A

APPENDIX A

Stakeholder Participation Materials

Nelson Lake Comprehensive Lake Management Plan
Project Kick-Off Meeting – June 11, 2005 at 8:30 am

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

The Nelson Lake Association has received two grants from the Wisconsin Department of Natural Resources to partially fund the completion of a comprehensive lake management plan for Nelson Lake. The project has two primary parts, the first being the completion of an in-depth study including plant surveys, water quality sampling, and watershed investigations; the second being the completion of a long-term management plan for the lake and its watershed. The project will incorporate opportunities for stakeholder education and input, which are both very important components of any lake management planning effort. The first opportunity for your participation in the process will be at the Project Kick-off Meeting to be held on Saturday, June 11th at 8:30 am at the VFW in Hayward.

During the meeting, Tim Hoyman, an aquatic ecologist with Onterra, LLC of Green Bay, will make a presentation describing the project and its importance. His presentation will include a description of each of the project's components, a quick course on lake ecology, and breakdown of how the Association's Planning Committee will be involved in the plan's completion. So, please plan on attending the meeting and do not hesitate to ask Tim questions or make comments.

Project Kick-off Meeting
June 11, 2005

Presentation Outline

- Introduction to Lake Ecology
- Current Lake Project
  - Goals
  - Components
  - Timeline

General Lake Ecology

- Eutrophication – *Natural lake aging*
- Trophic States
  - Oligotrophic
  - Mesotrophic
  - Eutrophic
- Cultural Eutrophication – *Accelerated eutrophication caused by human activity*
- Phosphorus
  - Limiting Nutrient
  - Controls Plant Abundance (Productivity)
    - Algae – Simple plants
    - Macrophytes – Advanced, vascular plants
- Aquatic Plants (macrophytes)
  - Native Plants
    - Base of food web
    - Cover (not only fish)
    - Nursery
    - Sediment Stabilization
  - Exotic Plants (non-native)
    - Curly-leaf pondweed
    - Eurasian water-milfoil
  - Consequences of Exotics
    - Competition with native plants
    - Decreased recreational value
    - Decreased property value

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Onterra LLC
Lake Management Planning

Comprehensive Lake Management Plan

- Study and Plan Goals
  - Collect & analyze data
  - Construct long-term & useable plan
- Study Components
  - Public participation
  - Watershed modeling
  - Water quality
  - Aquatic vegetation
    - Curly-leaf pondweed survey
    - Comprehensive survey
  - Plan development
- Stakeholder Participation is Important
  - Concerns
  - Observations
  - Questions

Tim Hoyman holds a Master of Science Degree in Limnology from Iowa State University, a Bachelor of Science Degree in Biology/Chemistry from the University of Wisconsin—Whitewater and is a Certified Lake Manager (CLM) through the North American Lake Management Society (NALMS). During his graduate studies, Tim gained extensive knowledge in lake and river ecology, including water analysis, aquatic vegetation surveys, lake mapping, and lake management and restoration, while completing numerous studies and reports for various lake associations, the Iowa DNR, and the EPA. During the past five years in Wisconsin, Tim has managed over twenty lake-related projects including the completion of seven lake management plans and involvement in numerous shoreland restorations along with the implementation of in-depth nutrient loading studies and diagnostic/feasibilities studies. Tim grew up in Neenah, WI and currently lives in De Pere, with his wife and three daughters.

Onterra, LLC is a newly-formed company by Tim Hoyman, a familiar face in Wisconsin lake management. The firm's focus revolves around lake management planning from an ecosystem point of view. Onterra provides a variety of lake-related services ranging from science-based diagnostic/feasibility studies to comprehensive lake management plans consisting of aquatic plant inventories, stakeholder education, watershed and water quality analysis, and implementation plan development.

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Onterra LLC
Lake Management Planning

Nelson Lake Association

Project Kick-off
June 11, 2005

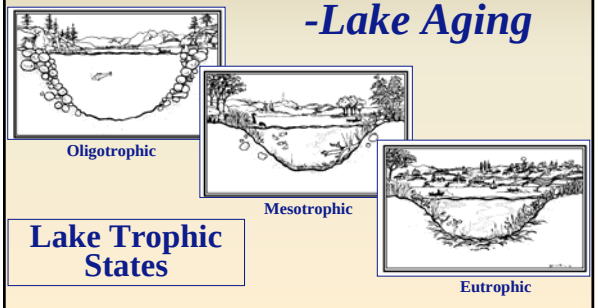
Timothy A. Hoyman, CLM
Onterra LLC
Lake Management Planning

Presentation Outline

- Introduction to Lake Ecology
- Current Lake Project
  - Goals
  - Components
  - Timeline

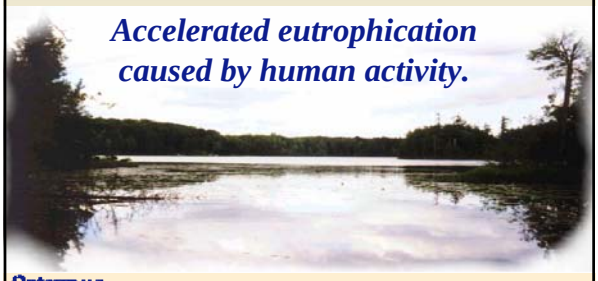
General Lake Ecology

Eutrophication -Lake Aging



Lake Trophic States

Cultural Eutrophication



Accelerated eutrophication caused by human activity.

