A

APPENDIX A

Public Participation Materials

Big Portage Lake
Management Planning Project

Update: December 2010

Submitted by: Brenton Butterfield, Onterra, LLC

All field studies relating to the Big Portage Lake Management Plan have been completed, and we greatly enjoyed our time spent on Big Portage Lake. Field studies on the lake began on February 23, 2010 when Onterra ecologists drilled through the ice to take water quality samples. Additional samples were collected during the spring and fall turnover periods, as well as during the summer months via coordination with the Big Portage Lake Citizen Lake Monitor volunteer, Mr. Forrest Muehlethaler. We have only just begun to evaluate all of the data that were collected over this past year, but regarding water quality on Big Portage Lake we can say with certainty that nothing was unexpected. The lake's water quality is very good with high water clarity and low nutrient/algae levels.

Numerous aquatic plant surveys were completed on the lake throughout the summer, identifying 26 native aquatic plant species. One species that was located, small purple bladderwort (*Utricularia resupinata*), is presently denoted as a species of 'special concern' in Wisconsin due to its rarity and sensitivity to environmental degradation, and is a testament to the high quality conditions found in Big Portage Lake. Other aquatic plant species that are considered to be environmentally sensitive were also observed, including alternate-flowered water milfoil, dwarf water milfoil, and water lobelia. The exotic species curly-leaf pondweed and Eurasian water milfoil were <u>not</u> located during any of the surveys, and it is likely that these aquatic invasives do not exist in Big Portage Lake at this time or exist at an undetectable level.

The floating-leaf and emergent plant communities within Big Portage Lake were also accurately mapped, creating a snap-shot in which future data can compare and determine whether these communities are expanding or receding; which is often the case with changing water levels. A survey assessing the quality of shoreline habitat was also completed.

Our next steps over this coming winter will be to finish analyzing the data collected during these field surveys and to begin drawing conclusions on the current status of the water quality, the plant community, and the shoreline areas of Big Portage Lake. We will compile the water quality data collected this year as well as any historic data that exists to determine not only the current condition of the lake's water quality, but if sufficient historical data exists, to also ascertain if any significant changes are occurring over time.

Aquatic plants are the foundation of terrestrial as well as aquatic ecosystems, and can be used as indicators of environmental condition. We will use analysis methods such as the Floristic Quality Index to assess the current condition of Big Portage Lake's plant community, as well as compare it to those of other lakes within the Northern Lakes Ecoregion and Wisconsin. The data collected from the shoreline assessment survey will allow us to delineate and recommend areas that may be possible candidates for shoreline protection or restoration.

The data from the stakeholder survey sent out to association members over the summer will also be analyzed. This information will be very useful during the planning process as it provides insight into the stakeholder's ideas and thoughts pertaining to Big Portage Lake.

Once the data analyses and studies report are complete, the Planning Committee members will meet with Onterra ecologists to develop realistic and implementable management actions. The management actions will be a collaborative effort to help stakeholders meet their realistic management goals while doing what is best ecologically for the lake. The timing of this meeting will depend upon the availability of the committee members. Once the management plan is developed, a public meeting called a "Project Wrap-up Meeting" will be held to present the study results and the management plan to all those who are interested.

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
  - Five full-time ecologists
  - One part-time ecologist
  - One intern
- 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
  - Shoreline Assessment

Water Quality Analysis

- General water chemistry (current & historic)
  - Citizens Lake Monitoring Network
- Nutrient analysis
  - Lake trophic state (Eutrophication)
  - Limiting plant nutrient
- Supporting data for watershed modeling

Watershed Assessment

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

Aquatic Plant Surveys

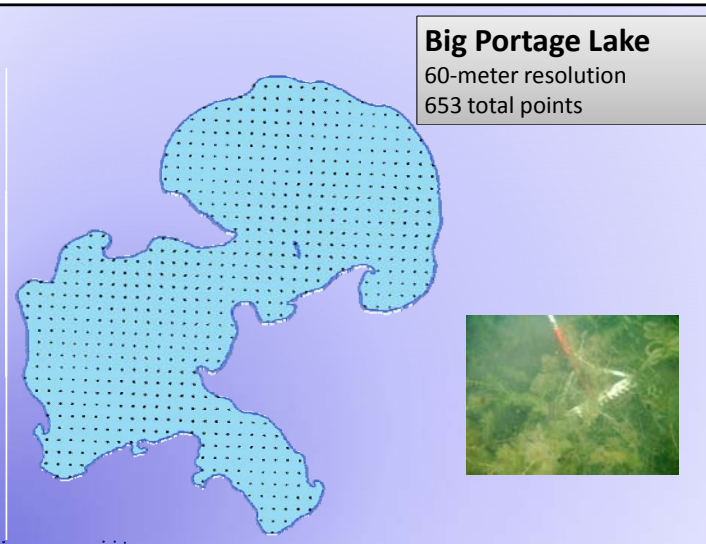
- Concerned with both native and non-native plants
- Multiple surveys used in assessment
  - Curly-leaf pondweed survey
  - Point-intercept survey
  - Plant community mapping
  - Volunteer survey findings

Non-native Aquatic Plants

Curly-leaf Pondweed

Non-native Aquatic Plants

Eurasian Water Milfoil



Fisheries Data Integration

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

Stakeholder Survey

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

Shoreland Assessment

- Shoreland area is important for buffering runoff and provides valuable habitat for aquatic and terrestrial wildlife.
- It does not look at lake shoreline on a property-by-property basis.
- Assessment ranks shoreland area from shoreline back 35 feet

Urbanized

Range

Natural

Planning Process

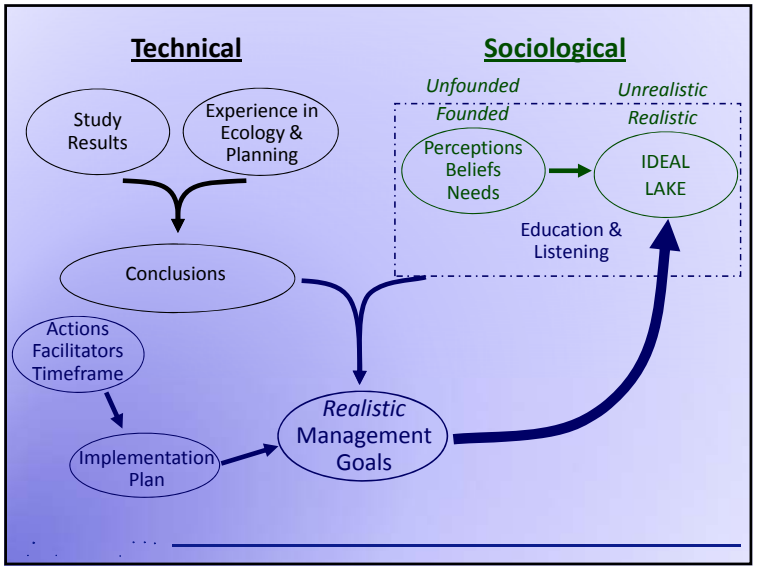
Planning Committee Meetings

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

↓

Implementation Plan


The Planning Process
…it's not as easy as you may think.


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

Big Portage Lake Association

Big Portage Lake
Management Planning Project
Planning Meeting I
July 25, 2011

Tim Hoyman, CLM
Onterra LLC
Lake Management Planning

Presentation Outline

- **Lake Management Planning Project Overview**
- **Study Results**
  - Water Quality
  - Watershed
  - Aquatic Plants
  - Fishery
- **"Big Picture"**
- **Stakeholder Survey**
- **Goals and Actions Discussion**

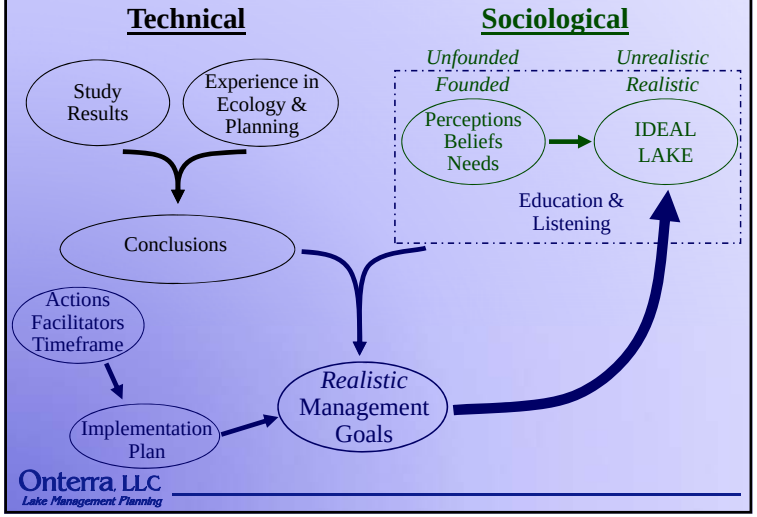
Onterra LLC
Lake Management Planning

Study and Plan Goals

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

Onterra LLC
Lake Management Planning

Planning Process



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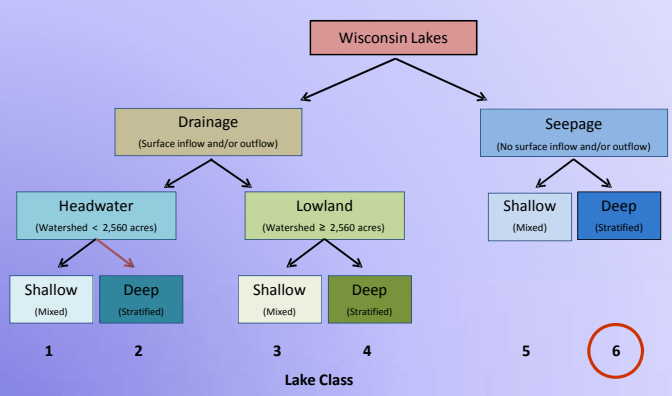
Lake Management Planning

Water Quality

- Phosphorus (Limiting Plant Nutrient)
- Chlorophyll-*a* (Algal Abundance)
- Water Clarity (Secchi Disk)

Onterra LLC
Lake Management Planning

Wisconsin Lakes Classification



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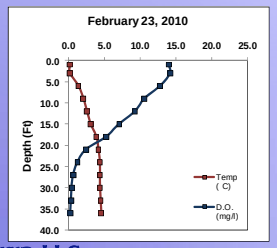
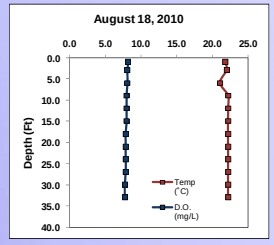
Lake Management Planning

Dissolved Oxygen and Temperature Profiles

- **Dissolved Oxygen and Temperature Profiles**
  - Lake is stratified during winter and mixed during the summer(?)
  - Summer mixing may be a unusual or occasional event.
    - In the end, there is little concern for winter or summer fishkill





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Lake Management Planning

Wisconsin Ecoregions

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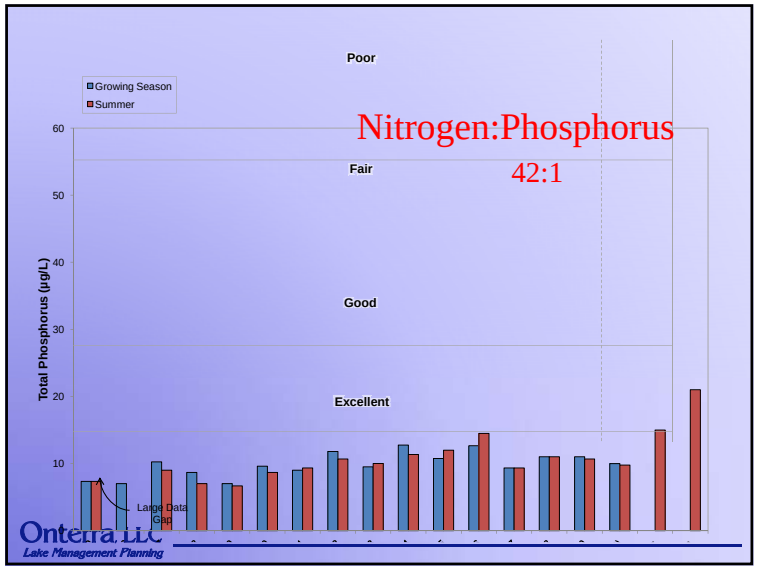
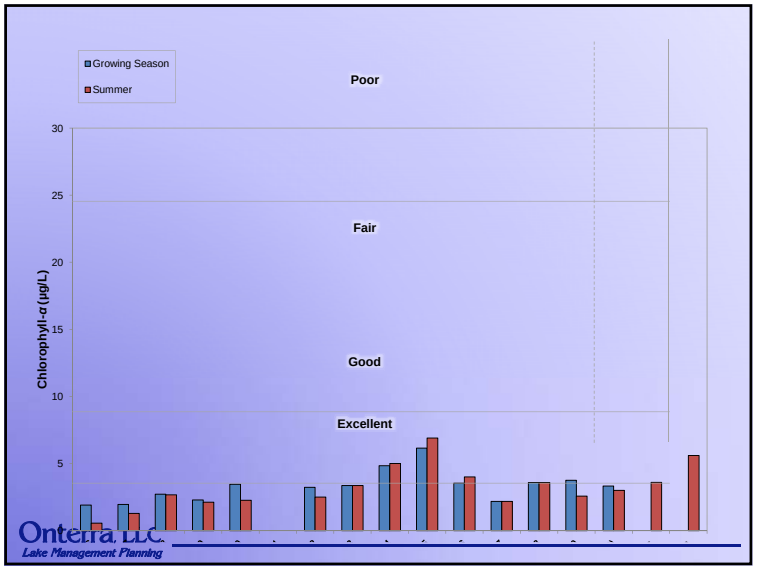
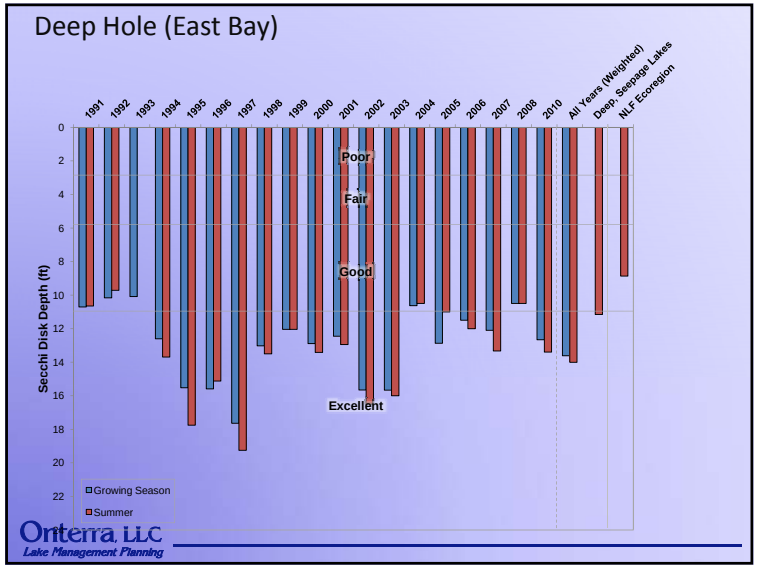
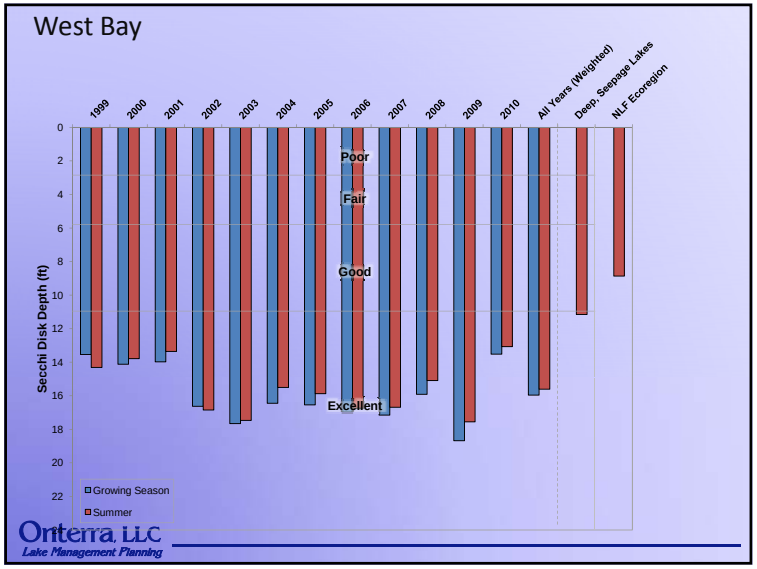
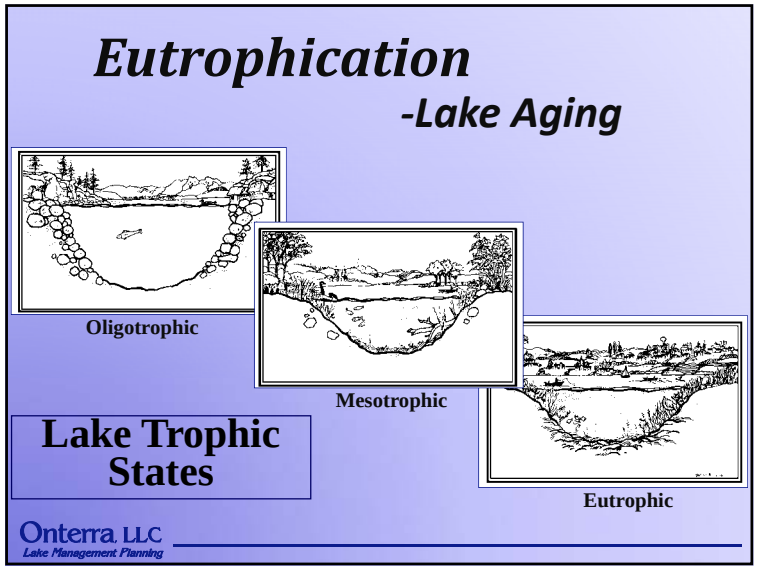
Lake Management Planning

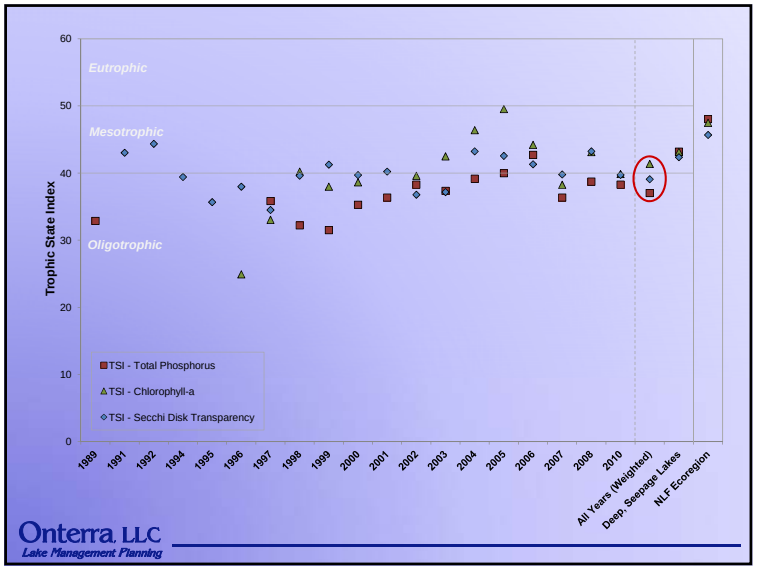

Poor
Growing Season
Summer
Nitrogen:Phosphorus
42:1
Fair
Total Phosphorus (µg/L)
Good
Excellent
Large Data Gap
Ontera LLC
Lake Management Planning

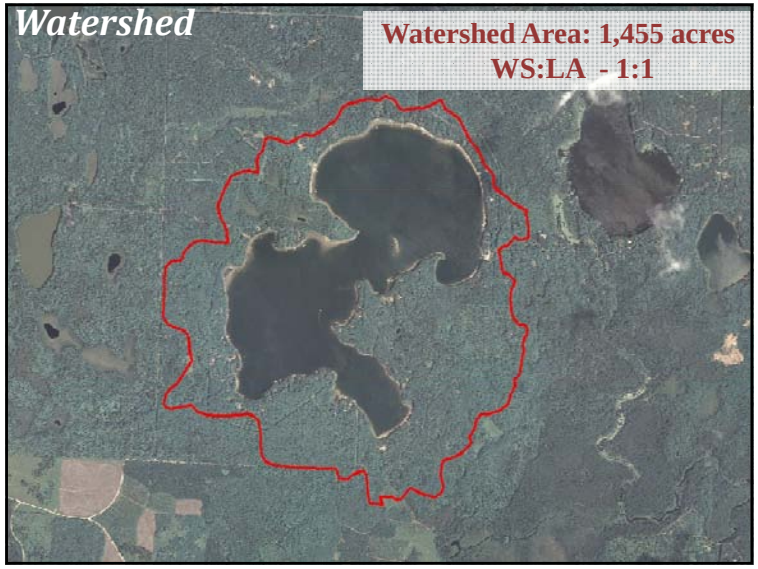

Growing Season
Summer
Poor
Chlorophyll-α (µg/L)
Fair
Good
Excellent
Ontera LLC
Lake Management Planning

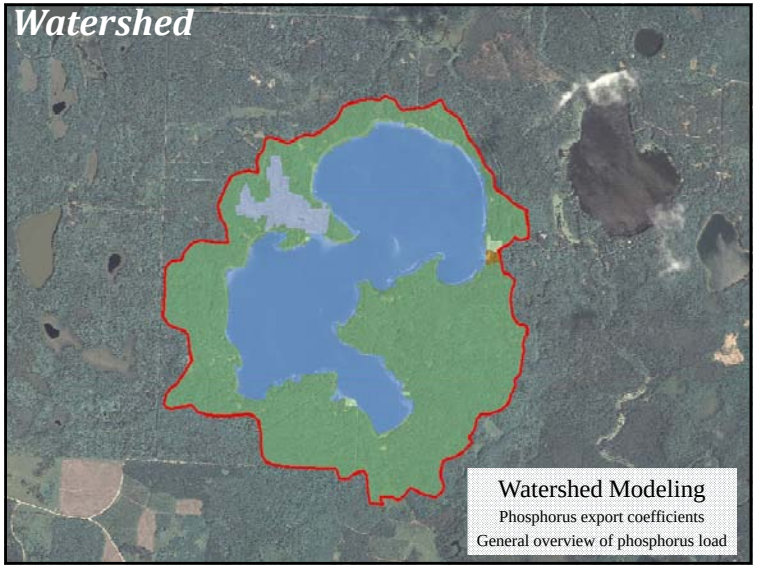

Deep Hole (East Bay)
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2010 All Years (Weighted) Deep, Seepage Lakes NLF Ecoregion
Poor
Fair
Secchi Disk Depth (ft)
Good
Excellent
Growing Season
Summer
Ontera LLC
Lake Management Planning

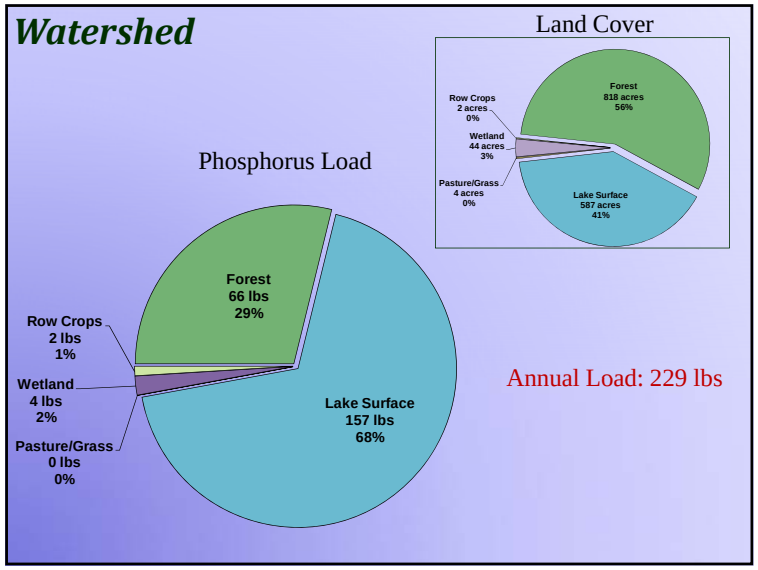

West Bay
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 All Years (Weighted) Deep, Seepage Lakes NLF Ecoregion
Poor
Fair
Secchi Disk Depth (ft)
Good
Excellent
Growing Season
Summer
Ontera LLC
Lake Management Planning


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

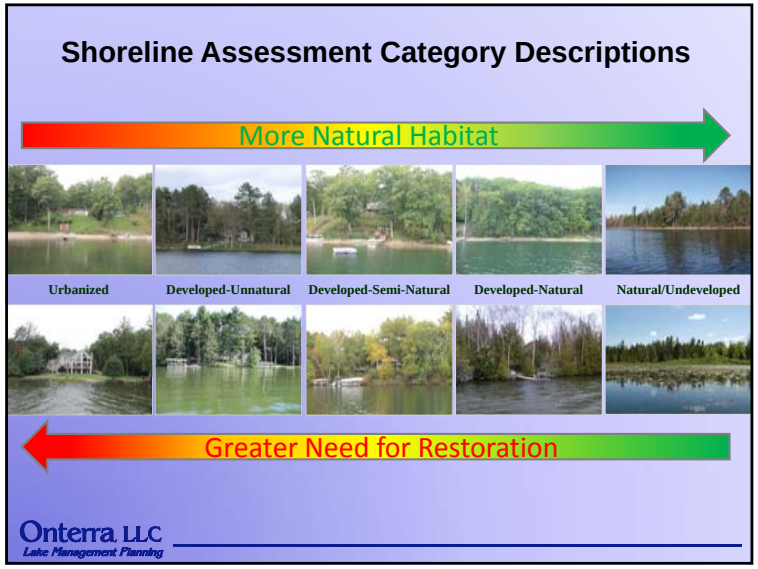

Eutrophic
Mesotrophic
Oligotrophic
Trophic State Index
TSI - Total Phosphorus
TSI - Chlorophyll-a
TSI - Secchi Disk Transparency
1989
1991
1992
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2010
All Years (Weighted)
Deep, Seepage Lakes
NLF Ecoregion
Onterra LLC
Lake Management Planning


Watershed
Watershed Area: 1,455 acres
WS:LA - 1:1


Watershed
Watershed Modeling
Phosphorus export coefficients
General overview of phosphorus load


Watershed
Land Cover
Forest
818 acres
56%
Row Crops
2 acres
0%
Wetland
44 acres
3%
Pasture/Grass
4 acres
0%
Lake Surface
587 acres
41%
Phosphorus Load
Forest
66 lbs
29%
Row Crops
2 lbs
1%
Wetland
4 lbs
2%
Pasture/Grass
0 lbs
0%
Lake Surface
157 lbs
68%
Annual Load: 229 lbs


Shoreland Assessment
Shoreland area is important for buffering runoff and provides valuable habitat for aquatic and terrestrial wildlife.
It does not look at lake shoreline on a property-by-property basis.
Assessment ranks shoreland area from shoreline back 35 feet
Urbanized
Natural
Range
Onterra LLC
Lake Management Planning


