9.2	10.3
4	10.5	11.3
5	11.6	12.9
6	13.9	14.4
7	16.3	15.3
8	18.5	16.7
9	20.1	

Table 6. NP Pine Lake 2003 Length Frequency			
unmarked fish only			
INCH			
GROUP	04/23 - 06/05/03	9/24/03	totals
<8.0			0
8			0
9			
10	8		8
11	32		32
12	17		17
13	28		28
14	42		42
15	43		43
16	62	3	65
17	61	7	68
18	56	2	58
19	40	1	41
20	45	4	49
21	37	2	39
22	20	2	22
23	8		8
24	8		8
25	2		2
26	5		5
27	2		2
28	1		1
29	0		
30	0		
TOTALS	517	21	538

Table 7. Northern pike length at age (inches)		
	Pine Lake 2003	NC Wis avg. (drainage)
age	survey avg length	length
2	13.4	14.1
3	16.8	17.1
4	19.7	19.8
5	21.6	21.8
6	23.5	25
7	27.0	25.9
8	28.9	27.4

Table 8. Pine Lake Walleye Lengths

Length (in.)		male WE	April 23-28 fykes plus April 28 s female WE	unk. WE	TOTALS	May7electro unk. WE	May 15 electro unk. WE	June 5 electro unk. WE	Sept24electro unk. WE	GRAND TOTAL
<	8.0				0					
8.0 -	8.4				0					
8.5 -	8.9				0					
9.0 -	9.4				0					
9.5 -	9.9				0		1			1
10.0 -	10.4	2			2	1				3
10.5 -	10.9	0		4	4			1		5
11.0 -	11.4	4		2	6		1			7
11.5 -	11.9	1		4	5		1			6
12.0 -	12.4	1		1	2		1			3
12.5 -	12.9	0		2	2					2
13.0 -	13.4	1		0	1					1
13.5 -	13.9	1		0	1					1
14.0 -	14.4	1		0	1				1	2
14.5 -	14.9	4		0	4				1	5
15.0 -	15.4	14		1	15			1	2	18
15.5 -	15.9	32		0	32				3	35
16.0 -	16.4	41	1	1	43					43
16.5 -	16.9	63	1	0	64					64
17.0 -	17.4	48	9	7	64			1		65
17.5 -	17.9	25	26	6	57					57
18.0 -	18.4	5	41	9	55	1				56
18.5 -	18.9	5	41	7	53					53
19.0 -	19.4	4	35	3	42				1	43
19.5 -	19.9	6	21	6	33					33
20.0 -	20.4	6	10	1	17					17
20.5 -	20.9	7	3	1	11				1	12
21.0 -	21.4	3	5	0	8					8
21.5 -	21.9	3	8	0	11					11
22.0 -	22.4		15	0	15					15
22.5 -	22.9		16	0	16				1	17
23.0 -	23.4		36	0	36					36
23.5 -	23.9		35	0	35					35
24.0 -	24.4		32	0	32					32
24.5 -	24.9		18	0	18					18
25.0 -	25.4		9	0	9					9
25.5 -	25.9		11	0	11					11
26.0 -	26.4		8	0	8					8
26.5 -	26.9		5	0	5					5
27.0 -	27.4		3	0	3					3
27.5 -	27.9		2		2					2
28.0 -	28.4		2		2					2
28.5 -	28.9				0					
29.0 -	29.4				0					
29.5 -	29.9				0					
30.0 -	30.4				0					
30.5 -	30.9				0					
>	30.9				0					
Totals		277	393	55		2	4	3		744

Table 9. Walleye Avg Length Pine Lake
Early spring fyke nets (1980-1985) and early spring fyke nets plus first recap run (200

Survey Year	Males	Females	Unknown	Combined	Number Fish
1980				20.2	244
1985	16.1	22.6	13.5	17.8	445
2003	16.8	21.4	16.7	19.3	725