Phosphorus

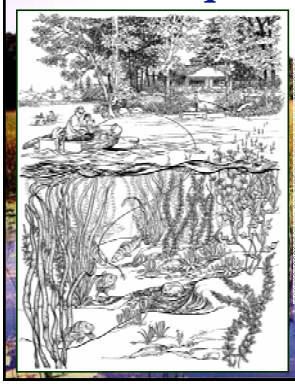
- *Limiting Nutrient*
- *Controls Plant Abundance (Productivity)*
  - *Algae*
  - *Macrophytes*

General Lake Ecology

Aquatic Plants (macrophytes)

- *Native Plants*
- *Exotic Plants (non-native)*

Native Aquatic Plants

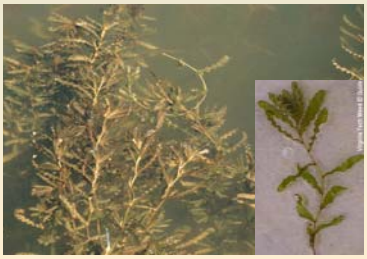


- Base of the Food Web
- Cover (not only fish)
- Nursery
- Sediment Stabilization

General Lake Ecology

Non-native Aquatic Plants

Curly-leaf Pondweed



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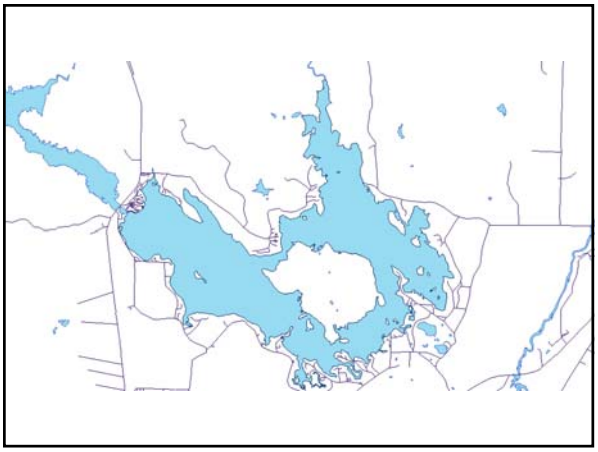

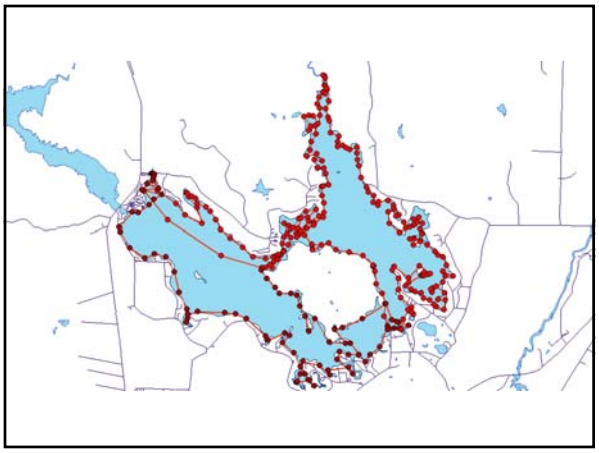

Not Curly-leaf Pondweed

General Lake Ecology

Non-native Aquatic Plants

Eurasian Water-Milfoil

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General Lake Ecology

Consequences of Exotics

- Competition with Natives
  - Monotypic Community
- Decreased Recreational Value
- Decreased Property Value

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Current Project

Study and Plan Goals

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

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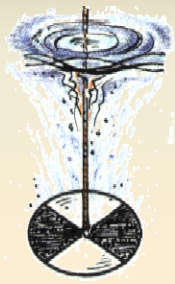
Current Project

Study Components

- Public Participation
- Watershed Modeling
- Water Quality
- Aquatic Vegetation
  - Curly-leaf Survey
  - Comprehensive Survey
- Plan Development



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Current Project

Your Participation is Important to the Success of this Project

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Current Project

- Concerns
- Observations
- Questions

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Thank You

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

Wisconsin Lakes Partnership

UW Extension

WISCONSIN DEPT OF NATURAL RESOURCES

Onterra LLC

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Nelson Lake Comprehensive Management Plan

Project Update – September 2005

Submitted By: Tim Hoyman, Aquatic Ecologist, Onterra

The end of August signals that another field season on the lakes will be ending soon. This summer was much better than last summer with warmer air and water temperatures. Although the drought the encompassed most of Wisconsin this summer is not good for crops or lake levels, it makes getting the field studies completed much easier (and drier).

The comprehensive aquatic plant study was completed on Nelson Lake during the week of July 25th. We spent nearly 45 hours over three and a half days assessing the lake's plant communities. A portion of this study used the point-intercept method where we sampled aquatic plants at predetermined points on the lake (see map). The 768 points were spaced every 120 meters (roughly 393 feet). Not all of the points were visited because some areas of the lake are too deep for plant growth. At each point that was sampled, we identified all of the plants and recorded depth and bottom type. These results will be the bulk of the aquatic plant data used to create the lake management plan.

