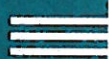


Report



Lake Namakagon Aquatic Plant Management Plan

Lake Namakagon

Project I.D.: 08N015

**Namakagon Lake Association
Bayfield County, Wisconsin**

December 2010





December 21, 2010

Ms. Lisa Holt
Namakagon Lake Association
1520 Hidden Valley Cir.
Houlton WI 54082

Dear Ms. Holt:

RE: *Lake Namakagon Aquatic Plant Management Plan*

On behalf of the Namakagon Lake Association, Foth Infrastructure and Environment LLC (Foth) is submitting an Aquatic Plant Management Plan. This Aquatic Plant Management Plan, for the Lake Namakagon Chain of Lakes, presents a strategy for managing aquatic plants by protecting native plant populations and preventing establishment of invasive species. The plan includes data pertaining to the plant community, watershed, and water quality of the lakes.

Please contact us at (920) 497-2500, if you have any comments or questions regarding the information presented in this plan.

Sincerely,

Foth Infrastructure & Environment, LLC



Gregory Parins
Environmental Scientist



Brian L. Hinrichs
Lead Environmental Scientist

cc: Pam Tosher, Wisconsin DNR

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Lake Namakagon Aquatic Plant Management Plan

Distribution

<u>No. of Copies</u>	<u>Sent To</u>
1	Pam Toshner Water Resources Management Specialist Wisconsin Department of Natural Resources 810 W. Maple Street Spooner WI 54801

Lake Namakagon Aquatic Plant Management Plan

Project ID: 08N015

Prepared for
Namakagon Lake Association

Bayfield County, Wisconsin

Prepared by
Foth Infrastructure & Environment, LLC

December 2010

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2737 South Ridge Road, Suite 600 • P.O. Box 12326 • Green Bay, WI 54307-2326 • (920) 497-2500 • Fax: (920) 497-8516

Lake Namakagon Aquatic Plant Management Plan

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Appendix D	Aquatic Invasive Plant Incident Report
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Appendix F	<i>Bayfield County Shoreland Management Guide</i>

Lake Namakagon Aquatic Plant Management Plan

Executive Summary

Namakagon Lake Association (NLA) was formed in 1995 to address resource management concerns within the Lake Namakagon Chain of Lakes, which is comprised of Lake Namakagon, Garden Lake, and Jackson Lake. NLA has been and an active participant in the prevention of aquatic invasive species introduction to the Namakagon Chain. Over the past few years, NLA has been actively working with the Wisconsin Department of Natural Resources (WDNR) and consultants to develop and execute a monitoring program through successful grant applications. These efforts and proactive response to the threat of an invasive species infestation has been the key to keeping the Lake Namakagon Chain free of aquatic invasive species.

This *Lake Namakagon Aquatic Plant Management Plan (APMP)* for the Lake Namakagon Chain of Lakes presents a strategy for managing aquatic plants by protecting native plant populations and preventing establishment of invasive species. The plan includes data about the plant community, watershed, and water quality of the lakes. The 2009 Baseline Aquatic Plant Survey, conducted August 3-7, 2009 and August 17, 2009, found that the Lake Namakagon Chain of Lakes has a very diverse native aquatic plant community. Native plants provide fish and wildlife habitat, stabilize bottom sediments, reduce the impact of waves against the shoreline, and prevent establishment of the non-native invasive plant species, all critical functions for the Chain of Lakes.

List of Abbreviations, Acronyms, and Symbols

<i>APMP</i>	<i>Aquatic Plant Management Plan</i>
C	Coefficient of Conservatism
FQI	Floristic Quality Index
Foth	Foth Infrastructure & Environment, LLC
GPS	global positioning system
NLA	Namakagon Lake Association
SDI	Simpson Diversity Index
TSI	Trophic Status Index
WDNR	Wisconsin Department of Natural Resources

1 Introduction

On behalf of the Namakagon Lake Association (NLA), Foth Infrastructure & Environment, LLC (Foth) has prepared this *Lake Namakagon Aquatic Plant Management Plan (APMP)* for the Lake Namakagon Chain of Lakes, located in Bayfield County, Wisconsin. This report presents a strategy for managing aquatic plants by protecting native plant populations and preventing establishment of invasive species.

This *APMP* will discuss:

- ♦ Public input for plan development
- ♦ Lake information
- ♦ Water quality
- ♦ Aquatic plant ecology
- ♦ 2009 Baseline Aquatic Plant Survey
- ♦ Aquatic plant management
- ♦ Plans, goals, and strategies
- ♦ Recommendations

1.1 Public Input for Plan Development

The Namakagon Lake Association provided input for the development of this Management Plan. The NLA board met throughout 2008 and 2009 to discuss and review planning requirements, the lake use survey, and management efforts to date.

2 Background Information

Lake Namakagon is located in Bayfield County, Wisconsin with the nearest town being Cable, Wisconsin. Lake Namakagon is a large drainage lake, which has both an inlet and outlet stream flows and is located in the headwaters of the Namakagon River. The lake is comprised of 3,227 acres with a maximum depth of 51 feet and an average depth of 16 feet. The lake habitats present in Lake Namakagon are very diverse and support a balanced fishery. Muskellunge, northern pike, walleye, largemouth and smallmouth bass, bluegill, and crappie are all present in the lake. Lake Namakagon is classified by the Wisconsin Department of Natural Resources (WDNR) as an A1 Muskellunge fishery. This classification is designated for “trophy waters” for their ability to produce large fish, even though overall numbers of fish may be low. The WDNR has also designated 33 sensitive areas for plants and wildlife on the Chain of Lakes as part of a pilot study conducted in 2000 as shown in Appendix E.

Appendix A provides an overall view of the Chain of Lakes.

2.1 Lake Information

The following summarizes the lakes physical attributes:

Table 2-1
Lake Namakagon Facts

LakeType	Drainage
Surface Area (acres)	3227
Maximum Depth (feet)	51
Shoreline Length (miles)	43
Catchment/Drainage Area (sq. miles)	197
Boat Landings	9

2.1.1 Primary Human Use Areas

The Lake Namakagon Chain provides year-round recreational opportunities including fishing, swimming, water skiing, pleasure boating, snowmobiling and more. With numerous resorts and vacation properties located on the lake tourism is a major part of the local economy and the need to keep the waters of Lake Namakagon and surrounding areas pristine is vital.

2.1.2 Namakagon Fishery

Namakagon and Jackson Lakes have a diverse fishery consisting of walleye, muskellunge, northern pike, largemouth bass, smallmouth bass, bluegill, pumpkinseed, rock bass, black crappie, yellow perch, white sucker, yellow bullhead, black bullhead, trout perch, tadpole madtom, common shiner, golden shiner, and spottail shiner.

Historic management of Namakagon Lake has included fishery surveys, stocking, and various length and bag regulations. Historic surveys for walleye occurred in 1989 and 1993 utilizing WDNR standardized treaty protocols (Hennessey 2002). Walleye surveys were also conducted in 1976 and 2000 using a different sampling protocol, i.e. electrofishing to both mark and recapture walleye for a population estimate.

Fish stocking in Namakagon Lake has involved primarily walleye and muskellunge (Table 2-2). Walleye stocking was discontinued in Namakagon Lake following the 1993 survey due to evidence of strong natural reproduction (Scholl 1996). Muskellunge were stocked from 1937 to 1947 and then discontinued until 1983. Muskellunge were stocked annually from 1983 to 1993 at a rate of 0.8 fish/acre (2,500 fish total), with the exception of 1987 when no stocking occurred. Also, no stocking of muskellunge occurred from 1994 through 1996 due to hatchery renovations at Spooner. Starting in 1997, muskellunge have been stocked in alternate years at a rate of 0.8 fish/acre.

Table 2-2
Stocking History of Walleye and Muskellunge in Namakagon Lake
Bayfield County, Wisconsin

Year	Walleye		Muskellunge	
	Number Stocked	Size	Number Stocked	Size
1933	729,109	Fry		
1934	457,562	Fry		
1935	2,202,400	Fry		
1936	3,175,200	Fry		
1937	5,136,600	Fry	90,900	Fry
1938	6,238,560	Fry	1,750,000	Fry
1939	6,832,000	Fry	150,000	Fry
1940	6,000,000	Fry	300,000	Fry
1941	4,000,000	Fry	5,125	Fingerling
			50,000	Fry
1942	3,000,000	Fry	346,352	Fry
	10,000	Fingerling	2,700	Fingerling
1943	4,000,000	Fry	353,078	Fry
	13,400	Fingerling	2,500	Fingerling
1944	3,200,000	Fry	105,000	Fry
	7,860	Fingerling	1,250	Fingerling
1945	1,941,100	Fry	118,125	Fry
	8,000	Fingerling	625	Fingerling
1946	3,620,195	Fry	2,925	Fingerling
	8,295	Fingerling		
1947	4,000,000	Fry	2,200	Fingerling
	20,000	Fingerling		
1949	9,200	Fingerling		
1950	35,787	Fingerling		
1951	17,845	Fingerling		
1953	10,670	Fingerling		

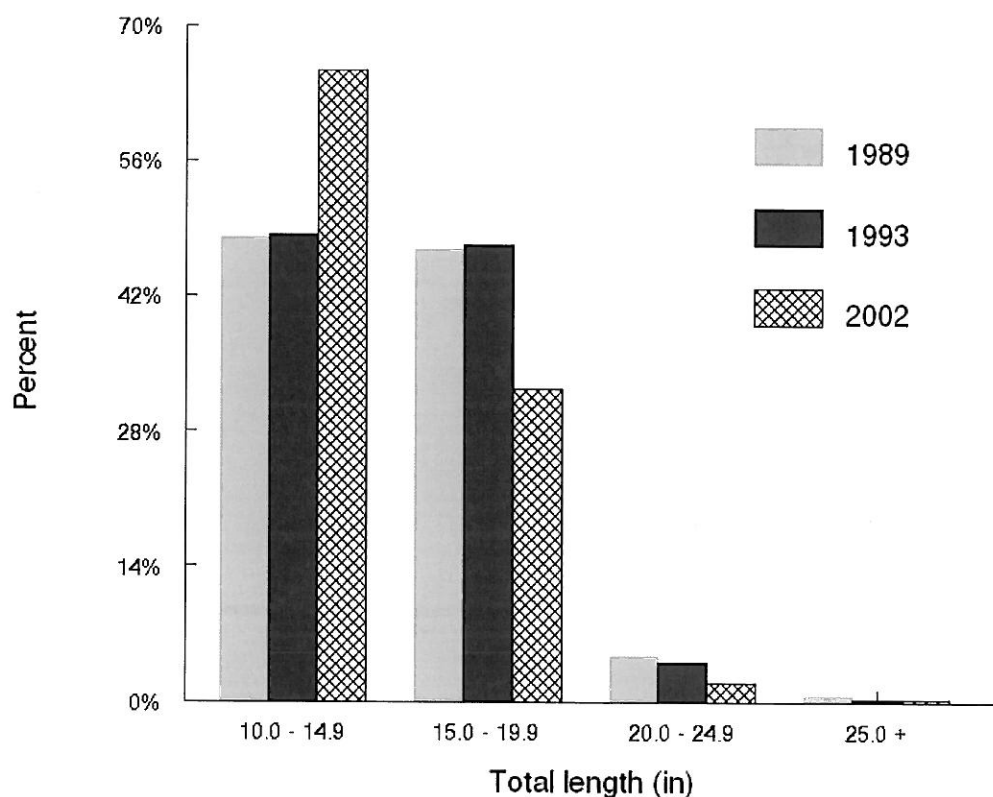
Year	Walleye		Muskellunge	
	Number Stocked	Size	Number Stocked	Size
1955	6,500	Fingerling		
1956	7,875	Fingerling		
1957	10,500	Fingerling		
1958	3,500	Fingerling		
1960	4,585	Fingerling		
1961	26,915	Fingerling		
1963	1,065	Fry		
1964	45,006	Fingerling		
	2,416	Lg Fingerling		
1967	10,500	Fingerling		
1977	384,000	Fry		
1983			1,000	Lg Fingerling
1984			1,000	Lg Fingerling
1985			4,000	Lg Fingerling
1986			2,500	Lg Fingerling
1988			5,000	Lg Fingerling
1989			2,500	Lg Fingerling
1990	600,000	Fry	1,250	Lg Fingerling
1991	6,500	Fingerling	2,500	Lg Fingerling
1992	11,100	Fingerling	2,500	Lg Fingerling
	150	Lg Fingerling		
1993	465	Lg Fingerling	3,300	Lg Fingerling
1997			2,500	Lg Fingerling
1999			2,500	Lg Fingerling
2001			3,227	Lg Fingerling
2003			2,500	Lg Fingerling

Source: Fishery Survey - Namakagon and Jackson Lakes, Bayfield County, 2002-2003. WDNR, 2004.

Walleye fishing regulations have changed over time in Namakagon Lake. There was no minimum length limit for walleye until 1990 when a 15-inch minimum length limit was instituted statewide. A no length limit, but only one walleye over 14-inch bag limit was instituted in 1997 when survey data indicated that there was a harvestable population of walleye under 15 inches and that protection was needed for larger walleye (Scholl 1996). Bag limits for walleye have been adjusted annually according to tribal harvest declarations that began in 1988.