Shoreline Assessment Category Descriptions
More Natural Habitat
Urbanized
Developed-Unnatural
Developed-Semi-Natural
Developed-Natural
Natural/Undeveloped
Greater Need for Restoration
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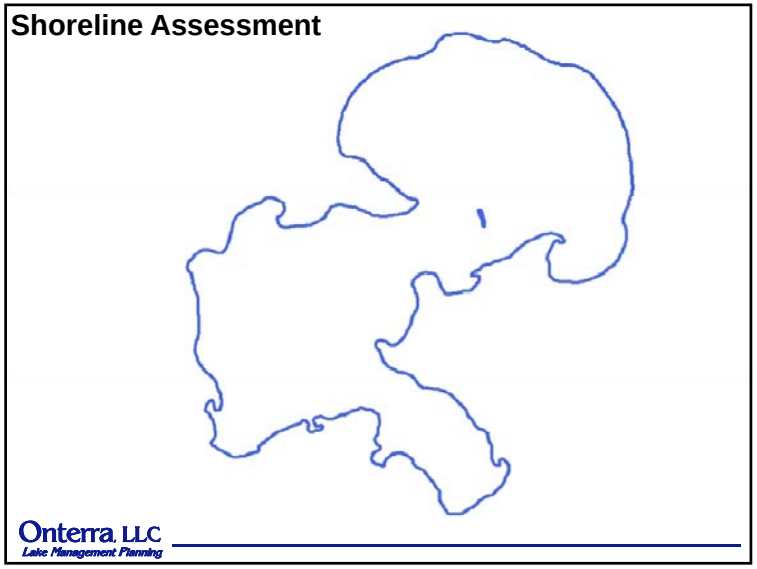
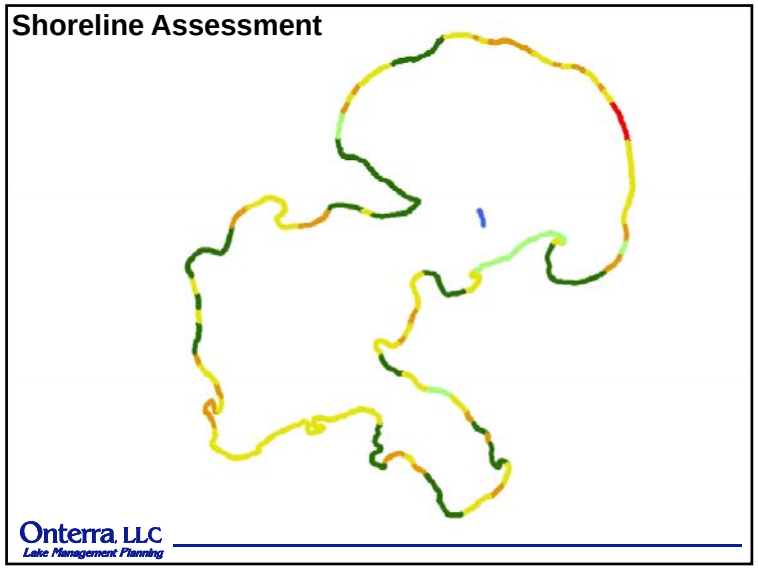
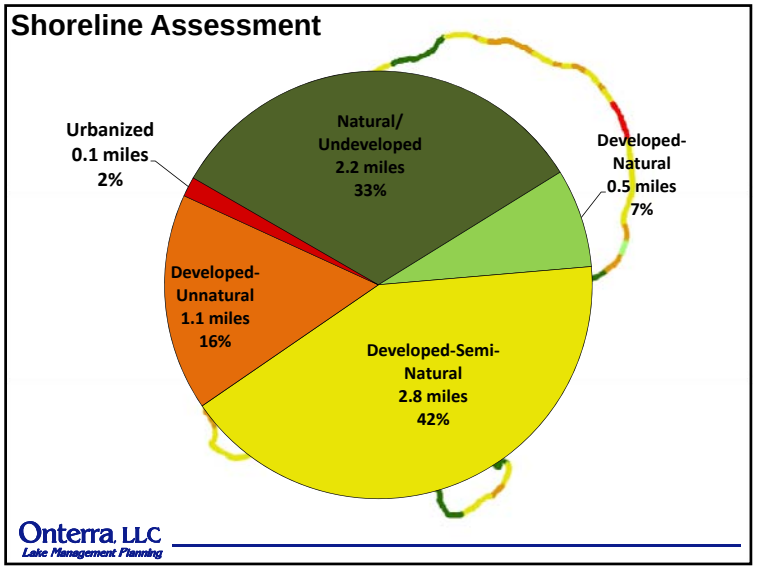
Lake Management Planning


Shoreline Assessment
Onterra LLC
Lake Management Planning


Shoreline Assessment
Onterra LLC
Lake Management Planning


Shoreline Assessment
Urbanized
0.1 miles
2%
Natural/
Undeveloped
2.2 miles
33%
Developed-
Natural
0.5 miles
7%
Developed-
Unnatural
1.1 miles
16%
Developed-Semi-
Natural
2.8 miles
42%
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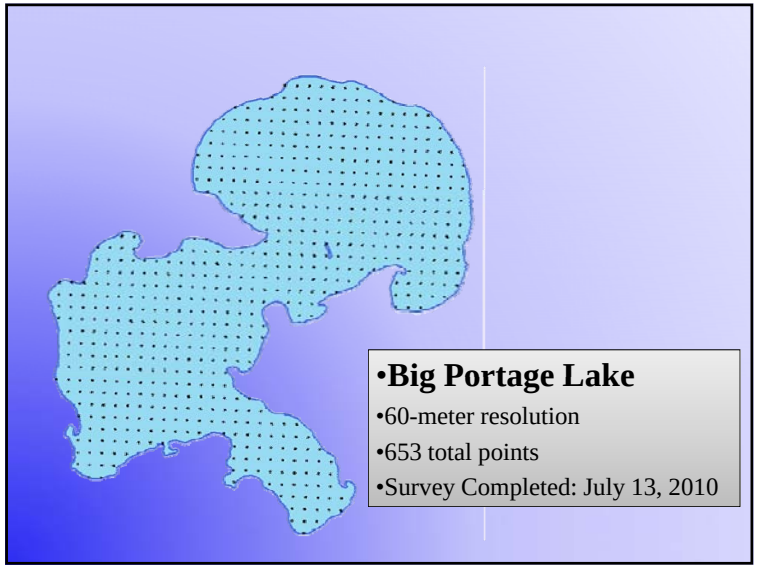
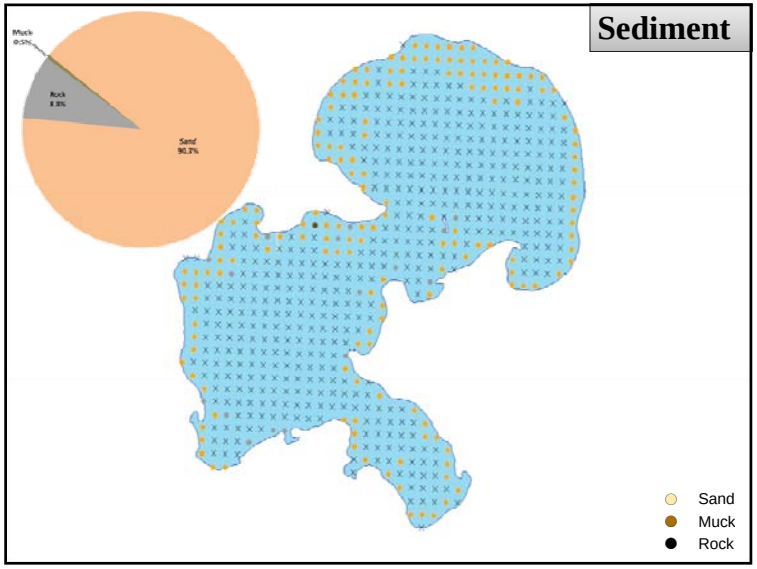
Lake Management Planning


•Big Portage Lake
•60-meter resolution
•653 total points
•Survey Completed: July 13, 2010


Sediment
Sand
Muck
Rock

Species List

- **30 Native Species**
- **1 Non-native Species**
  - Reed canary grass
- **1 Special Species of Concern**
  - Small purple bladderwort

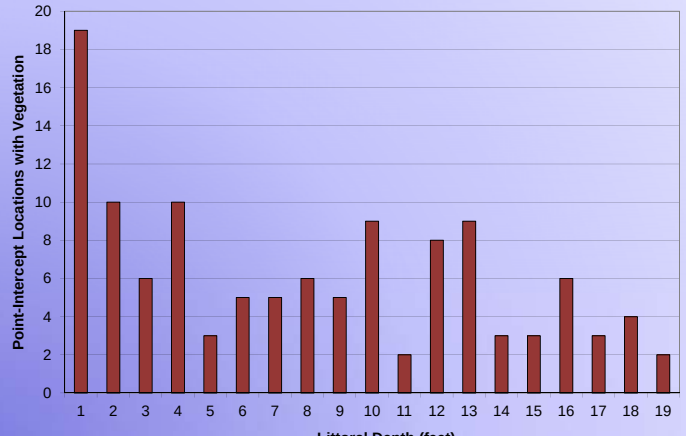
Big Portage Lake

Life Form	Scientific Name	Common Name	Coefficient of Conservatism (c)
Emergent	*Carex utriculata*	Northwest Territory Sedge	7
	Dulichium arundinaceum	Three-way sedge	9
	Equisetum fluviatile	Water horsetail	7
	Eleocharis palustris	Creeping spikerush	6
	Phalaris arundinacea	Reed canary grass	Exotic
	Phragmites australis subs. americanus	Common reed grass	N/A
	Schoenoplectus tabernaemontani	Softstem bulrush	4
	Sagittaria latifolia	Common arrowhead	3
	Typha spp.	Cattail spp.	1
FL	*Nuphar variegata*	Spatterdock	6
	Nymphaea odorata	White water lily	6
FL/E	*Sparganium fluctuans*	Floating-leaf bur-reed	10
	Sparganium angustifolium	Narrow-leaf bur-reed	9
Submergent	*Chara spp.*	Muskgrasses	7
	Eriocaulon aquaticum	Pipewort	9
	Elatine minima	Waterwort	9
	Isoetes echinospora	Spiny-spored quillwort	8
	Lobelia dortmanna	Water lobelia	10
	Myriophyllum tenellum	Dwarf water milfoil	10
	Nitella sp.	Stoneworts	7
	Najas flexilis	Slender naiad	6
	Potamogeton amplifolius	Large-leaf pondweed	7
	Potamogeton gramineus	Variable pondweed	7
	Potamogeton pusillus	Small pondweed	7
	Ranunculus flammula	Creeping spearwort	9
	Utricularia cornuta	Horned bladderwort	10
	Utricularia resupinata	Small purple bladderwort	9
	Vallisneria americana	Wild celery	6
SE	*Eleocharis acicularis*	Needle spikerush	5
	Juncus pelocarpus	Brown-fruited rush	8
	Sagittaria cristata	Crested arrowhead	9

FL = Floating Leaf
FL/E = Floating Leaf and Emergent
S/E = Submergent and Emergent

Onterra LLC
Lake Management Planning

Maximum Depth of Plant Colonization



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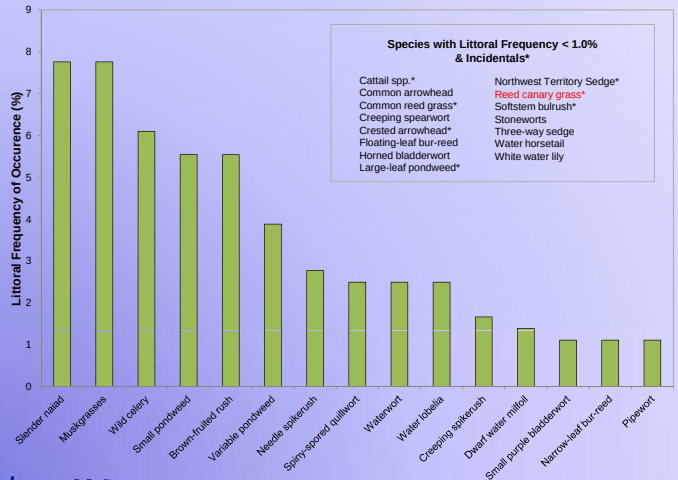
Lake Management Planning

Littoral Frequency of Occurence



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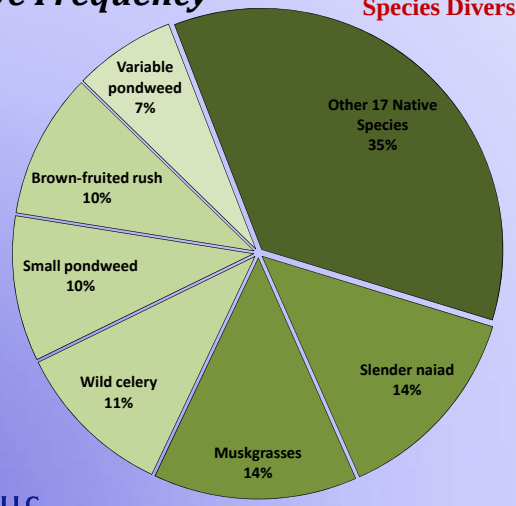
Relative Frequency

Species Diversity: 0.92



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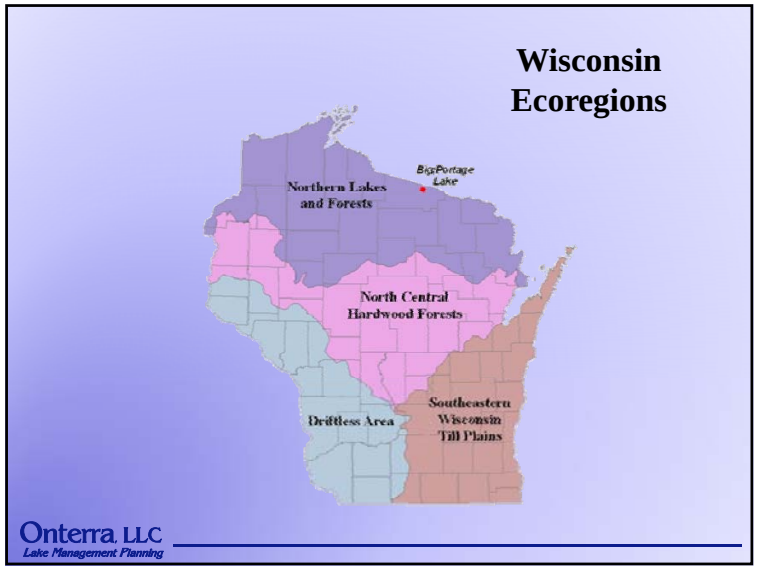
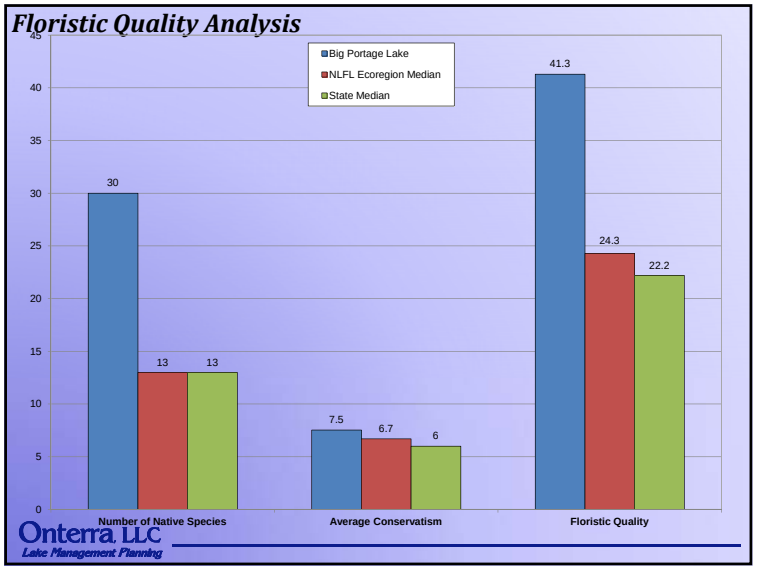
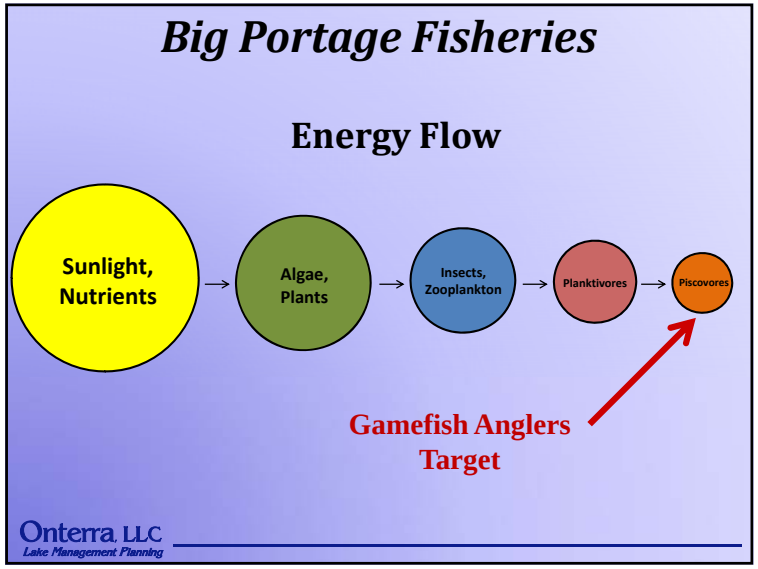
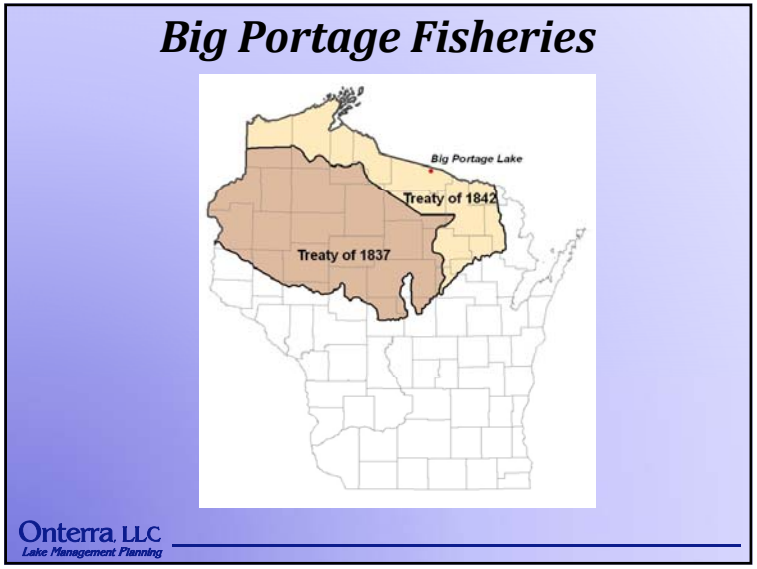
Lake Management Planning

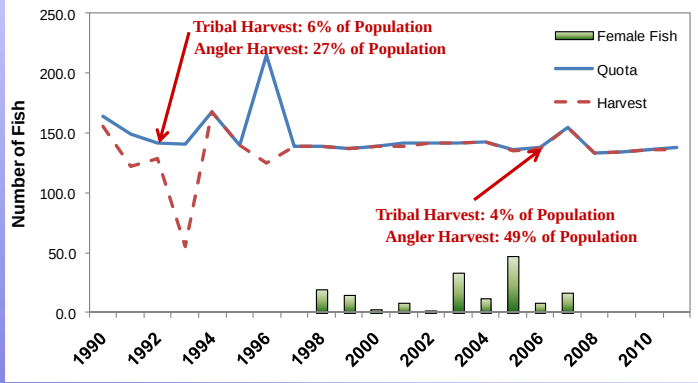

Wisconsin Ecoregions
Big Portage Lake
Northern Lakes and Forests
North Central Hardwood Forests
Driftless Area
Southeastern Wisconsin Till Plains
Onterra LLC
Lake Management Planning


Floristic Quality Analysis
Big Portage Lake
NLFL Ecoregion Median
State Median
30
13
13
7.5
6.7
6
41.3
24.3
22.2
Number of Native Species
Average Conservatism
Floristic Quality
Onterra LLC
Lake Management Planning


Big Portage Fisheries
Energy Flow
Sunlight, Nutrients
Algae, Plants
Insects, Zooplankton
Planktivores
Piscovores
Gamefish Anglers Target
Onterra LLC
Lake Management Planning


Big Portage Fisheries
Big Portage Lake
Treaty of 1842
Treaty of 1837
Onterra LLC
Lake Management Planning

Big Portage Fisheries



Onterra LLC
Lake Management Planning

Conclusions

- Water quality is excellent.
- Overall watershed is in great condition.
  - Land cover exports minimal phosphorus
  - Low WS:LA area ratio means groundwater is major source
  - Largest, controllable contributor is likely shoreland properties
- Aquatic plant community
  - Based upon standard analysis, native community is of high quality
  - Lake has diverse plant community, but it is of low biomass
- Fisheries
  - Lake's low productivity likely translates to low fish biomass
  - Low plant abundance may also limit fishery because of lacking structure in the lake

Big Portage Lake Riparian Owners Association

Big Portage Lake
Management Planning Project
Project Wrap-up Meeting
July 7, 2012

Tim Hoyman
Onterra LLC
Lake Management Planning

Presentation Outline

- Lake Management Planning Project Overview
- Study Results
  - Water Quality
  - Watershed
  - Aquatic Plants
  - Fishery Information
- "Big Picture"
- Implementation Plan

Onterra LLC
Lake Management Planning

Study and Plan Goals

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

Onterra LLC
Lake Management Planning

Overall Lake Health

- Excellent overall
  - Water quality
  - Watershed
  - Aquatic Plants
- Management Plan: Protection Mode

Water Quality

Onterra LLC
Lake Management Planning

Water Quality

- **Phosphorus (Limiting Plant Nutrient)**
  - Nitrogen:Phosphorus = 42:1
- **Chlorophyll-*a* (Algal Abundance)**
  - Very low algal abundance
- **Water Clarity (Secchi Disk)**
  - High Water Clarity

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Wisconsin Ecoregions

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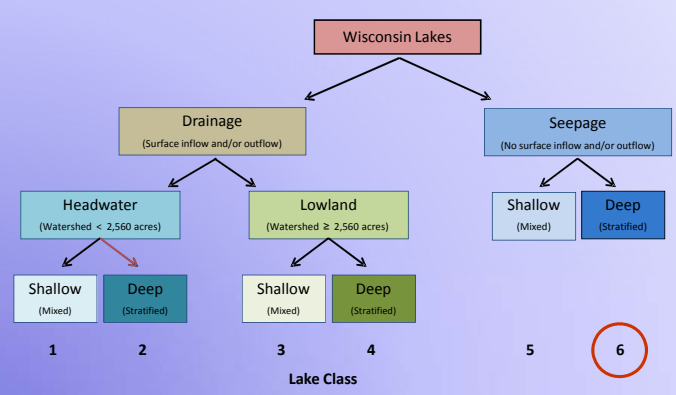
Wisconsin Lakes Classification



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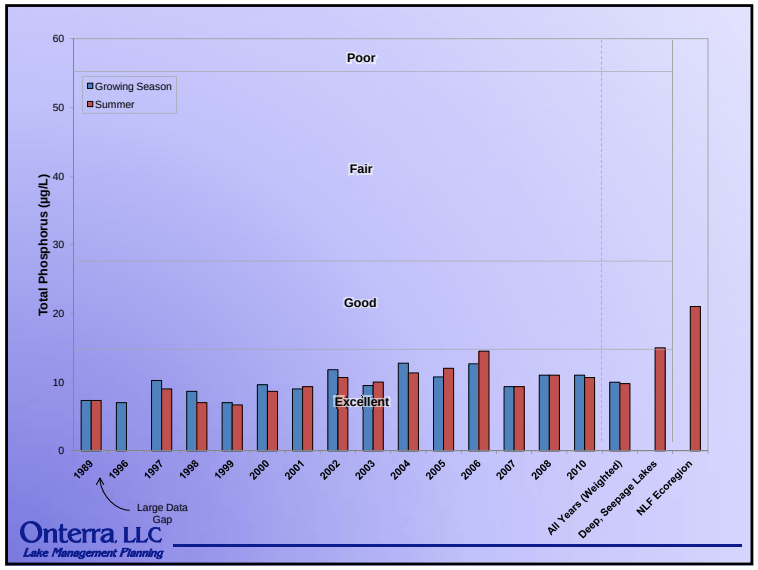
Total Phosphorus (µg/L)
Poor
Fair
Good
Excellent
Growing Season
Summer
Large Data Gap
All Years (Weighted)
Deep, Seepage Lakes
NLF Ecoregion
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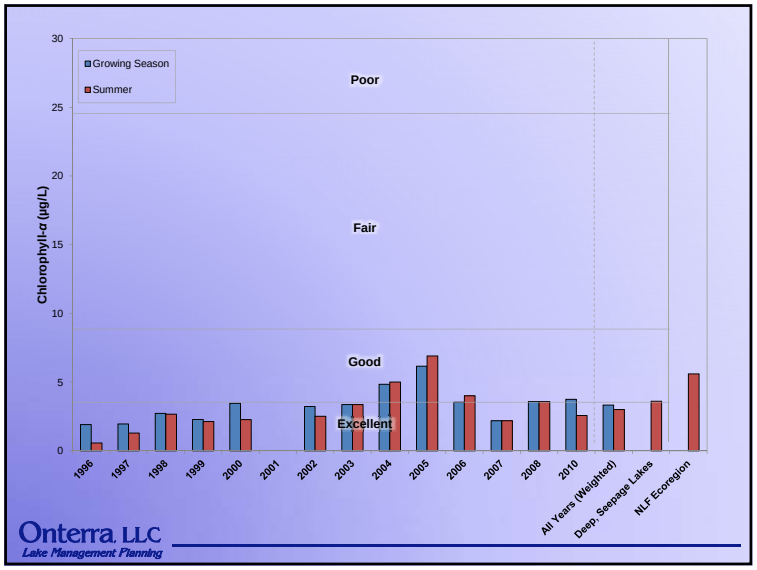
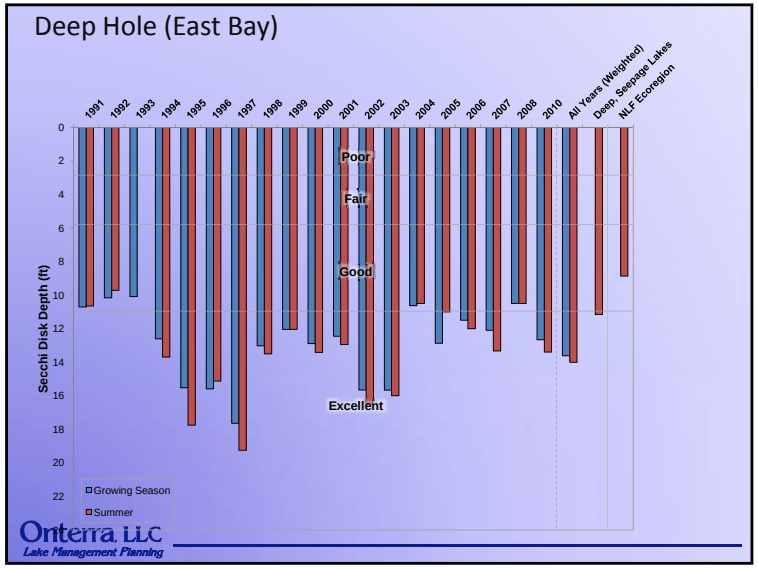

Chlorophyll-a (µg/L)
Poor
Fair
Good
Excellent
Growing Season
Summer
All Years (Weighted)
Deep, Seepage Lakes
NLF Ecoregion
Onterra LLC
Lake Management Planning


Deep Hole (East Bay)
Secchi Disk Depth (ft)
Poor
Fair
Good
Excellent
Growing Season
Summer
All Years (Weighted)
Deep, Seepage Lakes
NLF Ecoregion
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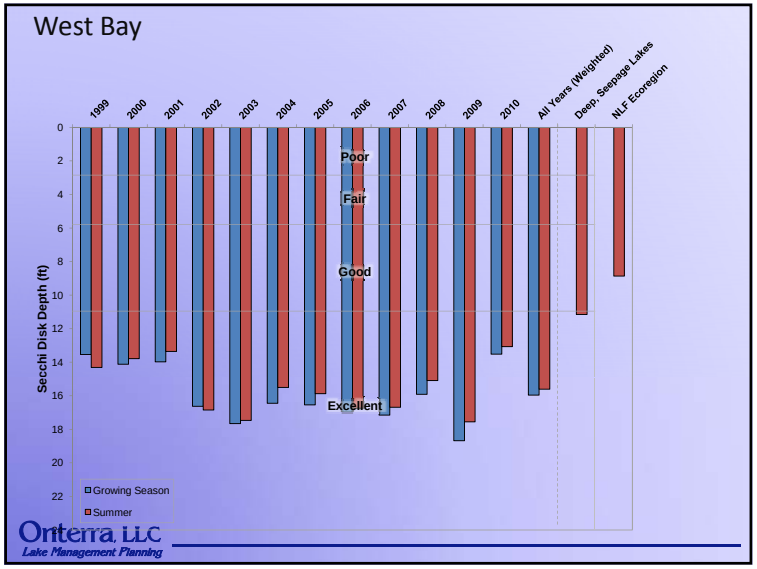
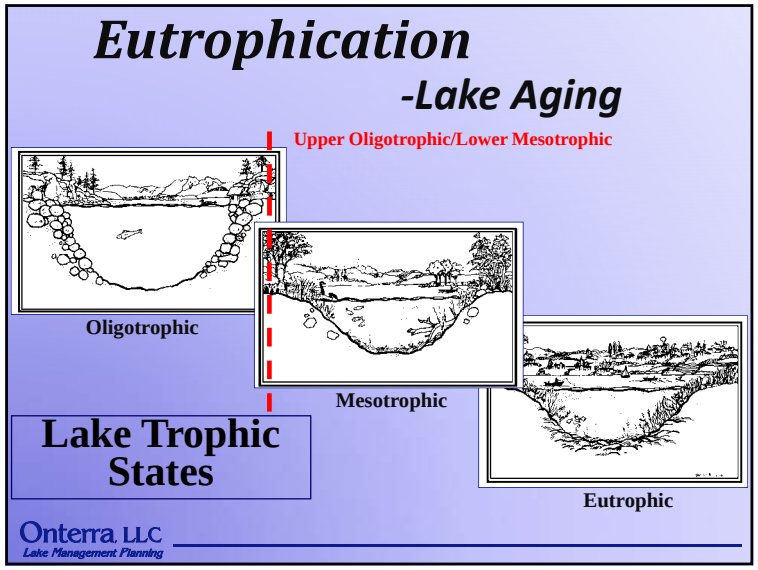

West Bay
Secchi Disk Depth (ft)
Poor
Fair
Good
Excellent
Growing Season
Summer
All Years (Weighted)
Deep, Seepage Lakes
NLF Ecoregion
Onterra LLC
Lake Management Planning