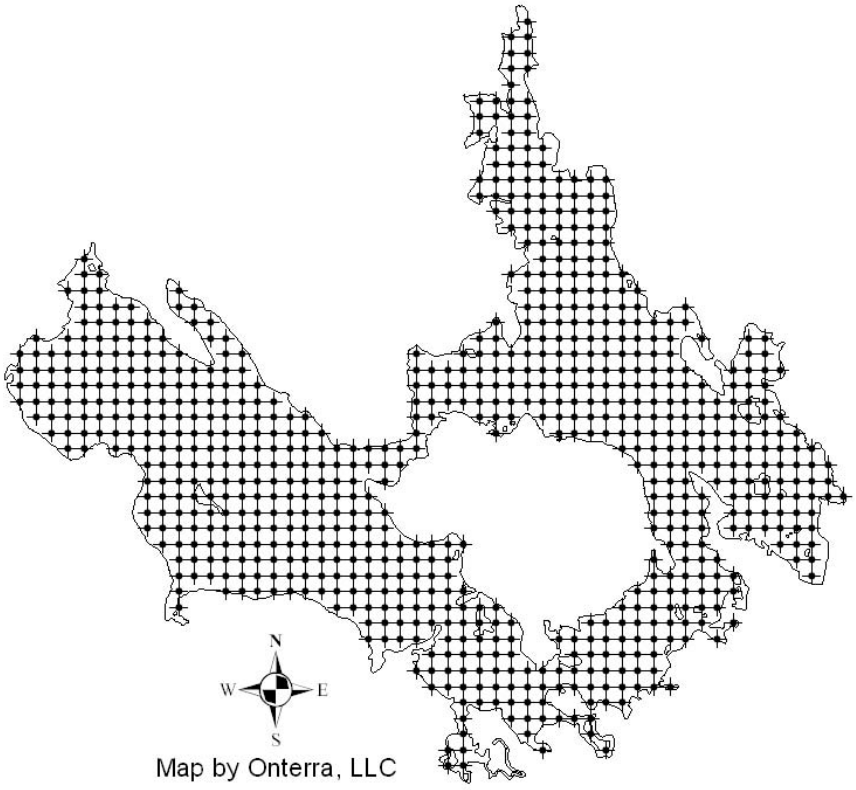
A second portion of the study included mapping of aquatic plant communities throughout the lake. A mapped community can consist of submergent, floating-leaf, or emergent plants, or a combination of these plant types. Examples of submergent plants include wild celery and pondweeds; while emergents include cattails, bulrushes, and arrowheads, and floating-leaf species include white and yellow pond lilies. Emergents and floating-leaf species lend themselves well to mapping, while submergents are much more difficult because they are often not visible from the surface and most species are often mixed throughout much of the lake.

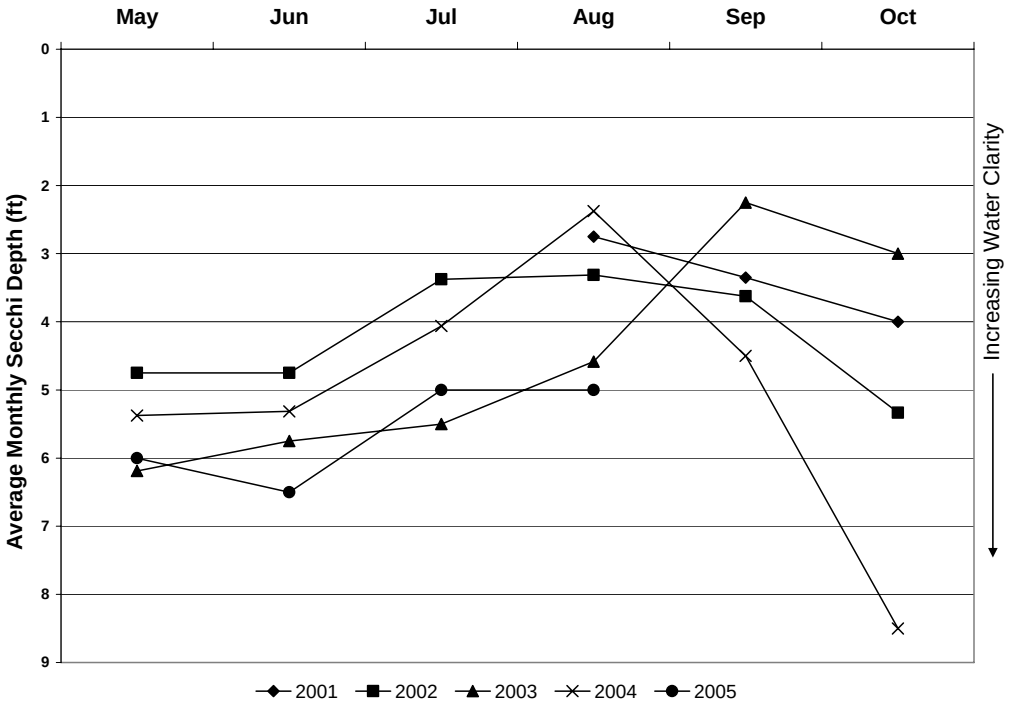
Fortunately, the only exotic plant we located was purple loosestrife (*Lythrum salicaria*) and only a few plants were found. These plants have already been dug up and removed by Nelson Lake Association volunteers. The fact that we did not find other exotics, such as Eurasian water-milfoil or curly-leaf pondweed, is very encouraging. It is also encouraging that we found such a healthy and diverse aquatic plant community within the lake. Some of the plants that occur in Nelson Lake are only found in less disturbed (more pristine) systems. This is a good indication that the Nelson Lake system is healthy.