Graph 2-1

Walleye Population in Namakagon Lake Bayfield County, Wisconsin

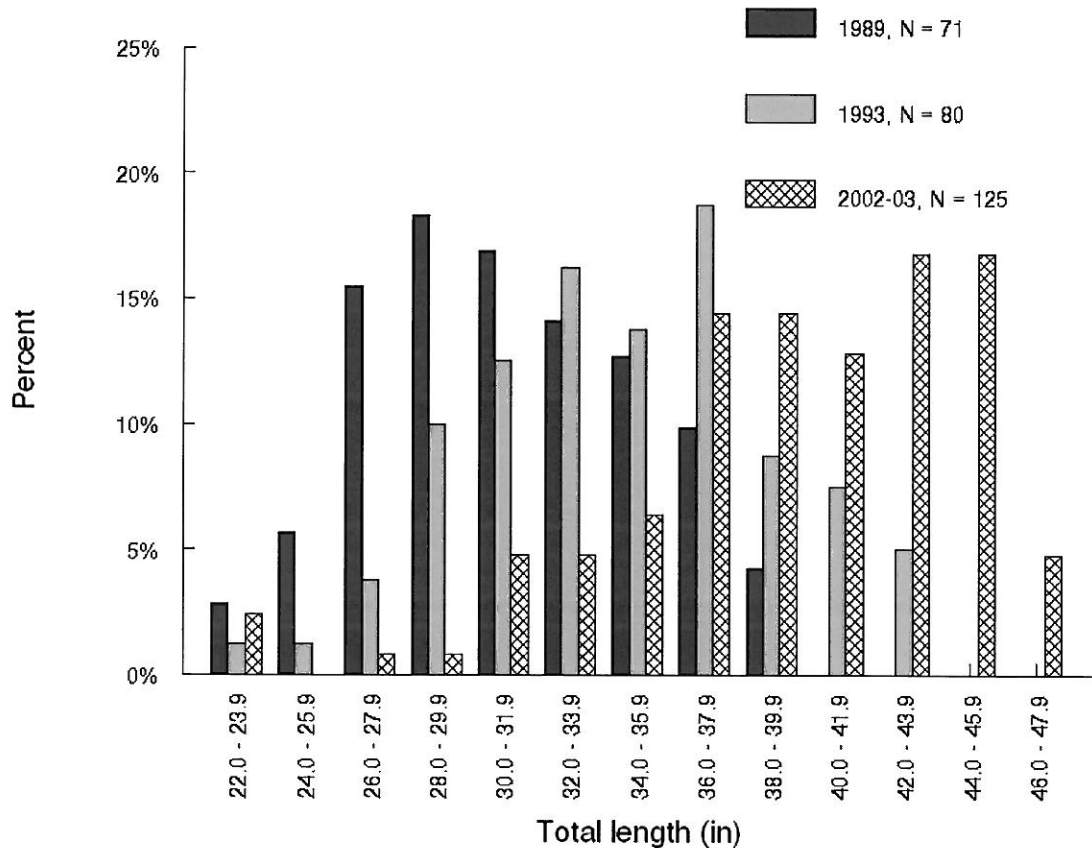


Percentage of the walleye population estimate by length interval in Namakagon Lake, Bayfield County, Wisconsin.

Source: Fishery Survey - Namakagon and Jackson Lakes, Bayfield County, 2002-2003. WDNR, 2004.

Muskellunge regulations for minimum length increased from 30 inches to 32 inches in 1983. A 40-inch minimum length limit was instituted in 1992, and in 1997 the minimum length limit increased to 50 inches. With the exception of walleye and muskellunge, other species have largely been managed via statewide size and bag limits.

Graph 2-2
Muskellunge Population in Namakagon Lake Bayfield County, Wisconsin



Percent length frequency of muskellunge in Namakagon Lake, Bayfield County, Wisconsin.

Source: Fishery Survey - Namakagon and Jackson Lakes, Bayfield County, 2002-2003. WDNR, 2004.

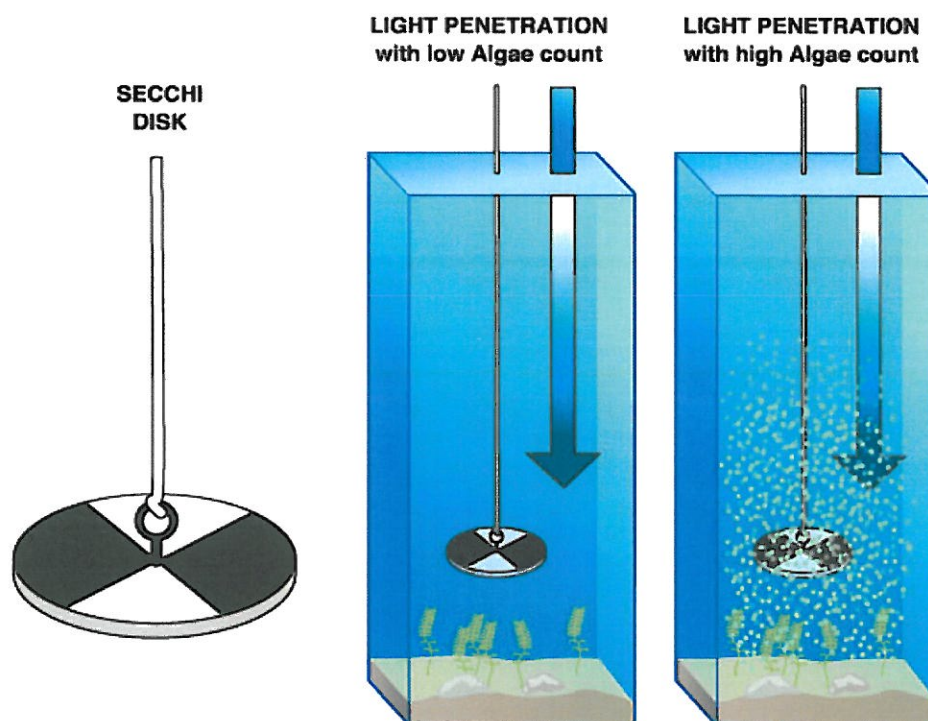
Recent management has largely focused on public outreach and education, and habitat protection. Protecting spawning areas by efforts to remove beaver dams in tributaries has been used to attempt to regenerate lost riverine walleye spawning areas that had been historically used. Also, a sensitive area designation was completed in 2002 to help protect areas that are considered high value to aquatic biota and wildlife. In an attempt to increase habitat complexity in areas that had little vegetative cover, 24 fish cribs were cooperatively installed in 2002 and 2003.

2.1.3 Water Quality

One way to measure a lakes water quality is through the use of Secchi disk readings. What is a Secchi disk? A Secchi disk is an 8-inch (20 centimeter) disk with alternating black and white quadrants. It is lowered into the water of a lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measure of the *transparency* of the water. The Secchi disk measures the transparency of the water. Transparency can be affected by the color of the water, algae, and suspended sediments. Transparency decreases as color,

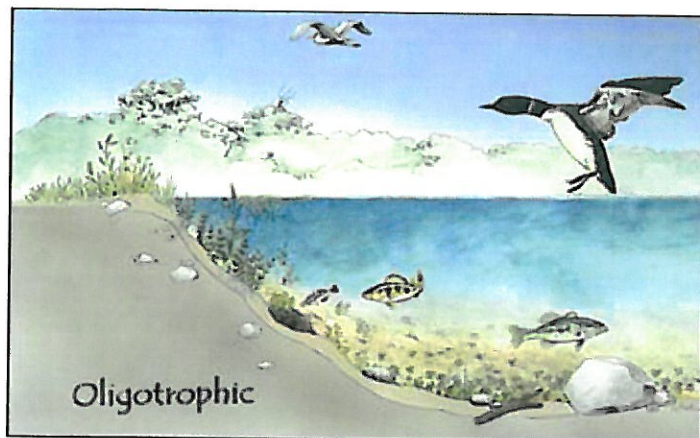
suspended sediments, or algal abundance increases. Water is often stained yellow or brown by decaying plant matter. In bogs and some lakes, the brown stain can make the water the color of strong tea. Algae are small, green aquatic plants whose abundance is related to the amount of plant nutrients, especially phosphorus and nitrogen. Transparency can, therefore, be affected by the amount of plant nutrients coming into the lake from sources such as sewage treatment plants, septic tanks, and lawn and agricultural fertilizer. Suspended sediments often come from sources such as resuspension from the lake bottom, construction sites, agricultural fields, and urban storm runoff.

Transparency is an indicator of the impact of human activity on the land surrounding the lake. If transparency is measured through the season and from year to year, trends in transparency may be observed. Transparency can serve as an early-warning that activities on the land are having an effect on a lake.

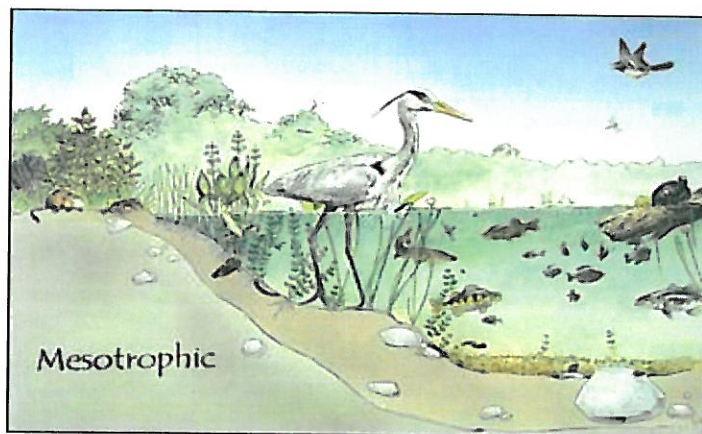


2.1.4 Wisconsin Trophic Status Index

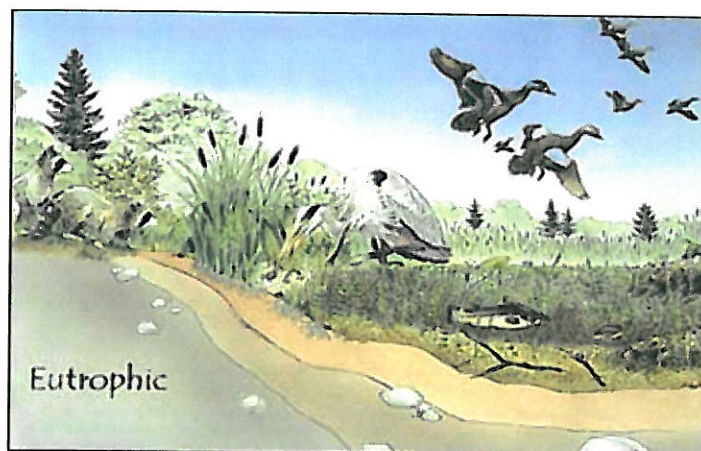
Secchi disk data allows us to determine the trophic status (or level of nutrient enrichment) of the lake. Trophic State Index (TSI) is a continuum scale of 0 to 100, corresponding with the clearest (and most nutrient poor) lake possible, to the least clear (and presumably, most nutrient rich) lake possible. Lakes can be divided into three main levels of nutrient enrichment categories.



Oligotrophic
(TSI 0-40), or **nutrient poor**. These lakes are characterized by very high Secchi depths (very clear water), plenty of oxygen even in deep water, and they may have cold-water fish species living in them.



Mesotrophic
(TSI 40-50). Mesotrophic lakes fall in the middle of the continuum from nutrient-poor to nutrient-rich. They have moderately clear water, and may experience low to no oxygen concentrations in bottom waters.



Eutrophic
(TSI > 50) or **nutrient rich**. They have decreased Secchi disc readings and experience low to no oxygen in the bottom waters during the summer. These lakes would only be habitable to warm water fish. They may also experience blue-green algae blooms.

2.1.5 TSI Results

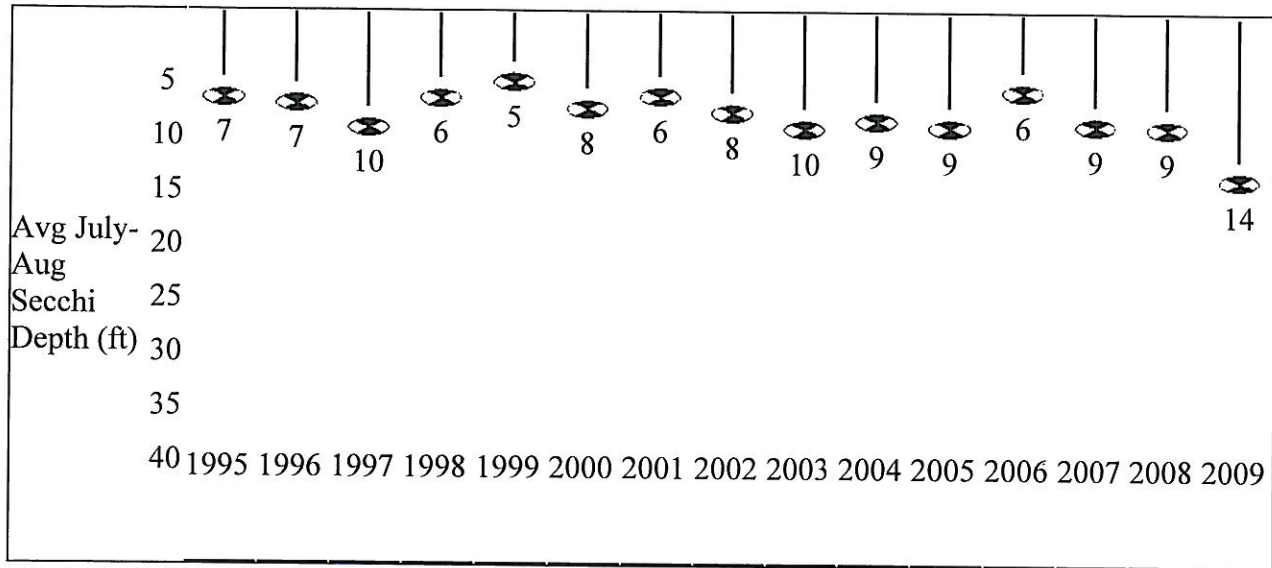
Citizen Lake monitoring volunteers have collected lake data annually since the mid 1990s. Data collected through the WDNR Citizen Lake Monitoring Program shows Lake Namakagon's TSI values, based on Secchi disk readings, Chlorophyll and Total Phosphorous samples, range from the mid 40s to mid 50s (see Graphs 2-3 to 2-12). This classifies Lake Namakagon on the border of mesotrophic and eutrophic.

It is important to note that the different lake classification categories actually make smooth transitions into each other. Meaning, data from one date may suggest eutrophic lake conditions and data from another date may suggest a mesotrophic lake condition. If the tendency for a lake is to be mesotrophic, we refer to the lake as being mesotrophic. Being that the Lake Namakagon Chain is made up of three different lakes, it is possible to have different classifications. An example being Jackson Lake, which is much shallower and has a much denser vegetation base than the main lake and collected TSI data trends towards eutrophic conditions. It is also possible for different regions within a lake the size of Lake Namakagon with many large bays to have different classifications especially near an inlet or outlet stream.

The following graphs present historical data collected through the WDNR Citizen Lake Monitoring Program for the Namakagon Chain.