Table 10. Walleye length at age (inches)

age	Pine Lake 2003 survey avg length	NC Wis avg. (drainage) length
1		
2	10.6	8.9
3	11.5	11.1
4	13.9	12.5
5	18.1	14.2
6	20.7	15.8
7	21.0	17.9
8	22.5	19.7
9		20.9
10	23.7	22.0
11	27.3	23.7
12		24.5
13		26.1

Table 11. Pine Lake Walleye PE's

	1985	1991	2003
Number Adult Walleyes	2255	1277	1261
Number per Acre	1.4	0.8	0.8

Table 12. Pine Lake Panfish Netting CPE -2003			
	Early Spring	Late Spring	Summer
Black Crappie	33.33	4.06	4.17
Bluegill	8.75	147.61	150.61
Pumpkinseed	1.00	42.67	43.67
Rock Bass	0.75	5.22	5.89
Yellow Perch	1.29	0.22	0.28

Table 13. Black Crappie LF Pine Lake 2003 fyke nets early and late spring		
Size Range	number BC	
<2		
2.0-2.4		
2.5-2.9		
3.0-3.4		
3.5-3.9	8	
4.0-4.4	17	
4.5-4.9	6	
5.0-5.4	2	
5.5-5.9	6	
6.0-6.4	22	
6.5-6.9	31	
7.0-7.4	47	
7.5-7.9	54	
8.0-8.4	58	
8.5-8.9	32	
9.0-9.4	20	
9.5-9.9	14	
10.0-10.4	9	
10.5-10.9	7	
11.0-11.4	1	
11.5-11.9	1	
12.0-12.4		
Totals	335	

Table 14. Pine Lake Panfish Proportional and Relative Stock Densities							
species	sample	number >= min pref length (8")	number >= min quality length (6")	number >= min stock length (3")	RSD("preferred")	PSD("quality")	No. of Fish
Bluegill	late spr fykes	22	319	451	5	71	451
Pumpkinseed	late spr fykes	15	232	382	4	61	382
Black Crappie	early and late	18	142	304	6	47	335

Table 15. Black Crappie length at age (inches)		
	Pine Lake 2003	NC Wis avg. (drainage)
age	survey avg length	length
2	4.2	5.9
3	6.2	8
4	7.1	9.4
5	8.3	10.6
6	9.4	11.3
7	10.1	12.3
8	10.9	13.0

Table 16. Bluegill LF Pine Lake 2003		
fyke netsJune 3-5		
Size Range	number BG	
<2		
2.0-2.4		
2.5-2.9		
3.0-3.4		
3.5-3.9	1	
4.0-4.4	4	
4.5-4.9	13	
5.0-5.4	44	
5.5-5.9	70	
6.0-6.4	80	
6.5-6.9	119	
7.0-7.4	65	
7.5-7.9	33	
8.0-8.4	19	
8.5-8.9	2	
9.0-9.4	1	
9.5-9.9		
Totals	451	

Table 17. Bluegill length at age (inches)		
	Pine Lake 2003	NC Wis avg. (drainage)
age	survey avg length	length
2		3.6
3	4.0	5.3
4	4.4	6.4
5	4.8	7
6	6.0	7.8
7	7.0	8.4
8	7.6	8.5
9	7.9	
10	8.0	
11	8.5	

Table 18. Pumpkinseed LF Pine Lake 2003			
fyke netsJune 3-5			
Size Range	number PS		
<2			
2.0-2.4			
2.5-2.9			
3.0-3.4			
3.5-3.9	1		
4.0-4.4	15		
4.5-4.9	25		
5.0-5.4	40		
5.5-5.9	69		
6.0-6.4	80		
6.5-6.9	80		
7.0-7.4	35		
7.5-7.9	22		
8.0-8.4	11		
8.5-8.9	4		
9.0-9.4			
9.5-9.9			
Totals	382		