Your Self-Help Lake Monitor, Mr. Bill Wilcox, sent an email stating that Nelson Lake appeared clearer this August than in years past and asked why this is the case. First off, Bill is correct, according to the Secchi disk measurements Bill has been collecting for the past few years, the lake was clearer. Remember, a Secchi disk is a weighted disk with black and white quadrants that is lowered into the water until it disappears from sight. The clearer the water, the deeper the disk can be lowered into the lake. As the graph shows, the water clarity for August 2005 has been better than past years.

The simple answer to Bill's question is that there is less "stuff" in the water and as a result the water is clearer. The stuff I am talking about comes in two forms; either as dissolved chemicals or as suspended particulates. An example of dissolved stuff is the

characteristic reddish-brown (stained) color of Nelson Lake that is caused by dissolved organic acids entering the lake from its watershed. The acids, which are not dangerous, are a product of plant decomposition and incidentally, are also the cause of the foam that may appear along the shoreline on windy days. Examples of suspended particulates include algae and sediments. Over the course of a year, any of these may be the dominant factor in reducing water clarity, especially in a flowage like Nelson Lake. However, in most Wisconsin lakes, including Nelson, the biggest factor affecting water clarity is algal abundance. This is most evident during the summer growing season and its extent is pretty much controlled by light and phosphorus availability. More light and phosphorus equals more algae which equals less clarity. This is very apparent in the graph because Secchi disk depths generally decrease during the summer and then get deeper again during autumn. The Nelson Lake area did not receive much rain over the summer, so phosphorus levels have likely not been very high and as a result, the lake is experiencing unusually clear water for this time of year.




May
Jun
Jul
Aug
Sep
Oct
0
1
2
3
4
5
6
7
8
9
Average Monthly Secchi Depth (ft)
Increasing Water Clarity
2001
2002
2003
2004
2005

Nelson Lake Comprehensive Management Plan

Project Wrap-up
June 10, 2006

Timothy A. Hoyman, CLM
Onterra LLC

Presentation Outline

- Project Refresher
- General Lake Ecology
- Study Results
- Conclusions
- Implementation Plan

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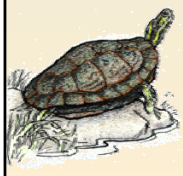
Project Overview

Study and Plan Goals

- Collect & Analyze Data
- Construct Long-term & Useable Management Plan



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Project Overview

Study Components

- Public Participation
- Watershed Modeling
- Water Quality
- Aquatic Vegetation
  - Curly-leaf Pondweed Survey
  - Comprehensive Survey
- Plan Development

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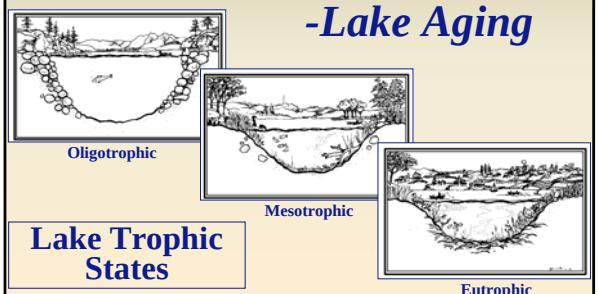
General Lake Ecology

Eutrophication -*Lake Aging*



Lake Trophic States

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General Lake Ecology

Cultural Eutrophication

Accelerated eutrophication caused by human activity.

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General Lake Ecology

Phosphorus

- *Limiting Nutrient*
- *Controls Plant Abundance (Productivity)*
  - *Algae*
  - *Macrophytes*

Study Results

Study Results

Water Quality

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

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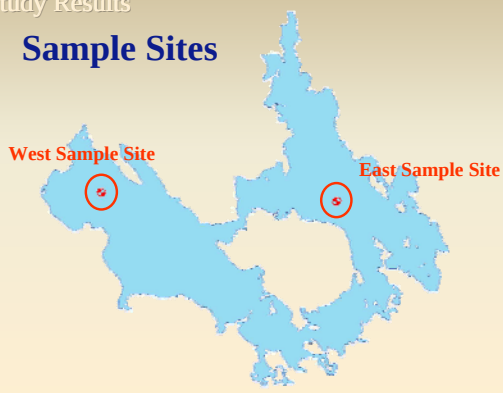
Study Results

Sample Sites



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Study Results

Water Quality Regions

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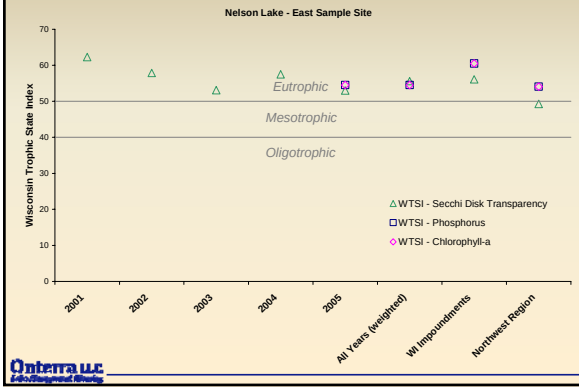
Study Results