Graph 2-3

Secchi Depth Averages for Namakagon Lake – Deep Hole



Waterbody No.: 2732600 WDNR Region: NO GEO Region: NW Lake Type: Drainage

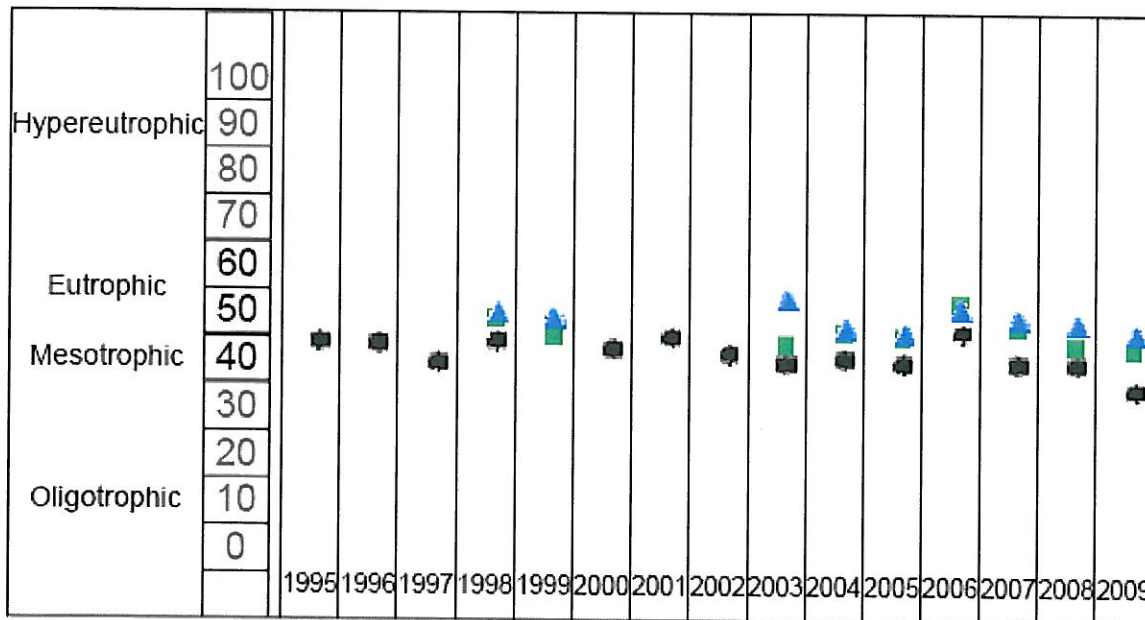
Past secchi averages in feet (July and August only).

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=043113>

Graph 2-4

Trophic State Index Graph for Namakagon Lake – Deep Hole



♦ = Secchi ■ = Chlorophyll ▲ = Total Phosphorus

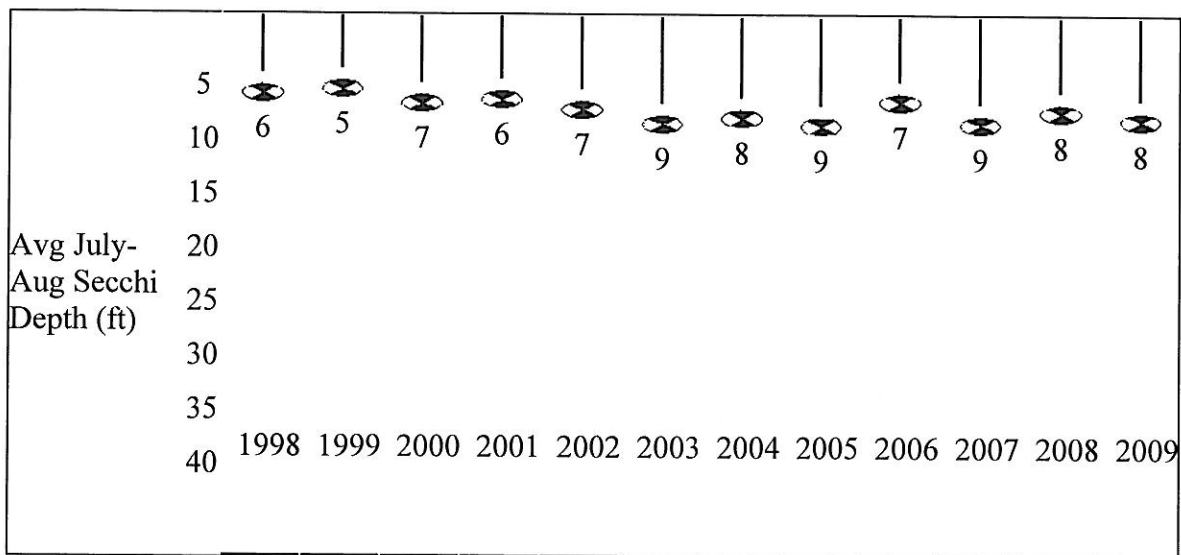
Past Summer (July-August) Trophic State Index (TSI) averages.

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=33&action=post&format=html&stationNo=043113>

Graph 2-5

Secchi Depth Averages for Namakagon Lake – East Basin



Waterbody No.: 2732600 WDNR Region: NO GEO Region: NW Lake Type: Drainage

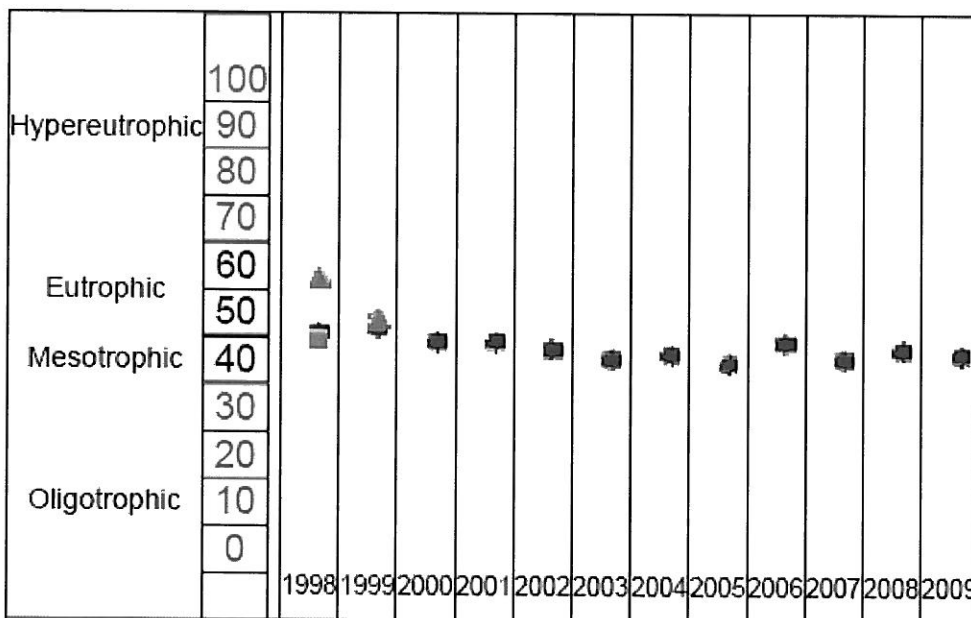
Past secchi averages in feet (July and August only).

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=043114>

Graph 2-6

Trophic State Index Graph for Namakagon Lake – East Basin



♦ = Secchi ■ = Chlorophyll ▲ = Total Phosphorus

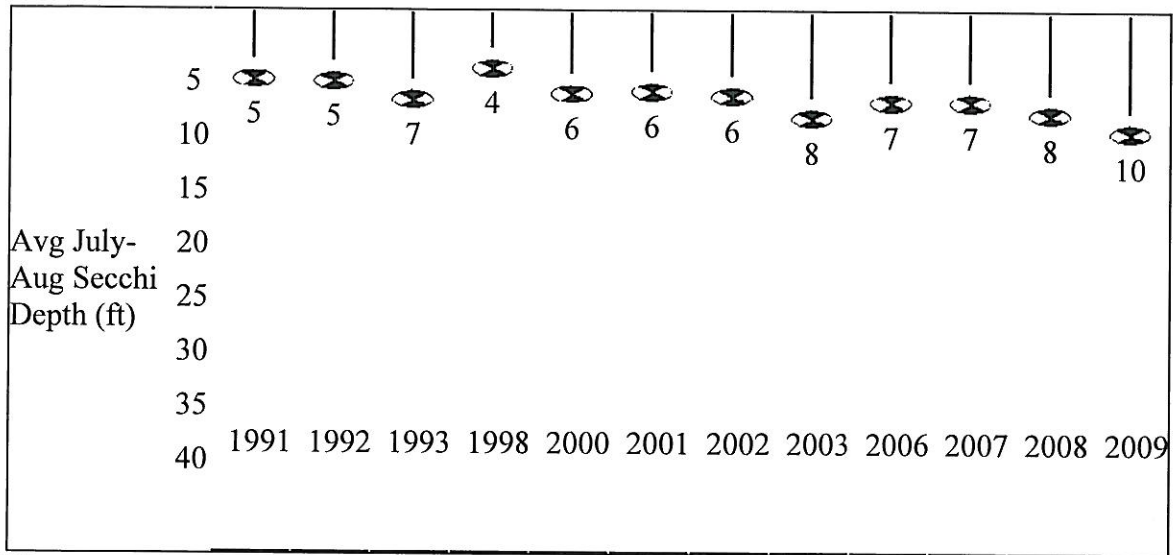
Past Summer (July-August) Trophic State Index (TSI) averages.

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=33&action=post&format=html&stationNo=043114>

Graph 2-7

Secchi Depth Averages for Namakagon Lake – Northeast Basin



Waterbody No.: 2732600 WDNR Region: NO GEO Region: NW Lake Type: Drainage

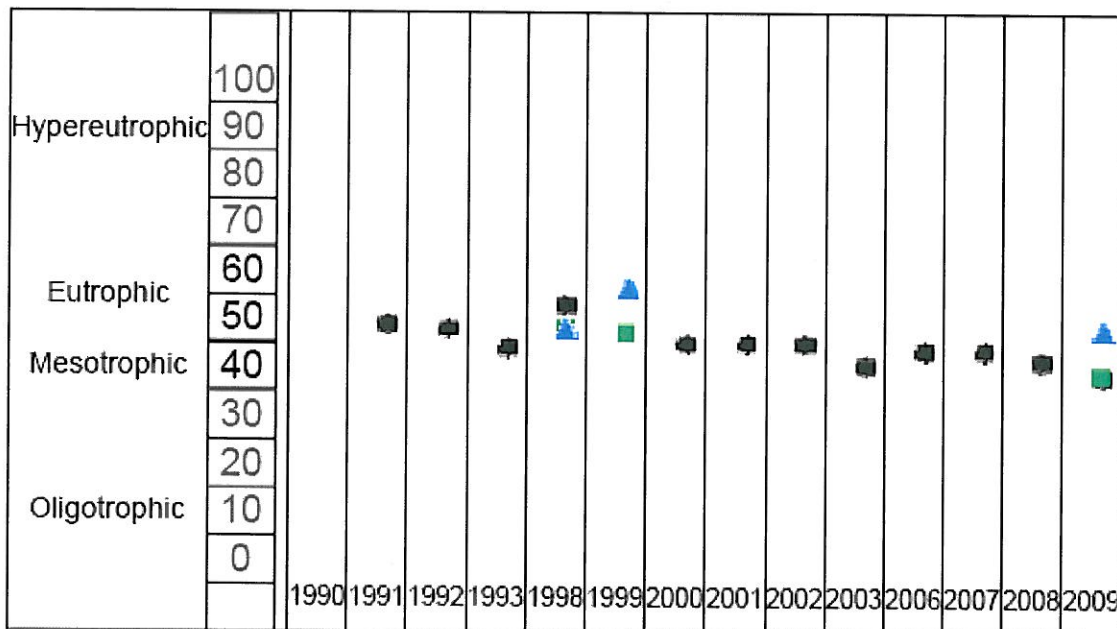
Past secchi averages in feet (July and August only).

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=043112>

Graph 2-8

Trophic State Index Graph for Namakagon Lake – Northeast Basin



♦ = Secchi ■ = Chlorophyll ▲ = Total Phosphorus

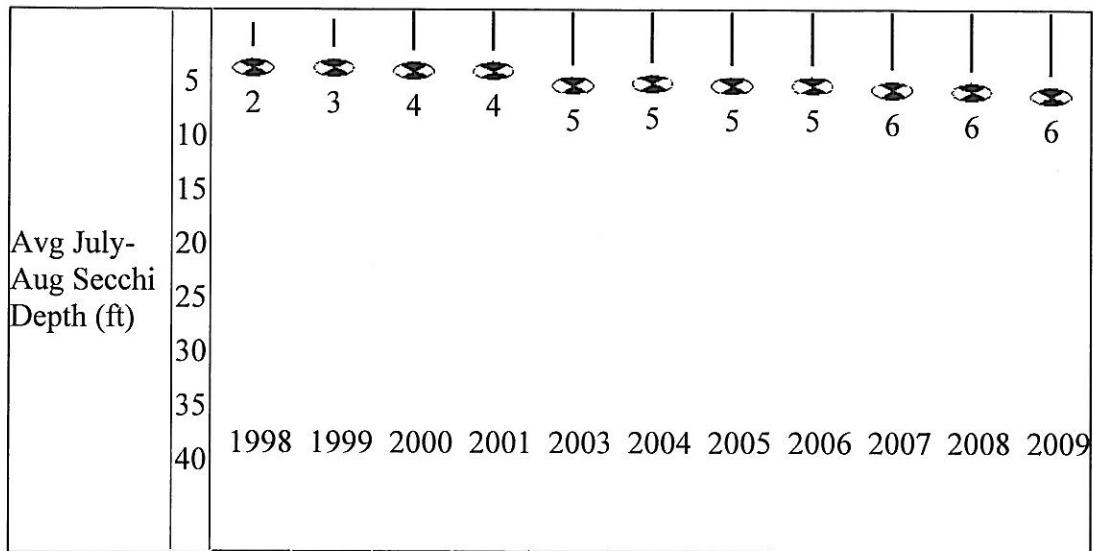
Past Summer (July-August) Trophic State Index (TSI) averages.

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=33&action=post&format=html&stationNo=043112>

Graph 2-9

Secchi Depth Averages for Jackson Lake



Waterbody No.: 2734200 WDNR Region: NO GEO Region: NW Lake Type: Drainage

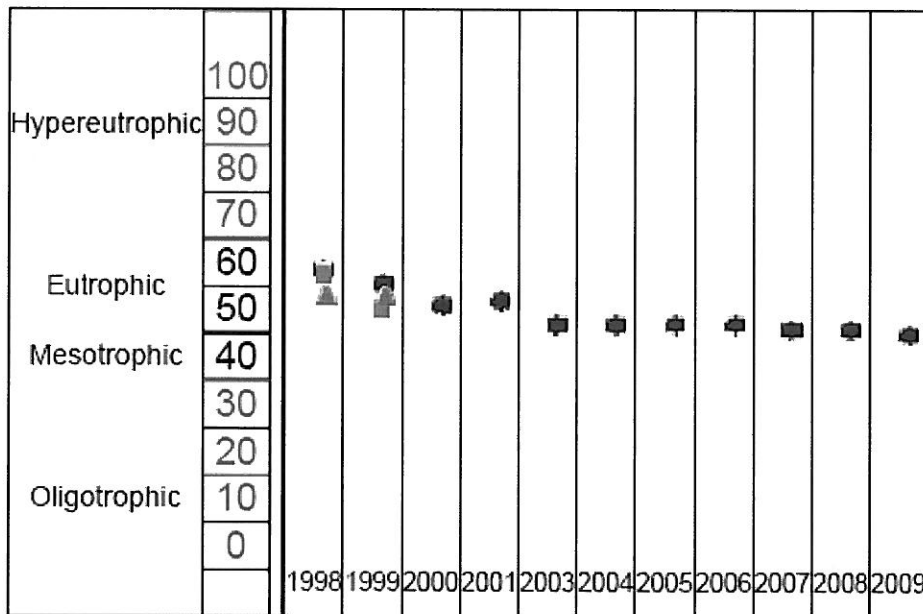
Past secchi averages in feet (July and August only).