Table 19. Pumpkinseed length at age (inches)		
	Pine Lake 2003	NC Wis avg. (drainage)
age	survey avg length	length
2		3.6
3	4.0	4.8
4	4.7	6.0
5	6.0	6.8
6	6.8	7.0
7	7.6	7.0
8	7.8	
9	8.2	

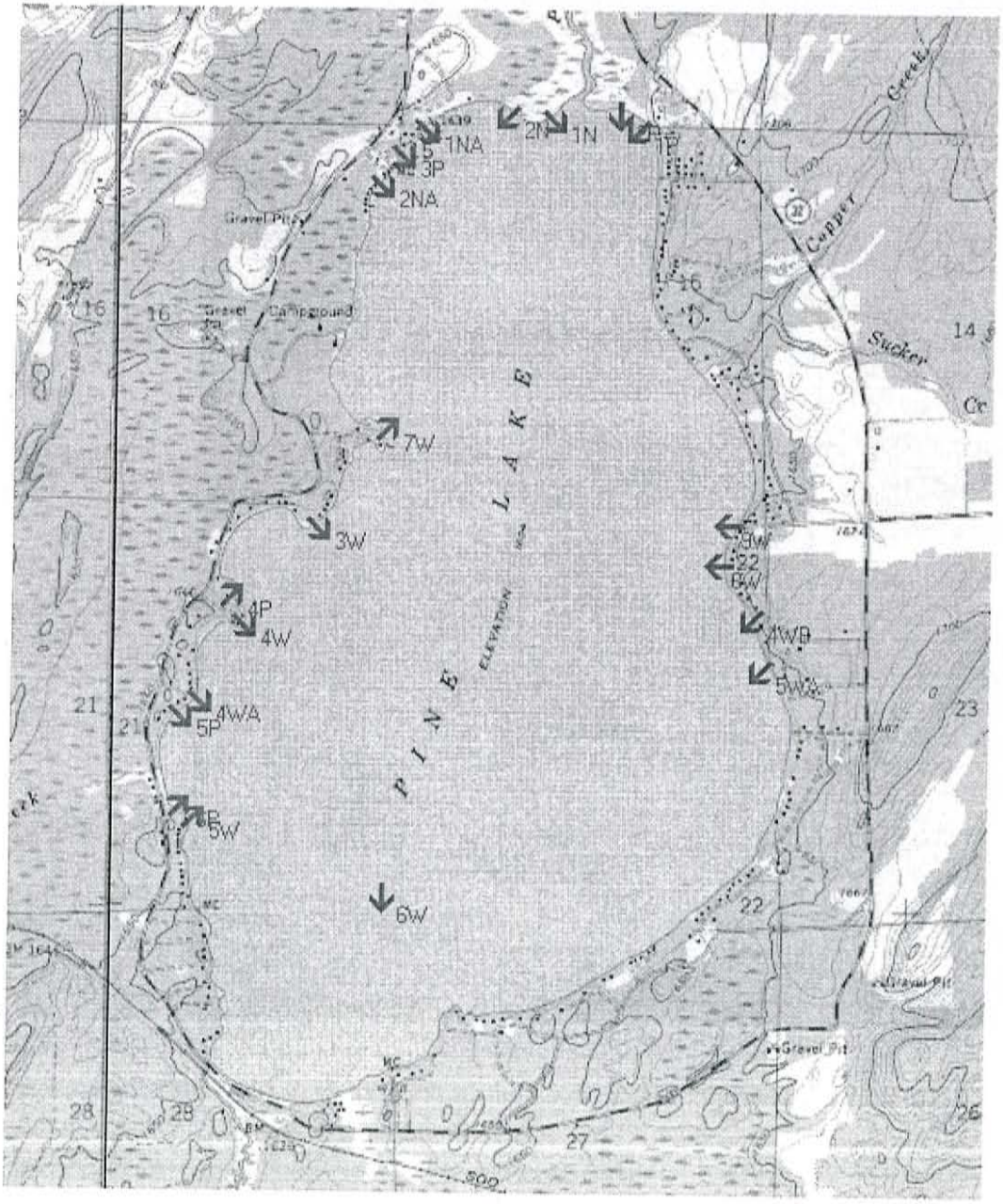
Table 20. Pine Lake 2003	
Rockbass LF	
fyke netsJune 3-5	
Size Range	number RB
4.0-4.4	
4.5-4.9	
5.0-5.4	
5.5-5.9	5
6.0-6.4	2
6.5-6.9	12
7.0-7.4	18
7.5-7.9	16
8.0-8.4	31
8.5-8.9	8
9.0-9.4	
9.5-9.9	2
10.0-10.4	3
10.5-10.9	1
11.0-11.4	
11.5-11.9	
12.0-12.4	
Totals	98