Trophic State



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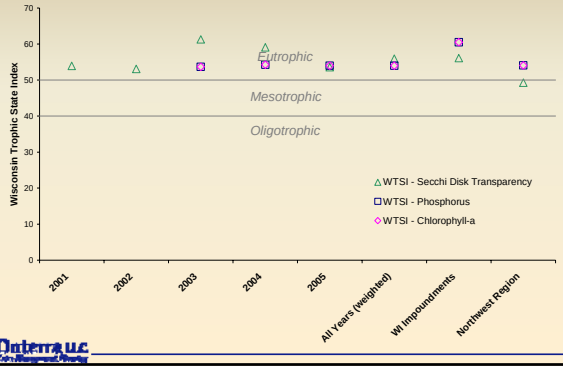
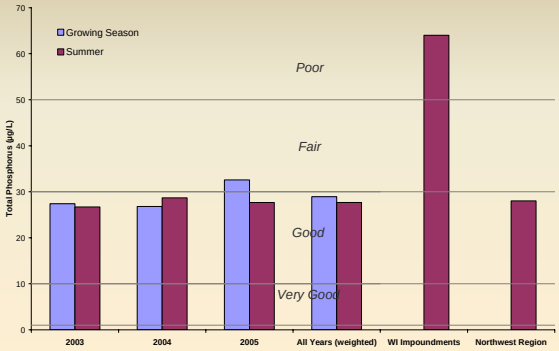
Study Results

Trophic State

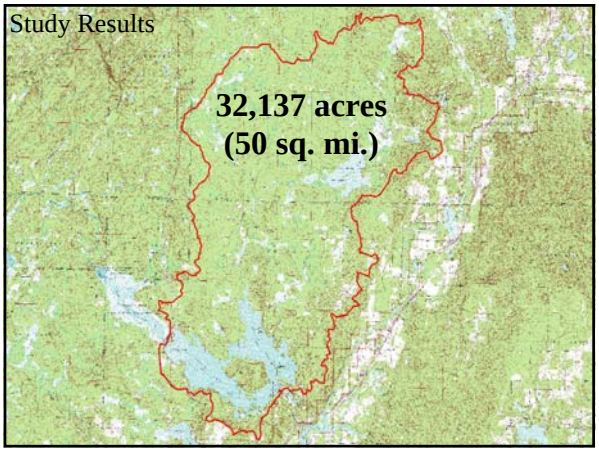


Study Results

West Basin Phosphorus



Study Results



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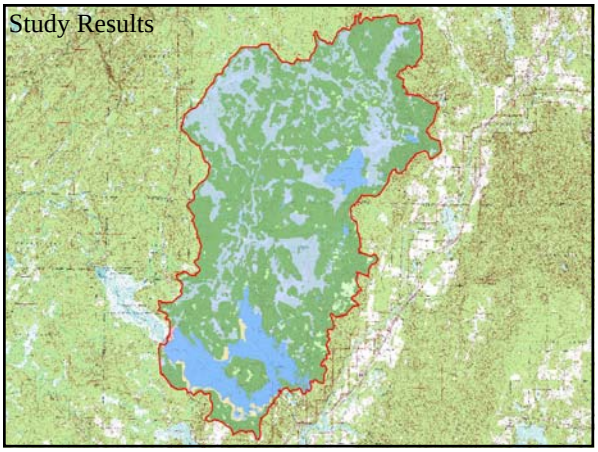

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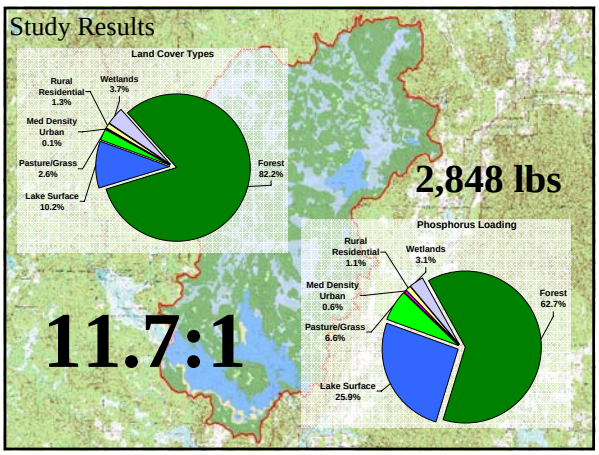
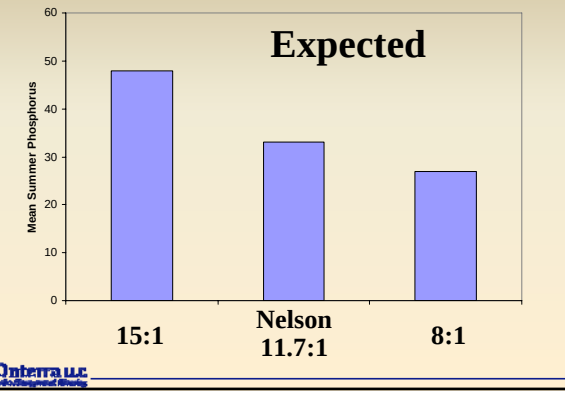


Study Results



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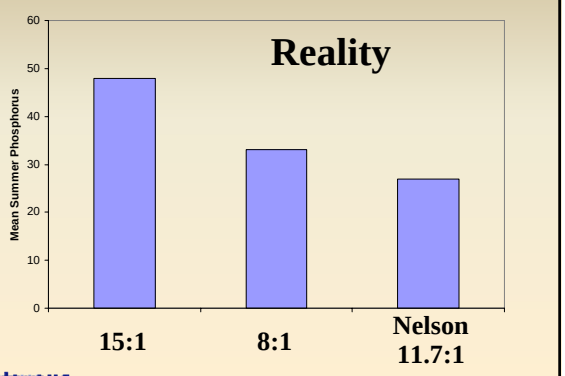