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=043111>

Graph 2-10

Trophic State Index Graph for Jackson Lake



♦ = Secchi ■ = Chlorophyll ▲ = Total Phosphorus

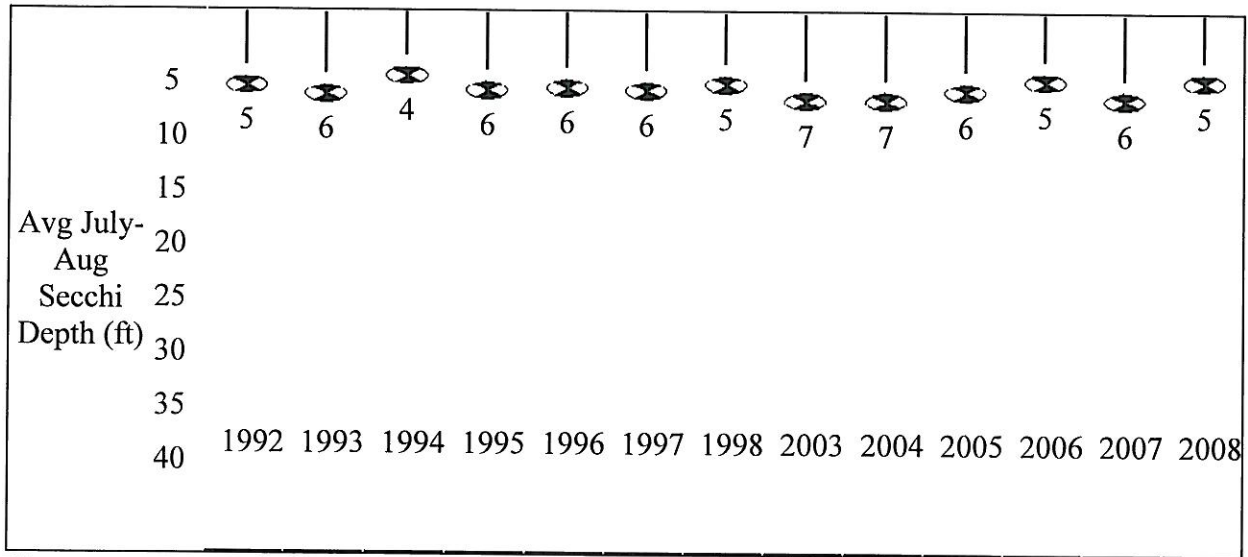
Past Summer (July-August) Trophic State Index (TSI) averages.

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=33&action=post&format=html&stationNo=043111>

Graph 2-11

Secchi Depth Averages for Garden Lake



Waterbody No.: 2735500 WDNR Region: NO GEO Region: NW

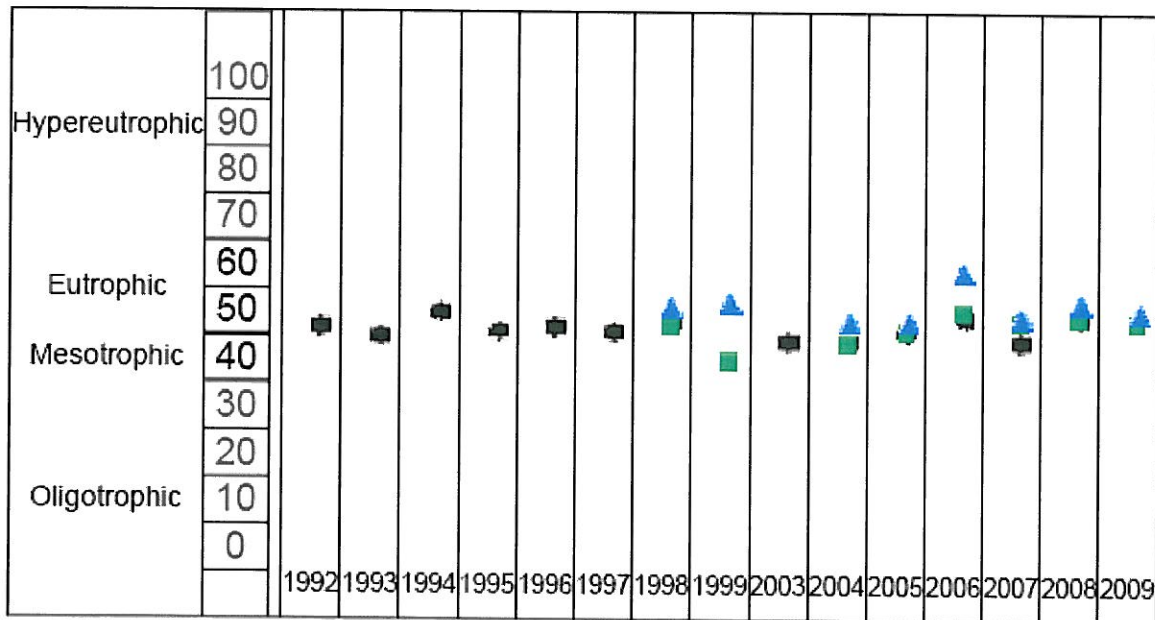
Past secchi averages in feet (July and August only).

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=043115>

Graph 2-12

Trophic State Index Graph for Garden Lake



♦ = Secchi ■ = Chlorophyll ▲ = Total Phosphorus

Past Summer (July-August) Trophic State Index (TSI) averages.

Data obtained from the WDNR website:

<http://prodoasjava.dnr.wi.gov/swims/public/reporting.do?type=33&action=post&format=html&stationNo=043115>

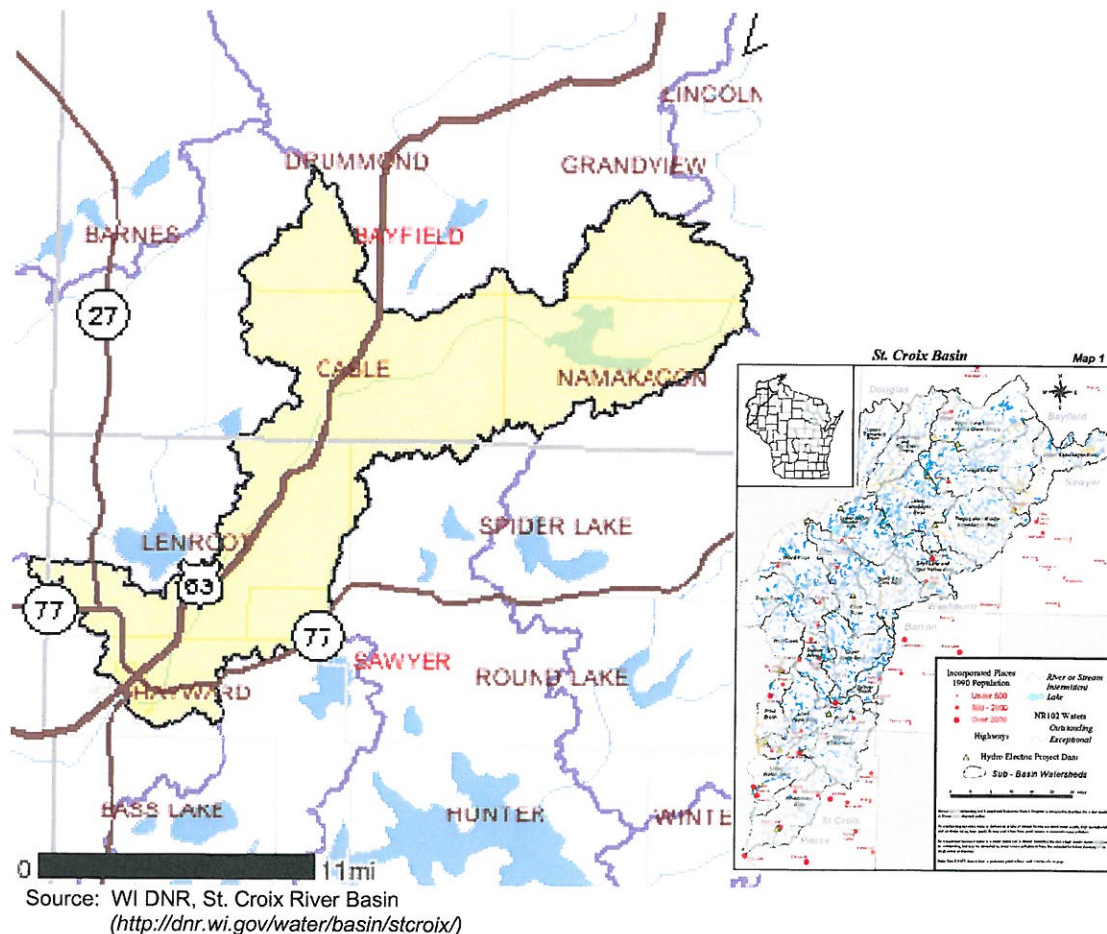
2.1.6 Lake Morphological and Watershed Characteristics

2.1.6.1 Watershed

Lake Namakagon is located in the Upper Namakagon River Watershed, which is a sub-watershed of the St. Croix River Basin. The Namakagon Watershed's headwaters are in northwest Wisconsin, beginning in southwest Bayfield County, just south of the drainage divide between Lake Superior and Mississippi River system. The Namakagon River, 98 miles in length, begins at the outlet of Lake Namakagon, making its way southwest to Trego and then turning northwest until it enters the St. Croix River a few miles upstream of Riverside in northeast Burnett County.

The entire Namakagon River and Lake Namakagon are classified as "Outstanding Resource Waters" by the WDNR. This is due in large part to the land use of the watershed, which is over 65% forestland and nearly 15% wetland in area. Much of these areas are county forest lands or part of the Chequamegon National Forest. The Totagatic River, in the northern part of the watershed, is a major tributary to the Namakagon River. There are numerous lakes in the watershed, with Lake Namakagon, Nelson Lake, and the Minong Flowage among the largest.

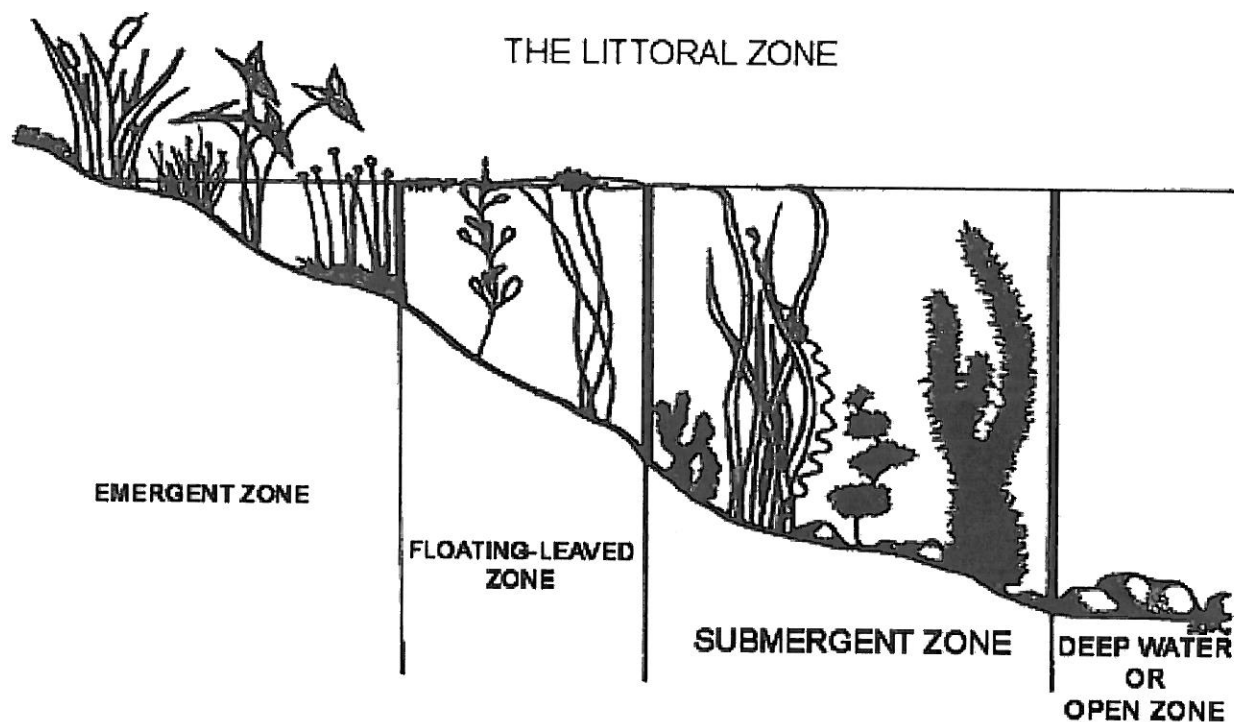
Figure 2-1
Upper Namakagon River Watershed



3 Aquatic Plant Ecology

Aquatic plants are beneficial in many ways. Areas with plants produce more food items for fish, such as insect larvae, snails, and other invertebrates. Aquatic vegetation offers shelter for fish, as well as spawning habitat. Many submerged plants provide food for waterfowl and provide habitat for insects on which some waterfowl feed. Aquatic plants further benefit lakes by producing oxygen and by absorbing nutrients from runoff, such as phosphorus and nitrogen. Emergent plants also protect shorelines and bottoms by dampening wave action and stabilizing sediments. All aquatic vegetation grows in along shorelines and in shallow water areas known as the littoral zone. The littoral zone, or area of which a lake that can support aquatic vegetation (macrophytes), can be divided into four transitional zones: the emergent zone, floating-leaf zone, submergent zone, and deep zone.

The following illustration depicts these zones and plant communities.



3.1 Functions & Values of Native Aquatic Plants

Naturally occurring native plants are extremely beneficial to the lake. They provide a diversity of habitats, help maintain water quality, sustain fish populations, and support common lakeshore wildlife from loons to frogs.

Water Quality

Aquatic plants can improve water quality by absorbing phosphorus, nitrogen, and other nutrients from the water that could otherwise fuel nuisance algal growth. Some plants can even filter and break down pollutants. Plant roots and underground stems help to prevent re-suspension of sediments from the lake bottom. Stands of emergent plants (with stems that protrude above the water surface) and floating plants help to blunt wave action and prevent erosion at the shoreline.