Table 21. Rockbass length at age (inches)		
	Pine Lake 2003	NC Wis avg. (drainage)
age	survey avg length	length
2		3.7
3		5.2
4	6.3	6.4
5	7.2	7.3
6	7.9	7.9
7	8.3	8.5
8	9.0	9.0
9		
10	10.4	

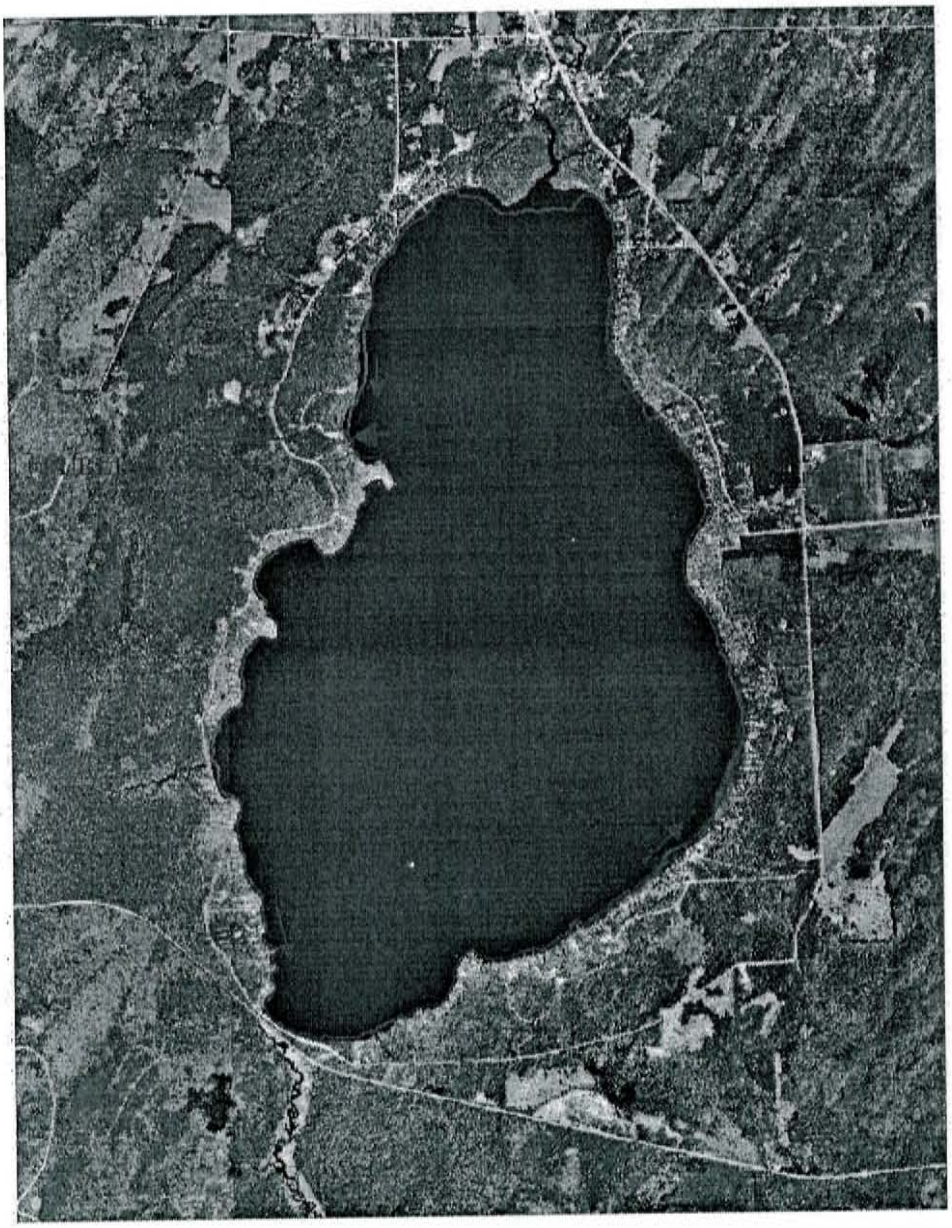
Table 22. Yellow perch length at age (inches)		
	Pine Lake 2003	NC Wis avg. (drainage)
age	survey avg length	length
2		4.3
3		5.8
4		7.1
5	7.9	8.1
6	8.4	9.1
7		9.8
8		11.3