Eutrophication
-Lake Aging
Upper Oligotrophic/Lower Mesotrophic
Oligotrophic
Mesotrophic
Eutrophic
Lake Trophic States
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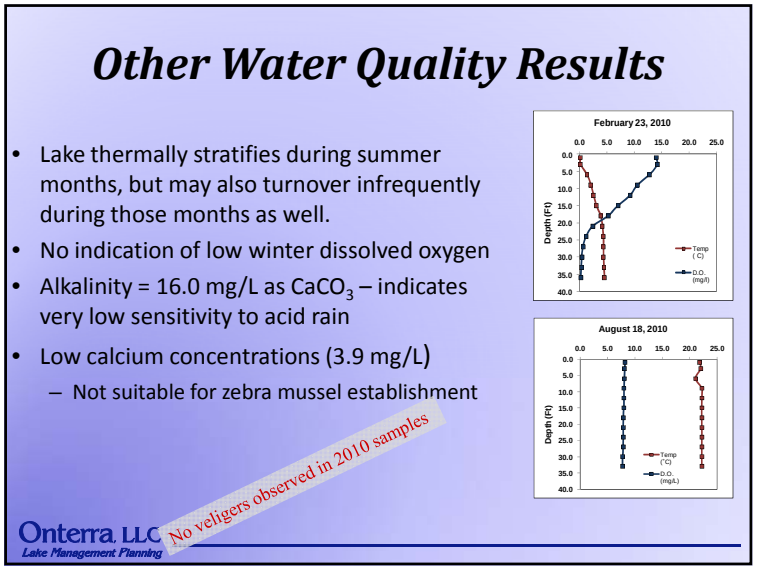
Other Water Quality Results
Lake thermally stratifies during summer months, but may also turnover infrequently during those months as well.
No indication of low winter dissolved oxygen
Alkalinity = 16.0 mg/L as CaCO3 – indicates very low sensitivity to acid rain
Low calcium concentrations (3.9 mg/L)
Not suitable for zebra mussel establishment
February 23, 2010
August 18, 2010
No veligers observed in 2010 samples
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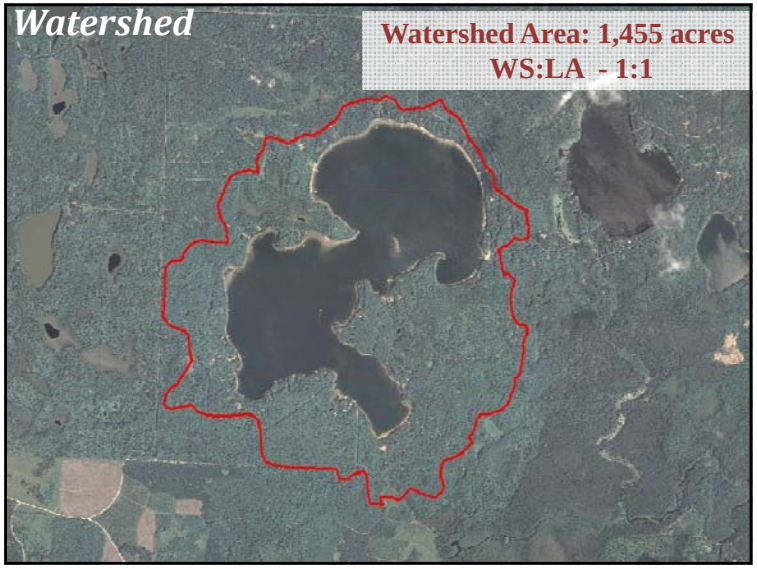
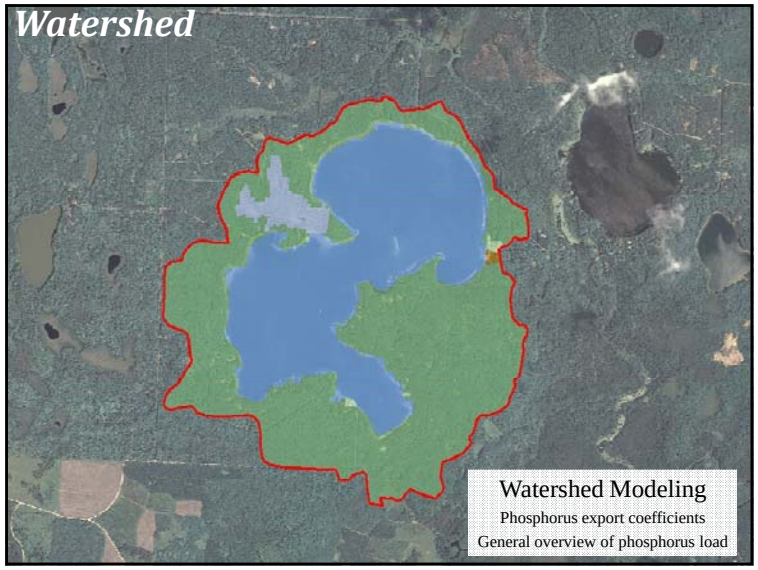
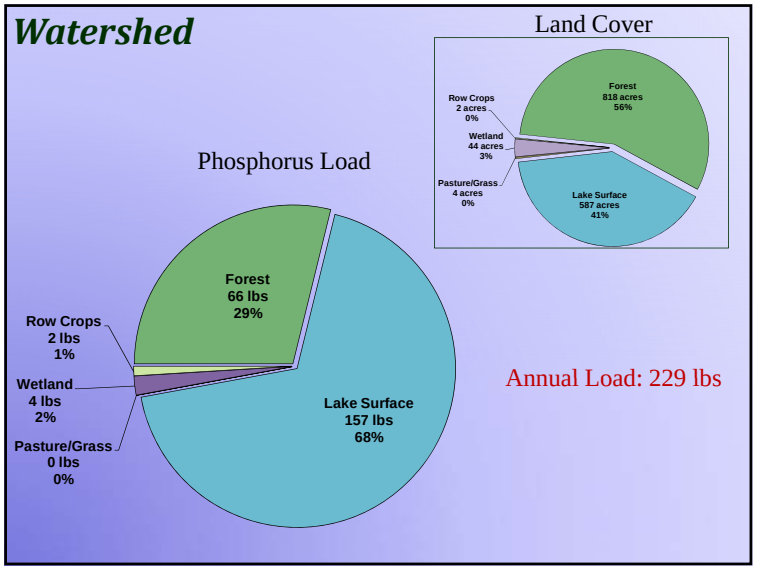
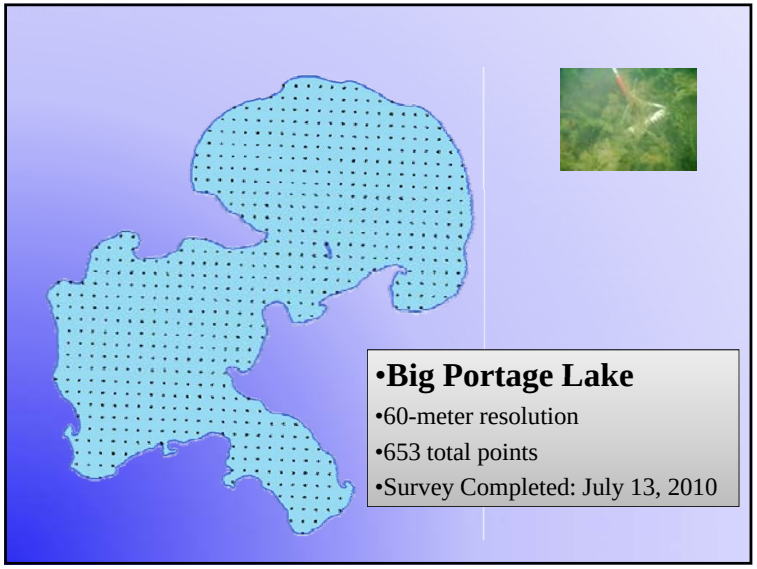
Watershed

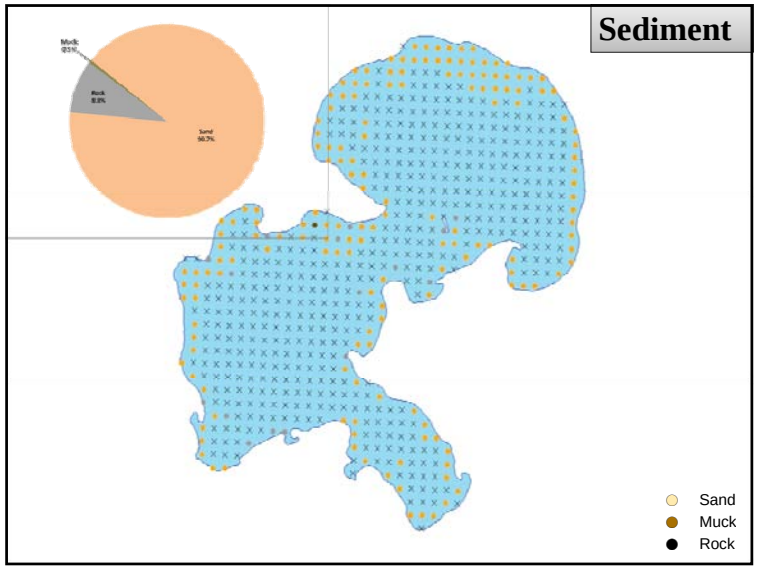

Watershed
Watershed Area: 1,455 acres
WS:LA - 1:1


Watershed
Watershed Modeling
Phosphorus export coefficients
General overview of phosphorus load


Watershed
Land Cover
Row Crops
2 acres
0%
Forest
818 acres
56%
Wetland
44 acres
3%
Pasture/Grass
4 acres
0%
Lake Surface
587 acres
41%
Phosphorus Load
Forest
66 lbs
29%
Row Crops
2 lbs
1%
Wetland
4 lbs
2%
Pasture/Grass
0 lbs
0%
Lake Surface
157 lbs
68%
Annual Load: 229 lbs


Aquatic Plants


•Big Portage Lake
•60-meter resolution
•653 total points
•Survey Completed: July 13, 2010



Species List

- 30 Native Species
- 1 Non-native Species
  - Reed canary grass
- 1 Special Species of Concern
  - Small purple bladderwort

Big Portage Lake

Life Form	Scientific Name	Common Name	Coefficient of Conservatism (c)
Emergent	*Carex utriculata*	Northwest Territory Sedge	7
	Dulichium arundinaceum	Three-way sedge	9
	Equisetum fluviatile	Water horsetail	7
	Eleocharis palustris	Creeping spikerush	6
	Phalaris arundinacea	Reed canary grass	Exotic
	Phragmites australis subs. americanus	Common reed grass	N/A
	Schoenoplectus tabernaemontani	Softstem bulrush	4
	Sagittaria latifolia	Common arrowhead	3
	Typha spp.	Cattail spp.	1
FL	*Nuphar variegata*	Spatterdock	6
	Nymphaea odorata	White water lily	6
FL/E	*Sparganium fluctuans*	Floating-leaf bur-reed	10
	Sparganium angustifolium	Narrow-leaf bur-reed	9
Submergent	*Chara spp.*	Muskgrasses	7
	Eriocaulon aquaticum	Pipewort	9
	Elatine minima	Waterwort	9
	Isoetes echinospora	Spiny-spored quillwort	8
	Lobelia dortmanna	Water lobelia	10
	Myriophyllum tenellum	Dwarf water milfoil	10
	Nitella sp.	Stoneworts	7
	Najas flexilis	Slender naiad	6
	Potamogeton amplifolius	Large-leaf pondweed	7
	Potamogeton gramineus	Variable pondweed	7
	Potamogeton pusillus	Small pondweed	7
	Ranunculus flammula	Creeping spearwort	9
	Utricularia comuta	Horned bladderwort	10
	Utricularia resupinata	Small purple bladderwort	9
	Vallisneria americana	Wild celery	6
S/E	*Eleocharis acicularis*	Needle spikerush	5
	Juncus pelocarpus	Brown-fruited rush	8
	Sagittaria cristata	Crested arrowhead	9

FL = Floating Leaf
FL/E = Floating Leaf and Emergent
S/E = Submergent and Emergent

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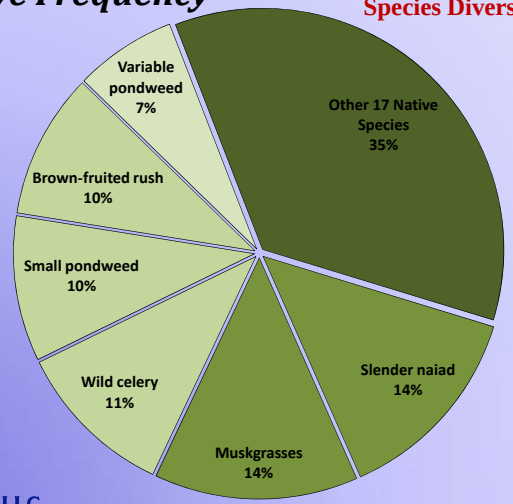
Relative Frequency

Species Diversity: 0.92



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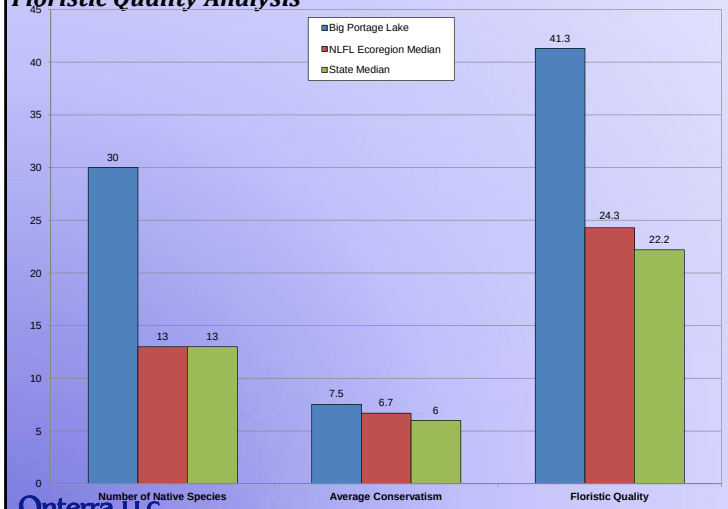
Floristic Quality Analysis



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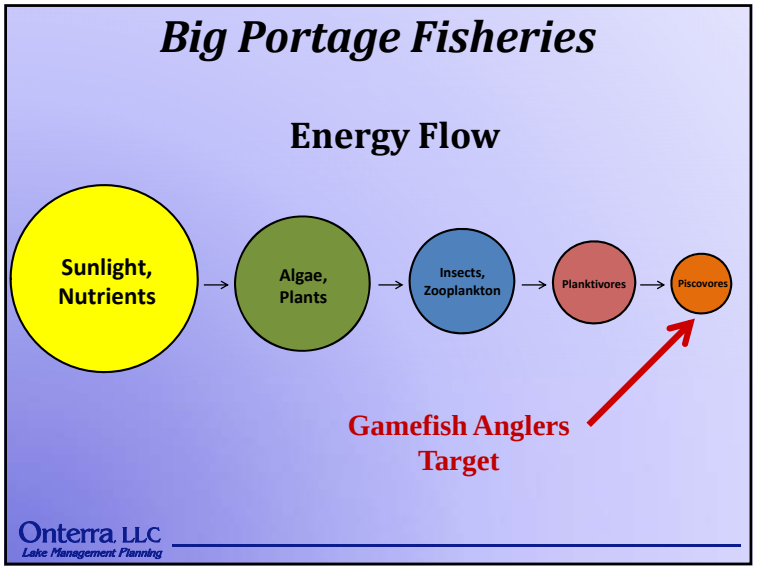
Fisheries


Big Portage Fisheries
Energy Flow
Sunlight, Nutrients
Algae, Plants
Insects, Zooplankton
Planktivores
Piscovores
Gamefish Anglers Target
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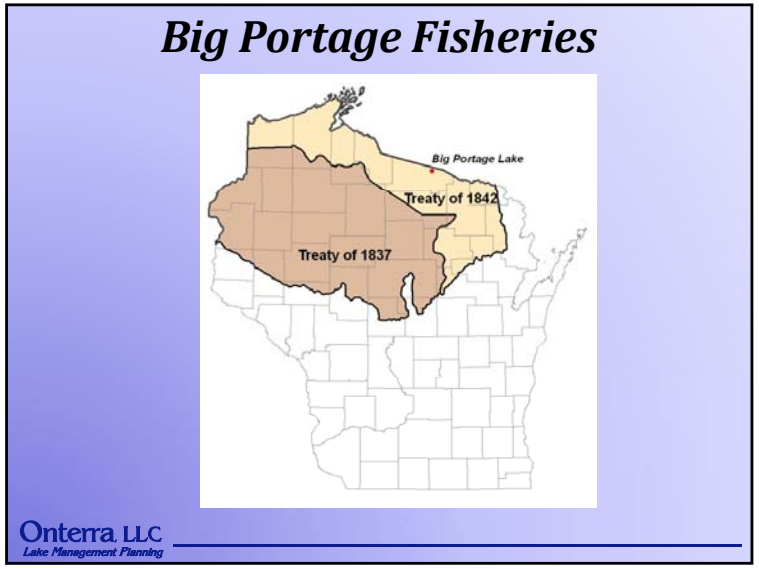
Big Portage Fisheries
Big Portage Lake
Treaty of 1842
Treaty of 1837
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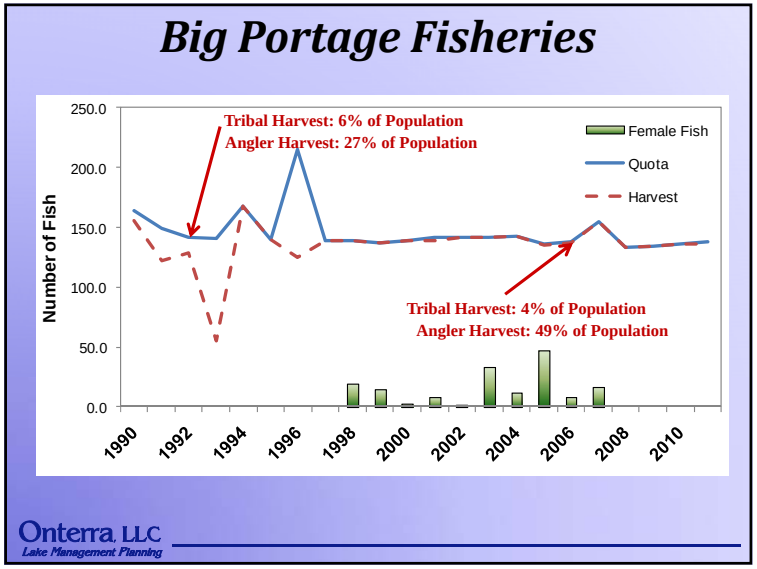
Big Portage Fisheries
Tribal Harvest: 6% of Population
Angler Harvest: 27% of Population
Female Fish
Quota
Harvest
Number of Fish
250.0
200.0
150.0
100.0
50.0
0.0
Tribal Harvest: 4% of Population
Angler Harvest: 49% of Population
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
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Conclusions

- Water quality is excellent.
- Overall watershed is in great condition.
  - Land cover exports minimal phosphorus
  - Low WS:LA area ratio means groundwater is major source
  - Largest, controllable contributor is likely shoreland properties
- Aquatic plant community
  - Based upon standard analysis, native community is of high quality
  - Lake has diverse plant community, but it is of low biomass
- Fisheries
  - Lake's low productivity which translates to low fish biomass
  - Low plant abundance also limits fishery because of lacking structure in the lake

Planning Process

Planning Committee Meetings

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

↓

Implementation Plan

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Mission Statement

To preserve and protect the natural environment and quality of Big Portage Lake for current and future generations through continued education and involvement of stakeholders, monitoring of the lake environment, and being prepared to respond to change

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Management Goal 1:
Increase Big Portage Lake Riparian Owners Association's Capacity to Communicate with Lake Stakeholders

Management Actions

1. Support an Education Committee to promote safe boating, water quality, public safety, and quality of life on Big Portage Lake.
2. Raise riparian owners' awareness on the issue of lake shoreline condition.

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Management Goal 2:
Maintain Current Water Quality Conditions

Management Actions

1. Continue water quality monitoring through WDNR Citizen Lake Monitoring Network.
2. Reduce phosphorus and sediment loads from shoreland watershed to Big Portage Lake (educational initiative).

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Management Goal 3:
Prevent Aquatic Invasive Species Introductions to Big Portage Lake

Management Actions

1. Continue Clean Boats Clean Waters watercraft inspections at Big Portage Lake public access.
2. Coordinate annual volunteer monitoring of aquatic invasive species.

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Management Goal 4:
Improve Fishery Resources and Fishing on Big Portage Lake

Management Actions

1. Work with fisheries managers to enhance the fishery on Big Portage Lake.

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B

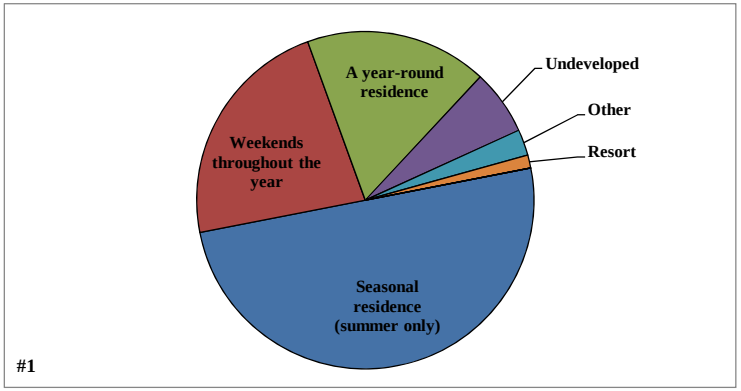
APPENDIX B

Stakeholder Survey Response Charts and Comments

Returned Surveys	74
Sent Surveys	106
Response Rate (%)	69.8

#1 What type of property do you own on Big Portage Lake?

	Total	%
Seasonal residence (summer only)	40	*50.0*
Weekends throughout the year	18	*22.5*
A year-round residence	14	*17.5*
Undeveloped	5	*6.3*
Other	2	*2.5*
Resort	1	*1.3*
Rental property	0	*0.0*
I do not live on the lake	0	*0.0*
	80	*100.0*

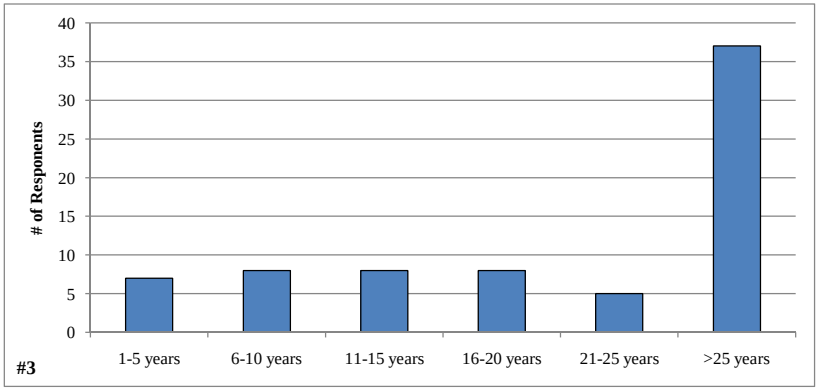


#2 If you are not a year-round resident, how many days each year is your property used by you or others?

Answered Question	56
Average	79.9
Standard deviation	55.6

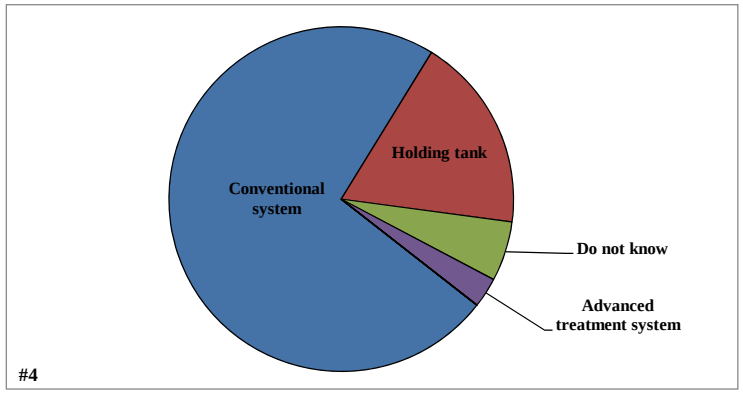
#3 How long have you owned your property on Big Portage Lake?

	Total	%
1-5 years	7	*9.6*
6-10 years	8	*11.0*
11-15 years	8	*11.0*
16-20 years	8	*11.0*
21-25 years	5	*6.8*
>25 years	37	*50.7*
	73	*100.0*



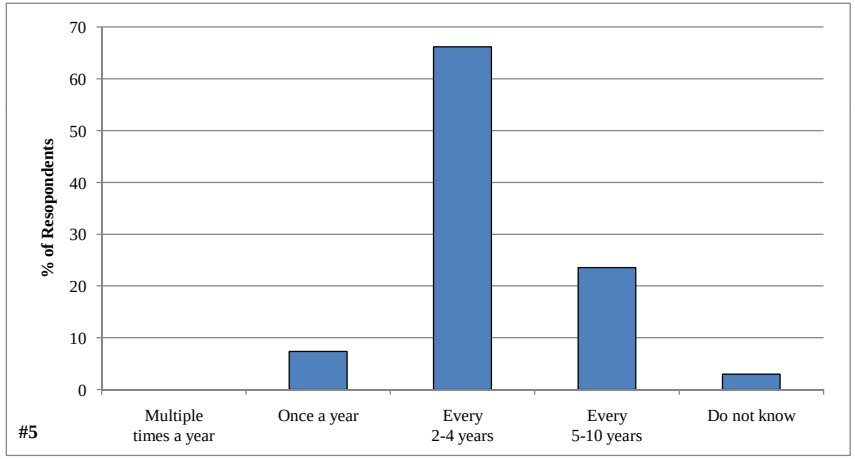
#4 What type of septic system does your property utilize?

	Total	%
Conventional system	52	*73.2*
Holding tank	13	*18.3*
Do not know	4	*5.6*
Advanced treatment system	2	*2.8*
Mound	0	*0.0*
Municipal sewer	0	*0.0*
	71	*100.0*



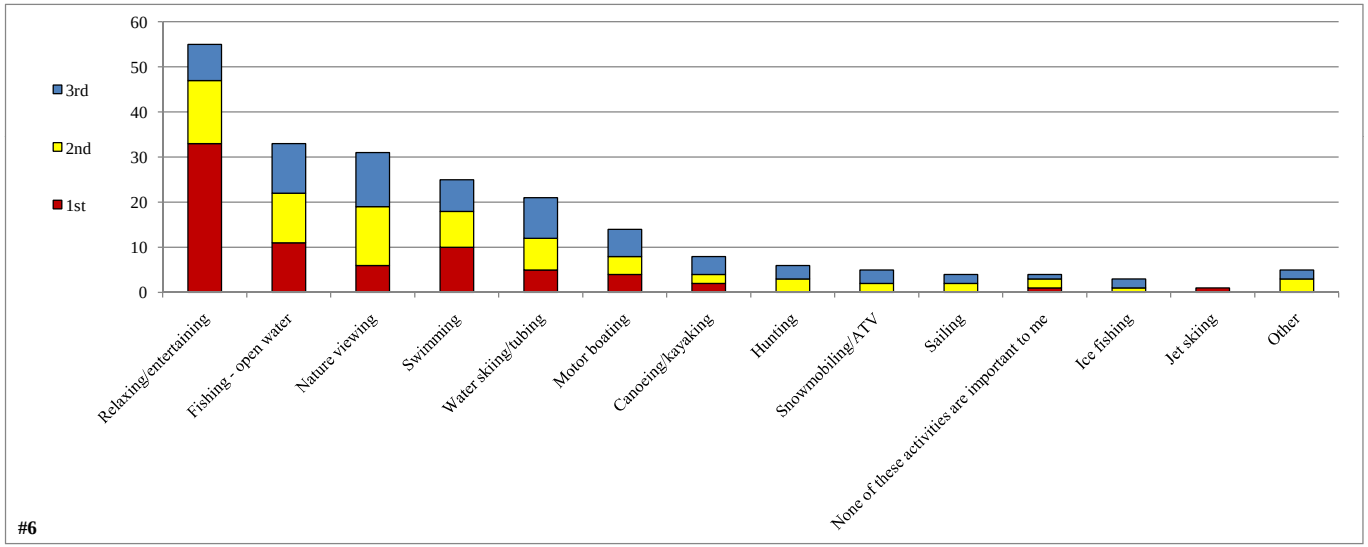
#5 How often is the septic tank on your property pumped?