Fishing

Habitat created by aquatic plants provides food and shelter for both young and adult fish. Invertebrates living on or beneath plants are a primary food source for many species of fish. Other fish such as bluegills graze directly on the plants themselves. Plant beds provide important spawning habitat for many fish species.

Waterfowl

Plants offer food, shelter, and nesting material for waterfowl. Birds eat both the invertebrates that live on plants and the plants themselves.

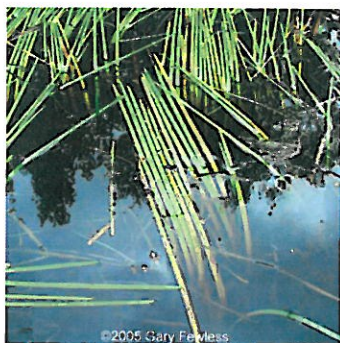
Protection against Invasive Species

Non-native invasive species threaten native plants in Northern Wisconsin. The most common are Eurasian Water Milfoil (EWM) and Curly Leaf Pondweed (CLP). These species are described as opportunistic invaders. This means that they take over openings in the lake bottom where native plants have been removed. Without competition from other plants, these invasive species may successfully become established in the lake. This concept of opportunistic invasion can also be observed on land, when bare soil is quickly taken over by weeds.

Removal of native vegetation not only diminishes the natural qualities of a lake, but it increases the risk of non-native species invasion and establishment. Invasive species can change many of the natural features of a lake and often lead to expensive annual control plans. Allowing native plants to grow may not guarantee protection against invasive plants, but it can discourage their establishment. Native vegetation may cause localized concerns to some users, but as a natural feature of lakes, it generally does not cause harm.

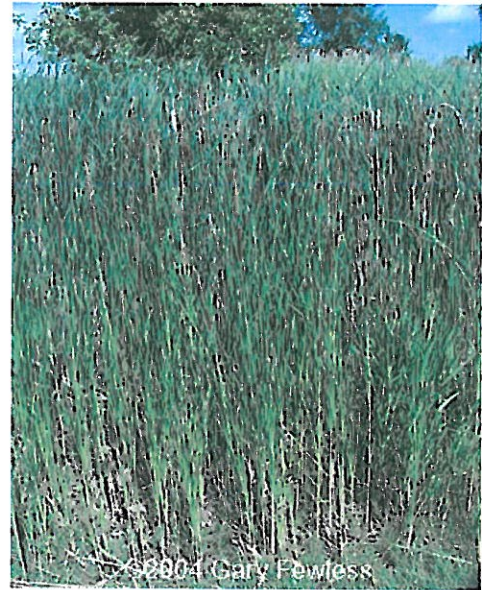
3.2 Emergent Zone

Dominated by emergent aquatic vegetation such as cattail, bulrush, and pickerel weed. This zone extends to water depths between 3 and 6 feet.

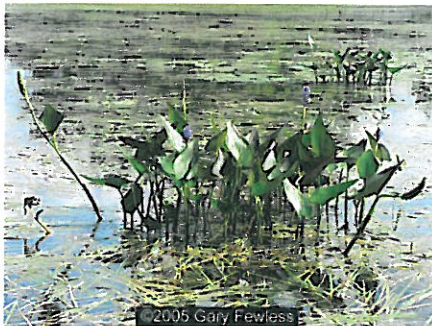


Floating-leaf bur-reed, has flat, wide floating leaves (5-9 mm). The flower stalk is branched with 2-4 fruiting heads (1.5-2 cm). Bur-reed help anchor sediment. The fruit is eaten by a variety of water fowl including mallards and tundra swans.

Narrow-leaf cattail, has dark green, sword-like leaves (5-11 mm wide, 1 m or more tall). The flowers look like hotdogs on stick and is dark brown to brown in color. Cattails provide nesting habitat for many marsh birds. Shoots and rhizomes are consumed by muskrats and geese. Submersed stalks provide spawning habitat for sunfish and shelter for young fish.



Softstem bulrush has tall, flexible stems (1-3 m tall and 1-1.5cm wide). The cylindrical, bluish-green stems are spongy due to an air chamber that fills the stem. The fruit are generally reddish brown and clustered. Softstem bulrush offer habitat for invertebrates and shelter for young fish. The nutlets are consumed by waterfowl, marsh birds, an upland birds. Stems are eaten by muskrats and geese and also provide nesting material for a variety of animals.



Pickerelweed has glossy heart-shaped leaves that emerge from a sprawling rhizome. The leaves have many fine parallel veins. The flower spike (5-15 cm long) is crowded with small bluish flowers. The flowering stalk is home to many insects. The seeds are consumed by waterfowl as well as muskrats. Beds of pickerelweed are important shoreline stabilizers.

Common reed has stems (2-4 m tall) that grow out of stout rhizomes. The leaves move in the wind like pennants and some are topped with clusters of spikelets that resemble a feather duster. Common reed is a valuable shoreline stabilizer, but its dense nature can exclude other beneficial plants.



3.3 Floating Leaf Zone

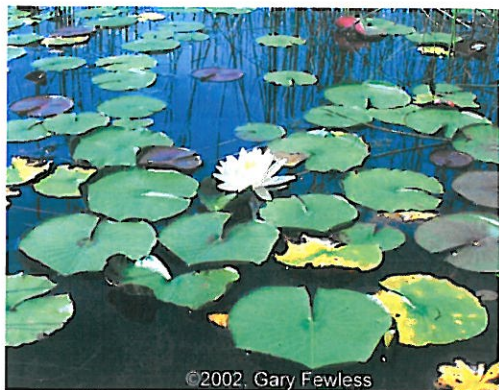
This zone is dominated by floating leaf aquatic vegetation like white water lily, watershield, and spatterdock. The zone extends to water depths between 3 and 9 feet.



Watershield leaves have a upper green surface and a purple underside, all underwater parts of watershield are coated with a thick, gelatinous coating. The seeds, leaves, stems, and buds of watershield are consumed by a wide variety of waterfowl. The floating leaves also offer shade and shelter for fish and invertebrates.

Spatterdock has heart shaped leaves (10-25 cm long) with rounded lobes that are parallel to overlapping. Flowers are globular to saucer shaped with five to six yellow sepal that often have a deep red patch at the base. Spatterdock anchors the shallow water community and provides food and shelter to waterfowl and fish.





White water lily has round leaves (10-30 cm wide) with a narrow sinus and reddish-purple underside. The flowers are white (7-20 cm wide) and are born from individual stalks that rise directly from the rhizome. White water lily provides seeds for waterfowl. The rhizomes are eaten by deer, muskrat, and beaver. The leaves offer shade and shelter for fish.

3.4 Submergent Zone

Dominated by submerged aquatic vegetation like coontail, northern water milfoil, and the various pondweeds. This zone extends to the limit of the photic zone, which is the maximum depth that sufficient light can support photosynthesis.



Coontail has long, trailing stems with stiff leaves arranged in whorls of 5-12. Each leave us forked once or twice. The stiff whorls of leaves offer prime habitat to invertebrates. The foliage and fruit of coontail is consumed by a variety of waterfowl. It also provides important shelter and forage opportunities for fish.

Common waterweed has slender stems (up to 1 m long). The small leaves are attached directly to the stem in whorls of three. The branching stems often form a tangled mat that can become a nuisance. Common waterweed offers valuable shelter and grazing opportunities for fish, although the very dense stands can obstruct fish movement.





Plantain shoreweed has a rosette of dark green leaves (4-5 cm long) that emerge from a well developed rootstalk. The leaves are quill-like and taper to a point. Plantain shoreweed can provide some limited habitat for invertebrates and fish in low fertility lakes.

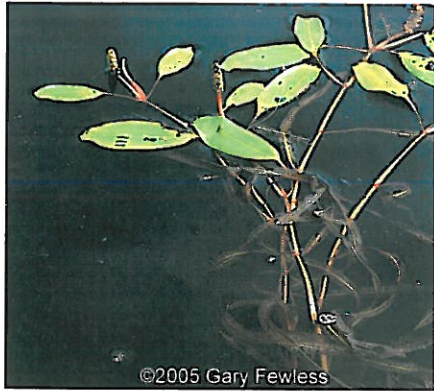
Northern water milfoil has light colored stems with leaves (1-5 cm long) divided like a feather, with a short stalk and about 5-12 pairs of thread-like leaflets. The leaves are arranged in whorls (4-5 per whorl). Leaves and fruit of Northern water milfoil are consumed by a variety of waterfowl. Beds of milfoil offer shade, shelter, and foraging opportunities for fish.



Bushy Pondweed has fine branched stems up to 1 m long. Bushy pondweed is an important source of food for waterfowl as well as shelter for fish.

Large leaf pondweed has the broadest leaves of all pondweeds (3.5-7.2 cm wide). Floating leaves are oval (5-10 cm long) on long stalks. The broad leaves of Large leaf pondweed offers shade, shelter and foraging opportunities for fish. Abundant production of large nutlets makes this a valuable source for waterfowl. Fishermen often refer to this plant as musky weed.





Ribbon leaf pondweed has slightly flattened stems (up to 2 m long) with long tape-like leaves (up to 20 cm long and 2-10 mm wide). The fruit produced by ribbon leaf can be a locally important food source for a variety of ducks and geese. Leaves and stems can be colonized by invertebrates and offer foraging opportunities for fish.

White stem pondweed has zigzag stems (2-3 m long). The submersed leaves are lance to oval shaped and clasp the stem. The fruit of white stem provides valuable grazing for a variety of ducks and geese. The plant may also be consumed by muskrat, beaver, and deer. It is also considered a good food producer for trout and valuable habitat for muskellunge.



Clasping leaf pondweed oval to lance shaped leaves. The base of the leaves are heart shaped and cover one-half to three-quarters of the stem. The fruit produced by clasping leaf pondweed can be a locally important food source for a variety of ducks and geese. Leaves and stems can be colonized by invertebrates and offer foraging opportunities for fish.

Robbins pondweed has leaves that are strongly two-ranked, creating a feather or fern like appearance which is most evident when the plant is submerged. Robbins or fern pondweed provides habitat for invertebrates that are grazed by waterfowl. Leaves and stems can also be colonized by invertebrates and offer foraging opportunities for fish.



Flat stem pondweed stems are strongly flattened and have a stiff angled appearance. Leaves are 10-20 cm long and have a stiff linear structure. No floating leaves are produced. Flat stem is an important source of food for a variety of waterfowl. The plant may also be grazed by muskrat, deer, beaver and moose. It also provides a food source and cover for fish and invertebrates.



Wild celery has ribbon like leaves that emerge in clusters. The leaves are up to 2 m long. The leaves are mostly submersed with just the tips trailing on the surface. Wild celery is a premiere source of food for waterfowl. All portions of the plant are consumed. Beds of wild celery are considered good fish habitat providing shade, shelter, and feeding opportunities.

Nitella is a type of algae that looks like a higher plant. Branches are arranged in whorls around the stem. The overall plant ranges from 10 cm to 0.5 m. Nitella is sometimes grazed by waterfowl. The algae and invertebrates on its surface are attractive to ducks and geese. Nitella also offers foraging for fish.



Muskgrass, this unusual type of algae has a growth form that resembles a higher plant. These plants range in size from angle high to knee high. Muskgrass is a favorite waterfowl food. Algae and invertebrates found on muskgrass provide grazing for waterfowl. It is also considered valuable fish habitat. Beds of muskgrass offer cover and are excellent producers of food, especially for young trout, largemouth and smallmouth bass.

Small pondweed has slender stems up to 1.5 m long. Submersed leaves (1-7 cm long, 0.2-2.5 mm wide) are linear and attached directly to the stem. Small pondweed is an important source of food for a variety of waterfowl. The plant may also be grazed by muskrat, deer, beaver and moose. It also provides a food source and cover for fish and invertebrates.



3.5 Deep Water Zone

This zone lacks vegetation and generally lacks the light penetration to support photosynthesis.

4 Plant Community

4.1 2009 Baseline Aquatic Plant Survey Results

The aquatic plant community of the lake was surveyed by Foth Infrastructure & Environment, LLC (Foth), in August 2009. The survey was completed according to the point intercept sampling method described in the *Aquatic Plant Management in Wisconsin* guidelines from the UW Extension Lakes.

The sample grid was split into the three main lakes, Jackson (368 points), Namakagon (1,291 points), and Garden (734 points) totaling 2393 pre-determined intercept points. Latitude and longitude coordinates and sample identifications were assigned to each intercept point on the grid as shown in Appendix A. Geographic coordinates were uploaded into a global positioning system (GPS) receiver. The GPS unit was then used to navigate to intercept points. At each intercept point, plants were collected using a double sided rake on a pole or by lowering a rakehead on a rope and dragging the bottom of the lake for approximately 2 feet. All collected plants were identified and recorded on field data sheets. Water depth, substrate characteristics, rake fullness were also collected at each point. See Appendix A for point intersect sample locations.

The point intercept method was used to evaluate the existing emergent, submergent, floating-leaf, and free-floating aquatic plants. If a species was not collected at that point the data field was left blank. The data from each sample point was entered into the WDNR data processing spreadsheet to calculate the following statistics.

- ♦ Taxonomic richness (total number of plant species detected).
- ♦ Maximum depth of plant growth.
- ♦ Community frequency of occurrence (number of intercept points where aquatic plants were detected divided by the number of intercept points shallower than the maximum depth of plant growth).
- ♦ Mean intercept point native taxonomic richness (the average number of native species per intercept point).
- ♦ Mean intercept point taxonomic richness (the average number of species per intercept point).
- ♦ Taxonomic frequency of occurrence within vegetated areas (the number of intercept points where a particular species was detected divided by the total number of intercept points where vegetation was present).
- ♦ Taxonomic frequency of occurrence at sites within the photic zone (the number of intercept points where a particular species was detected divided by the total number of intercept points which are equal or shallower than the maximum depth of plant growth).

- ♦ Relative taxonomic frequency of occurrence (the number of intercept points where a particular species was detected divided by the sum of all species occurrences).
- ♦ Mean density (the sum of the density values for a particular species divided by the number of sampling sites).
- ♦ Simpson Diversity Index (SDI) is an indicator of aquatic plant community diversity. SDI is calculated by taking one minus the sum of the relative frequencies squared for each species present. Based upon the index of community diversity, the closer the SDI is to one, the greater the diversity within the population.

4.1.1 2009 Aquatic Plant Statistics

4.1.1.1 Lake Namakagon Statistics

The vegetation in Lake Namakagon was identified to a maximum depth of 14.20 feet. The area delineated by depth at which vegetation can grow is known as a lake's photic zone. Aquatic vegetation was present at approximately 85% of the photic zone intercept points.