SAMPLE LOCATIONS

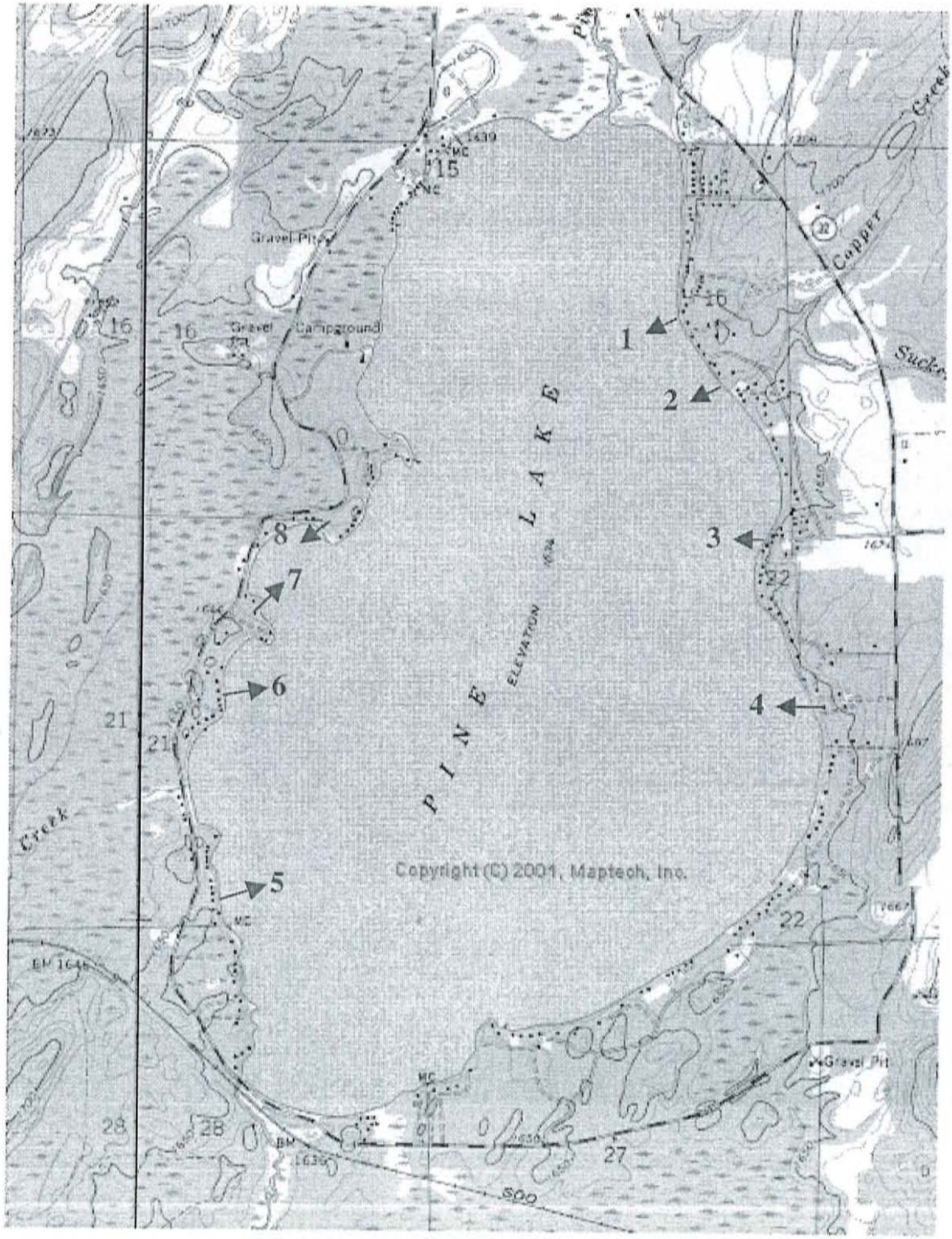
Fyke Nets in Pine Lake, Forest County
2003 Comp Survey