	Total	%
Multiple times a year	0	*0.0*
Once a year	5	*7.4*
Every 2-4 years	45	*66.2*
Every 5-10 years	16	*23.5*
Do not know	2	*2.9*
	68	*100.0*



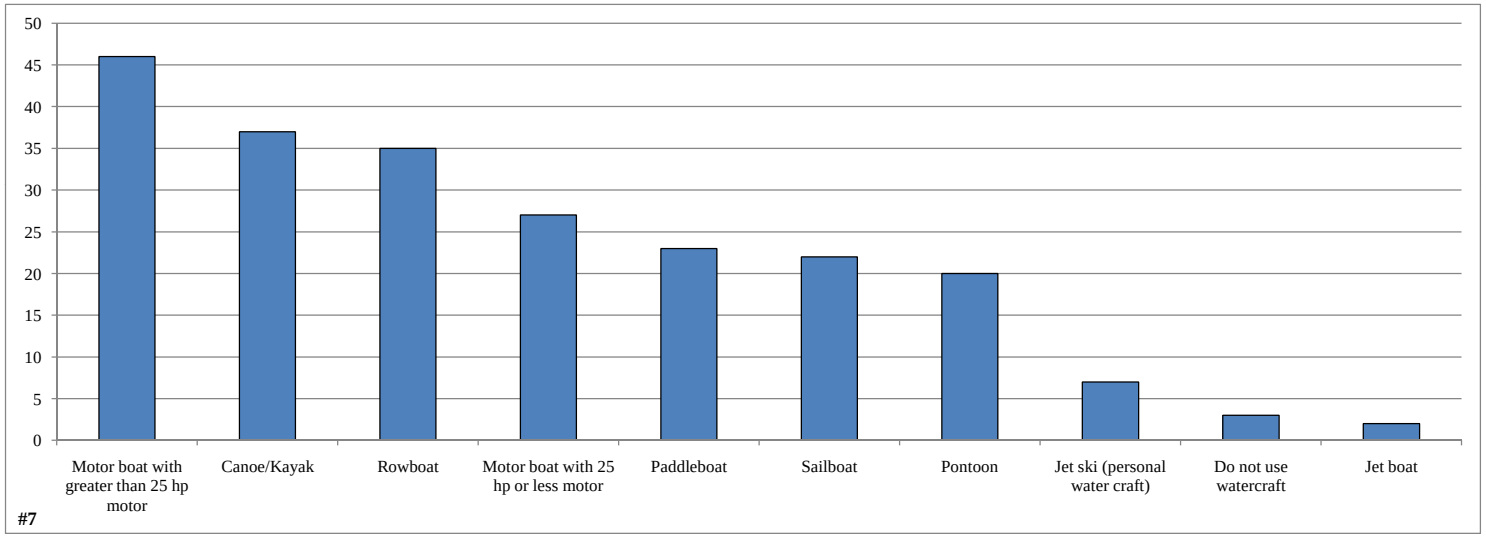
#6 Please rank up to three activities that are important reasons for owning your property on or near the lake.

	1st	2nd	3rd	*% ranked*
Relaxing/entertaining	33	14	8	*26.3*
Fishing - open water	11	11	11	*15.8*
Nature viewing	6	13	12	*14.8*
Swimming	10	8	7	*12.0*
Water skiing/tubing	5	7	9	*10.0*
Motor boating	4	4	6	*6.7*
Canoeing/kayaking	2	2	4	*3.8*
Hunting	0	3	3	*2.9*
Snowmobiling/ATV	0	2	3	*2.4*
Sailing	0	2	2	*1.9*
None of these activities are important to me	1	2	1	*1.9*
Ice fishing	0	1	2	*1.4*
Jet skiing	1	0	0	*0.5*
Other	0	3	2	*2.4*
	72	69	68	*100.0*



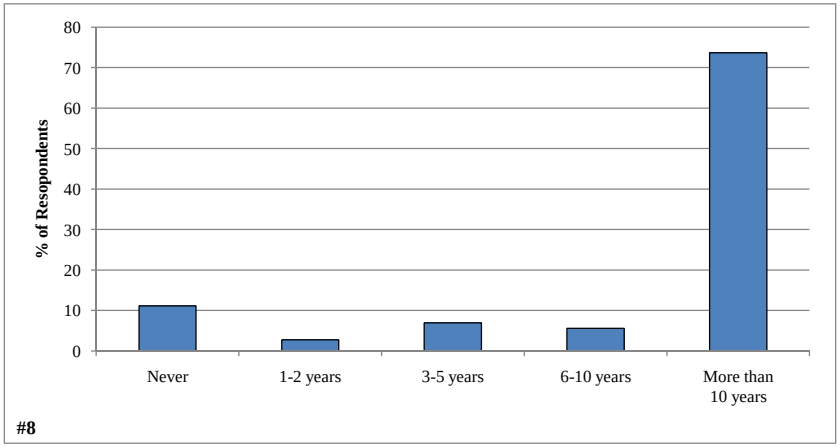
#7 What types of watercraft do you currently use on the lake?

	Total
Motor boat with greater than 25 hp motor	46
Canoe/Kayak	37
Rowboat	35
Motor boat with 25 hp or less motor	27
Paddleboat	23
Sailboat	22
Pontoon	20
Jet ski (personal water craft)	7
Do not use watercraft	3
Jet boat	2
	217



#8 For how many years have you fished Big Portage Lake?

	Total	%
Never	8	*11.1*
1-2 years	2	*2.8*
3-5 years	5	*6.9*
6-10 years	4	*5.6*
More than 10 years	53	*73.6*
	72	*100.0*

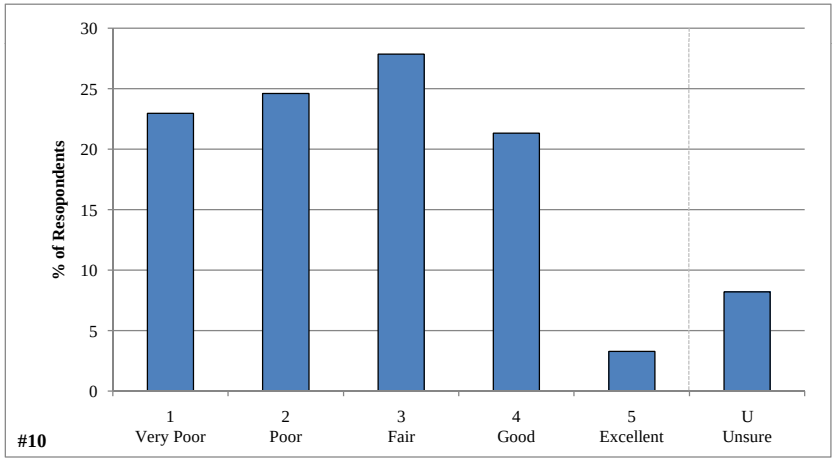


#9 Have you personally fished on Big Portage Lake in the past 3 years?

	Total	%
Yes	52	*77.6*
No	15	*22.4*
	67	*100.0*

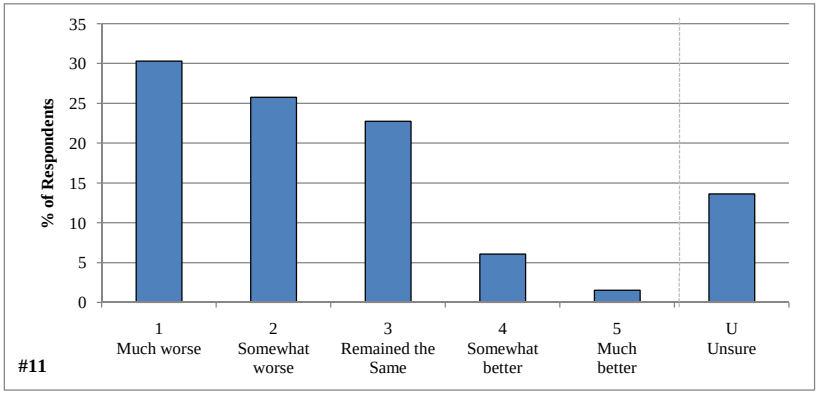
#10 How would you describe the current quality of fishing on Big Portage Lake?

	Total	%
1 - Very Poor	14	*23.0*
2 - Poor	15	*24.6*
3 - Fair	17	*27.9*
4 - Good	13	*21.3*
5 - Excellent	2	*3.3*
U - Unsure	5	*8.2*
	61	*100.0*



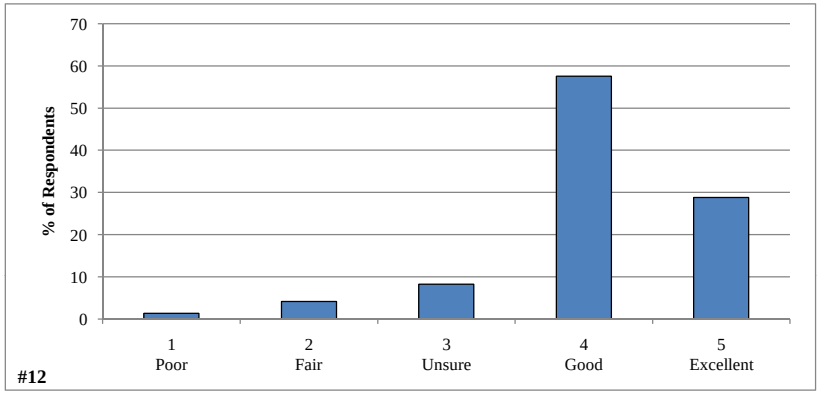
#11 How has the quality of fishing changed on Big Portage Lake since you started fishing the lake?

	Total	%
1 - Much worse	20	*30.3*
2 - Somewhat worse	17	*25.8*
3 - Remained the Same	15	*22.7*
4 - Somewhat better	4	*6.1*
5 - Much better	1	*1.5*
U - Unsure	9	*13.6*
	66	*100.0*



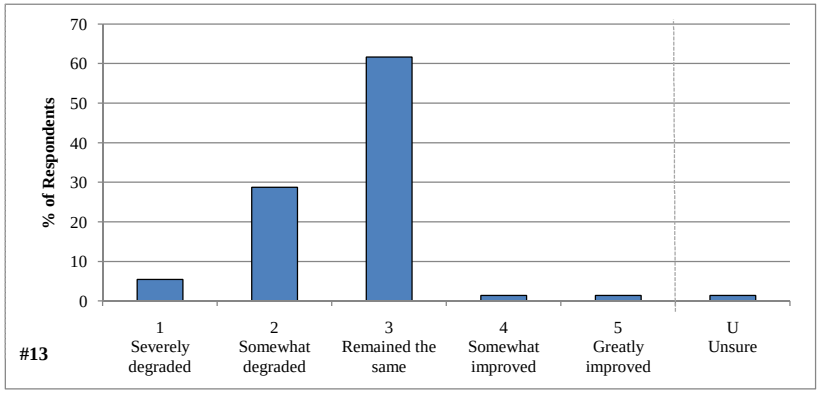
#12 How would you describe the current water quality of Big Portage Lake?

	Total	%
1 - Poor	1	*1.4*
2 - Fair	3	*4.1*
3 - Unsure	6	*8.2*
4 - Good	42	*57.5*
5 - Excellent	21	*28.8*
	73	*100.0*



#13 How has the water quality changed in Big Portage Lake since you obtained your property?

	Total	%
1 - Severely degraded	4	*5.5*
2 - Somewhat degraded	21	*28.8*
3 - Remained the same	45	*61.6*
4 - Somewhat improved	1	*1.4*
5 - Greatly improved	1	*1.4*
U - Unsure	1	*1.4*
	73	*100.0*



#14 Have you ever heard of aquatic invasive species?

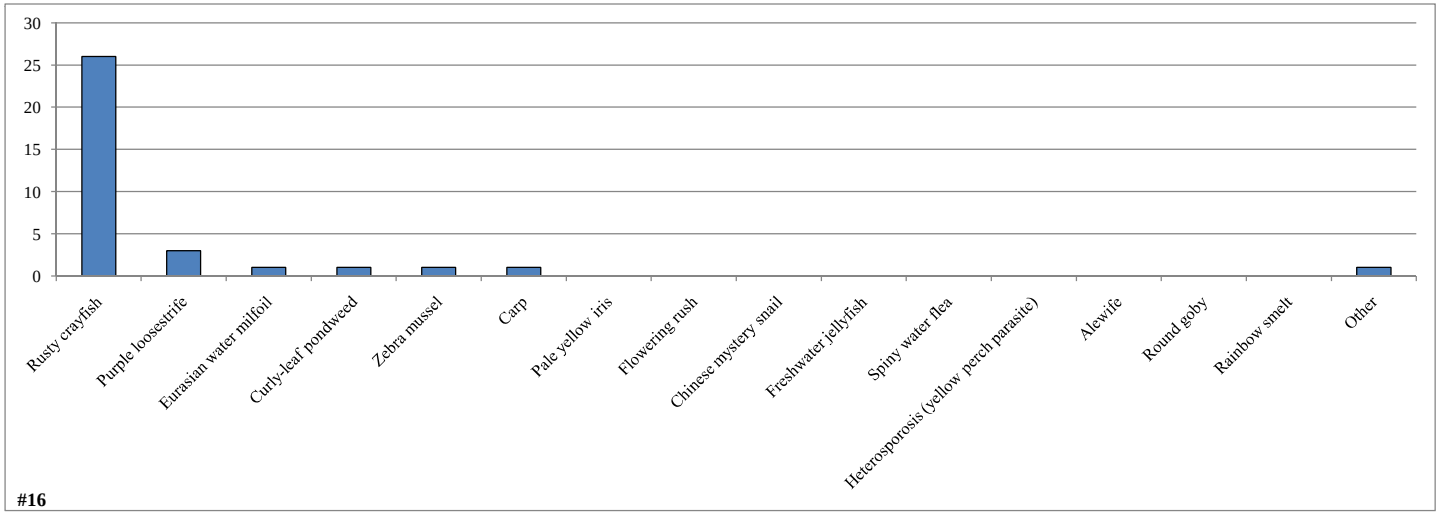
	Total	%
Yes	72	*98.6*
No	1	*1.4*
	73	*100.0*

#15 Are you aware of aquatic invasive species in Big Portage Lake?

	Total	%
Yes	27	*38.0*
No	44	*62.0*
	71	*100.0*

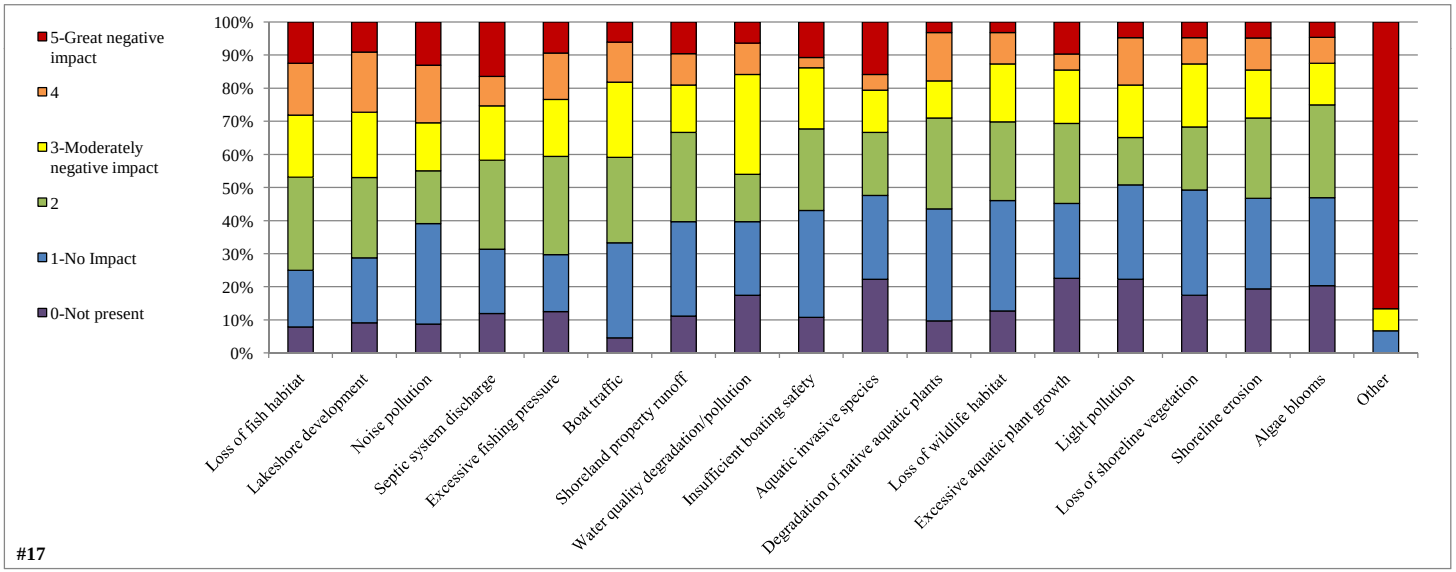
#16 Which aquatic invasive species are you aware of in the lake or channel?

	Total
Rusty crayfish	26
Purple loosestrife	3
Eurasian water milfoil	1
Curly-leaf pondweed	1
Zebra mussel	1
Carp	1
Pale yellow iris	0
Flowering rush	0
Chinese mystery snail	0
Freshwater jellyfish	0
Spiny water flea	0
Heterosporosis (yellow perch parasite)	0
Alewife	0
Round goby	0
Rainbow smelt	0
Other	1



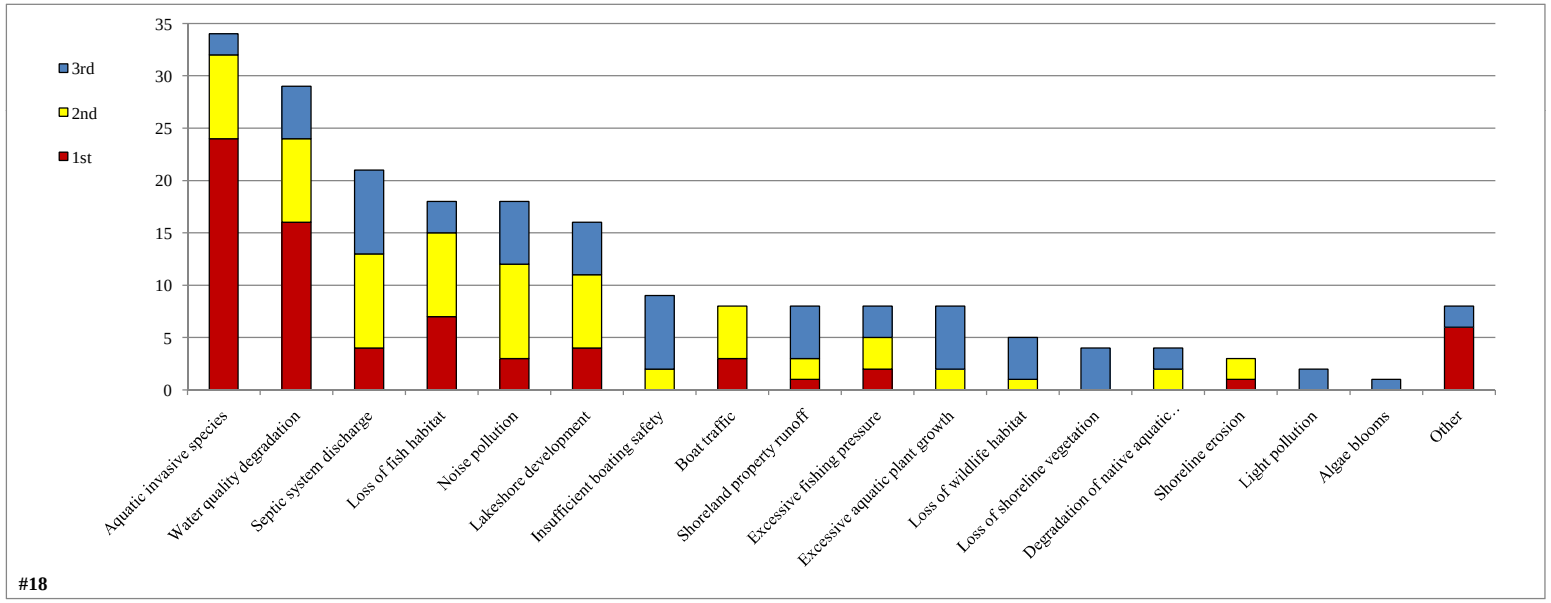
#17 To what level do you believe each of the following factors may be negatively impacting Big Portage Lake?

	0-Not present	1-No Impact	2	3-Moderately negative impact	4	5-Great negative impact	*Total*	*Average*
Loss of fish habitat	5	11	18	12	10	8	*59*	*2.5*
Lakeshore development	6	13	16	13	12	6	*60*	*2.5*
Noise pollution	6	21	11	10	12	9	*63*	*2.4*
Septic system discharge	8	13	18	11	6	11	*59*	*2.4*
Excessive fishing pressure	8	11	19	11	9	6	*56*	*2.3*
Boat traffic	3	19	17	15	8	4	*63*	*2.3*
Shoreland property runoff	7	18	17	9	6	6	*56*	*2.1*
Water quality degradation/pollution	11	14	9	19	6	4	*52*	*2.1*
Insufficient boating safety	7	21	16	12	2	7	*58*	*2.0*
Aquatic invasive species	14	16	12	8	3	10	*49*	*2.0*
Degradation of native aquatic plants	6	21	17	7	9	2	*56*	*2.0*
Loss of wildlife habitat	8	21	15	11	6	2	*55*	*1.9*
Excessive aquatic plant growth	14	14	15	10	3	6	*48*	*1.9*
Light pollution	14	18	9	10	9	3	*49*	*1.9*
Loss of shoreline vegetation	11	20	12	12	5	3	*52*	*1.8*
Shoreline erosion	12	17	15	9	6	3	*50*	*1.8*
Algae blooms	13	17	18	8	5	3	*51*	*1.8*
Other	0	1	0	1	0	13	*15*	*4.6*



#18 From the list below, please rank your top three concerns regarding Big Portage Lake.

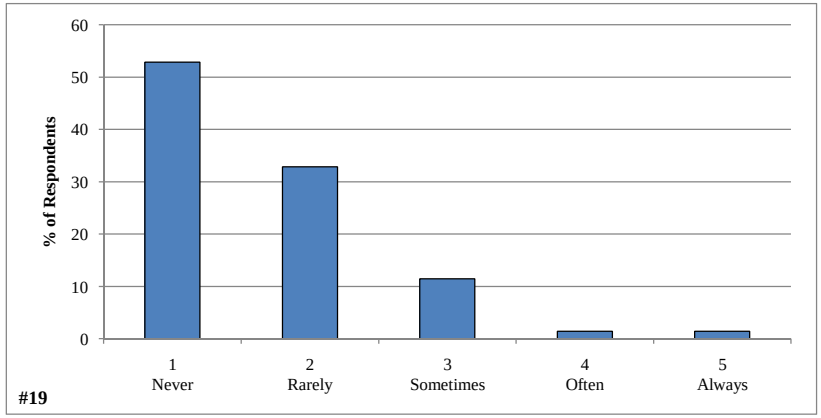
	1st	2nd	3rd	*% Ranked*
Aquatic invasive species	24	8	2	*16.7*
Water quality degradation	16	8	5	*14.2*
Septic system discharge	4	9	8	*10.3*
Loss of fish habitat	7	8	3	*8.8*
Noise pollution	3	9	6	*8.8*
Lakeshore development	4	7	5	*7.8*
Insufficient boating safety	0	2	7	*4.4*
Boat traffic	3	5	0	*3.9*
Shoreland property runoff	1	2	5	*3.9*
Excessive fishing pressure	2	3	3	*3.9*
Excessive aquatic plant growth	0	2	6	*3.9*
Loss of wildlife habitat	0	1	4	*2.5*
Loss of shoreline vegetation	0	0	4	*2.0*
Degradation of native aquatic plants	0	2	2	*2.0*
Shoreline erosion	1	2	0	*1.5*
Light pollution	0	0	2	*1.0*
Algae blooms	0	0	1	*0.5*
Other	6	0	2	*3.9*
	71	68	65	*100.0*



#18

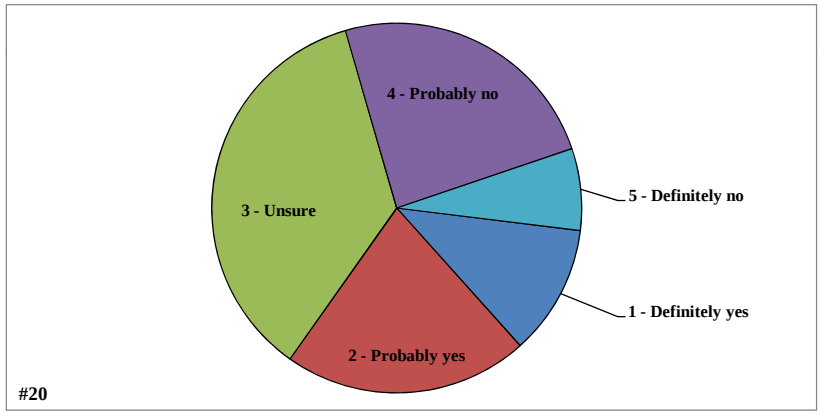
#19 During open water season how often does aquatic plant growth, including algae, negatively impact your enjoyment of Big Portage Lake?

	Total	%
1 - Never	37	*52.9*
2 - Rarely	23	*32.9*
3 - Sometimes	8	*11.4*
4 - Often	1	*1.4*
5 - Always	1	*1.4*
	70	*100.0*



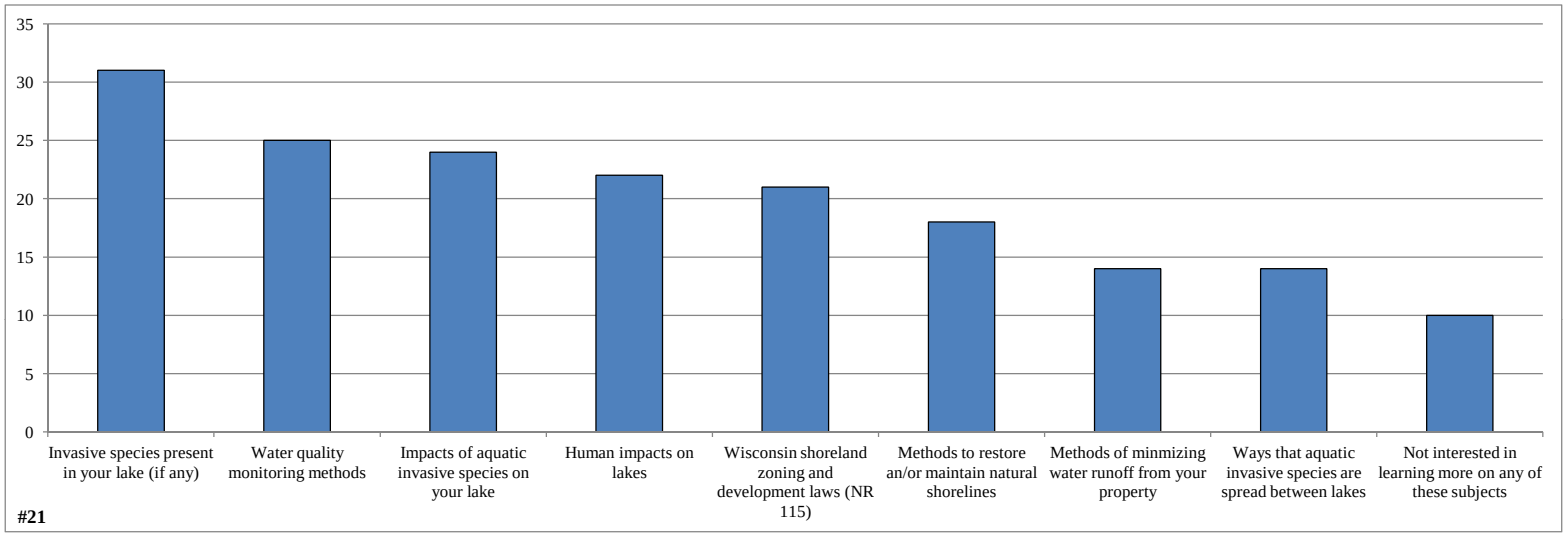
#20 Considering your answer to the question above, do you believe aquatic plant control is needed on Big Portage Lake?

	Total	%
1 - Definitely yes	8	*11.4*
2 - Probably yes	15	*21.4*
3 - Unsure	25	*35.7*
4 - Probably no	17	*24.3*
5 - Definitely no	5	*7.1*
	70	*100.0*



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

	Total
Invasive species present in your lake (if any)	31
Water quality monitoring methods	25
Impacts of aquatic invasive species on your lake	24
Human impacts on lakes	22
Wisconsin shoreland zoning and development laws (NR 115)	21
Methods to restore an/or maintain natural shorelines	18
Methods of minmizing water runoff from your property	14
Ways that aquatic invasive species are spread between lakes	14
Not interested in learning more on any of these subjects	10



#22 Before receiving this mailing, have you ever heard of the Big Portage Lake Riparian Owners Association?

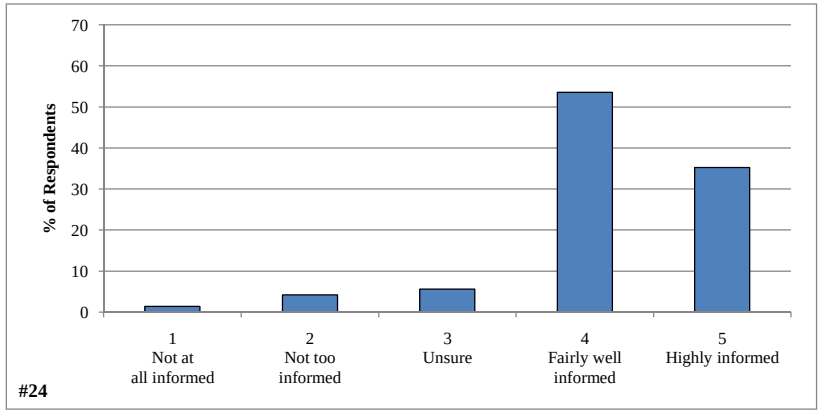
	Total	%
Yes	73	*100.0*
No	0	*0.0*
	73	*100.0*

#23 What is your membership status with the Big Portage Lake Riparian Owners Association?