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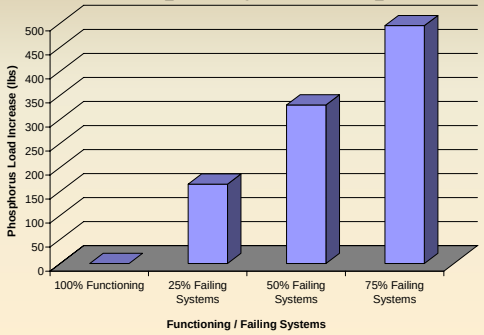
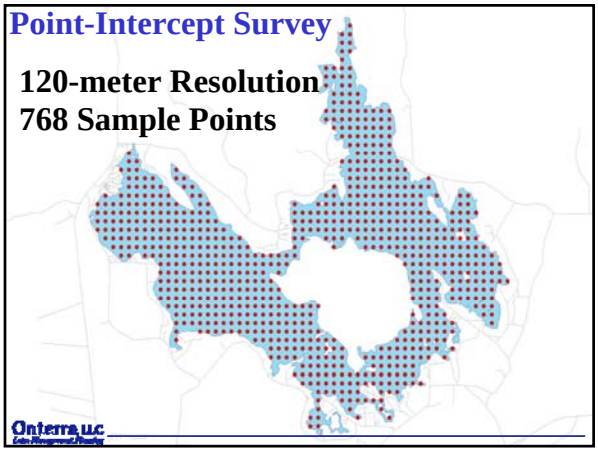


Point-Intercept Survey

120-meter Resolution
768 Sample Points



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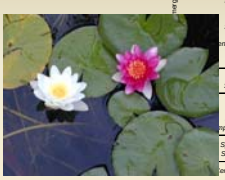
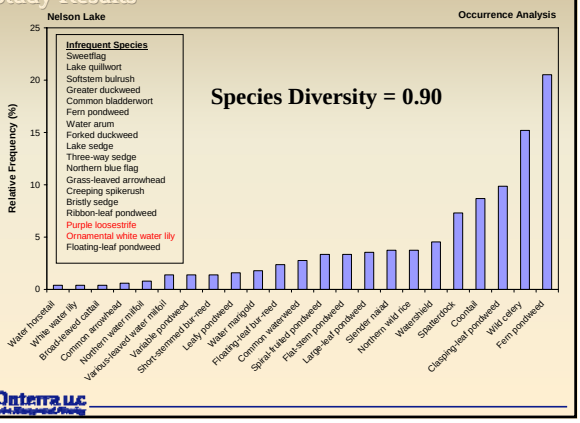


Life Form	Scientific Name	Common Name	Coefficient of Conservatism (c)
Emergent	*Acorus calamus*	Sweetflag	7
	Calla palustris	Water arum	9
	Carex comosa	Bristly sedge	5
	Carex lacustris	Lake sedge	6
	Dulichium arundinaceum	Three-way sedge	9
	Eleocharis palustris	Creeping spikerush	6
	Equisetum fluviatile	Water horsetail	7
	Iris versicolor	Northern blue flag	5
	Lythrum salicaria	Purple loosestrife	Exotic
	Sagittaria graminea	Grass-leaved arrowhead	9
	Sagittaria latifolia	Common arrowhead	3
	Schoenoplectus tabernaemontani	Softstem bulrush	4
	Typha latifolia	Broad-leaved cattail	1
	Zizania palustris	Northern wild rice	8
FF	*Lemna trisulca*	Forked duckweed	6
	Spirodela polyrhiza	Greater duckweed	5
FL	*Brasenia schreberi*	Watershield	7
	Nuphar variegata	Spatterdock	6
	Nymphaea odorata	White water lily	6
	Nymphaea odorata var. rosea	White water lily Ornamental	Exotic
FLE	*Sparganium emersum*	Short-stemmed bur-reed	8
	Sparganium fluctuans	Floating-leaf bur-reed	10
Submergent	*Ceratophyllum demersum*	Coontail	3
	Elodea canadensis	Common waterweed	3
	Isoetes lacustris	Lake quillwort	8
	Megalodonta beckii	Water marigold	8
	Myriophyllum heterophyllum	Various-leaved water milfoil	7
	Myriophyllum sibiricum	Northern water milfoil	7
	Najas flexilis	Slender naiad	6
	Potamogeton amplifolius	Large-leaf pondweed	7
	Potamogeton epihydrus	Ribbon-leaf pondweed	8
	Potamogeton foliosus	Leafy pondweed	6
	Potamogeton gramineus	Variable pondweed	7
	Potamogeton natans	Floating-leaf pondweed	5
	Potamogeton richardsonii	Clasping-leaf pondweed	5
	Potamogeton robbinsii	Fern pondweed	8
	Potamogeton spirillus	Spiral-fruited pondweed	8
	Potamogeton zosteriformis	Flat-stem pondweed	6
	Utricularia vulgaris	Common bladderwort	7
	Vallisneria americana	Wild celery	6