Electroshocker Route April-May
2003 Comp Survey Pine Lake, Forest County



Mini-fyke nets 7/29-30/2003 Pine Lake, Forest County



Electroshocker route and stations 9/24/03 Pine Lake, Forest County

SAMPLE LOCATION COORDINATES

Pine Lake, Forest County
2003 Comp Survey

Net and Station Locations
Map Datum WGS84

NETS

Date	Net Number	Latitude Degrees	Latitude Minutes	Longitude Degrees	Longitude Degrees
April 22-27, 2003	1N	45 N	41.716	88 W	58.626
April 22-27, 2003	1NA	45 N	41.691	88 W	59.029
April 22-27, 2003	2N	45 N	41.723	88 W	58.773
April 22-27, 2003	2NA	45 N	41.570	88 W	59.170
April 22-27, 2003	3W	45 N	40.826	88 W	59.354
April 22-27, 2003	4W	45 N	40.614	88 W	59.583
April 22-27, 2003	4WA	45 N	40.450	88 W	59.717
April 22-27, 2003	4WB	45 N	40.632	88 W	57.990
April 22-27, 2003	5W	45 N	40.188	88 W	59.736
April 22-27, 2003	5WA	45 N	40.522	88 W	57.957
April 22-27, 2003	6W	45 N	40.012	88 W	59.146
April 22-27, 2003	7W	45 N	41.041	88 W	59.148
April 22-27, 2003	8W	45 N	40.748	88 W	58.105
April 22-27, 2004	9W	45 N	40.834	88 W	58.074
June 2-5, 2003	1	45 N	41.696	88 W	58.364
June 2-5, 2003	2	45 N	41.720	88 W	58.420
June 2-5, 2003	3	45 N	41.638	88 W	59.104
June 2-5, 2003	4	45 N	40.676	88 W	59.627
June 2-5, 2003	5	45 N	40.415	88 W	59.779
June 2-5, 2004	6	45 N	40.216	88 W	59.781

STATIONS

Date	Station	Latitude Degrees	Latitude Minutes	Longitude Degrees	Longitude Degrees
September 24, 2004	End Index 1/Start Gamefish 1	45 N	40.936	88 W	59.300
September 24, 2005	End Gamefish 1/Start Non-Index1	45 N	39.946	88 W	59.681
September 24, 2006	End Non-Index 1/Start Index 2	45 N	40.041	88 W	58.096
September 24, 2007	End Index 2/Start Gamefish 2	45 N	40.359	88 W	57.870
September 24, 2008	End Gamefish 2/Start Non-Index 2	45 N	41.559	88 W	58.316