	Total	%
Current member	66	*91.7*
Former member	4	*5.6*
Never been a member	2	*2.8*
	72	*100.0*

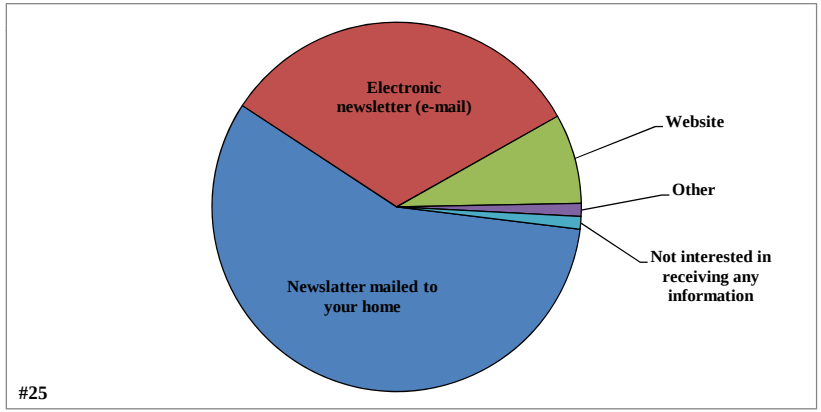
#24 How informed has the Big Portage Lake Riparian Owners Association kept you regarding issues with Big Portage Lake and its management?

	Total	%
1 - Not at all informed	1	*1.4*
2 - Not too informed	3	*4.2*
3 - Unsure	4	*5.6*
4 - Fairly well informed	38	*53.5*
5 - Highly informed	25	*35.2*
	71	*100.0*



#25 Through what source would you most like to receive communication about Big Portage Lake?

	Total
Newslatter mailed to your home	51
Electronic newsletter (e-mail)	29
Website	7
Other	1
Not interested in receiving any information	1



Survey Number	1g Comment	6m Comment	16p Comment	17r Comment	18r Comment	25d Comment	Other Comments (and Question 26)
1				spearing	spearing		
2	Use summer, weekends, 2 wks at Christmas						The lake should be kept clean. Property values maintained by clear water etc. However the anti fishing, boating, skiing, fireworks, anti-fun people are over the top. Just because you like loons and quiet does not mean some of us can't enjoy a time to ski, do fireworks or let loose. its is give and take to all. get along and keep the lake and property pristine. This lake slum award has to Stop!
3							Pleased we had a zoning change and are participation in this study. Boating courtesy could be improved.
4							
6				boating courtesy			Over a 50+ yr span there has been some changes in water quality- the shoal in the middle of the lake was all rocks, no weeds or grasses now there is vegetation, even small trees which appear to have developed regardless of water level. Suspect more nutrients in water. fishery could be better- but obvious increase in small-mouth bass has made fishing more interesting. suspect walleyes are decling by over fishing by outsiders. not sure if slot limit helps. More reports of northern pike. Recommend DNR do a new fishery survey- last was 2006. Boating courtesy a problem particularly in respect to giving anglers a wide berth. Pontoon boat "cocktail cruisers" are particularly guilty- they also often ignore 100ft rule w/ respect to piers.
7							until 15 years ago we would see large schools of minnows at our dock- Now we see None!
8							
9							
11							what are your thoughts on management of weed/grass on the shoreline/beaches? The overgrowth is excessive. On one hand it is great to see nature at work. However it is hard to lose our beautiful sandy beach & waterfront.
12				jet skis			people throwing leftover food in the woods. Jet ski noise.
13							Jet skis are a problem. There is a fine line between managing an organization & dictating ones personal usage of their property. Some folks aren't looking for a sense of community, they may want privacy.

Survey Number	1g Comment	6m Comment	16p Comment	17r Comment	18r Comment	25d Comment	Other Comments (and Question 26)
14							I don't think the walleye slot limit is working! I would support only one walleye over 18"! I don't believe the lake can reproduce enough fish to replace what the spear fishing takes. I believe B P lake must be stocked on a regular basis.
15							where did all the Northerns come from in the lake. I caught 25 northerns this yr, 40 yrs since I caught my previous northern. They are very bad for walleye
16							
17					spearing		what about the upkeep of the public boat landing?
18					personal hi speed watercraft people drawing water from the lake		why are people in residential properties allowed to use them as commercial rental/resort properties without penalty. Why are property owners allowed to draw water out of lake for lawn care or household/business use. Why are property owners allowed to break shoreline regulations throug(sp) payola- why isn't their a uniform standard at all. how can the lakes get more regular/consistent patrol and governance from the very DNR we all fund! what can bplroa do to become a more attractive and inclusive body to really advocate for property owner rights. awareness is not enough.
19							
20							appreciate all you do - Keep up the good work.
21						word of mouth	Management is fine! We would like to see if there is any possible way by which our lake assoc. or the state could bring back the water levels in our low areas and our bays without waiting for God's help in producing multiple rain storms.
22							
23							
24							
25							we have an absolute jewel of a lake. To Keep it that way, we would like to see some sort of restriction on PWC's either require better mufflers on them and/or restrict hours of usage. Monitoring of the boat landing is a great program and we do volunteer. But I doubt it catches half of the boats. I don't have any ideas on how to fix this other than hire someone.
26							
27							The association is a great way to keep members informed and work as a group towards a common goal. It never should be used for enforcement issues of complaints for lake owners, Stay out of policing the lake.

Survey Number	1g Comment	6m Comment	16p Comment	17r Comment	18r Comment	25d Comment	Other Comments (and Question 26)
28							
29							I love BP Lake! I have been visiting it for 47 out of my 48 years. It is easily the #1 best time of my summer. I could easily stay the entire summer but I have to share. Thank you thank you for your devotion to the lake We presently stay in our 73 year old cabin and are considering (finally) a rebuild. We will erect a small, chinked cottage that will fit right in. This will hopefully give us more time throughout the year to visit. I have never in 47 years seen the lake frozen over. I look forward to that!!
30							Thank you for being concerned about our lake and taking measures to keep the lake healthy.
31							
32							
33							
34							
35							
36							I would be in favor of a membership fee increase if funds were needed to maintain lake quality. As usual, a core group carries the load. Since I am still working my time is spent relaxing. Once I retire I plan to donate more time. There fore an increase in fees to allow the association to hire as needed seems fair.
37	The cover letter accompaning this survey indicates that BPLROA may ultimately receive up to $26,000 in Gov't grants to study, plan and ultimately implement a lake management plan. While ther BPLROA board may be excited at this prospect, what it indicates to me is an overwheliming disregard by governmental entities to be responsible steward of their financial resources. It reconciles perfectly with past attitudes by those in power to just spend money on anything at all because, after all, the supply is limitless and therefore the need for justification does not exist. As long as there is even a hint of attainable "public good" either real or imagined, then there should be no restraint. It doesn't matter if it requires a contorted extention of logic to perceive this possibility of public good. BPLROA should be chagrin at accepting this funding. Additionally, I am bothered by the concept of a group of people presuming to act in my best interest. Like government, no quasi-regulatory group can prevent power from going to their heads. I sincerely hope the BPLROA fails in any effort to become such. What will happen is the BPLROA will eventually become as out of control as most government already is and they will establish themselves as quasi legislative in nature with enforcement authority. To assuage any misgivings, the board will cloak itself with self agrandizing rhetoric such as "stakeholder education", "Awareness of issues", "enhancing the quality of like", "Providing a sense of community" and "collective voice" These are all direct quotes from your survey and frankly they scare me. Even the title of your survey "Lake Management Planning" bothers me. I don't want you to manage or plan anything for me! I suggest you all go back to one simple philosophy: Live and use Big Portage Lake as courteously as you would want you neighbor to do on your behalf. It is just plain good manners and quite uncomplicated. It's far superior to setting a bunch of rules.							

Survey Number	1g Comment	6m Comment	16p Comment	17r Comment	18r Comment	25d Comment	Other Comments (and Question 26)
38			not aware BPL had been invaded. I thought that volunteers to help prevent these issues from hurting BPL				
39	portion of the summer & weekends throughout						
40							Only God can fix the water level. Understand boat ramp being fixed. Pave the last gravel portion of big port. Lake rd. Glad to hear, if correct, that the lake gets a 6 yr hiatus from exploitive spearing/ seining as it would be a nice addition to have a better quality fishing lake(understand it was great before indigenous rights"restored") I appreciate public access rights. But what if DNR required a postcard sized questionnaire to fill out regarding invasive species, boat cleaning prior to putting watercraft in or be subject to a fine. we only have our watercraft on BPL this is a serious matter. We should build a fund for the next caterpillar attack. Glad some of us got involved to stop high density multi-unit development, even if not fully appreciated. thanks to all who work to protect the lake from invasive species. thanks to all who work on the snow trails.
41							
42							
43							
44							
45	summer residence& weekends						fishing seems much worse than 50 years ago I would like to know the reason for the decline in the perch and walleye populations
46				spearing			
47				spearing			would like to see the DNR begin a walleye stocking program to improve fishing. Loss of natural weed beds in lake is disturbing. Condition of boat landing keeps us from coming up more often.

Survey Number	1g Comment	6m Comment	16p Comment	17r Comment	18r Comment	25d Comment	Other Comments (and Question 26)
48				jet skis	jet ski traffic		Largest impacts Jet skis discharge huge amounts of gas/oil into lake, may lakes ban them. Septic tank drainage- human waste & T P has been found floating in lake. The lake is definitely not as clear & clean as it was 30 years ago. Back then BPL was as pristine as Clarke lake in Sylvania. NO More! Who are these people who blow off fireworks at 10-11 PM at night?!?
49							
50							
51				Indian spearing	The present big problem with fishing in BPL is the ability for the indian population to spear fish any number of walleyes they want during spawning season. It appears the DNR has no control over this and the indians do not respect the law or I guess the treaty set up. There needs to be action to stop this unlimited spearing of fish during spawing season of walleyes by the indians. It is impossible for the Lake association or the people on the lake to do anything for fear of destruction to cabins and property. The DNR and the indians have to come together to get a resolution. Suggestion. Have indians go back to the use of a single spear along the shore instead of the high powered boats, powerful lights, stunning devices and multiple spears they now use. In order to keep BPL a pristine lake it is necessary to close permanently the BPL public landing. It is presently in poor condition and the right time to close it. the town of land o lakes has responsibility for it maintainence and the town board refuses to allocate the funds to put the landing in a workable condition. I have seen in wisconsin other public boat landings closed permanentyly, for one reason or another. Based on that I hope the BPL public boat landing is closed to the public.		
52					drop in water level never this low in my 73 years on the lake in 1940's it was 18"to24" higher		
53							
54					water level		
55				barking dogs			when will the boat landing be improved?
56							fix the boat landing
57							
58	plan to develop within 5 yrs						It is a great lake. Thanks for all the hard work you do to guarantee it remains great.

Survey Number	1g Comment	6m Comment	16p Comment	17r Comment	18r Comment	25d Comment	Other Comments (and Question 26)
59							Although just an owner of an empty lot, it is good to be informed that lake property owners do take an interest in the health of the waters and eco-system. This long term oversight, and shared responsibility will serve well in preservation of the lake area, it's natural solitude, and (safe) opportunities for recreation.
60							
61							
62							
63							Walleye populations?? Water quality - yearly tracking and history. Thank you all for your good work and commitment to our beautiful lake.
64				spearing			would like walleye slot limit changed to 1 fish over 14" what can be done to restore perch fishery?
65							
66							
67							I am not knowledgeable on many question as I have not been to the lake since 2000. I am now in a wheel chair & cannot drive or ride that distance. My family uses it however & thru them & care givers of property I have maintained it. I expect to put it up for sale again next spring. I know we do not have a spring fed lake and one of my concerns is the water is so low now. We cannot use our boat lift or dock a ski boat at the pier. I know in the past people were using pumps to water their lawns with lake water and I feel this needs to be monitored. Big portage lake is a beautiful place. I think every effort should be made to keep it that way. I am sorry that this is late but I have been sick.
68							
69							
70							
71				people hitting golf balls into lake & they are left to pollute the water & other things thrown into the lake			
72							
73					jet skis		
74							
75							

C

APPENDIX C

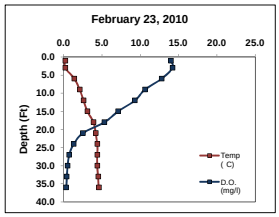
Water Quality Data

Big Portage Lake

Date: 02-23-10
Time: 11:00
Weather: 100% clouds, calm, 21°F
Ent: BTB **Verf:**

Max Depth (ft): 37.6
BPLS Depth (ft): 3.0
BPLB Depth (ft): 34.0
Secchi Depth (ft): 10.0

Depth (ft)	Temp (°C)	D.O. (mg/l)	pH	Sp. Cond (µS/cm)
1.0	0.2	14.0	6.2	44
3.0	0.2	14.2	6.3	42
6.0	1.4	12.8	6.4	38
9.0	2.1	10.6	6.4	38
12.0	2.6	9.3	6.3	39
15.0	3.1	7.1	6.2	39
18.0	3.9	5.3	6.0	41
21.0	4.2	2.5	5.9	42
24.0	4.4	1.3	5.9	45
27.0	4.4	0.7	5.9	46
30.0	4.4	0.5	5.9	46
33.0	4.5	0.4	6.0	46
36.0	4.6	0.3	6.0	60



Parameter	BPLS	BPLB
Total P (µg/L)	10.00	11.00
Dissolved P (µg/L)		
Chl-a (µg/L)		
TKN (µg/L)	390.00	820.00
$NO_3 + NO_2$-N (µg/L)	ND	68.00
NH_3-N (µg/L)	36.00	519.00
Total N (µg/L)	390.00	820.00
Lab Cond. (µS/cm)	42.00	46.00
Lab pH	6.00	6.30
Alkalinity (mg/L $CaCO_3$)		
Total Susp. Solids (mg/L)	ND	2.00
Calcium (mg/L)		

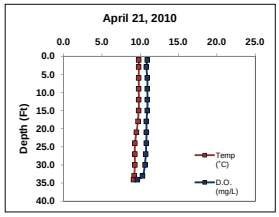
Data collected by: TAH and EJH (Onterra)
Ice: 1.3 ft

Big Portage Lake

Date: 4/21/2010
Time: 9:00
Weather: Overcast, cold, 32°F
Entry: DAC

Max Depth: 26.6
BPLS Depth (ft): 3.0
BPLB Depth (ft): 34.0
Secchi Depth (ft): 9.5

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	9.8	10.9	7.8	
3	9.8	10.8	7.8	
6	9.8	10.9	7.8	
9	9.8	10.9	7.9	
12	9.8	10.9	7.9	
15	9.8	10.9	7.9	
18	9.7	10.8	7.9	
21	9.5	10.8	7.8	
24	9.3	10.8	7.8	
27	9.3	10.7	7.7	
30	9.3	10.6	7.7	
33	9.2	10.3	7.6	
34	9.1	9.6	7.2	



Parameter	BPLS	BPLB
Total P (µg/L)	12.00	13.00
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	6.74	
TKN (µg/L)	470.00	530.00
$NO_3 + NO_2$-N (µg/L)	480.00	490.00
NH_3-N (µg/L)	ND	ND
Total N (µg/L)	470.00	530.00
Lab Cond. (µS/cm)	40.00	41.00
Lab pH	7.54	7.39
Alkalinity (mg/L $CaCO_3$)	16.00	16.20
Total Susp. Solids (mg/L)	3.00	4.00
Calcium (mg/L)	4.50	

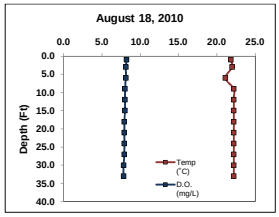
Data collected by SNR and TWH (Onterra)

Big Portage Lake

Date: 8/18/2010
Time: 17:15
Weather: Rain, 100% overcast, breezy, 65°F
Entry: TWH

Max Depth: 37'
BPLS Depth (ft):
BPLB Depth (ft):
Secchi Depth (ft): 9.7'

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	21.8	8.2		
3	22.0	8.1		
6	21.1	8.1		
9	22.2	8.0		
12	22.2	8.0		
15	22.2	8.0		
18	22.2	7.9		
21	22.2	7.9		
24	22.2	7.9		
27	22.2	7.9		
30	22.2	7.8		
33	22.2	7.8		



Parameter	BPLS	BPLB
Total P (µg/L)		
Dissolved P (µg/L)		
Chl-a (µg/L)		
TKN (µg/L)		
$NO_3 + NO_2$-N (µg/L)		
NH_3-N (µg/L)		
Total N (µg/L)		
Lab Cond. (µS/cm)		
Lab pH		
Alkalinity (mg/L $CaCO_3$)		
Total Susp. Solids (mg/L)		
Calcium (mg/L)		

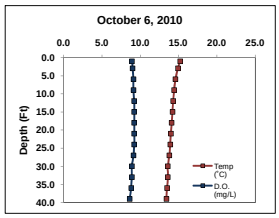
Data collected by TAH (Onterra)

Big Portage Lake

Date: 10-06-10
Time: 14:45
Weather: 100% sun, breezy, 65°F
Entry: TWH **Verf:**

Max Depth (ft): 41.1
CLS Depth (ft): 3.0
CLB Depth (ft): 38.0
Secchi Depth (ft): 11.6

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	15.2	8.9		
3.0	14.9	9.0		
6.0	14.6	9.1		
9.0	14.4	9.1		
12.0	14.3	9.2		
15.0	14.2	9.2		
18.0	14.1	9.2		
21.0	14.0	9.2		
24.0	13.9	9.2		
27.0	13.8	9.1		
30.0	13.6	8.9		
33.0	13.6	8.9		
36.0	13.5	8.8		
39.0	13.4	8.6		



Parameter	BPLS	BPLB
Total P (µg/L)	11.00	12.00
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	4.29	
TKN (µg/L)	510.00	
$NO_3 + NO_2$-N (µg/L)	ND	
NH_3-N (µg/L)	270.00	
Total N (µg/L)	510.00	
Lab Cond. (µS/cm)		
Lab pH		
Alkalinity (mg/L $CaCO_3$)		
Total Susp. Solids (mg/L)	2.00	3.00
Calcium (mg/L)		

Data collected by: TAH and TWH (Onterra)

Water Quality Data

2010	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	3	NA	NA	NA
Total P (µg/L)	3.00	11.0	3.00	12.0
Dissolved P (µg/L)	0.00	NA	0.00	NA
Chl a (µg/L)	2.00	5.5	0.00	NA
TKN (µg/L	3.00	456.7	2.00	675.0
NO3+NO2-N (µg/L)	1.00	480.0	2.00	279.0
NH3-N (µg/L)	2.00	153.0	1.00	519.0
Total N (µg/L)	3.00	456.7	2.00	675.0
Lab Cond. (µS/cm)	2.00	41.0	2.00	43.5
Lab pH	2.00	6.8	2.00	6.8
Alkal (mg/l CaCO3)	1.00	16.0	1.00	16.2
Total Susp Sol (mg/l)	2.00	2.5	3.00	3.0
Calcium (µg/L)	1.00	4.5	0.00	NA

Morphological / Geographical Data

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

Watershed Data

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

Trophic State Index (WTSI)

Year	TP	Chl-a	Secchi
1989	32.9		
1990			
1991			43.0
1992			44.4
1993			
1994			39.4
1995			35.7
1996		24.9	38.0
1997	35.8	33.0	34.5
1998	32.2	40.2	39.6
1999	31.5	38.0	41.3
2000	35.3	38.6	39.7
2001	36.4		40.2
2002	38.3	39.6	36.8
2003	37.4	42.5	37.2
2004	39.2	46.4	43.2
2005	40.0	49.6	42.6
2006	42.7	44.2	41.3
2007	36.4	38.3	39.8
2008	38.7	43.1	43.2
2009			
2010	38.3	39.9	39.7
All Years (Weighted)	37.0	41.4	39.1
Deep, Seepage Lakes	43.2	43.2	42.4
NLF Ecoregion	48.1	47.5	45.7

	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1989	0		0		0		0		3	7.3	3.0	7.3
1990	0		0									
1991	6	10.7	5	10.7								
1992	7	10.2	4	9.7								
1993	3	10.1	0									
1994	7	12.6	4	13.7								
1995	12	15.5	6	17.8								
1996	16	15.6	8	15.1	2	1.9	1	0.6	1	7.0	0.0	
1997	14	17.6	7	19.3	4	2.0	3	1.3	4	10.3	2.0	9.0
1998	11	13.0	7	13.5	4	2.7	3	2.7	3	8.7	1.0	7.0
1999	12	12.0	6	12.0	4	2.3	3	2.1	5	7.0	3.0	6.7
2000	14	12.9	9	13.4	4	3.5	3	2.3	5	9.6	3.0	8.7
2001	14	12.4	9	12.9	0		0		4	9.0	3.0	9.3
2002	13	15.7	8	16.4	3	3.2	2	2.5	5	11.8	3.0	10.7
2003	9	15.7	6	16.0	3	3.4	3	3.4	4	9.5	3.0	10.0
2004	4	10.6	3	10.5	4	4.8	3	5.0	4	12.8	3.0	11.3
2005	4	12.9	2	11.0	3	6.2	2	6.9	4	10.8	2.0	12.0
2006	3	11.5	2	12.0	3	3.5	2	4.0	3	12.7	2.0	14.5
2007	5	12.1	3	13.3	3	2.2	3	2.2	3	9.3	3.0	9.3
2008	2	10.5	2	10.5	2	3.6	2	3.6	2	11.0	2.0	11.0
2009	0		0		0		0		0		0.0	
2010	10	12.7	7	13.4	5	3.7	3	2.6	5	11.0	3.0	10.7
All Years (Weighted)		13.6		14.0		3.3		3.0		10.0		9.8
Deep, Seepage Lakes				11.2				3.6				15.0
NLF Ecoregion				8.9				5.6				21.0

Summer 2010 N: 456.7
Summer 2010 P: 11.0

Summer 2011 N:P 42 :1

D

APPENDIX D

Watershed Analysis WiLMS Results

Date: 7/13/2011 Scenario: Big Portage Current, v1

Lake Id: 1629500
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 868.2 acre
Total Unit Runoff: 14 in.
Annual Runoff Volume: 1012.9 acre-ft
Lake Surface Area <As>: 587 acre
Lake Volume <V>: 11204 acre-ft
Lake Mean Depth <z>: 19.1 ft
Precipitation - Evaporation: 5.5 in.
Hydraulic Loading: 1281.9 acre-ft/year
Areal Water Load <qs>: 2.2 ft/year
Lake Flushing Rate <p>: 0.11 1/year
Water Residence Time: 8.74 year
Observed spring overturn total phosphorus (SPO): 12.0 mg/m^3
Observed growing season mean phosphorus (GSM): 11.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre	Low	Most Likely	High	Loading %	Low	Most Likely	High
	(ac)	Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	2.3	0.50	1.00	3.00	0.9	0	1	3
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	4	0.10	0.30	0.50	0.5	0	0	1
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	0.0	0.05	0.10	0.25	0.0	0	0	0
Wetlands	43.9	0.10	0.10	0.10	1.7	2	2	2
Forest	818	0.05	0.09	0.18	28.6	17	30	60
Lake Surface	587.0	0.10	0.30	1.00	68.4	24	71	238

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)	94.2	229.8	666.9	100.0
Total Loading (kg)	42.7	104.3	302.5	100.0
Areal Loading (lb/ac-year)	0.16	0.39	1.14	0.0
Areal Loading (mg/m^2-year)	17.98	43.89	127.35	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)	41.8	72.7	143.2	100.0
Total NPS Loading (kg)	19.0	33.0	65.0	100.0

Phosphorus Prediction and Uncertainty Analysis Module

Date: 7/13/2011 Scenario: 7
Observed spring overturn total phosphorus (SPO): 12.0 mg/m^3
Observed growing season mean phosphorus (GSM): 11.0 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	10	24	70	13	118
Canfield-Bachmann, 1981 Natural Lake	8	14	28	3	27
Canfield-Bachmann, 1981 Artificial Lake	9	15	27	4	36
Rechow, 1979 General	1	4	10	-7	-64
Rechow, 1977 Anoxic	10	25	73	14	127
Rechow, 1977 water load<50m/year	2	6	17	-5	-45
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	8	21	60	9	75
Vollenweider, 1982 Combined OECD	7	16	37	5	43
Dillon-Rigler-Kirchner	6	15	45	3	25
Vollenweider, 1982 Shallow Lake/Res.	6	12	31	1	9
Larsen-Mercier, 1976	7	17	48	5	42
Nurnberg, 1984 Oxic	5	13	38	2	18

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	13	53	Tw	0	GSM
Canfield-Bachmann, 1981 Natural Lake	4	40	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	5	43	FIT	1	GSM
Rechow, 1979 General	2	8	L qs	0	GSM
Rechow, 1977 Anoxic	14	55	FIT	0	GSM
Rechow, 1977 water load<50m/year	3	13	FIT	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	10	48	FIT	0	SPO
Vollenweider, 1982 Combined OECD	7	33	FIT	0	ANN
Dillon-Rigler-Kirchner	8	34	L qs p	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	6	26	FIT	0	ANN
Larsen-Mercier, 1976	10	37	P Pin	0	SPO
Nurnberg, 1984 Oxic	6	30	FIT	0	ANN

Water and Nutrient Outflow Module

Date: 7/13/2011 Scenario: 7
Average Annual Surface Total Phosphorus: 12.0mg/m^3
Annual Discharge: 1.28E+003 AF => 1.58E+006 m^3
Annual Outflow Loading: 39.9 LB => 18.1 kg

E

APPENDIX E

Aquatic Plant Survey Data

Total Rake Fullness	Point Number	latitude	longitude	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Chara spp.	Dulichium arundinaceum	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Equisetum fluviatile	Eriocaulon aquaticum	Isoetes lacustris	Juncus pelocarpus	Lobelia dortmanna	Myriophyllum tenellum	Najas flexilis	Nitella spp.	Nuphar variegata	Nymphaea odorata	Potamogeton gramineus	Potamogeton pusillus	Ranunculus flammula	Sagittaria latifolia	Sparganium angustifolium	Sparganium fluctuans	Utricularia resupinata	Vallisneria americana	Utricularia cornuta				NOTES
	1	46.12529482	-89.29788958				UNREACHABLE																															
1	2	46.12475485	-89.29789644	1	S	P							1				1		1	1												1		1				
1	3	46.12421488	-89.2979033	1	S	P						1				1																						
1	4	46.12367491	-89.29791016	3	S	P												1															1					
1	5	46.12097507	-89.29794445	3	S	P												1																				
	6	46.12529004	-89.29711301				UNREACHABLE																															
	7	46.12475008	-89.29711988	2	S	P	No Vegetation																															
	8	46.12421011	-89.29712675	6	S	P	No Vegetation																															
	9	46.12367014	-89.29713361	12	S	P	No Vegetation																															
	10	46.12313017	-89.29714048	13		R	No Vegetation																															
	11	46.1225902	-89.29714735	11	S	P	No Vegetation																															
1	12	46.12205023	-89.29715422	12	S	P				1													1															
	13	46.12151027	-89.29716108	11	S	P	No Vegetation																															
2	14	46.1209703	-89.29716795	13		R																2	1				1										
	15	46.12043033	-89.29717481	9	S	P	No Vegetation															1																
1	16	46.12528527	-89.29633645	1	R	P														1							1										
1	17	46.1247453	-89.29634332	6	S	P																												1				
	18	46.12420533	-89.2963502	14		R	No Vegetation																															
1	19	46.12366536	-89.29635707	16		R																1															
	20	46.12312539	-89.29636395	17		R	No Vegetation																															
1	21	46.12258543	-89.29637082	16		R																					1										
	22	46.12204546	-89.29637769	17		R	No Vegetation																															
1	23	46.12150549	-89.29638457	16		R																1															
	24	46.12096552	-89.29639144	16		R	No Vegetation																															
	25	46.12042555	-89.29639832	17		R	No Vegetation																															
1	26	46.11988558	-89.29640519	8	S	P																												1				
	27	46.11934561	-89.29641206	5	R	P	No Vegetation																															
1	28	46.11826568	-89.29642581	5	S	P																												1				
	29	46.11772571	-89.29643268	6	S	P	No Vegetation																															
	30	46.11718574	-89.29643955	4	S	P	No Vegetation																															
1	31	46.12690039	-89.29553923	2	S	P																									1							
	32	46.12636042	-89.29554611	2	S	P	No Vegetation																															
2	33	46.12582045	-89.295553	2	S	P						1						1	1		1												1	1				
	34	46.12528048	-89.29555988	5	S	P	No Vegetation																															
1	35	46.12474051	-89.29556676	8	S	P				1																								1				
	36	46.12420055	-89.29557365	16		R	No Vegetation																															
	37	46.12366058	-89.29558053	17		R	No Vegetation																															
	38	46.12312061	-89.29558741	17		R	No Vegetation																															
	39	46.12258064	-89.29559429	18		R	No Vegetation																															
	40	46.12204067	-89.29560117	18		R	No Vegetation																															
	41	46.12150071	-89.29560806	17		R	No Vegetation																															
1	42	46.12096074	-89.29561494	17		R																					1										
1	43	46.12042077	-89.29562182	17		R																					1										
	44	46.1198808	-89.2956287	16		R	No Vegetation																															
	45	46.11934083	-89.29563558	14		R	No Vegetation																															
	46	46.11880086	-89.29564246	9	S	P	No Vegetation																															
	47	46.1182609	-89.29564934	12		R	No Vegetation																															
1	48	46.11772093	-89.29565622	13		R																1					1										
	49	46.11718096	-89.2956631	14		R	No Vegetation																															
	50	46.11664099	-89.29566998	2	S	P	No Vegetation																															
	51	46.1268956	-89.29476264	9	S	P	No Vegetation																															
	52	46.12635563	-89.29476953	13		R	No Vegetation																															
	53	46.12581566	-89.29477642	14		R	No Vegetation																															
1	54	46.12527569	-89.29478331	11	S	P																												1				
	55	46.12473573	-89.2947902	12	R	P	No Vegetation																															
	56	46.12419576	-89.29479709	17		R	No Vegetation																															
	57	46.12365579	-89.29480398	17		R	No Vegetation																															
	58	46.12311582	-89.29481087	19		R	No Vegetation																															
	59	46.12257585	-89.29481776				Too Deep																															
	60	46.12203589	-89.29482465	19		R	No Vegetation																															
	61	46.12149592	-89.29483154	19		R	No Vegetation																															