Study Results



Study Results

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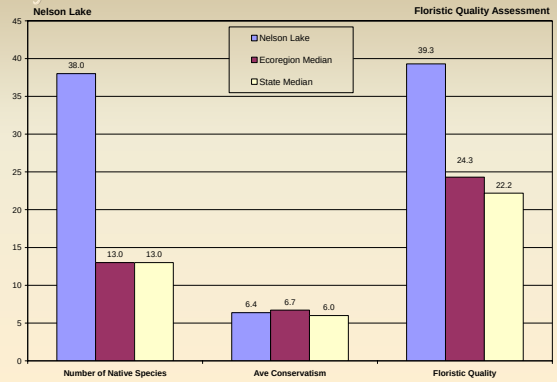
	Iris versicolor	Northern blue flag	5
	Lythrum salicaria	Purple loosestrife	Exotic
	Sagittaria graminea	Grass-leaved arrowhead	9
	Sagittaria latifolia	Common arrowhead	3
	Schoenoplectus tabernaemontani	Softstem bulrush	4
	Typha latifolia	Broad-leaved cattail	1
	Zizania palustris	Northern wild rice	8
FF	*Lemna trisulca*	Forked duckweed	6
	Spirodela polyrhiza	Greater duckweed	5
FL	*Brasenia schreberi*	Watershield	7
	Nuphar variegata	Spatterdock	6
	Nymphaea odorata	White water lily	6
	Nymphaea odorata var. rosea	White water lily Ornamental	Exotic
FLE	*Sparganium emersum*	Short-stemmed bur-reed	8
	Sparganium fluctuans	Floating-leaf bur-reed	10
Submergent	*Ceratophyllum demersum*	Coontail	3
	Elodea canadensis	Common waterweed	3
	Isoetes lacustris	Lake quillwort	8
	Megalodonta beckii	Water marigold	8
	Myriophyllum heterophyllum	Various-leaved water milfoil	7
	Myriophyllum sibiricum	Northern water milfoil	7
	Najas flexilis	Slender naiad	6
	Potamogeton amplifolius	Large-leaf pondweed	7
	Potamogeton epihydrus	Ribbon-leaf pondweed	8
	Potamogeton foliosus	Leafy pondweed	6
	Potamogeton gramineus	Variable pondweed	7
	Potamogeton natans	Floating-leaf pondweed	5
	Potamogeton richardsonii	Clasping-leaf pondweed	5
	Potamogeton robbinsii	Fern pondweed	8
	Potamogeton spirillus	Spiral-fruited pondweed	8
	Potamogeton zosteriformis	Flat-stem pondweed	6
	Utricularia vulgaris	Common bladderwort	7
	Vallisneria americana	Wild celery	6

Study Results



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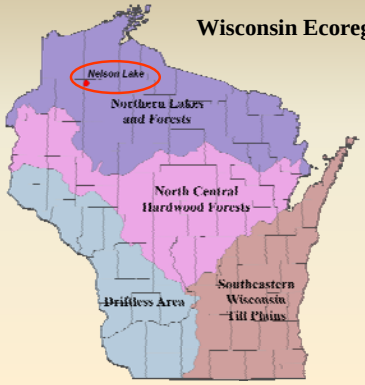

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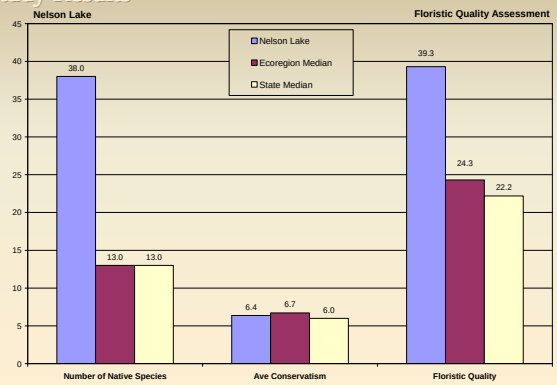
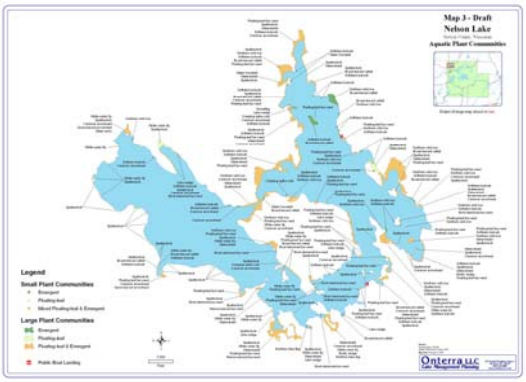


Study Results



Conclusions

- Nelson Lake is a eutrophic, relatively shallow system.
- The eutrophic nature is related to the size of the watershed.
- The watershed is in about the best condition it can be.
- Septic systems could potentially impact lake health.
- The plant community in the lake is outstanding.

Nelson Lake is Very Healthy!

The Plan

Protection Mode

The Most Difficult Plan to Implement

- Course of action can seem undefined
- Status quo equals success
  - Goal is already met
  - Motivation can be difficult
- Volunteer involvement is essential

The Plan

Protection Mode

Three-prong Approach

- Education
- Prevention
- Early Detection

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Thank You

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news

Expert determines Nelson Lake healthy, challenges association to keep it that way

by Lauri Perlick
Staff Writer

Members of the Nelson Lake Association received both positive news about the quality of Nelson Lake and a challenge as they met for their annual meeting last Saturday.

A good portion of the meeting was devoted to a discussion of the draft Nelson Lake Comprehensive Management Plan developed by Tim Hoyman, an aquatic ecologist and owner of Onterra, LLC.

Onterra was hired last year to conduct a survey of Nelson Lake to collect the data necessary to establish a baseline to create a proactive lake management plan.