The SDI value of the plant community was 0.90 indicating a diverse plant community in 2009.

Table 4-1 illustrates the data collected from the aquatic plant baseline survey at Lake Namakagon.

Table 4-1
Vegetation – Lake Namakagon

Summary Statistics Lake Namakagon	Percent
Total number of points sampled	596
Total number of sites with vegetation	486
Total number of sites shallower than maximum depth of plants	574
Frequency of occurrence at sites shallower than maximum depth of plants	84.67
Simpson Diversity Index	0.90
Maximum depth of plants (ft)	14.20
Number of sites sampled using rake on Rope (R)	0
Number of sites sampled using rake on Pole (P)	609
Average number of all species per site (shallower than max depth)	2.31
Average number of all species per site (veg. sites only)	2.72
Average number of native species per site (shallower than max depth)	2.28
Average number of native species per site (veg. sites only)	2.72
Species richness	21
Species richness (including visuals)	23

4.1.1.2 Jackson Lake Statistics

The vegetation in Jackson Lake was identified to a maximum depth of 8.80 feet. Aquatic vegetation was present at approximately 90% of the photic zone intercept points.

The SDI value of the plant community was 0.85 indicating a diverse plant community in 2009.

Table 4-2 illustrates the data collected from the aquatic plant baseline survey in Jackson Lake.

Table 4-2
Vegetation – Jackson Lake

Summary Statistics Jackson Lake	Percent
Total number of points sampled	176
Total number of sites with vegetation	145
Total number of sites shallower than maximum depth of plants	162
Frequency of occurrence at sites shallower than maximum depth of plants	89.51
Simpson Diversity Index	0.85
Maximum depth of plants (ft)	8.80
Number of sites sampled using rake on Rope (R)	0
Number of sites sampled using rake on Pole (P)	229
Average number of all species per site (shallower than max depth)	2.35
Average number of all species per site (veg. sites only)	2.63
Average number of native species per site (shallower than max depth)	2.30
Average number of native species per site (veg. sites only)	2.63
Species Richness	16
Species Richness (including visuals)	19

4.1.1.3 Garden Lake Statistics

The vegetation in Garden Lake was identified to a maximum depth of 11.00 feet. Aquatic vegetation was present at approximately 76% of the photic zone intercept points.

The SDI value of the plant community was 0.85 indicating a diverse plant community in 2009.

Table 4-3 illustrates the data collected from the aquatic plant baseline survey at Garden Lake.

Table 4-3
Vegetation – Garden Lake

Summary Statistics Garden Lake	Percent
Total number of points sampled	233
Total number of sites with vegetation	168
Total number of sites shallower than maximum depth of plants	219
Frequency of occurrence at sites shallower than maximum depth of plants	76.71
Simpson Diversity Index	0.85
Maximum depth of plants (ft)	11.00
Number of sites sampled using rake on Rope (R)	0
Number of sites sampled using rake on Pole (P)	233
Average number of all species per site (shallower than max depth)	1.87
Average number of all species per site (veg. sites only)	2.43
Average number of native species per site (shallower than max depth)	1.80
Average number of native species per site (veg. sites only)	2.43
Species Richness	15
Species Richness (including visuals)	20

4.1.2 Plants Identified in 2009 Baseline Aquatic Plant Survey

The 2009 Baseline Aquatic Plant Survey identified 23 different floating leaf, emergent, and submerged aquatic vascular plant species during the survey. The following sub-sections list species identified by category.

4.1.2.1 Floating-Leaf Plants

The following three floating-leaf plants were identified during the 2009 Baseline Aquatic Plant Survey.

Scientific Name	Common Name
Brasenia schreberi	Watershield
Nuphar variegata	Spatterdock
Nymphaea odorata	White water lily

4.1.2.2 Emergent Plants

The following five floating-leaf plants were identified during the 2009 Baseline Aquatic Plant Survey.

Scientific Name	Common Name
Phragmites australis	Common reed
Pontederia cordata	Pickereelweed

Scientific Name	Common Name
<i>Schoenoplectus tabernaemontani</i>	Softstem bulrush
<i>Sparganium fluctuans</i>	Floating-leaf-bur-reed
<i>Typha angustifolium</i>	Narrow-leaved cattail

4.1.2.2 Submergent Plants

The following 15 floating-leaf plants were identified during the 2009 Baseline Aquatic Plant Survey.

Scientific Name	Common Name
<i>Ceratophyllum demersum</i>	Coontail
<i>Chara</i>	Muskgrasses
<i>Elodea canadensis</i>	Common waterweed
<i>Littorella americana</i>	Littorella
<i>Myriophyllum sibiricum</i>	Northern water-milfoil
<i>Najas flexilis</i>	Bushy pondweed
<i>Nitella</i>	Nitella
<i>Potamogeton amplifolius</i>	Large-leaf pondweed
<i>Potamogeton epihydrus</i>	Ribbon-leaf pondweed
<i>Potamogeton praelongis</i>	White-stem pondweed
<i>Potamogeton richardsonii</i>	Clasping-leaf pondweed
<i>Potamogeton robbinsii</i>	Robbins pondweed
<i>Potamogeton pusillus</i>	Small pondweed
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed
<i>Vallisneria americana</i>	Wild celery

4.2 Floristic Quality Index

A lake's plant community reflects that lake's water quality and its level of disturbance. Stan Nichols (Wisconsin Geological and Natural History Survey) developed the Floristic Quality Index (FQI) to help assess lake quality using the aquatic plants that live in a lake. To determine the FQI, we need to know the number of different species and the identity of those species in a lake. Next, each species is assigned a number, called the coefficient of conservatism (C), indicating how typical this plant is of pristine conditions. A plant found only in clear, low nutrient and undisturbed conditions is given a 10. Plants typically found in more nutrient rich and/or disturbed waters are given lower numbers. Nichols assigned this coefficient of conservatism to 128 emergent, floating, or submersed lake plants found in Wisconsin. Together, the number of species found, the identity of those plants, and the coefficient of conservatism associated with each plant help quantify lake quality. The FQI varies around Wisconsin but ranges from 3.0 to 44.6 with a median of 22.2. The FQI is particularly valuable for comparing lakes around the state or looking at a single lake over time. Generally, higher FQI numbers mean better lake quality. Based on data collected during the August 2009 Baseline Aquatic Plant Survey, Lake Namakagon's FQI is 30.01 placing it above average for Bayfield County lakes

suggesting very good water quality when using aquatic vegetation as an indicator. Table 4-4 is the FQI worksheet used to calculate the FQI for Lake Namakagon.

Table 4-4
Lake Namakagon Floristic Quality Index Worksheet

Species	Common Name	C	Present	Value
<i>Brasenia schreberi</i>	Watershield	7	1	7
<i>Ceratophyllum demersum</i>	Coontail	3	1	3
<i>Chara</i>	Muskgrasses	7	1	7
<i>Elodea canadensis</i>	Common waterweed	3	1	3
<i>Lemna minor</i>	Small duckweed	5	1	5
<i>Littorella americana</i>	Littorella	10	1	10
<i>Myriophyllum sibiricum</i>	Northern water-milfoil	7	1	7
<i>Najas flexilis</i>	Bushy pondweed	6	1	6
<i>Nitella</i>	Nitella	7	1	7
<i>Nuphar variegata</i>	Spatterdock	6	1	6
<i>Nymphaea odorata</i>	White water lily	6	1	6
<i>Phragmites australis</i>	Common reed	1	1	1
<i>Pontederia cordata</i>	Pickereelweed	9	1	9
<i>Potamogeton amplifolius</i>	Large-leaf pondweed	7	1	7
<i>Potamogeton epihydrus</i>	Ribbon-leaf pondweed	8	1	8
<i>Potamogeton praelongis</i>	White-stem pondweed	8	1	8
<i>Potamogeton pusillus</i>	Small pondweed	7	1	7
<i>Potamogeton richardsonii</i>	Clasping-leaf pondweed	5	1	5
<i>Potamogeton robbinsii</i>	Robbins pondweed	8	1	8
<i>Potamogeton zosteriformis</i>	Flat-stem pondweed	6	1	6
<i>Schoenoplectus tabernaemontani</i>	Softstem bulrush	4	1	4
<i>Sparganium fluctuans</i>	Floating-leaf-bur-reed	10	1	10
<i>Typha angustifolium</i>	Narrow-leaved cattail	1	1	1
<i>Vallisneria americana</i>	Wild celery	6	1	6
		N	24	
		mean C		6.125
		FQI		30.01

N = number present

Table 4-5 is a list of other Bayfield County lakes surveyed by the WDNR and corresponding FQI values.

Table 4-5
Bayfield County Wisconsin WDNR Survey Lakes
Bayfield County, Wisconsin

Lake	County	Lake Acres	FQI
Atkins	Bayfield	169.56	28
Bellevue	Bayfield	62.93	31.20516
Chippewa	Bayfield	281.94	33.16912
Perch	Bayfield	68.89	31.75
Robinson	Bayfield	89.22	38.53732
Sandbar	Bayfield	126.83	28.99138
Tomahawk	Bayfield	131.1	30.0
Twin Bear	Bayfield	157.2	23.8
Bass	Bayfield	80.51	32.57703
Moon	Bayfield	40.58	20.80428
Bayfield County Average			29.88343

Data received by WDNR.

5 Aquatic Plant Management

5.1 Discussion of Management Methods

As of the date of this aquatic plant survey, no invasive species have been identified and based on data gathered during the lake use survey a overwhelming majority of the lakeshore property owners feel that the amount of aquatic plants in the Namakagon Chain is ‘just right’ (lake use survey question #24, see Appendix B).

Of the 196 residents of the Namakagon Chain who responded to question #24 (regarding the amount of aquatic plants), 20% of property owners felt there was too much aquatic vegetation and 78% thought the vegetation density of the lake was just right. A property owner's location on the Lake Namakagon Chain may determine their opinion as to the amount of vegetation they may experience surrounding their property. The lake itself is comprised of different near shore substrates, from rocky sandy shores on the main lake to the shallow sediment filled bays and backwaters. The areas and bays with muck or sediment as the main substrate generally will have the highest densities of aquatic vegetation depending on water depth. If a resident has property in one of these locations they may experience an increase in aquatic vegetation as the year moves into late summer. This is normal and although it may interrupt a property owner's use of the lake in a manner they would like, these areas are important to the overall lake health. Vegetation provides critical habitat and nursery areas for the young of the year fish. In addition to providing shelter to young fish, aquatic plants are also a food supply for many different types of waterfowl and macroinvertebrates. Before attempting to manage or remove any aquatic vegetation a property owner should check WDNR regulations as well as any local ordinances that may be in place to find out if a permit is required. It is also recommended that the NLA, Namakagon Township, and Grandview Township provide WDNR and UW Extension aquatic plant educational information at their respective Town Halls and meeting places for the public to review. Notification of the existence of these educational materials as well as web links to informational web sites could be provided to residents in NLA and Township websites and newsletters.

The following potential management methods are available if aquatic invasive species are discovered or native vegetation reaches a nuisance level and NLA desires to act on these management practices.

Permitting Requirements

The WDNR regulates the removal of aquatic plants when chemicals are used, when plants are removed mechanically, and when plants are removed manually from an area greater than thirty feet in width along the shore. The requirements for chemical plant removal are described in Administrative Rule NR 107 – Aquatic Plant Management. A permit is required for any aquatic chemical application in Wisconsin.

The requirements for manual and mechanical plant removal are described in NR 109 – Aquatic Plants: Introduction, Manual Removal & Mechanical Control Regulations. A permit is required for manual and mechanical removal except when a riparian (waterfront) landowner manually removes or gives permission to someone to manually remove plants, (with the exception of wild rice) from his/her shoreline up to a 30-foot corridor. A riparian landowner may also manually remove the invasive plants Eurasian water milfoil, curly leaf pondweed, and purple loosestrife along his or her shoreline without a permit. Manual removal refers to the control of aquatic plants

by hand or hand-held devices without the use or aid of external or auxiliary power. Techniques to control the growth and distribution of aquatic plants are discussed in the following text. The application, location, timing and combination of techniques must be considered carefully.

Manual Removal

Manual removal (involving hand pulling, cutting, or raking plants) will effectively remove plants from small areas. It is likely that plant removal will need to be repeated during the growing season. The best timing for hand removal of herbaceous plant species is after flowering but before seed head production. For plants with rhizomatous (underground stem) growth, pulling roots is not generally recommended since it may stimulate new shoot production. Hand pulling is a strategy recommended for rapid response to a Eurasian water milfoil establishment and for private landowners who wish to remove small areas of curly leaf pondweed growth. Raking is recommended to clear nuisance growth in riparian area corridors up to thirty feet wide.

SCUBA divers may engage in manual removal for invasive species like Eurasian water milfoil. Care must be taken to remove all plant fragments from the lake. Manual removal with divers is recommended for shallow areas with sporadic EWM growth.

Mechanical Control

Larger-scale control efforts require more mechanization. Mechanical cutting, mechanical harvesting, diver-operated suction harvesting, and rotovating (tilling) are the most common forms of mechanical control available. WDNR permits under Chapter NR 109 are required for mechanical plant removal.

Aquatic plant harvesters are floating machines that cut and remove vegetation from the water. The cutter head uses sickles similar to those found on farm equipment. The size, and consequently the harvesting capabilities, of these machines vary greatly. As they move, harvesters cut a swath of aquatic plants that is between 4 and 20 feet wide, and between 1 and 10 feet deep. The on-board storage capacity of a harvester ranges from 100 to 1000 cubic feet (by volume) or 1 to 8 tons (by weight).

A conveyor belt on the cutter head brings the clippings onboard the machine for storage. The cuttings are then transferred to shore for disposal. In some cases the plants are transported to shore by the harvester itself, while in other cases a barge is used to store and transport the plants in order to increase the efficiency of the cutting process. The plants are deposited on shore, where they can be transported to a local farm (the nutrient content of composted aquatic plants is comparable to that of cow manure) or to an upland landfill for proper disposal. Most harvesters can cut between 2 and 8 acres of aquatic vegetation per day, and the average lifetime of a mechanical harvester is 10 years.

Pros and cons: Mechanical harvesting of aquatic plants presents both positive and negative consequences to any lake. Its results—open water and accessible boat lanes—are immediate, and can be enjoyed without the restrictions on lake use which follow herbicide treatments. In addition to the human use benefits, the clearing of thick aquatic plant beds may also increase the growth and survival of some fish. By eliminating the upper canopy, harvesting reduces the shading caused by aquatic plants. The nutrients stored in the plants are also removed from the lake, and the sedimentation that would normally occur as a result of the decaying of this plant matter is prevented. Additionally, repeated treatments may result in thinner, more scattered growth. Aside from the obvious effort and expense of harvesting aquatic plants, there are many

environmentally detrimental consequences to consider. The removal of aquatic species during harvesting is non-selective. Native and invasive species alike are removed from the target area. This loss of plants results in a subsequent loss of the functions they perform, including sediment stabilization and wave absorption. Shoreline erosion may therefore increase. Other organisms such as fish, reptiles, and insects are often displaced or removed from the lake in the harvesting process. This may have adverse effects on these organisms' populations as well as the lake ecosystem as a whole.