Total Rake Fullness	Point Number	latitude	longitude	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Chara spp.	Dulichium arundinaceum	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Equisetum fluviatile	Eriocaulon aquaticum	Isoetes lacustris	Juncus pelocarpus	Lobelia dortmanna	Myriophyllum tenellum	Najas flexilis	Nitella spp.	Nuphar variegata	Nymphaea odorata	Potamogeton gramineus	Potamogeton pusillus	Ranunculus flammula	Sagittaria latifolia	Sparganium angustifolium	Sparganium fluctuans	Utricularia resupinata	Vallisneria americana	Utricularia cornuta				NOTES
	62	46.12095595	-89.29483843	19		R	No Vegetation																															
1	63	46.12041598	-89.29484532	18		R																					1											
	64	46.11987601	-89.29485221	17		R	No Vegetation																															
	65	46.11933604	-89.2948591	16		R	No Vegetation																															
	66	46.11879608	-89.29486599	12	R	P	No Vegetation																															
	67	46.11825611	-89.29487287	13		R	No Vegetation																															
	68	46.11771614	-89.29487976	14		R	No Vegetation																															
	69	46.11717617	-89.29488665	14		R	No Vegetation																															
	70	46.1166362	-89.29489354	6	S	P	No Vegetation																															
1	71	46.12743077	-89.29397915	1	S	P							1			1	1			1																		
	72	46.1268908	-89.29398605	12		R	No Vegetation																															
2	73	46.12635084	-89.29399295	16		R																		2														
	74	46.12581087	-89.29399985				Too Deep																															
	75	46.1252709	-89.29400675	18		R	No Vegetation																															
	76	46.12473093	-89.29401365	17		R	No Vegetation																															
	77	46.12419096	-89.29402054	18		R	No Vegetation																															
	78	46.123651	-89.29402744	19		R	No Vegetation																															
	79	46.12311103	-89.29403434				Too Deep																															
	80	46.12257106	-89.29404124				Too Deep																															
	81	46.12203109	-89.29404813				Too Deep																															
	82	46.12149112	-89.29405503				Too Deep																															
	83	46.12095116	-89.29406193				Too Deep																															
	84	46.12041119	-89.29406882	19		R	No Vegetation																															
	85	46.11987122	-89.29407572	19		R	No Vegetation																															
	86	46.11933125	-89.29408261	13		R	No Vegetation																															
	87	46.11879128	-89.29408951	15		R	No Vegetation																															
	88	46.11825132	-89.29409641	15		R	No Vegetation																															
	89	46.11771135	-89.2941033	17		R	No Vegetation																															
	90	46.11717138	-89.2941102	13		R	No Vegetation																															
1	91	46.12742597	-89.29320256	1	S	P																			1	1				1	1	1						
1	92	46.126886	-89.29320946	1	S	P													1											1	1							
	93	46.12634604	-89.29321637	5	S	P	No Vegetation																															
	94	46.12580607	-89.29322328	15		R	No Vegetation																															
	95	46.1252661	-89.29323018	18		R	No Vegetation																															
	96	46.12472613	-89.29323709	18		R	No Vegetation																															
	97	46.12418617	-89.29324399	19		R	No Vegetation																															
	98	46.1236462	-89.2932509				Too Deep																															
	99	46.12310623	-89.2932578				Too Deep																															
	100	46.12256626	-89.29326471				Too Deep																															
	101	46.12202629	-89.29327161				Too Deep																															
	102	46.12148633	-89.29327852				Too Deep																															
	103	46.12094636	-89.29328542				Too Deep																															
	104	46.12040639	-89.29329233				Too Deep																															
	105	46.11986642	-89.29329923	20		R	Too Deep																															
	106	46.11932645	-89.29330613	19		R	No Vegetation																															
	107	46.11878649	-89.29331304	19		R	No Vegetation																															
	108	46.11824652	-89.29331994	19		R	No Vegetation																															
	109	46.11770655	-89.29332684	9	R	P	No Vegetation																															
1	110	46.12634123	-89.29243979	1	R	P					1	1				1																						
	111	46.12580126	-89.2924467	10	S	P	No Vegetation																															
	112	46.1252613	-89.29245362	13		R	No Vegetation																															
	113	46.12472133	-89.29246053	19		R	No Vegetation																															
	114	46.12418136	-89.29246744				Too Deep																															
	115	46.12364139	-89.29247436				Too Deep																															
	116	46.12310143	-89.29248127				Too Deep																															
	117	46.12256146	-89.29248818				Too Deep																															
	118	46.12202149	-89.29249509				Too Deep																															
	119	46.12148152	-89.292502				Too Deep																															
	120	46.12094155	-89.29250892				Too Deep																															
	121	46.12040159	-89.29251583				Too Deep																															
	122	46.11986162	-89.29252274				Too Deep																															

Total Rake Fullness	Point Number	latitude	longitude	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Chara spp.	Dulichium arundinaceum	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Equisetum fluviatile	Eriocaulon aquaticum	Isoetes lacustris	Juncus pelocarpus	Lobelia dortmanna	Myriophyllum tenellum	Najas flexilis	Nitella spp.	Nuphar variegata	Nymphaea odorata	Potamogeton gramineus	Potamogeton pusillus	Ranunculus flammula	Sagittaria latifolia	Sparganium angustifolium	Sparganium fluctuans	Utricularia resupinata	Vallisneria americana	Utricularia cornuta				NOTES
	123	46.11932165	-89.29252965				Too Deep																															
	124	46.11878168	-89.29253656	20		R	No Vegetation																															
	125	46.11824171	-89.29254347	19		R	No Vegetation																															
1	126	46.12633642	-89.29166321	2	S	P							1																									
1	127	46.12579645	-89.29167013	14		R																1																
	128	46.12525649	-89.29167705	17		R	No Vegetation																															
	129	46.12471652	-89.29168397	19		R	No Vegetation																															
	130	46.12417655	-89.29169089				Too Deep																															
	131	46.12363658	-89.29169781				Too Deep																															
	132	46.12309662	-89.29170473				Too Deep																															
	133	46.12255665	-89.29171165				Too Deep																															
	134	46.12201668	-89.29171857				Too Deep																															
	135	46.12147671	-89.29172549				Too Deep																															
	136	46.12093675	-89.29173241				Too Deep																															
	137	46.12039678	-89.29173933				Too Deep																															
	138	46.11985681	-89.29174625				Too Deep																															
	139	46.11931684	-89.29175317				Too Deep																															
	140	46.11877687	-89.29176009	20		R	No Vegetation																															
	141	46.11823691	-89.29176701	7	R	P	No Vegetation																															
1	142	46.12633161	-89.29088663	5	S	P							1																									
	143	46.12579164	-89.29089356	19		R	No Vegetation																															
1	144	46.12525167	-89.29090049	18		R																					1											
	145	46.12471171	-89.29090741				Too Deep																															
	146	46.12417174	-89.29091434				Too Deep																															
	147	46.12363177	-89.29092127				Too Deep																															
	148	46.1230918	-89.2909282				Too Deep																															
	149	46.12255183	-89.29093513				Too Deep																															
	150	46.12201187	-89.29094205				Too Deep																															
	151	46.1214719	-89.29094898				Too Deep																															
	152	46.12093193	-89.29095591				Too Deep																															
	153	46.12039196	-89.29096283				Too Deep																															
	154	46.119852	-89.29096976				Too Deep																															
	155	46.11931203	-89.29097669				Too Deep																															
	156	46.11877206	-89.29098361	20		R	No Vegetation																															
	157	46.11823209	-89.29099054	1	R	P	No Vegetation																															
1	158	46.12686675	-89.29010311	4	S	P													1																			
2	159	46.12632679	-89.29011005	8	S	P				1																	1							1				
	160	46.12578682	-89.29011699	16		R	No Vegetation																															
	161	46.12524685	-89.29012392	19		R	No Vegetation																															
	162	46.12470688	-89.29013086				Too Deep																															
	163	46.12416692	-89.29013779				Too Deep																															
	164	46.12362695	-89.29014473				Too Deep																															
	165	46.12308698	-89.29015166				Too Deep																															
	166	46.12254702	-89.2901586				Too Deep																															
	167	46.12200705	-89.29016553				Too Deep																															
	168	46.12146708	-89.29017247				Too Deep																															
	169	46.12092711	-89.2901794				Too Deep																															
	170	46.12038714	-89.29018634				Too Deep																															
	171	46.11984718	-89.29019327				Too Deep																															
	172	46.11930721	-89.29020021				Too Deep																															
	173	46.11876724	-89.29020714	19		R	No Vegetation																															
1	174	46.13118166	-89.28927097	2	S	P												1																				
1	175	46.1306417	-89.28927791	3	S	P												1																1				
1	176	46.13010173	-89.28928486	4	S	P																												1				
1	177	46.1274019	-89.28931958	1	S	P								1					1																			
1	178	46.12686193	-89.28932653	9	M	P				1																												
	179	46.12632196	-89.28933347	14		R	No Vegetation																															
	180	46.12578199	-89.28934041	17		R	No Vegetation																															
	180	46.12524203	-89.28934736				Too Deep																															
	181	46.12470206	-89.2893543	19		R	No Vegetation																															
	182	46.12416209	-89.28936124				Too Deep																															

Total Rake Fullness	Point Number	latitude	longitude	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Chara spp.	Dulichium arundinaceum	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Equisetum fluviatile	Eriocaulon aquaticum	Isoetes lacustris	Juncus pelocarpus	Lobelia dortmanna	Myriophyllum tenellum	Najas flexilis	Nitella spp.	Nuphar variegata	Nymphaea odorata	Potamogeton gramineus	Potamogeton pusillus	Ranunculus flammula	Sagittaria latifolia	Sparganium angustifolium	Sparganium fluctuans	Utricularia resupinata	Vallisneria americana	Utricularia cornuta					NOTES
	183	46.12362213	-89.28936819				Too Deep																																
	184	46.12308216	-89.28937513				Too Deep																																
	185	46.12254219	-89.28938207				Too Deep																																
	186	46.12200222	-89.28938901				Too Deep																																
	187	46.12146226	-89.28939596				Too Deep																																
	189	46.12092229	-89.2894029				Too Deep																																
	190	46.12038232	-89.28940984				Too Deep																																
	191	46.11984235	-89.28941678				Too Deep																																
	192	46.11930238	-89.28942372				Too Deep																																
	193	46.11876242	-89.28943067	19		R	No Vegetation																																
	194	46.13225676	-89.28848041	5	S	P	No Vegetation																																
	195	46.1317168	-89.28848736	10	S	P	No Vegetation																																
1	196	46.13117683	-89.28849432	12		R																1																	
1	197	46.13063686	-89.28850127	13		R																1					1	1											
1	198	46.1300969	-89.28850822	10	S	P																												1					
	199	46.12955693	-89.28851518	1	S	P	No Vegetation																																
	200	46.12739706	-89.28854299				UNREACHABLE																																
	201	46.1268571	-89.28854994	3	S	P	No Vegetation																																
1	202	46.12631713	-89.28855689	4	S	P				1												1																	
	203	46.12577716	-89.28856384	11	S	P	No Vegetation																																
	204	46.1252372	-89.28857079				Too Deep																																
	205	46.12469723	-89.28857774				Too Deep																																
	206	46.12415726	-89.28858469				Too Deep																																
	207	46.12361729	-89.28859164				Too Deep																																
	208	46.12307733	-89.2885986				Too Deep																																
	209	46.12253736	-89.28860555				Too Deep																																
	210	46.12199739	-89.2886125				Too Deep																																
	211	46.12145743	-89.28861945				Too Deep																																
	212	46.12091746	-89.2886264				Too Deep																																
	213	46.12037749	-89.28863334				Too Deep																																
	214	46.11983752	-89.28864029				Too Deep																																
	215	46.11929755	-89.28864724				Too Deep																																
	216	46.11875759	-89.28865419	13		R	No Vegetation																																
1	217	46.13279189	-89.28769679	1	S	P								1																									
	218	46.13225193	-89.28770375	9	S	P	No Vegetation																																
1	219	46.13171196	-89.28771071	13		R																1																	
2	220	46.13117199	-89.28771767	12		R																2																	
1	221	46.13063203	-89.28772463	12		R																1																	
2	222	46.13009206	-89.28773159	12	S	P				1												2																	
1	223	46.12955209	-89.28773855	6	S	P																					1												
2	224	46.12685226	-89.28777335	1	S	P						1					1		1	1																			
1	225	46.12631229	-89.28778031	3	R	P						1																	1					1					
	226	46.12577233	-89.28778727	10	S	P	No Vegetation																																
	227	46.12523236	-89.28779423	16		R	No Vegetation																																
	228	46.12469239	-89.28780119				Too Deep																																
	229	46.12415243	-89.28780815				Too Deep																																
	230	46.12361246	-89.2878151				Too Deep																																
	231	46.12307249	-89.28782206				Too Deep																																
	232	46.12253252	-89.28782902				Too Deep																																
	233	46.12199256	-89.28783598				Too Deep																																
	234	46.12145259	-89.28784293				Too Deep																																
	235	46.12091262	-89.28784989				Too Deep																																
	236	46.12037266	-89.28785685				Too Deep																																
	237	46.11983269	-89.28786381				Too Deep																																
	238	46.11929272	-89.28787076				Too Deep																																
	239	46.13332702	-89.28691315	1	S	P	No Vegetation																																
	240	46.13278705	-89.28692012	5	S	P	No Vegetation																																
1	241	46.13224708	-89.28692708	10	S	P				1												1																	
1	242	46.13170712	-89.28693405	13		R																1						1											
1	243	46.13116715	-89.28694102	13		R																1						1											
1	244	46.13062719	-89.28694799	12		R																1																	

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1	245	46.13008722	-89.28695496	12		R																1					1											
1	246	46.12954725	-89.28696193	10	S	P				1																1											
1	247	46.12900729	-89.28696889	4	S	P																											1					
	248	46.12684742	-89.28699676	1	R	P	No Vegetation																															
1	249	46.12630745	-89.28700373	7	S	P				1																							1					
	250	46.12576749	-89.2870107	11	S	P	No Vegetation																															
	251	46.12522752	-89.28701766				Too Deep																															
	252	46.12468755	-89.28702463				Too Deep																															
	253	46.12414758	-89.2870316	11		R	No Vegetation																															
	254	46.12360762	-89.28703856	14		R	No Vegetation																															
	255	46.12306765	-89.28704553				Too Deep																															
	256	46.12252768	-89.28705249				Too Deep																															
	257	46.12198772	-89.28705946	18		R	No Vegetation																															
1	258	46.12144775	-89.28706642	1	R	P								1					1																			
	259	46.12090778	-89.28707339	6	S	P	No Vegetation																															
	260	46.12036781	-89.28708035				Too Deep																															
	261	46.11982785	-89.28708732				Too Deep																															
	262	46.11928788	-89.28709428				Too Deep																															
1	263	46.11874791	-89.28710125	1	S	P													1																			
	264	46.13332217	-89.28613647	3	S	P	No Vegetation																															
	265	46.1327822	-89.28614345	6	S	P	No Vegetation																															
1	266	46.13224224	-89.28615042	12		R																1																
1	267	46.13170227	-89.2861574	16		R																1					1											
1	268	46.1311623	-89.28616437	10	S	P				1																												
	269	46.13062234	-89.28617135	10	S	P	No Vegetation																															
	270	46.13008237	-89.28617833	13		R	No Vegetation																															
1	271	46.12954241	-89.2861853	14		R																1					1											
1	272	46.12900244	-89.28619228	11	S	P																1																
1	273	46.12846247	-89.28619925	1	S	P								1					1								1				1							
1	274	46.12684257	-89.28622018	2	S	P												1	1	1							1											
	275	46.12630261	-89.28622715	11	S	P	No Vegetation																															
	276	46.12576264	-89.28623413	18		R	No Vegetation																															
	277	46.12522267	-89.2862411				Too Deep																															
	278	46.12468271	-89.28624807				Too Deep																															
	279	46.12414274	-89.28625505	6	R	P	No Vegetation																															
	280	46.12360277	-89.28626202	16		R	No Vegetation																															
	281	46.1230628	-89.28626899				Too Deep																															
	282	46.12252284	-89.28627597	19		R	No Vegetation																															
1	283	46.12198287	-89.28628294	4	S	P																											1					
	285	46.12036297	-89.28630386				Too Deep																															
	286	46.119823	-89.28631083				Too Deep																															
	287	46.11928303	-89.2863178	10	S	P	No Vegetation																															
	288	46.11874307	-89.28632477	4	S	P	No Vegetation														V																	
	289	46.1182031	-89.28633174	1	S	P													1						V													
	289	46.11766313	-89.28633872	7	S	P	No Vegetation																															
	290	46.11712316	-89.28634569				UNREACHABLE																															
	291	46.1165832	-89.28635266				UNREACHABLE																															
1	292	46.13331732	-89.28535979	4	S	P																					1								1			
	293	46.13277735	-89.28536678	7	S	P	No Vegetation																															
	294	46.13223738	-89.28537376	13		R	No Vegetation																															
	295	46.13169742	-89.28538074	17		R	No Vegetation																															
	296	46.13115745	-89.28538773	17		R	No Vegetation																															
	297	46.13061749	-89.28539471	16		R	No Vegetation																															
1	298	46.13007752	-89.28540169	16		R																						1										
	299	46.12953755	-89.28540868	15		R	No Vegetation																															
1	300	46.12899759	-89.28541566	14		R																1																
1	301	46.12845762	-89.28542264	8		R																1													1			
	302	46.12683772	-89.28544359	7	S	P	No Vegetation																															
1	303	46.12629775	-89.28545057	19		R																1																
	304	46.12575779	-89.28545755				Too Deep																															
	305	46.12521782	-89.28546454				Too Deep																															

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	306	46.12467785	-89.28547152				Too Deep																															
	307	46.12413789	-89.2854785	7	S	P	No Vegetation																															
	308	46.12359792	-89.28548548	13		R	No Vegetation																															
	309	46.12305795	-89.28549246	19		R	No Vegetation																															
	310	46.12251799	-89.28549944	6	S	P	No Vegetation																															
	311	46.12197802	-89.28550642	2	S	P	No Vegetation																															
	312	46.12035812	-89.28552736				UNREACHABLE																															
	313	46.11981815	-89.28553434	19		R	No Vegetation																															
	314	46.11927818	-89.28554132				Too Deep																															
	315	46.11873822	-89.2855483				Too Deep																															
	316	46.11819825	-89.28555528				Too Deep																															
	317	46.11765828	-89.28556226	16		R	No Vegetation																															
	318	46.11711831	-89.28556924	5	S	P	No Vegetation																															
1	319	46.13385242	-89.28457612	1	S	P								1																									
1	320	46.13331246	-89.28458311	5	S	P																												1					
	321	46.13277249	-89.28459011	9	S	P	No Vegetation																															
1	322	46.13223253	-89.2845971	17		R																	1															
	323	46.13169256	-89.28460409	17		R	No Vegetation																															
1	324	46.13115259	-89.28461108	18		R																						1										
	325	46.13061263	-89.28461807	17		R	No Vegetation																															
	326	46.13007266	-89.28462506	17		R	No Vegetation																															
	327	46.12953269	-89.28463205	16		R	No Vegetation																															
	328	46.12899273	-89.28463904	17		R	No Vegetation																															
	329	46.12845276	-89.28464603	17		R	No Vegetation																															
	330	46.1279128	-89.28465303	6	S	P	No Vegetation																															
	331	46.12737283	-89.28466002	11	S	P	No Vegetation																															
	332	46.12683286	-89.284667				Too Deep																															
	333	46.1262929	-89.28467399				Too Deep																															
	334	46.12575293	-89.28468098				Too Deep																															
	335	46.12521296	-89.28468797				Too Deep																															
	336	46.124673	-89.28469496	9	S	P	No Vegetation																															
1	337	46.12359306	-89.28470894	3	S	P							1						1	1																		
	338	46.1230531	-89.28471593	3	S	P	No Vegetation																															
	339	46.11981329	-89.28475785	7	S	P	No Vegetation																															
	340	46.11927333	-89.28476484				Too Deep																															
	341	46.11873336	-89.28477183				Too Deep																															
	342	46.11819339	-89.28477881				Too Deep																															
	343	46.11765343	-89.2847858				Too Deep																															
	344	46.11711346	-89.28479279	14		R	No Vegetation																															
	345	46.13438752	-89.28379244				UNREACHABLE																															
	346	46.13384756	-89.28379944	3	S	P	No Vegetation																												V			
	347	46.13330759	-89.28380644	7	S	P	No Vegetation																															
1	348	46.13276763	-89.28381344	10	S	P				1																												
	349	46.13222766	-89.28382044	18		R	No Vegetation																															
	350	46.1316877	-89.28382744	19		R	No Vegetation																															
	351	46.13114773	-89.28383443	19		R	No Vegetation																															
	352	46.13060776	-89.28384143				Too Deep																															
	353	46.1300678	-89.28384843	18		R	No Vegetation																															
	354	46.12952783	-89.28385543	18		R	No Vegetation																															
	355	46.12898787	-89.28386243	18		R	No Vegetation																															
	356	46.1284479	-89.28386943	12		R	No Vegetation																															
	357	46.12790793	-89.28387642	18		R	No Vegetation																															
	358	46.12736797	-89.28388342				Too Deep																															
	359	46.126828	-89.28389042				Too Deep																															
	360	46.12628803	-89.28389742				Too Deep																															
	361	46.12574807	-89.28390441				Too Deep																															
	362	46.1252081	-89.28391141	9	R	P	No Vegetation																															
	363	46.11926847	-89.28398836	18		R	No Vegetation																															
	364	46.1187285	-89.28399536				Too Deep																															
	365	46.11818853	-89.28400235				Too Deep																															
	366	46.11764856	-89.28400934				Too Deep																															

Total Rake Fullness	Point Number	latitude	longitude	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Chara spp.	Dulichium arundinaceum	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Equisetum fluviatile	Eriocaulon aquaticum	Isoetes lacustris	Juncus pelocarpus	Lobelia dortmanna	Myriophyllum tenellum	Najas flexilis	Nitella spp.	Nuphar variegata	Nymphaea odorata	Potamogeton gramineus	Potamogeton pusillus	Ranunculus flammula	Sagittaria latifolia	Sparganium angustifolium	Sparganium fluctuans	Utricularia resupinata	Vallisneria americana	Utricularia cornuta				NOTES
	367	46.1171086	-89.28401634	19		R	No Vegetation																															
	368	46.11656863	-89.28402333	8	S	P	No Vegetation																															
1	369	46.13438266	-89.28301575	1	S	P													1																			
1	370	46.13384269	-89.28302275	9	S	P				1																												
1	371	46.13330272	-89.28302976	13		R																					1										
	372	46.13276276	-89.28303677	13		R	No Vegetation																															
	373	46.13222279	-89.28304377	18		R	No Vegetation																															
	374	46.13168283	-89.28305078				Too Deep																															
	375	46.13114286	-89.28305779				Too Deep																															
	376	46.1306029	-89.28306479				Too Deep																															
	377	46.13006293	-89.2830718				Too Deep																															
	378	46.12952296	-89.28307881				Too Deep																															
	379	46.128983	-89.28308581				Too Deep																															
	380	46.12844303	-89.28309282	19		R	No Vegetation																															
	381	46.12790307	-89.28309982	19		R	No Vegetation																															
	382	46.1273631	-89.28310683				Too Deep																															
	383	46.12682313	-89.28311383				Too Deep																															
	384	46.12628317	-89.28312084				Too Deep																															
	385	46.1257432	-89.28312784				Too Deep																															
	386	46.12520323	-89.28313485	20		R	No Vegetation																															
	387	46.12466327	-89.28314185	17		R	No Vegetation																															
1	388	46.1192636	-89.28321188	13		R																	1															
	389	46.11872363	-89.28321888				Too Deep																															
	390	46.11818367	-89.28322589				Too Deep																															
	391	46.1176437	-89.28323289	20		R	No Vegetation																															
	392	46.11710373	-89.28323989				Too Deep																															
	393	46.11656376	-89.28324689	19		R	No Vegetation																															
	394	46.1160238	-89.28325389	7	S	P	No Vegetation																															
1	395	46.13437778	-89.28223905	6	S	P																																
1	396	46.13383782	-89.28224607	10	S	P				1																	1											
	397	46.13329785	-89.28225308	17		R	No Vegetation																															
	398	46.13275788	-89.2822601				Too Deep																															
	399	46.13221792	-89.28226711				Too Deep																															
	400	46.13167795	-89.28227413				Too Deep																															
	401	46.13113799	-89.28228114				Too Deep																															
	402	46.13059802	-89.28228816				Too Deep																															
	403	46.13005806	-89.28229517				Too Deep																															
	404	46.12951809	-89.28230218				Too Deep																															
	405	46.12897812	-89.2823092				Too Deep																															
	406	46.12843816	-89.28231621	19		R	No Vegetation																															
	407	46.12789819	-89.28232322	16		R	No Vegetation																															
	408	46.12735823	-89.28233023	19		R	No Vegetation																															
	409	46.12681826	-89.28233725	19		R	No Vegetation																															
	410	46.12627829	-89.28234426				Too Deep																															
	411	46.12573833	-89.28235127	19		R	No Vegetation																															
1	412	46.12519836	-89.28235828	19		R																					1										
	413	46.12465839	-89.2823653	18		R	No Vegetation																															
	414	46.12411843	-89.28237231	15		R	No Vegetation																															
	415	46.11925873	-89.2824354	8	S	P	No Vegetation																															
	416	46.11871876	-89.28244241	13		R	No Vegetation																															
	417	46.11817879	-89.28244942	17		R	No Vegetation																															
	418	46.11763883	-89.28245643				Too Deep																															
	419	46.11709886	-89.28246344				Too Deep																															
	420	46.11655889	-89.28247045				Too Deep																															
	421	46.11601892	-89.28247746				Too Deep																															
	422	46.11547896	-89.28248446	10		R	No Vegetation																															
	423	46.11493899	-89.28249147	5	S	P	No Vegetation																															
1	424	46.1343729	-89.28146236	4	S	P							1																									
	425	46.13383294	-89.28146938	7	S	P	No Vegetation																															
	426	46.13329297	-89.28147641	14		R	No Vegetation																															
	427	46.13275301	-89.28148343				Too Deep																															

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	428	46.13221304	-89.28149045				Too Deep																															
	429	46.13167307	-89.28149747				Too Deep																															
	430	46.13113311	-89.2815045				Too Deep																															
	431	46.13059314	-89.28151152				Too Deep																															
	432	46.13005318	-89.28151854				Too Deep																															
	433	46.12951321	-89.28152556				Too Deep																															
	434	46.12897325	-89.28153258				Too Deep																															
	435	46.12843328	-89.2815396	13		R	No Vegetation																															
	436	46.12789331	-89.28154662	13		R	No Vegetation																															
	437	46.12735335	-89.28155364	8	S	P	No Vegetation																															
	438	46.12681338	-89.28156066	10		R	No Vegetation																															
	439	46.12627341	-89.28156768	18		R	No Vegetation																															
	440	46.12573345	-89.2815747	18		R	No Vegetation																															
	441	46.12519348	-89.28158172	16		R	No Vegetation																															
	442	46.12465352	-89.28158874	8	R	P	No Vegetation																															
	443	46.12411355	-89.28159576	5	S	P	No Vegetation																															
	444	46.11871388	-89.28166594	6	S	P																																
	445	46.11817392	-89.28167296	8	S	P	No Vegetation																															
	446	46.11763395	-89.28167997	18		R																					1										
	447	46.11709398	-89.28168699	19		R	No Vegetation																															
	448	46.11655402	-89.28169401	20			Too Deep																															
	449	46.11601405	-89.28170102				Too Deep																															
	450	46.11547408	-89.28170804	19		R	No Vegetation																															
1	451	46.11493411	-89.28171505	8	S	P				1													1															
	452	46.11439415	-89.28172207				UNREACHABLE																															
1	453	46.13436802	-89.28068567	4	S	P																					1							1			
	454	46.13382805	-89.2806927	7	S	P	No Vegetation																															
1	455	46.13328809	-89.28069973	10	S	P				1																												
	456	46.13274812	-89.28070676				Too Deep																															
	457	46.13220815	-89.28071379				Too Deep																															
	458	46.13166819	-89.28072082				Too Deep																															
	459	46.13112822	-89.28072785				Too Deep																															
	460	46.13058826	-89.28073488				Too Deep																															
	461	46.13004829	-89.28074191				Too Deep																															
	462	46.12950833	-89.28074894				Too Deep																															
	463	46.12896836	-89.28075596				Too Deep																															
	464	46.1284284	-89.28076299				Too Deep																															
	465	46.12788843	-89.28077002				Too Deep																															
	466	46.12734846	-89.28077705				UNREACHABLE																															
1	467	46.1268085	-89.28078408	1	R	P							1																									
	468	46.12626853	-89.2807911	4	S	P	No Vegetation																															
	469	46.12572857	-89.28079813	12		R	No Vegetation																															
	470	46.1251886	-89.28080516	6	S	P	No Vegetation																															
	471	46.11816903	-89.28089649	4	S	P	No Vegetation																															
	472	46.11762907	-89.28090352	12		R	No Vegetation																															
	473	46.1170891	-89.28091054	16		R	No Vegetation																															
	474	46.11654913	-89.28091757	18		R	No Vegetation																															
	475	46.11600917	-89.28092459				Too Deep																															
	476	46.1154692	-89.28093161	15		R	No Vegetation																															
	477	46.11492923	-89.28093864	5	S	P	No Vegetation																															
1	478	46.13436313	-89.27990898	2	S	P																												1			
1	479	46.13382316	-89.27991602	6	S	P																																
1	480	46.1332832	-89.27992305	7	S	P				1																	1										
1	481	46.13274323	-89.27993009	15		R				1																												
	482	46.13220326	-89.27993713	15		R	No Vegetation																															
	483	46.1316633	-89.27994417				Too Deep																															
	484	46.13112333	-89.2799512				Too Deep																															
	485	46.13058337	-89.27995824				Too Deep																															
	486	46.1300434	-89.27996528				Too Deep																															
	487	46.12950344	-89.27997231				Too Deep																															
	488	46.12896347	-89.27997935				Too Deep																															