On Friday evening Hoyman met with members of the NLA Board of Directors to present the draft plan for Nelson Lake and to consider what strategies could be used to implement the plan.

He told those in attendance "this is only the second time I've told a group their lake is very healthy (the meeting with the directors was the first).

"Your group is probably one of the most progressive groups I've ever worked with in the state. Your group is progressive because you guys are steps ahead of what other groups are doing."

He cited the groups adopt a shoreline project as just one of the ways the NLA is ahead of other lake associations he has worked with.

Although what Hoyman presented was just the basics he touched on many issues.

"Basically there are two major steps in creating a lake management plan," Hoyman said. "The first is to collect and analyze data."

Last summer data was collected on Nelson Lake's watershed, lake water quality and aquatic plants. Identified stakeholders were also surveyed. That information was used to produce a baseline for future comparison. "What you have is a very nice snapshot of the condition of your lake both in the water and in the watershed."

He said the next step is to construct a long term usable management plan.

Tim Hoyman of Onterra, LLC presents the data collected and the recommendations for a lake management plan to members of the Nelson Lake Association at there annual meeting Saturday, June 10.

As far as the lake's ecology, Hoyman discussed three results; the trophic state (nutrient and clarity levels), the watershed and plant diversity.

Nelson Lake is a eutrophic lake which is the state that is most productive and that can support fish production.

"The reason for doing a management plan," Hoyman said, "is due to cultural eutrophication," that is the acceleration of nutrient loading caused by human activity. "If man did not affect the lakes at all, they would age so slowly that we would not even notice it in our lifetimes and there wouldn't be anything we could do about it. Because man has such an impact on lakes it accelerates the eutrophication — the aging of our lakes.

"The whole point of lake management is to try and slow that down and try to curb those impacts that man has, including invasives."

Hoyman said in Nelson Lake the eutrophication is driven by phosphorus. There is plenty of nitrogen and other nutrients to support plant growth. What limits an increase in plant growth is the amount of phosphorus present. "Add more phosphorus and you will have more algae — more algae is less clear water. That is why we concentrate so much on the phosphorus sources of your lake.

"Your phosphorus levels are pretty steady. They are in line with other lakes in the region." He added that the association needs to continue its monitoring of water quality and note any trends that indicate an increase in the phosphorus level. "The reason we're talking about phosphorus levels is because that controls the algae growth.

"You guys have a great watershed," Hoyman said. The majority, 82 percent, of the lake's watershed is forested. "It's abnormal to have that much watershed forested."

Since much of the forested land is owned by the state, the county or is in conservancy, Hoyman said he didn't think that was apt to change in the future.

The forested land in the watershed contributes roughly one and one half ton of phosphorus to the lake each year. Hoyman said although that sounds like a lot, it really isn't. "The big watershed is not something you need to worry about. What you need to worry about more is how you are impacting the lake immediately around it — in the immediate watershed. That's where you are looking at the biggest change. More of your shoreline has become developed — every place that is built on the lake impacts the lake a little more. It can increase the amount of phosphorus into your lake. The cumulative impact of development can surprise people. And in your lake more phosphorus equals more algae."

One of the recommendations made by Hoyman is that the lake association consider having an inspection done of the septic systems around the lake. Hoyman said that failing systems can really add phosphorus to the lake. When it comes to the lake ecology, Hoyman explained that a functioning system is not one that simply works as most people would define it. A functioning system is one that filters the phosphorus out. A normal system will take out about 90 percent of the phosphorus. As systems age or if they are improperly installed that amount of retention can drop to only 40 percent. "That's where the impact comes, the septic system that is supposed to be pulling the phosphorus out doesn't do it and it makes its way into the lake. In areas with a lot of septic systems or a lot of failing systems, that can be the biggest source of phosphorus in the lake. If just 25 percent of the septic systems were failing it would add 165 pounds of phosphorus to your lake. If 75 percent were failing that's nearly 500 pounds of additional phosphate added to your lake."

He added that on lakes with a lot of older properties, those numbers were not outlandish. "The biggest source of phosphorus that is going to affect your lake is along the shoreline."

Hoyman talked to county sanitarian Mert Maki. The county will perform the inspection if 50 percent of the property members request it. He said the way the county does inspections was "the best I have ever seen. I was completely awestruck at what he will do." He said the only drawback is that the department has to wait until enough funding is available from the county. Hoyman told the group they may want to look at lake management grants to help fund the septic system inspection project if the association decides it is feasible. He said while many people are nervous about the idea of inspections of septic systems, a failing system does not necessarily mean the whole system has to be replaced. "Other things can be done to alleviate the problem."

A final area where data was gathered was plant ecology. Both the diversity and occurrence of plants were sampled at more than 325 sites around the lake. Only two exotic species were found in the survey — purple loosestrife and a highbred ornamental water lily. The purple loosestrife — two plants — were removed.

"You have a pretty nice even distribution of plants. You have a lot of species richness. The plant community in the lake is outstanding."

Hoyman said the good health of Nelson Lake may be the association's biggest challenge. "The goal is already met making motivation difficult." He said keeping volunteer involvement is essential to keeping Nelson Lake healthy. He recommended a "protection mode" consisting of education, prevention and early detection.

A draft of the management plan has already been given to members of the board of directors. Department of Natural Resource's representatives will also be invited to examine the plan and add comments. A second draft will then be made available to members of the association on -line and in hard copy for their inspection.