While the negative effects of harvesting aquatic plants may be long term, the results are not. Much like mowing a lawn, harvesting must be conducted numerous times throughout the growing season. Although the harvester collects most of the plants that it cuts, some plant fragments inevitably persist in the water. This may allow invasive plant species to propagate and colonize in new, previously unaffected areas of the lake. Harvesting may also result in resuspension of contaminated sediments and the nutrients they contain. Considerations for mechanical harvesting disposal sites are a key component when considering mechanical harvesting of aquatic plants.

The sites must be on shore and upland to make sure the plants and their reproductive structures do not make their way back into the lake or to other lakes. The number of available disposal sites and their distance from the targeted harvesting areas will determine the efficiency and therefore cost of the operation.

Timing is also important. The ideal time to harvest in order to maximize the efficiency of the harvester, is just before the aquatic plants break the surface of the lake. For curly leaf pondweed, it should also be before the plants form turions to avoid spreading of the turions within the lake. If the harvesting is conducted too early, the plants will not be close enough to the surface, and the cutting will not do much damage to them. If too late, there may be too much plant matter on the surface of the lake for the harvester to cut effectively. If the harvesting work is contracted, equipment needs to be inspected before and after it enters the lake. Since these machines travel from lake to lake, they may carry plant fragments with them, and facilitate the spread of aquatic invasive species from one body of water to another. Prevailing winds must also be considered when harvesting, since cut vegetation can be blown into open areas of the lake or along shorelines.

Diver dredging operations use pump systems to collect plant and root biomass. The pumps are mounted on a barge or pontoon boat. The dredge hoses are from 3 to 5 inches in diameter and are handled by one diver. The hoses normally extend about 50 feet in front of the vessel. Diver dredging is especially effective against pioneering establishment of submersed invasive plant species. To be effective, the entire plant, including the subsurface portions, should be removed.

Plant fragments can result from this type of operation. Fragmentation is not as great a problem when infestations are small. Diver dredging operations may need to be repeated to be effective. When applied to a pioneering infestation, control can be complete. However, periodic inspections of the lake should be performed to ensure that all the plants have been found and collected.

Lake substrates can play an important part in the effectiveness of a diver dredging operation. Soft substrates are very easy to work in. Divers can remove the plant and root crowns with little difficulty. Hard substrates, however, pose more of a problem. Divers may need hand tools to help dig the root crowns out of hardened sediment.

Rotovation involves using large underwater rototillers to remove plant roots and other plant tissue. Rotovators can reach bottom sediments to depths of 20 feet. Rotovating may significantly affect non-target organisms and water quality as bottom sediments are disturbed. However, the suspended sediments and resulting turbidity produced by rotovation settles fairly rapidly once the tiller has passed. Tilling contaminated sediments could possibly release toxins into the water column. If there is any potential of contaminated sediments in the area, further investigation should be performed to determine potential impacts from rotovation. Tillers do not operate effectively in areas with many underwater obstructions such as trees and stumps. If operations are releasing large amounts of plant material, harvesting equipment should be on hand to collect this material and transport it to shore for disposal.

Biological Control

Biological control is the purposeful introduction of parasites, predators, and/or pathogenic microorganisms to reduce or suppress populations of plant or animal pests. Biological control counteracts the problems that occur when a species is introduced into a new region of the world without a complex or assemblage of organisms that feed directly upon it, attack its seeds or progeny through predation or parasitism, or cause severe or debilitating diseases. With the introduction of native pests to the target invasive organism, the exotic invasive species may be maintained at lower densities.

The effectiveness of biocontrol efforts varies widely. Beetles are commonly used to control purple loosestrife populations in Wisconsin with good success. Weevils are used as an experimental control for Eurasian water milfoil once the plant is established. Tilapia and carp are used to control the growth of filamentous algae in ponds. Grass carp, an herbivorous fish, is sometimes used to feed on pest plant populations, but grass carp introduction is not allowed in Wisconsin.

There are advantages and disadvantages to the use of biological control as part of an overall aquatic plant management program. Advantages include longer-term control relative to other technologies, lower overall costs, and plant-specific control. On the other hand there are several disadvantages to consider, including very long control times (years instead of weeks), a lack of available agents for particular target species, and relatively specific environmental conditions necessary for success. Biological control is not without risks; new non-native species introduced to control a pest population, may cause problems of its own.

Re-vegetation with Native Plants

Another aspect to biological control is native aquatic plant restoration. The rationale for revegetation is that restoring a native plant community should be the end goal of most aquatic plant management programs (Nichols 1991; Smart and Doyle 1995). However, in communities that have only recently been invaded by nonnative species, a propagule (seed) bank probably exists that will restore the community after nonnative plants are controlled (Madsen, Getsinger, and Turner, 1994).

Physical Control

In physical management, the environment of the plants is manipulated, which in turn acts upon the plants. Several physical techniques are commonly used: dredging, drawdown, benthic (lake bottom) barriers, and shading or light attenuation. Because they involve placing a structure on

the bed of a lake and/or affect lake water level, a Chapter 30 or 31 DNR permit would be required.

Dredging removes accumulated bottom sediments that support plant growth. Dredging is usually not performed solely for aquatic plant management but to restore lakes that have been filled in with sediments, have excess nutrients, need deepening, or require removal of toxic substances (Peterson 1982). Lakes that are very shallow due to sedimentation tend to have excess plant growth. Dredging can form an area of the lake too deep for plants to grow, thus creating an area for open water use (Nichols 1984). By opening more diverse habitats and creating depth gradients, dredging may also create more diversity in the plant community (Nichols 1984). Results of dredging can be very long term. However, due to the cost, environmental impacts, and the problem of disposal, dredging should not be performed for aquatic plant management alone. It is best used as a lake remediation technique.

A general permit or an individual permit is required to dredge material from the bed of a navigable waterway (dredging regulations, Sec 30.20 Wis. Stats.). A general permit would be possible only if the previous dredge project was approved by the Wisconsin DNR and there is adequate documentation of the process and less than 3000 cubic yards of material is to be removed. An individual permit requires submitting the proposed dredge area and shoreline cross sections, where spoils will be deposited, and floodplain and wetland boundaries. The cross sections must include the normal water level and a profile of the existing bottom and proposed dredged bottom. Sediment testing for hazardous materials may be required. Permit review may take three months or longer. Local zoning permits and U.S. Army Corps of Engineers permits may also be required.

Drawdown, or significantly decreasing lake water levels can be used to control nuisance plant populations. With drawdown, the water body has water removed to a given depth. It is best if this depth includes the entire depth range of the target species. Drawdowns need to be at least one month long to ensure thorough drying and effective removal of target plants (Cooke 1980a). In northern areas, a drawdown in the winter that will ensure freezing of sediments is also effective. Although drawdown may be effective for control of hydrilla for one to two years (Ludlow 1995), it is most commonly applied to Eurasian water milfoil (Geiger 1983; Siver et al. 1986) and other milfoils or submersed evergreen perennials (Tarver 1980). Drawdown requires a mechanism to lower water levels.

Although drawdown is inexpensive and has long-term effects (two or more years), it also has significant environmental effects and may interfere with the use and intended function (e.g., power generation or drinking water supply) of the water body during the drawdown period. Lastly, species respond in very different manners to drawdown and often not in a consistent fashion (Cooke 1980a). Drawdowns may provide an opportunity for the spread of highly weedy species, particularly annuals.

Benthic barriers or other bottom-covering approaches are another physical management technique. The basic idea is to cover the plants with a layer of a growth-inhibiting substance. Many materials have been used, including sheets or screens of organic, inorganic, and synthetic materials; sediments such as dredge sediment, sand, silt or clay; fly ash; and various combinations of the above materials (Cooke 1980b; Nichols 1974; Perkins 1984; Truelson 1984). The problem with using sediments is that new plants establish on top of the added layer

(Engel and Nichols 1984). The problem with synthetic sheeting is that the gasses evolved from plant and sediment decomposition collect underneath and lift the barrier (Gunnison and Barko 1992). Benthic barriers will typically kill the plants under them within one to two months, after which time they may be removed (Engel 1984). Sheet color is relatively unimportant; opaque (particularly black) barriers work best, but even clear plastic barriers will work effectively (Carter et al. 1994). Sites from which barriers are removed will be rapidly re-colonized (Eichler et al. 1995). Synthetic barriers, if left in place for multi-year control, will eventually become sediment-covered and will allow colonization by plants. Benthic barriers may be best suited to small, high-intensity use areas such as docks, boat launch areas, and swimming areas. However, they are too expensive to use over widespread areas, and heavily affect benthic communities by removing fish and invertebrate habitat. A WDNR permit would be required for a benthic barrier.

Shading or light attenuation reduces the light plants need to grow. Shading has been achieved by fertilization to produce algal growth, by application of natural or synthetic dyes, shading fabric or covers, and by establishing shade trees (Dawson 1981, 1986; Dawson and Hallows 1983; Dawson and Kern-Hansen 1978; Jorga et al. 1982; Martin and Martin 1992; Nichols 1974). During natural or cultural eutrophication, algae growth alone can shade aquatic plants (Jones et al. 1983). Although light manipulation techniques may be useful for narrow streams or small ponds, in general these techniques are of only limited applicability.

Herbicide and Algaecide Treatments

Herbicides are chemicals used to kill plant tissue. Currently, no product can be labeled for aquatic use if it poses more than a one in a million chance of causing significant damage to human health, the environment, or wildlife resources. In addition, it may not show evidence of biomagnification, bioavailability, or persistence in the environment (Joyce, 1991). Thus, there are a limited number of active ingredients that are assured to be safe for aquatic use (Madsen, 2000).

An important caveat is that these products are considered safe when used according to the label. The U.S. Environmental Protection Agency (EPA)-approved label gives guidelines protecting the health of the environment, the humans using that environment, and the applicators of the herbicide. Wisconsin Department of Natural Resources permits under Chapter NR 107 are required for herbicide application. General descriptions of herbicide classes are included below.

Contact herbicides act quickly and are generally lethal to all plant cells that they contact. Because of this rapid action, or other physiological reasons, they do not move extensively within the plant and are effective only where they contact plants directly. They are generally more effective on annuals (plants that complete their life cycle in a single year). Perennial plants (plants that persist from year to year) can be defoliated by contact herbicides, but they quickly resprout from unaffected plant parts. Submersed aquatic plants that are in contact with sufficient concentrations of the herbicide in the water for long enough periods of time are affected, but regrowth occurs from unaffected plant parts, especially plant parts that are protected beneath the sediment. Because the entire plant is not killed by contact herbicides, retreatment is necessary, sometimes two or three times per year. **Endothall**, **diquat**, and **copper** are contact aquatic herbicides.

Systemic herbicides are absorbed into the living portion of the plant and move within the plant. Different systemic herbicides are absorbed to varying degrees by different plant parts. Systemic

herbicides that are absorbed by plant roots are referred to as soil active herbicides and those that are absorbed by leaves are referred to as foliar active herbicides. **2,4-D, dichlobenil, fluridone, and glyphosate** are systemic aquatic herbicides. When applied correctly, systemic herbicides act slowly in comparison to contact herbicides. They must move to the part of the plant where their site of action is. Systemic herbicides are generally more effective for controlling perennial and woody plants than contact herbicides. Systemic herbicides also generally have more selectivity than contact herbicides.

Broad spectrum (sometimes referred to as nonselective) herbicides are those that are used to control all or most species of vegetation. This type of herbicide is often used for total vegetation control in areas such as equipment yards and substations where bare ground is preferred.

Glyphosate is an example of a broad spectrum aquatic herbicide. **Diquat, endothall, and fluridone** are used as broad spectrum aquatic herbicides, but can also be used selectively under certain circumstances.

Selective herbicides are those that are used to control certain plants but not others. Herbicide selectivity is based upon the relative susceptibility or response of a plant to an herbicide. Many related physical and biological factors can contribute to a plant's susceptibility to an herbicide. Physical factors that contribute to selectivity include herbicide placement, formulation, timing, and rate of application. Biological factors that affect herbicide selectivity include physiological factors, morphological factors, and the stage of plant growth.

Environmental considerations. Aquatic communities consist of aquatic plants including macrophytes (large plants) and phytoplankton (free floating algae), invertebrate animals (such as insects and clams), fish, birds, and mammals (such as muskrats and otters). All of these organisms are interrelated in the community. Organisms in the community require a certain set of physical and chemical conditions to exist such as nutrient requirements, oxygen, light, and space. Aquatic weed control operations can affect one or more of the organisms in the community, and in turn affect other organisms. These operations can also impact water chemistry which results in further implications for aquatic organisms.

General descriptions of the breakdown of commonly used aquatic herbicides are included below.

Copper is a naturally occurring element that is essential at low concentrations for plant growth. It does not break down in the environment, but forms insoluble compounds with other elements and is bound to charged particles in the water. It rapidly disappears from water after application as an herbicide. Because it is not broken down, it can accumulate in bottom sediments after repeated or high rates of application. Accumulation rarely reaches levels that are toxic to organisms or significantly above background concentrations in the sediment.

2,4-D photodegrades on leaf surfaces after being applied to leaves, and is broken down by microbial degradation in water and in sediments. Complete decomposition usually takes about 3 compounds.

Diquat is rarely found longer than 10 days after application, when applied to enclosed ponds for submersed weed control, and is often below detection levels 3 days after application. The most important reason for the rapid disappearance of diquat from water is that it is rapidly taken up by aquatic vegetation and bound tightly to particles in the water and bottom sediments. When bound

to certain types of clay particles, diquat is not biologically available. When diquat is bound to organic matter, it can be slowly degraded by microorganisms. When diquat is applied foliarly, it is degraded to some extent on the leaf surfaces by photodegradation. Because it is bound in the plant tissue, a proportion is probably degraded by microorganisms as the plant tissue decays.

Endothall, like 2,4-D, is rapidly and completely broken down into naturally occurring compounds by microorganisms. The by-products of endothall dissipation are carbon dioxide and water. Complete breakdown usually occurs in about 2 weeks in water and 1 week in bottom sediments.