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	489	46.12842351	-89.27998639				Too Deep																																
	490	46.12788354	-89.27999342				Too Deep																																
	491	46.12734357	-89.28000046	11	R	P	No Vegetation																																
	492	46.12680361	-89.28000749	8	S	P	No Vegetation																																
1	493	46.12626364	-89.28001453	9	S	P				1																													
	494	46.12572368	-89.28002156	11		R	No Vegetation																																
	495	46.12518371	-89.2800286				UNREACHABLE																																
	496	46.11762418	-89.28012706	5	S	P	No Vegetation																																
	497	46.11708421	-89.28013409	7	S	P	No Vegetation																																
	498	46.11654425	-89.28014112	7	S	P	No Vegetation																																
	499	46.11600428	-89.28014816	16		R	No Vegetation																																
1	500	46.11546431	-89.28015519	5	S	P							1																										
1	501	46.13435823	-89.27913229	2	S	P						1	1							1																				
1	502	46.13381827	-89.27913933	7	S	P				1																													
1	503	46.1332783	-89.27914638	9	S	P				1																												1		
	504	46.13273834	-89.27915342	11	S	P	No Vegetation																																
	505	46.13219837	-89.27916047	12		R	No Vegetation																																
	506	46.1316584	-89.27916751	18		R	No Vegetation																																
	507	46.13111844	-89.27917456				Too Deep																																
	508	46.13057847	-89.2791816				Too Deep																																
	509	46.13003851	-89.27918865				Too Deep																																
	510	46.12949854	-89.27919569				Too Deep																																
	511	46.12895858	-89.27920273				Too Deep																																
	512	46.12841861	-89.27920978				Too Deep																																
	513	46.12787865	-89.27921682				Too Deep																																
	514	46.12733868	-89.27922386				Too Deep																																
1	515	46.12679871	-89.27923091	15		R				1																													
1	516	46.12625875	-89.27923795	15		R																	1																
1	517	46.12571878	-89.27924499	2	S	P														1																			
1	518	46.11599939	-89.27937172	6	S	P																														1		
	519	46.11545942	-89.27937876				UNREACHABLE																																
1	520	46.13381336	-89.27836265	6	S	P																													1			
1	521	46.1332734	-89.2783697	7	S	P				1																1												
1	522	46.13273343	-89.27837676	10	S	P				1																1												
1	523	46.13219347	-89.27838381	13		R				1																												
	524	46.1316535	-89.27839086	15		R	No Vegetation																																
	525	46.13111354	-89.27839791				Too Deep																																
	526	46.13057357	-89.27840496				Too Deep																																
	527	46.13003361	-89.27841202				Too Deep																																
	528	46.12949364	-89.27841907				Too Deep																																
	529	46.12895368	-89.27842612				Too Deep																																
	530	46.12841371	-89.27843317				Too Deep																																
	531	46.12787375	-89.27844022				Too Deep																																
	532	46.12733378	-89.27844727				Too Deep																																
	533	46.12679381	-89.27845432				Too Deep																																
	534	46.12625385	-89.27846137	9	S	P	No Vegetation																																
2	535	46.13380846	-89.27758597	2	S	P						1							1	1	2					1								1					
1	536	46.13326849	-89.27759303	7	S	P				1																1												
1	537	46.13272853	-89.27760009	8	S	P				1																												
1	538	46.13218856	-89.27760715	10	S	P				1																												
	539	46.1316486	-89.27761421	12		R	No Vegetation																																
	540	46.13110863	-89.27762127				Too Deep																																
	541	46.13056867	-89.27762833				Too Deep																																
	542	46.1300287	-89.27763539				Too Deep																																
	543	46.12948874	-89.27764245				Too Deep																																
	544	46.12894877	-89.2776495				Too Deep																																
	545	46.12840881	-89.27765656				Too Deep																																
	546	46.12786884	-89.27766362				Too Deep																																
	547	46.12732888	-89.27767068				Too Deep																																
	548	46.12678891	-89.27767774				Too Deep																																
1	549	46.12624894	-89.2776848	2	S	P											1	1	1	1																		

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1	550	46.13380355	-89.27680928	1	S	P						1		1							1																		
1	551	46.13326358	-89.27681635	6	S	P													1																				
	552	46.13272362	-89.27682342	6	S	P	No Vegetation																																
	553	46.13218365	-89.27683049	10		R	No Vegetation																																
	554	46.13164369	-89.27683756	17		R	No Vegetation																																
	555	46.13110372	-89.27684462				Too Deep																																
	556	46.13056376	-89.27685169				Too Deep																																
	557	46.13002379	-89.27685876				Too Deep																																
	558	46.12948383	-89.27686582				Too Deep																																
	559	46.12894386	-89.27687289				Too Deep																																
	560	46.1284039	-89.27687996				Too Deep																																
	561	46.12786393	-89.27688702				Too Deep																																
	562	46.12732396	-89.27689409				Too Deep																																
	563	46.126784	-89.27690115	19		R	No Vegetation																																
1	564	46.13325867	-89.27603968	4	S	P				1									1	1																			
	565	46.1327187	-89.27604675	6	S	P	No Vegetation																																
	566	46.13217874	-89.27605383	9	S	P	No Vegetation																																
	567	46.13163877	-89.2760609	20		R	Too Deep																																
	568	46.13109881	-89.27606798				Too Deep																																
	569	46.13055884	-89.27607505				Too Deep																																
	570	46.13001888	-89.27608213				Too Deep																																
	571	46.12947891	-89.2760892				Too Deep																																
	572	46.12893895	-89.27609628				Too Deep																																
	573	46.12839898	-89.27610335				Too Deep																																
	574	46.12785901	-89.27611042				Too Deep																																
	575	46.12731905	-89.2761175				Too Deep																																
	576	46.12677908	-89.27612457	16		R	No Vegetation																																
	577	46.12569915	-89.27613872	7	S	P	No Vegetation																																
	578	46.12515919	-89.27614579	12	S	P	No Vegetation																																
	579	46.12461922	-89.27615286	1	S	P	No Vegetation																		V	V													
2	580	46.13325374	-89.275263	4	S	P							2						1																				
	581	46.13271378	-89.27527009	12		R	No Vegetation																																
	582	46.13217381	-89.27527717	15			No Vegetation																																
	583	46.13163385	-89.27528425				Too Deep																																
	584	46.13109388	-89.27529133				Too Deep																																
	585	46.13055392	-89.27529842				Too Deep																																
	586	46.13001395	-89.2753055				Too Deep																																
	587	46.12947399	-89.27531258				Too Deep																																
	588	46.12893402	-89.27531966				Too Deep																																
	589	46.12839406	-89.27532674				Too Deep																																
	590	46.12785409	-89.27533382				Too Deep																																
	591	46.12731413	-89.2753409				Too Deep																																
	592	46.12677416	-89.27534799				Too Deep																																
	593	46.1262342	-89.27535507				Too Deep																																
	594	46.12569423	-89.27536215				Too Deep																																
	595	46.12515427	-89.27536923				Too Deep																																
	596	46.1246143	-89.27537631	5	S	P	No Vegetation																																
1	597	46.13324882	-89.27448633	1	S	P						1	1					1			1																		
	598	46.13270885	-89.27449342	9	S	P	No Vegetation																																
	599	46.13216889	-89.27450051				Too Deep																																
	600	46.13162892	-89.2745076				Too Deep																																
	601	46.13108896	-89.27451469				Too Deep																																
	602	46.13054899	-89.27452178				Too Deep																																
	603	46.13000903	-89.27452887				Too Deep																																
	604	46.12946906	-89.27453596				Too Deep																																
	605	46.1289291	-89.27454305				Too Deep																																
	606	46.12838913	-89.27455014				Too Deep																																
	607	46.12784917	-89.27455723				Too Deep																																
	608	46.1273092	-89.27456431				Too Deep																																
	609	46.12676924	-89.2745714				Too Deep																																
	610	46.12622927	-89.27457849				Too Deep																																

Total Rake Fullness	Point Number	latitude	longitude	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Myriophyllum spicatum	Potamogeton crispus	Chara spp.	Dulichium arundinaceum	Elatine minima	Eleocharis acicularis	Eleocharis palustris	Elodea canadensis	Equisetum fluviatile	Eriocaulon aquaticum	Isoetes lacustris	Juncus pelocarpus	Lobelia dortmanna	Myriophyllum tenellum	Najas flexilis	Nitella spp.	Nuphar variegata	Nymphaea odorata	Potamogeton gramineus	Potamogeton pusillus	Ranunculus flammula	Sagittaria latifolia	Sparganium angustifolium	Sparganium fluctuans	Utricularia resupinata	Vallisneria americana	Utricularia cornuta				NOTES
	611	46.12568931	-89.27458558				Too Deep																															
	612	46.12514934	-89.27459267				Too Deep																															
1	613	46.12460938	-89.27459975	3	S	P												1																				
	614	46.13270392	-89.27371675	2	S	P	No Vegetation																															
	615	46.13216396	-89.27372385	12		R	No Vegetation																															
	616	46.13162399	-89.27373095				Too Deep																															
	617	46.13108403	-89.27373804				Too Deep																															
	618	46.13054406	-89.27374514				Too Deep																															
	619	46.1300041	-89.27375224				Too Deep																															
	620	46.12946413	-89.27375934				Too Deep																															
	621	46.12892417	-89.27376643				Too Deep																															
	622	46.1283842	-89.27377353				Too Deep																															
	623	46.12784424	-89.27378063				Too Deep																															
	624	46.12730427	-89.27378772				Too Deep																															
	625	46.12676431	-89.27379482				Too Deep																															
	626	46.12622434	-89.27380191				Too Deep																															
	627	46.12568438	-89.27380901				Too Deep																															
	628	46.12514441	-89.27381611	15		R	No Vegetation																															
	629	46.13215902	-89.27294719				UNREACHABLE																															
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	634	46.12945919	-89.27298272				Too Deep																															
	635	46.12891923	-89.27298982				Too Deep																															
	636	46.12837926	-89.27299692	15		R	No Vegetation																															
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	638	46.12729933	-89.27301113	13		R	No Vegetation																															
	639	46.12675937	-89.27301824				Too Deep																															
	640	46.1262194	-89.27302534				Too Deep																															
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	645	46.12999422	-89.27219898	4	S	P	No Vegetation																															
	646	46.12945425	-89.27220609	8	S	P	No Vegetation																															
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	650	46.12729439	-89.27223454	5	S	P	No Vegetation																															
	651	46.12675443	-89.27224165	6	S	P	No Vegetation																															
	652	46.12621446	-89.27224876	6	S	P																																
	653	46.1256745	-89.27225587	1	S	P	No Vegetation																															

F

APPENDIX F

WDNR Creel Survey Data

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
CREEL SURVEY REPORT

BIG PORTAGE LAKE

VILAS COUNTY

2006-07

Treaty Fisheries Publication

Written by Steve Kramer
Treaty Fisheries Technician

Edited by Michael A. Coshun
Treaty Fisheries Biologist

May 2007

CONTENTS

SUMMARY TABLES

Cover Art: Steve Hilt, Minocqua, WI
Fish Graphics: Virgil Beck, Stevens Point, WI

INTRODUCTION

Fish populations can fluctuate due to natural forces (weather, predation, competition), management actions (stocking, regulations, habitat improvement), inappropriate development (habitat degradation), and harvest impacts. Wisconsin Department of Natural Resources fisheries crews regularly conduct fishery surveys on area lakes and reservoirs to gather the information needed to monitor changes, identify concerns, evaluate past management actions, and to prescribe good fishery management strategies. Netting and electrofishing surveys are used to gather data on the status of fish populations and communities (species composition, population size, reproductive success, size/age distribution, and growth rates). But the other key component of the fishery that we often need to measure is the harvest.

On many lakes in the Ceded Territory of northern Wisconsin, harvest of fish is divided between sport anglers and the six Chippewa tribes who harvest fish under rights granted by federal treaties. The tribes harvest fish mostly using a highly efficient method, spearing, during a relatively short time period in the spring. Every fish in the spear harvest is counted – a complete "census" of the harvest.

We also measure the sport harvest to assess its impact on the fishery. But because it would be highly impractical and very costly to conduct a complete census of every angler who fishes on a lake, we conduct creel surveys.

A creel survey is an assessment tool used to sample the fishing activities of anglers on a body of water and make projections of harvest and other fishery parameters. Creel survey clerks work on randomly-selected days and shifts, forty hours per week during the open season for gamefish from the first Saturday in May through the first Sunday in March, except during the month of November when fishing effort is low and ice conditions are often unsafe. The survey is run during daylight hours, and shift times change from month to month as day length changes.

Creel survey clerks travel their lakes using a boat or snowmobile to count numbers of anglers on a lake at predetermined times, and to interview anglers who have completed their fishing trip to collect data on what species they fished for, catch, harvest, lengths of fish harvested, marks (finclips or tags), and hours of fishing effort. Collecting completed-trip data provides the most accurate assessment of angling activities, and it avoids the need to disturb anglers while they are fishing.

A computer program is used to make projections of total catch and harvest of each species, catch and harvest rates, and total fishing effort, by month and for the year in total. Keep in mind that these are only projections based on the best information available, and not a complete accounting of effort, catch, and harvest. Accurate projections require that we sample a sufficient and representative portion of the angling activity on a lake. The accuracy of creel survey results, therefore, depends on good cooperation and truthful responses by anglers when a creel clerk interviews them.

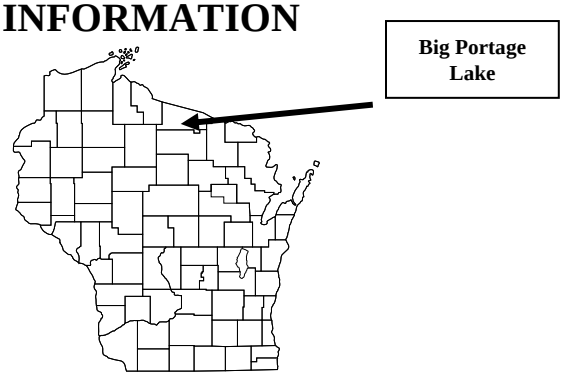
You may have encountered a DNR creel survey clerk on a recent fishing trip. We appreciate your cooperation during an interview. The survey only takes a moment of your time and it gives the Department valuable information needed for management of the fishery.

This report provides projections of:

1. Overall fishing pressure
2. Fishing effort directed at each species
3. Catch and harvest rates
4. Numbers of fish caught and harvested.

Also included are a physical description of Big Portage Lake; discussion of results of the survey; and detailed summaries, by species of fishing effort, catch and harvest.

GENERAL LAKE INFORMATION



Location
Big Portage Lake is located in Vilas County approximately 4 miles southwest of the town of Land O'Lakes.

Physical Characteristics
Big Portage Lake is a 638-acre seepage lake of low fertility with a maximum depth of 38 feet. Littoral substrate consists primarily of sand, gravel and rock. Big Portage Lake has clear water of high transparency.

Seasons Surveyed
The period referred to in this report as the 2006-fishing season ran from May 6, 2006 through March 4, 2007. The open water creel survey ran from May 6 through October 31, 2006 and the ice fishing creel survey ran from December 1, 2006 through March 4, 2007.

Weather
Ice-out on Big Portage Lake was around April 19, 2006 which is considered normal for northern Wisconsin. Spring, summer and fall weather was normal. Fishable-ice formed on Big Portage Lake in early December.

Sportfishing Regulations
The following seasons, daily bag limits, and length limits were in place on Big Portage Lake during the 2006-fishing season:

Species	Season	Bag Limit	Min. Size
Largemouth Bass&	5/06-6/17	Catch & Release	
Smallmouth Bass	6/18-3/04	5	14"
Musky	5/27-11/30	1	34"
Northern Pike	5/06-3/04	5	none
Walleye	5/06-3/04	2*	
No Minimum, 14"-18" Protected Slot, 1>18"			
Panfish	year round	25	none
Rock Bass	year round	none	none

* The statewide bag limit was 5 fish, but due to tribal declarations it was reduced on Big Portage Lake.

SPECIES CATCH AND HARVEST INFORMATION

Angling information is summarized for each species (Figures 1-10) with effort and/or catch information. Information presented about species whose fishing season extends beyond March 4 should be considered minimum estimates. Each species page has up to five graphs depicting the following:

1. **PROJECTED FISHING EFFORT**
   Total calculated number of hours during each month that anglers spent fishing for a species.

2. PROJECTED SPECIFIC CATCH AND HARVEST RATES
Calculated number of hours it takes an angler to catch or harvest a fish of the indicated species. Only information from anglers who were specifically targeting that species is reported.

3. PROJECTED CATCH AND HARVEST
Calculated number of fish of the indicated species caught or harvested by all anglers, regardless of targeted species.

4. LENGTH DISTRIBUTION OF HARVESTED FISH
All fish of a species that were measured by the clerk during the entire creel survey season.

5. LARGEST AND AVERAGE LENGTH OF HARVESTED FISH
Monthly largest and average length of harvested fish of a species. Only those fish measured by the creel survey clerk are reported.

CREEL SURVEY RESULTS AND DISCUSSION

Survey Logistics
The creel survey went well. We encountered no unusual problems conducting the survey or calculating the projections contained in the report. This was the first time the department conducted a creel survey on Big Portage Lake.

General Angler Information
Anglers spent 9,137 hours or 14.3 hours per acre fishing Big Portage Lake during the 2006 season (Table 1). That was less than half the statewide average of 33.6 hours per acre and the Vilas County average of 36.2 hours per acre. May was the most heavily fished month (4.1 hours per acre). Fishing effort was lightest in February (0.2 hours per acre).

SPECIES INFORMATION

Walleye (Table 2, Figure 1)
Walleye received the most fishing pressure in Big Portage Lake during the 2006 season. Anglers spent 8,375 hours targeting walleye. Walleye fishing effort was greatest in May (2,612 hours). February had the least amount of walleye fishing effort (69 hours).

Catch was 4,221 fish and harvest 1,560 fish. Highest catch (2,401 fish) and harvest (816 fish) occurred in May. Anglers fished 2.0 hours to catch and 5.4 hours to harvest a walleye during 2006.

The mean length of harvested walleye was 13.6 inches and the largest walleye measured was a 23.5-inch fish harvested in July.

Northern Pike (Table 2, Figure 2)
Fishing effort directed at northern pike was 51 hours during the 2006 season. Big Portage Lake has a low density of northern pike.

Catch was 3 fish and harvest was 3 fish. The mean length of harvested northern pike was 22.1 inches and the largest northern pike measured was a 22.1-inch fish.

Smallmouth Bass (Table 2, Figure 4)
Fishing effort targeted at smallmouth bass was 901 hours during the 2006 season. Smallmouth bass fishing effort was greatest in June (307 hours). 842 smallmouth bass were caught with 9 fish harvested. Highest

catch (564 fish) occurred in June. Anglers fished 1.4 hours to catch a smallmouth bass during 2006.

Largemouth Bass (Table 2, Figure 5)
Fishing effort directed at largemouth bass was 60 hours during the 2006 season. Largemouth bass fishing effort was greatest in September (44 hours).

Catch was 22 fish and harvest 0 fish. The only month catch (22 fish) occurred was September. Anglers fished 15.8 hours to catch a largemouth bass during 2006.

Panfish (Table 2, Figures 6-10)
Panfish effort was 1,928 hours during the 2006 season.

Yellow perch was the most sought after panfish during the survey. Yellow perch comprised 93% of panfish effort, 87% of catch and 95% of panfish harvest. Anglers fished 3.5 hours to catch and 4.4 hour to harvest a yellow perch during 2006. The mean length of harvested yellow perch was 10.5 inches and the largest yellow perch measured was a 13.5-inch fish harvested in May.

Other panfish caught during the 2005 survey include, bluegill (50 caught, 19 harvested) and rock bass (32 caught, 5 harvested).

ACKNOWLEDGMENTS

Completion of this survey was possible because of the efforts of the technical staff of the Treaty Fisheries Unit. Treaty staff responsible for ensuring completion of this survey includes Steve Kramer, Joelle Underwood, Marty Kiepke, Tim Tobias, and Jason Halverson. John Logan and Doug Day were the creel clerks on Big Portage Lake during the survey period.

The Department thanks the cooperators who generously allowed the department to keep a boat and snowmobile on their property during this survey.

We also thank fish management staff who worked in conjunction with the creel survey performing in-water sampling of the fish community.

We also thank all the anglers who took the time to offer information about their fishing trip to the survey clerk. Without their cooperation the survey would not have been possible.

Additional copies of this report and those covering other local lakes can be obtained from the Woodruff DNR. Requests should be directed to:

Mike Coshun
Treaty Fisheries Biologist
WI Department of Natural Resources
8770 Hwy. J
Woodruff, WI 54568
e-mail:
Michael.Coshun@dnr.state.wi.us

Table 1. Sportfishing effort summary, Big Portage Lake, 2006-07 season.

Month	Total Angler Hours	Total Angler Hours/Acre	Vilas County Average Hours/Acre	Statewide Average Hours/Acre
May	2612	4.1	5.4	5.8
June	1696	2.7	7.1	6.1
July	1433	2.2	7.7	6.4
August	1278	2.0	6.7	5.4
September	873	1.4	4.2	3.8
October	191	0.3	2.0	1.6
December	287	0.4	0.5	1.7
January	521	0.8	0.7	1.5
February	120	0.2	0.9	1.3
March	127	0.2	0.1	**
*Summer Total	8083	12.7	34.1	29.1
*Winter Total	1055	1.7	2.1	4.5
Grand Total	9137	14.3	36.2	33.6

*"Summer" is May-October; "Winter" is December-March
**Too few lakes have been surveyed in March to give a meaningful statewide average.

Total Angler Hours is the estimated total number of hours that anglers spent fishing on Big Portage Lake during each month surveyed.

Total Angler Hours/Acre is the total angler hours divided by the area of the lake in acres. This is useful if you wish to compare effort on Big Portage Lake to other lakes.

County Average Hours/Acre is the average angler effort in hours per acre for county lakes that have been surveyed since 1990. This value can be useful in comparisons as well.

Statewide Average Hours/Acre is the average angler effort in hours per acre for inland lakes in the state surveyed between 1990 and 1995. This value can be used to compare Big Portage Lake to other lakes statewide.

Table 2. Creel survey synopses, Big Portage Lake, 2006-07 fishing season.

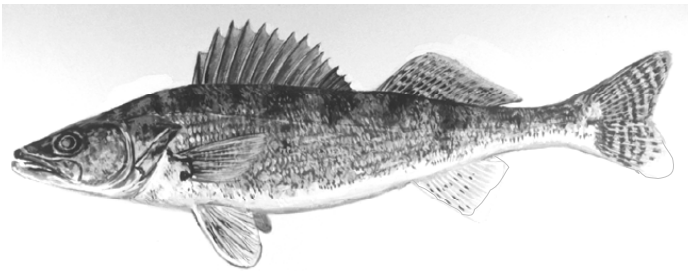
CREEL YEAR: 2006-07

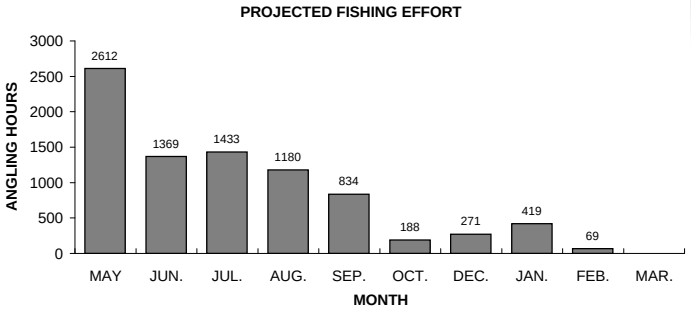
SPECIES	DIRECTED EFFORT (Hours)	PERCENT OF TOTAL	TOTAL CATCH	SPECIFIC CATCH RATE (Hrs/Fish) *	TOTAL HARVEST	SPECIFIC HARVEST RATE (Hrs/Fish) **	MEAN LENGTH OF HARVESTED FISH
Walleye	8375	73.78%	4221	2.0	1560	5.4	13.6
Northern Pike	51	0.4%	3		3		22.1
Muskellunge	37	0.33%	0		0		
Smallmouth Bass	901	7.94%	842	1.4	9	125.0	16.0
Largemouth Bass	60	0.53%	22	15.8	0		
Yellow Perch	1787	15.74%	550	3.5	441	4.4	10.5
Bluegill	111	0.98%	50		19		8.6
Rock Bass	30	0.26%	32		5		

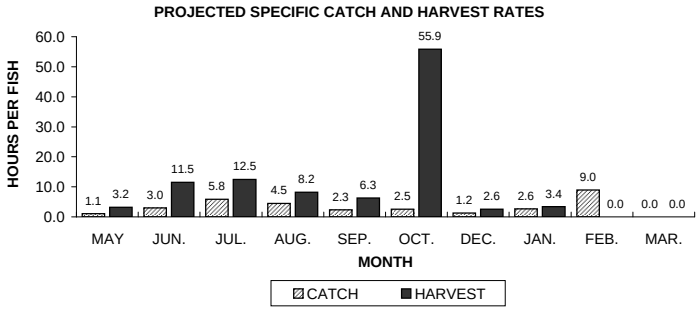
* A blank cell in this column indicates that no fish of a given species were caught by anglers who specifically targeted that species.

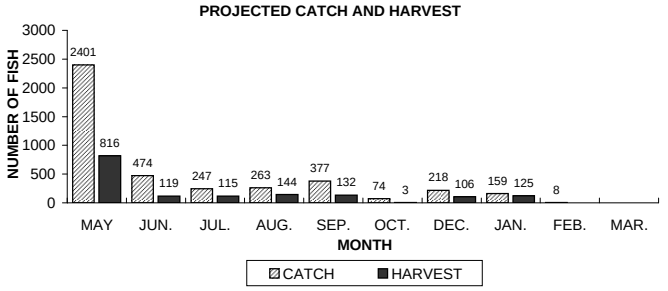
** A blank cell in this column indicates that no fish of a given species were harvested by anglers who specifically targeted that species.

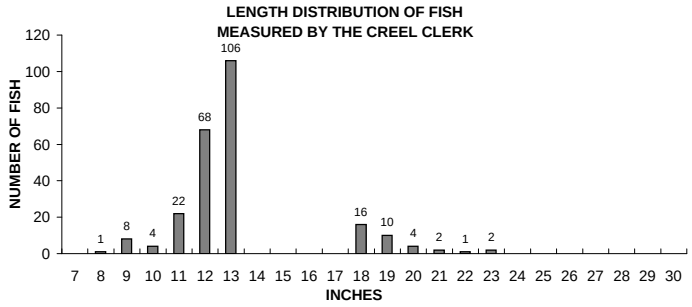
WALLEYE











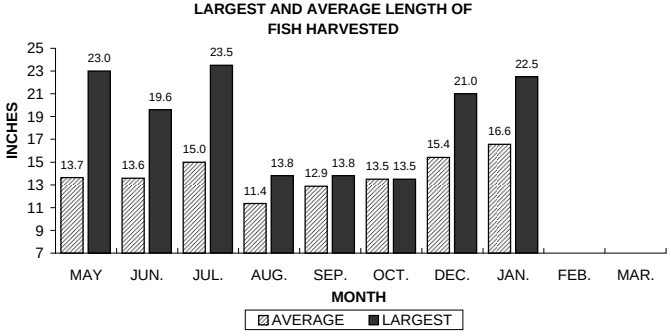
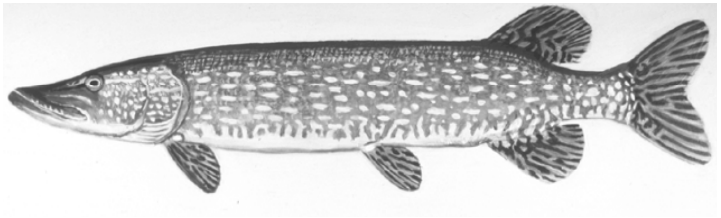
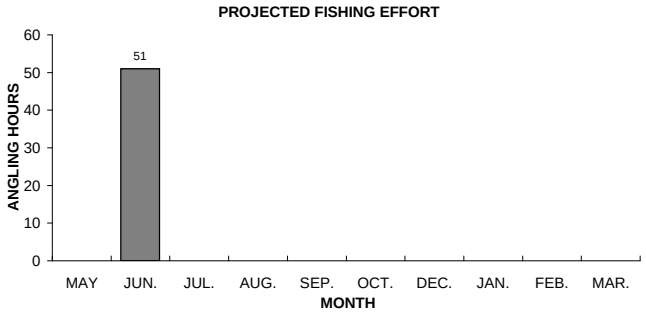
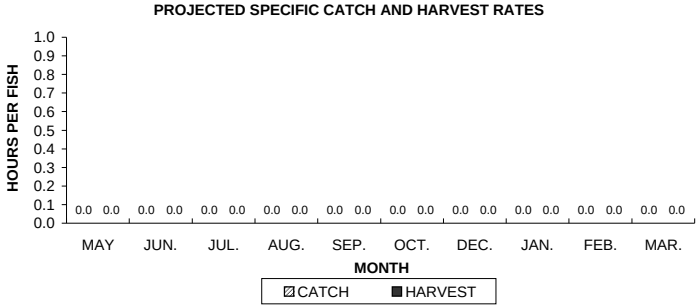


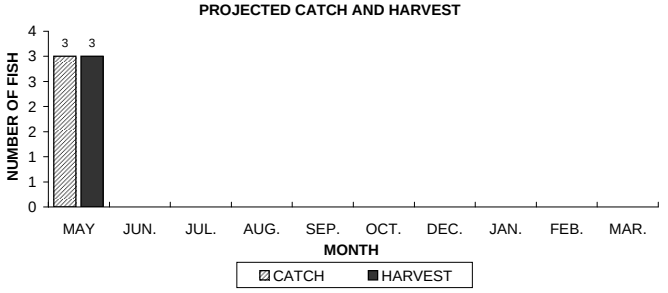
Figure 1. Walleye sportfishing effort, catch, harvest, and length distribution, Big Portage Lake, during 2006-07.

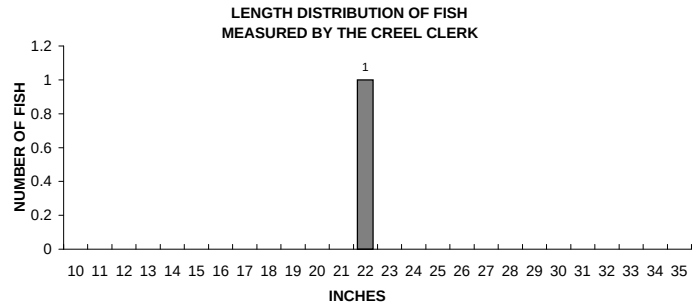
NORTHERN PIKE











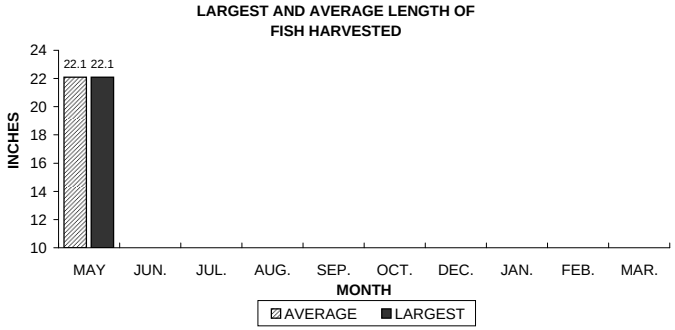
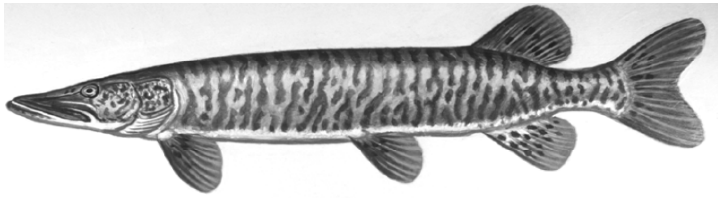
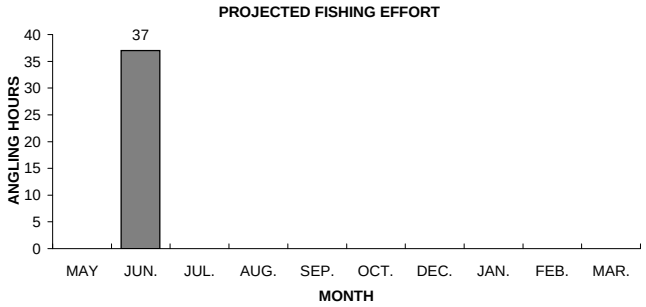
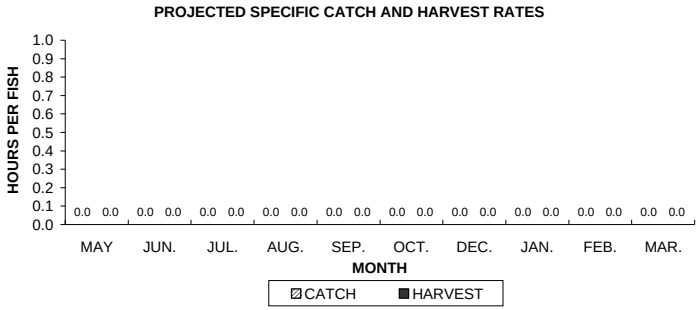


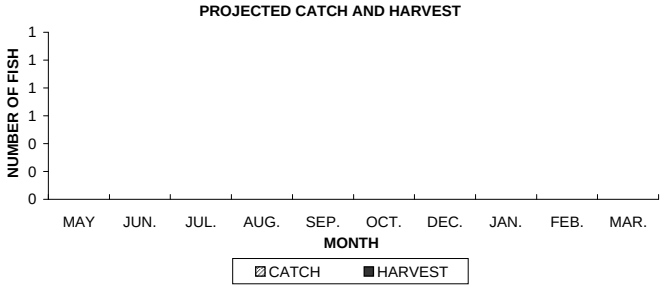
Figure 2. Northern pike sportfishing effort, catch, harvest, and length distribution, Big Portage Lake, during 2006-07.

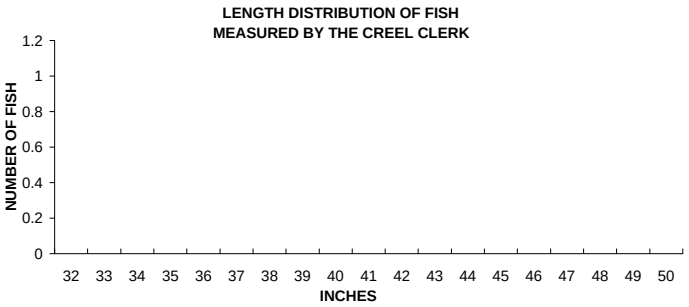
MUSKELLUNGE











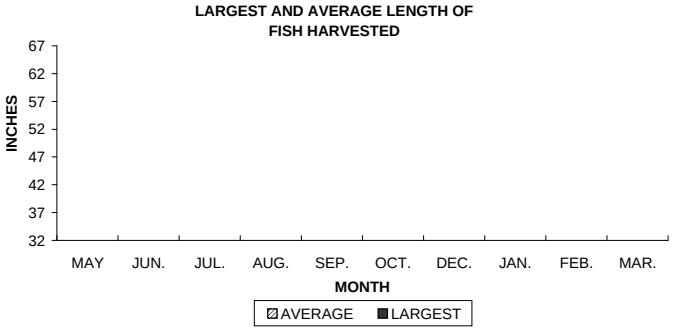
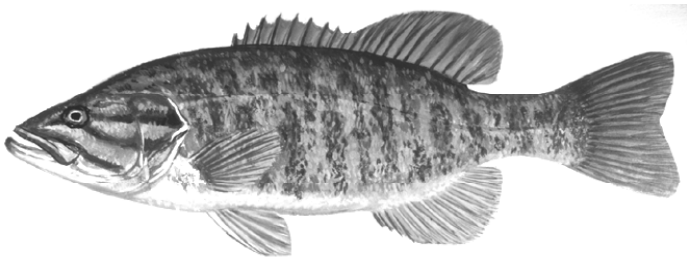
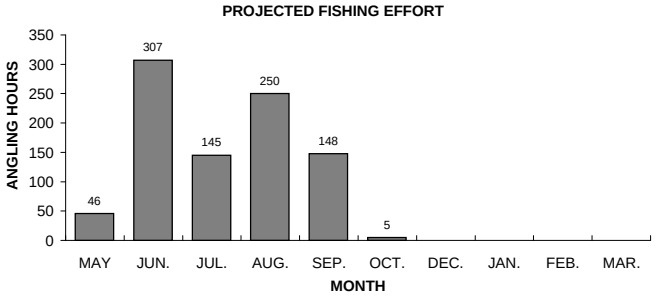
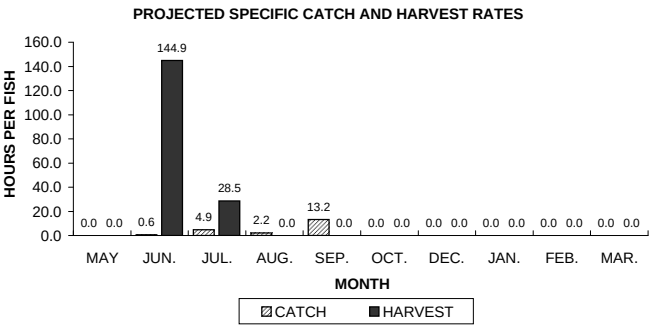


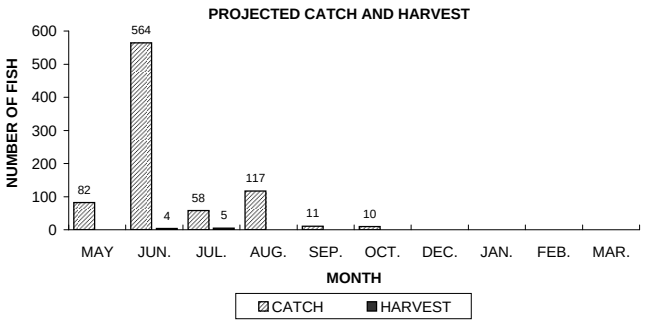
Figure 3. Muskellunge sportfishing effort, catch, harvest, and length distribution, Big Portage Lake, during 2006-07.

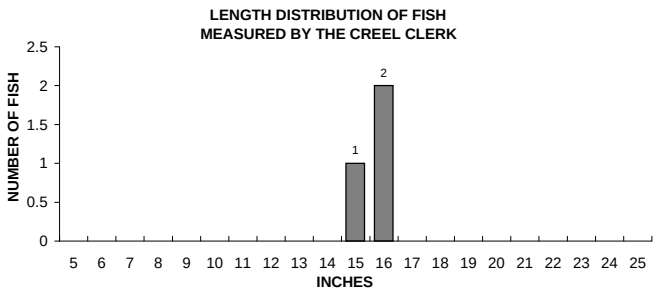
SMALLMOUTH BASS











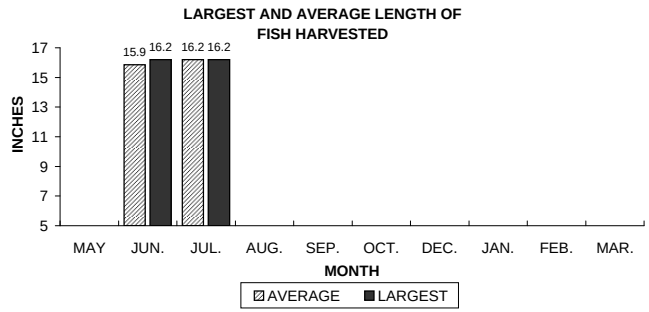
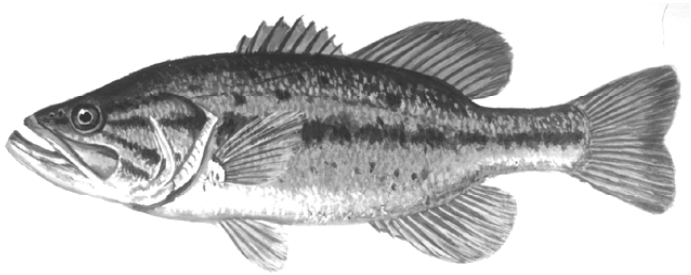
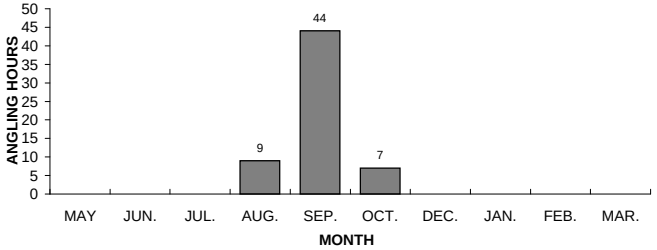


Figure 4. Smallmouth bass sportfishing effort, catch, harvest, and distribution, Big Portage Lake, during 2006-07.

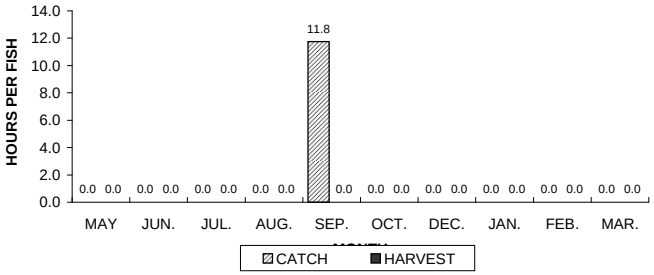
LARGEMOUTH BASS



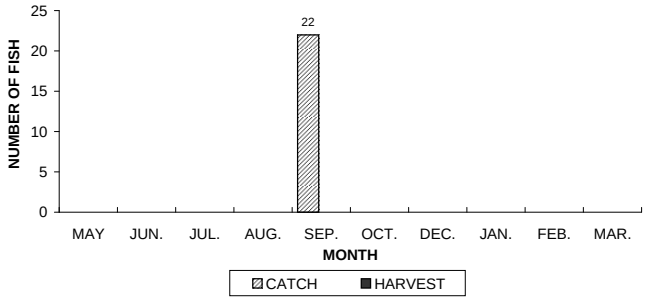
PROJECTED FISHING EFFORT



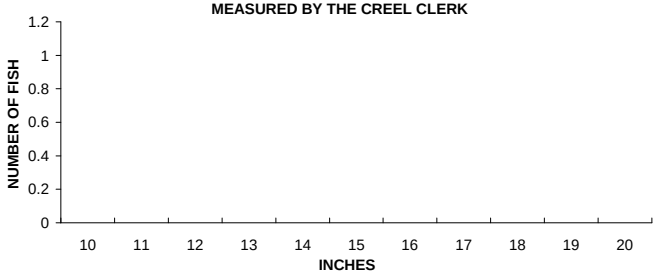
PROJECTED SPECIFIC CATCH AND HARVEST RATES



PROJECTED CATCH AND HARVEST



LENGTH DISTRIBUTION OF FISH
MEASURED BY THE CREEL CLERK



LARGEST AND AVERAGE LENGTH OF
FISH HARVESTED

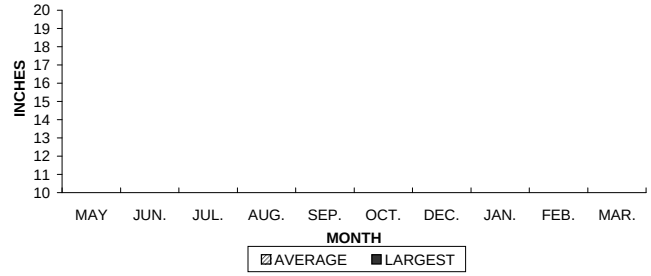
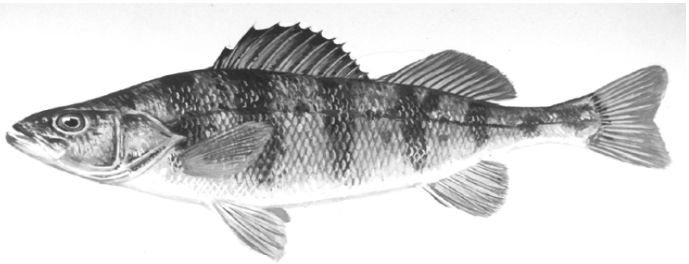
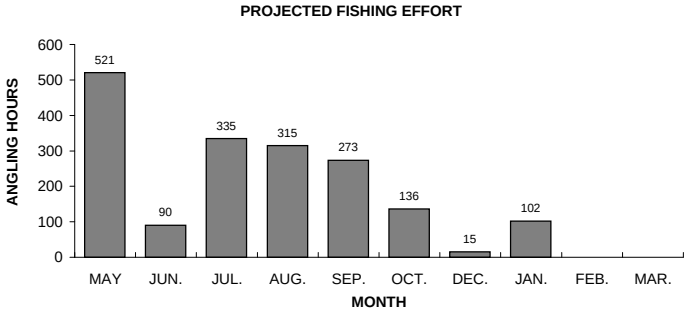
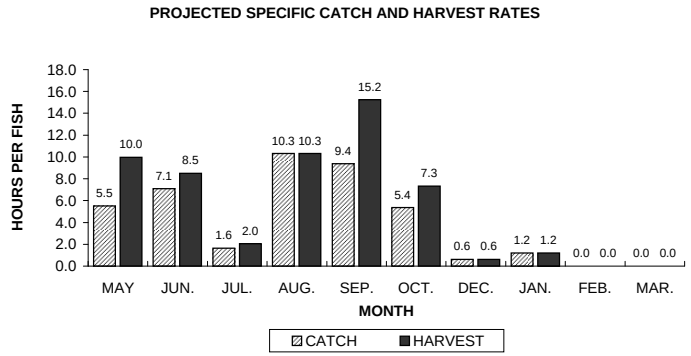


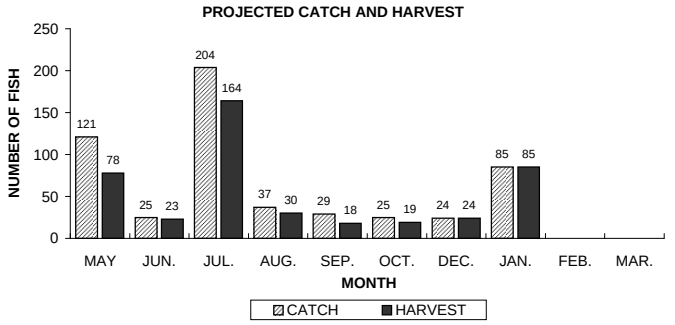
Figure 5. Largemouth bass sportfishing effort, catch, harvest, and length distribution, Big Portage Lake, during 2006-07.

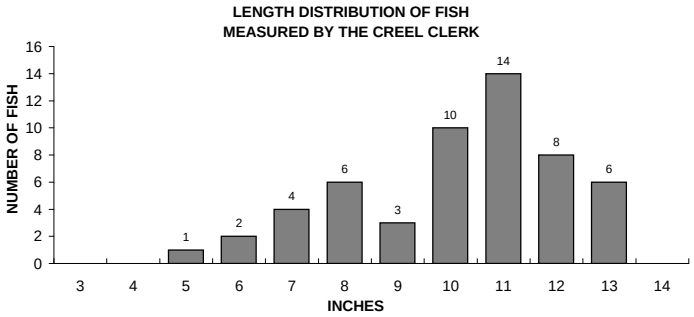
YELLOW PERCH











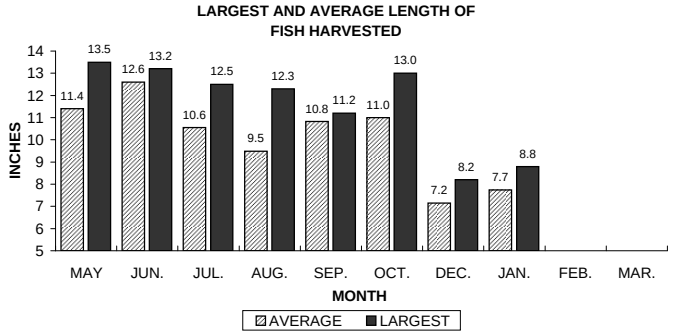
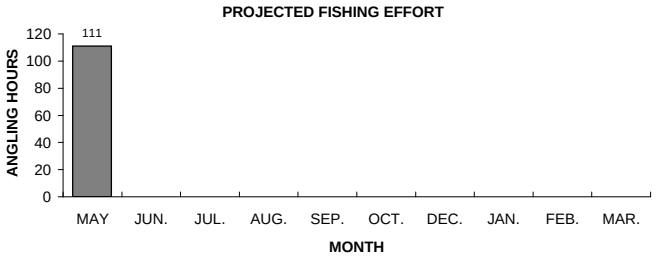
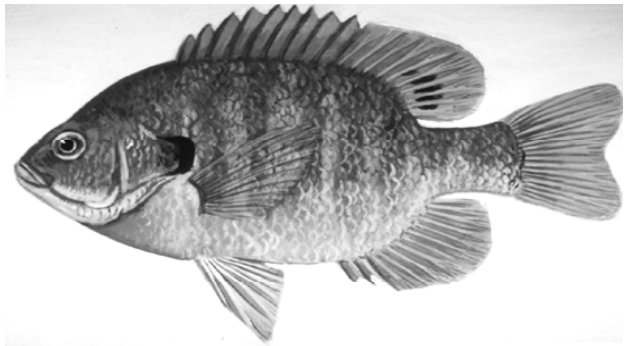
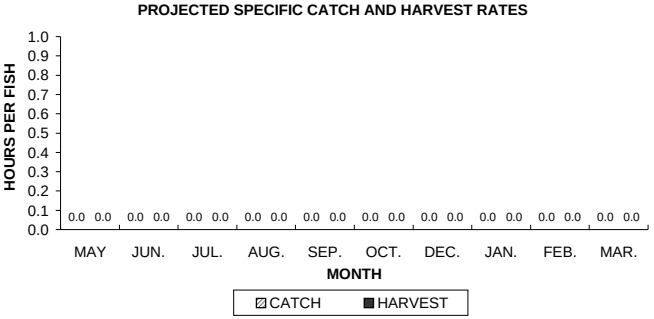


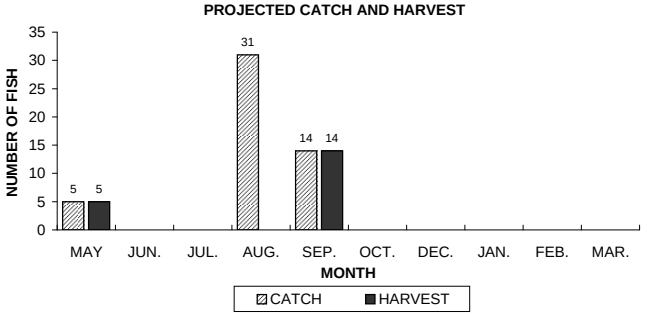
Figure 6. Yellow perch sportfishing effort, catch, harvest, and length distribution, Big Portage Lake, during 2006-07.

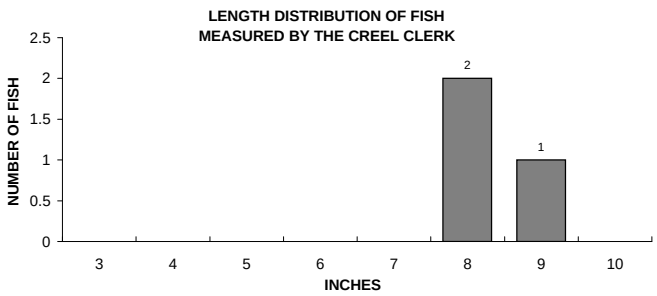
BLUEGILL











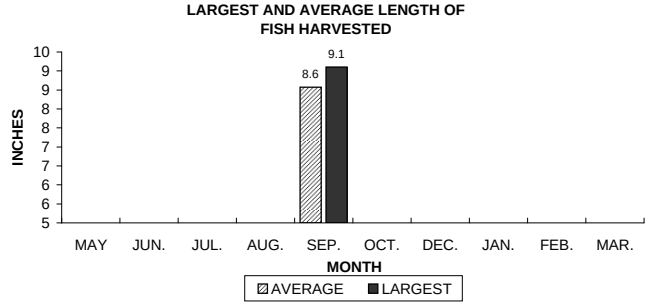
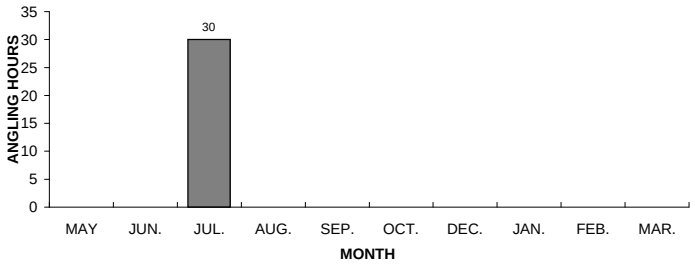
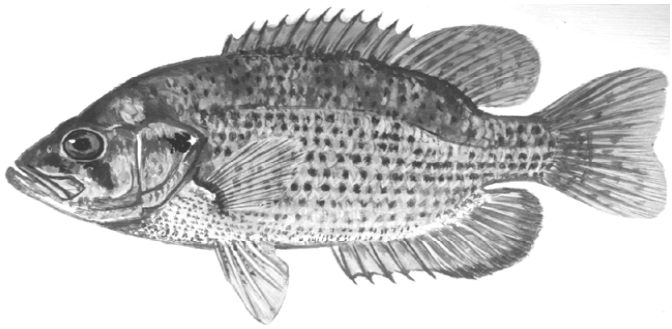
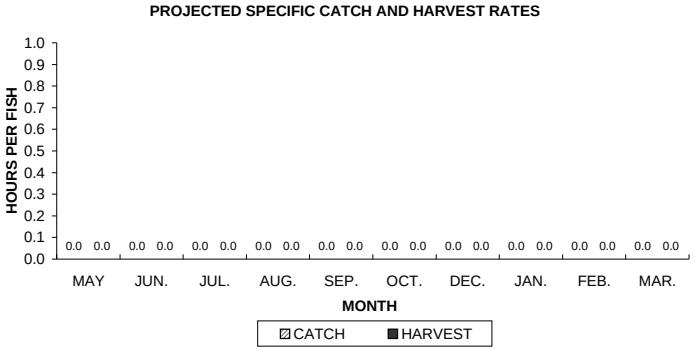


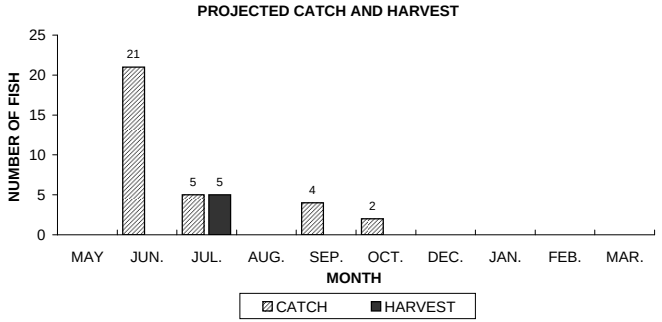
Figure 7. Bluegill sportfishing effort, catch, harvest, and length distribution, Big Portage Lake, during 2006-07.

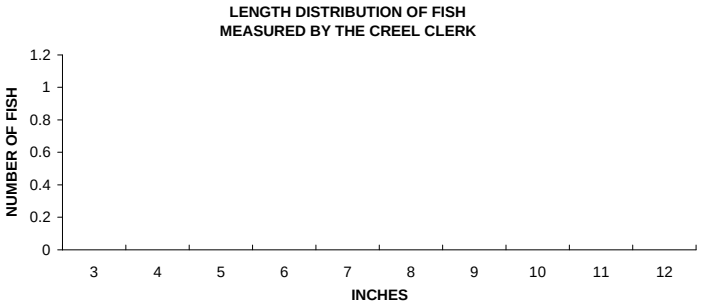
ROCK BASS











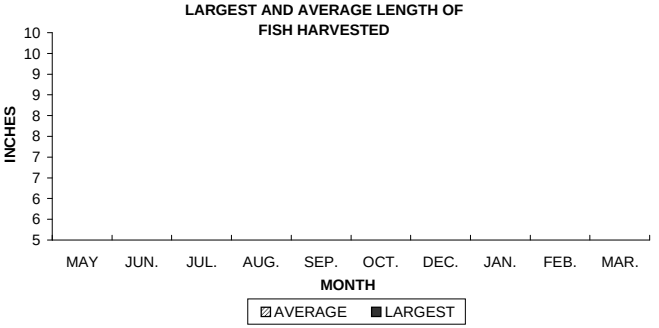


Figure 8. Rock bass sportfishing effort, catch, harvest, and length distribution, Big Portage Lake, during 2006-07.