Fluridone dissipates from water mainly by photodegradation. Metabolism by tolerant organisms and microbial breakdown also occurs, and microbial breakdown is probably the most important method of breakdown in bottom sediments. The rate of breakdown of fluridone is variable and may be related to time of application. Applications made in the fall or winter, when the sun's rays are less direct and days are shorter, result in longer half-lives. Fluridone usually disappears from pondwater after about 3 months but can remain up to 9 months. It may remain in bottom sediment between 4 months and 1 year.

Glyphosate is not applied directly to water for weed control, but when it enters the water it is bound tightly to dissolved and suspended particles and to bottom sediments and becomes inactive. Glyphosate is broken down into carbon dioxide, water, nitrogen, and phosphorus over a period of several months.

Copper-based compounds are generally used to treat filamentous algae. Common chemicals used are copper sulfate and Cutrine Plus, a chelated copper algaecide.

5.2 Current and Past Management Activities

The protection of the Lake Namakagon resource has been a goal of the Namakagon Lake Association (NLA) since its inception in 1995, and pursuing of Lake Management Grants and Aquatic Invasive Species grants over the past few years shows their dedication to preserving the ecosystem and applying best management practices when speaking about the aquatic plant population.

Although Purple Loosestrife was not identified during the aquatic survey of the lakes, the NLA has found a small area of Purple Loosestrife in Funny's Bay on Namakagon Lake. Volunteers have attempted to manually eradicate it from that location. The NLA will continue to monitor the site.

The NLA has instituted an annual aquatic plant survey of the nine boat access points on the Namakagon Chain, specifically to look for aquatic invasive species.

The NLA has installed remote photographic devices at several boat access points to monitor and encourage compliance with WDNR rules and NLA resource management goals.

A Clean Boats, Clean Waters Program, staffed by volunteers, has been collecting data since 1995. This program provides information to boaters at the landings, encourages removal of plant fragments and drainage of live wells, and records data.

6 Plans, Goals, and Strategies

This section of the plan lists goals for aquatic plant management for the Lake Namakagon watershed. It also presents a detailed strategy of actions that will be used to reach Aquatic Plant Management Plan goals.

Goal 1. Protect the natural functions that diverse native plants provide including habitat for fish and other aquatic species, sediment stabilization, protection against invasion by non-native species, and natural beauty.

Objectives:

- ♦ Use aquatic plant management methods that limit negative impacts to native plants, especially those of special concern.
- ♦ Increase residents' and lake users' understanding of the role and importance of aquatic plants within the Lake Namakagon watershed, Lake Namakagon, Jackson Lake, and Garden Lake and their impacts on them (see Goal 3).

Action Items:

- ♦ Consider impacts to state Special Concern Species and emergent plants prior to any plant control methods.
- ♦ Continue monitoring of areas adjacent to public access sites and strategic bays.

Measuring Progress:

- ♦ Conduct whole lake aquatic plant survey every 5-10 years, and conduct annual monitoring of public access points and strategic bays within the resource.

Goal 2. Prevent the introduction of Eurasian water milfoil and other invasive aquatic plants and animals and eradicate the growth of Purple Loosestrife at its location on Funny's Bay.

Objectives:

- ♦ 100% of boaters inspect, clean, and drain boats, trailers and equipment.
- ♦ The NLA, town of Namakagon, and town of Grandview are ready to rapidly respond to the introduction of aquatic invasive species.
- ♦ Aquatic invasive species (AIS) introductions in Lake Namakagon, if they occur, are discovered soon after introduction.
- ♦ Raise lake user and resident awareness to prevent AIS introduction (see Goal 3).

Action Items:

- ♦ Continue to monitor the growth of Purple Loosestrife at its location on Funny's Bay. Consider the various methods of control (<http://dnr.wi.gov/invasives/fact/loosecontrol.htm>):
 - ▶ Biocontrol is now considered the most viable option. A species of weevil (*Hylobius transversovittatus*) is being used that lays eggs in the stem and upper root system of the plant; as larvae develop, they feed on root tissue. Another weevil that feeds on flowers (*Nanophyes marmoratus*) is being used to stress the plant in multiple ways. Two species of leaf-eating beetles (*Galerucella californiensis* and *G. pusilla*) are being raised and released in the state.
 - ▶ Chemical (Roundup, Glyphos, and Rodeo are typically used). A permit must be applied for from WDNR before using any herbicide over water.
 - ▶ Mechanical control includes cutting, pulling, digging and drowning.
- ♦ Continue Clean Boats, Clean Waters boat monitoring at landings. Consider volunteer stipends, paid staff, and youth group donations for the program. Continue the remote photo documentation efforts of the NLA.
- ♦ Implement the Aquatic Invasive Plant Incident Report that can be found in Appendix D and details are found in section 6.1.
- ♦ Monitor to detect presence of Eurasian water milfoil and other AIS. Periodic testing and sampling will emphasize areas near boat landings, the entrances to the channel between the lakes, and random GPS points from the point intercept survey.
 - ▶ Volunteer monitoring at boat landings for Eurasian water milfoil at times of highest usage and during the Annual Musky Tournament.
 - ▶ Consultant monitoring at boat landings monthly as budget allows.
 - ▶ Consultant monitoring at public access points and random GPS points every other year.
 - ▶ Add additional monitoring as threats are identified and monitoring methods become available.

Measuring Progress:

- ♦ Conduct whole lake aquatic plant survey every 5-10 years, and conduct annual monitoring of public access points and strategic bays within the resource, with the intent of identifying potential aquatic invasive species.

Goal 3. Educate lake residents and visitors about the important role of native aquatic plants in the lake, the management strategies found in the plan, and appropriate plant management actions.

Objective A:

- ♦ Increase resident's and lake user's understanding of the role and importance of aquatic plants in Lake Namakagon and their impacts on the lake and watershed.

Audience:

- ♦ All lake residents
- ♦ Lake visitors

Action Items/Communication Plan:

- ♦ Describe native aquatic plant values.
- ♦ Emergent aquatic plants help to reduce erosion from the impact of waves along the shoreline.
- ♦ We have a unique lake with many native species.
- ♦ Native plant identification
- ♦ Information public of the importance of native species for the health of fishery and resource as a whole.

Communication Resources:

- ♦ Annual meeting presentations
- ♦ Newsletter
- ♦ Signs at boat landings
- ♦ Commissioners' meetings
- ♦ Encourage attendance to the Annual WAIS (Wisconsin Aquatic Invasive Species) Convention or workshops by lake residents and stakeholders.

Objective B: Raise visitor and resident awareness to prevent aquatic invasive species introduction.

Audience:

- ♦ All lake residents
- ♦ Lake visitors
- ♦ Renters
- ♦ Fishing tournament participants and organizers

Action Items/Communication Plan:

- ♦ Identification of Eurasian water milfoil, curly leaf pondweed, and purple loosestrife (include illustrations or photos) and who to contact if suspected plant is found.
- ♦ If you think you have found Eurasian water milfoil, mark the location with a GPS point, fishing buoy or milk jug, collect the plant in a sealed bag with water, and bring to the attention of individuals designated by the NLA.
- ♦ Identify locations of nearby lakes with Eurasian water milfoil.
- ♦ Describe new potential invasive species and why they are a threat.
- ♦ Inspect, clean, and drain boats and equipment.
- ♦ Provide avenue for reporting violations of county ordinance and state of Wisconsin "do not transport" regulations.
- ♦ Make copies of *APMP* available at town halls and public libraries as well as provide an internet website link to a PDF of the plan to the public.

Communication Resources:

- ♦ Summary of *APMP*
- ♦ Eurasian water milfoil education workshops for all lake users
- ♦ Improvements to signage at boat landings (visible when entering and leaving the landings)
- ♦ Neighbor-to-neighbor delivery of handouts
- ♦ Newsletter
- ♦ Mailings to lake residents
- ♦ Clean Boats, Clean Waters Program monitoring/education

- ♦ Annual and Commissioners' meetings

Goal 4: Encourage lake residents to restore and preserve shoreline buffers of native vegetation and reduce nutrient and soil runoff from their properties in accordance with Bayfield County Shoreland Management Guidelines (see Appendix F).

Objective:

- ♦ Restore and preserve shoreline buffers of native vegetation and reduce runoff from all properties (see Goal 3).

Action Items/Communication Plan:

- ♦ Shoreline buffers protect water quality, provide fish and wildlife habitat, and reduce erosion along the shoreline.
- ♦ Describe ways to restore shoreline buffers (natural recovery, stop mowing, vegetative buffers at shoreline, plant native plants).
- ♦ Practices such as rain gardens, diversions, and rock infiltration practices can reduce runoff from waterfront property.
- ♦ The maximum corridor or opening allowed in vegetation in the shoreline buffer zone area is 30% of the shoreline length up to a maximum of 30 feet.
- ♦ Highlight good examples of shoreline buffers on private waterfront properties and provide photo documentation on the NLA's website.

Communication Resources:

- ♦ Newsletters (quarterly)
- ♦ Internet websites postings and links
- ♦ Brochures
- ♦ Posters
- ♦ Boat landing signs
- ♦ Annual and Commissioners' meetings
- ♦ Seminars
- ♦ Encourage attendance to WAIS events.

Measuring Progress:

- ♦ Survey lakeshore property owners about changes to buffer zones or other shoreline practices as a result of educational efforts.

Goal 5: Utilize remote photographic devices to monitor and encourage compliance with WDNR rules and the NLA resource management goals.

Objectives:

- ♦ Continue to monitor current access points and to expand monitoring to additional access points.

Action Items:

- ♦ Apply to various grant funding programs to replace aging, faulty equipment and to install at additional access points.

Measuring Progress:

- ♦ Review data gathered and ensuring ordinances and regulations are being followed and invasive species are not present in Namakagon Chain.

6.1 What to do if Aquatic Invasive Species are Found?

If you feel you have found an aquatic invasive species such as Eurasian Milfoil or Curly-leaf Pondweed there are a few steps to follow:

1. Be sure the suspected invasive species has not been previously found on Lake Namakagon. As of now there are no aquatic invasive species identified within the Lake Namakagon Chain. In the future this can be checked on the WDNR website under the aquatic invasive list by county (<http://dnr.wi.gov/lakes/invasives/Default.aspx?countyCode=4>).
2. If possible take a digital photo of the area where the plant was found and collect GPS coordinates. This will allow lake managers to locate the area for confirmation and management activities.
3. Collect five to ten intact specimens. Try to get the root system, all leaves, seed heads, and flowers when present. Place into a Zip-loc® bag(s) with no water and place on ice until it can be transported to a refrigerator.
4. Fill out the Aquatic Invasive Plant Incident Report that is provided in Appendix D of this report.

5. If the area is small enough to place bouys or markers instructing boat traffic to avoid the area they should be placed as soon as possible. This is to minimize disturbance and possible spread through fragments broken loose by human activities.
6. Notify your local WDNR Invasive Species Contact and deliver specimens, report, digital photo, and GPS coordinates within four days of the discovery of the plant. The contact for the Lake Namakagon area is:

Pamela Toshner, Water Resources Management Specialist
Phone: (715) 635-4073 Email: pamela.toshner@wisconsin.gov

7. If working with a consultant contact them as soon as possible to begin working on an Early Detection and Response Grant. The extent of the infestation will need to be surveyed and characterized to design a management plan for the newly found invasive species.

6.2 Monitoring and Assessment

6.2.1 Aquatic Plant Surveys

Point intercept sampling, by consultant, repeat every five to ten years beginning in 2014 as budget allows.

The whole lake surveys will be conducted in accordance with the guidelines established by the WDNR. Any new species sampled will be saved, pressed, and mounted for voucher specimens.

6.2.2 Aquatic Invasive Species Monitoring

Volunteer and consultant monitoring for aquatic invasive species, at least annually, at boat landings and sensitive bays.

Consultant monitoring for Eurasian water milfoil at other high risk areas and random GPS points every other year.

Add additional monitoring as threats are identified and monitoring methods become available.

6.2.3 In-Lake Monitoring

Lake chemistry and Secchi disk measurements (completed by volunteer monitors).

6.3 Implementation Plans and Costs

Aquatic Plant Survey – full lake \$10,000 to \$15,000

Annual boat landing survey – full lake \$3,000 to \$6,000

6.4 Grants Programs

There are many grants available to lake associations and lake groups through the WDNR (<http://dnr.wi.gov/org/caer/cfa/Grants/index.html>). NLA should discuss their future projects and goals with their consultant or WDNR to see what grants may be available to their specific needs.

7 Project Discussion

Aquatic plants are vital to the health of a waterbody, but depending on a person's use of Lake Namakagon, these "weeds," as they are often referred to, can be beneficial or a nuisance to an individual's recreational activities. Many people consider them to be problematic when they clog up boat motors or impede on swimming areas and ultimately wish for them to be eradicated. This type of attitude must be overcome in order to properly manage a lake ecosystem.

Unfortunately, aquatic plants, especially exotic species like Eurasian Milfoil and Curly-leaf pondweed can grow into nuisance levels and degrade recreational activities. Fortunately for the Lake Namakagon Chain of Lakes, it remains free of exotic invasive species and all efforts should be made to keep the lake in its pristine condition that so many residents and vacationers have come to expect. Lake Namakagon has a very diverse plant community according to the SDI statistics, produced from the 2009 Baseline Aquatic Plant Survey, and is shown in Tables 4-1 through 4-3. The FQI was also calculated from data collected in the 2009 Baseline Aquatic Plant Survey. Results indicated that the water quality of the lake was above average for Wisconsin compared to other lakes in the area (Tables 4-4 and 4-5). Both are strong indicators of a healthy ecosystem.

In 2000, the WDNR conducted sensitive area surveys on Lake Namakagon. Sensitive areas are defined in Wisconsin Administrative Code Chapter NR 107.05(3.)(i.)(1.) as the following: "Sensitive areas are areas of aquatic vegetation identified by the department as offering critical or unique fish and wildlife habitat, including seasonal or life-stage requirements, or offering water quality or erosion control benefits to the body of water." Based on the surveys, the WDNR determined there were 33 sensitive areas that help maintain and enhance the quality of the lake. The report titled, *Namakagon Lake Sensitive Area Survey and Management Guidelines* (Stubbe, P., Scholl, C., Koshere; F., 2000), as provided in Appendix E, makes management recommendations as to the best methods to protect Lake Namakagon's sensitive areas. Some of these recommendations are reiterated in Section 8 of this report.

8 Recommendations

The management recommendations listed below are Foth's attempt to provide directions to NLA. The recommendations are general and will require work at the local level to see them through implementation. An APMP is a living document and Foth encourages lake users to get involved by keeping track of what is working and what is not, and what could be improved. Public participation and feedback is essential to successful implementation and adaptive management.

The management recommendations in this report are based on prevention of aquatic invasive species introduction and sensitive area protection.

1. NLA will develop an education committee to provide educational information to residents and visitors to the importance of protecting the resource from the establishment of exotic invasive species.
2. NLA will develop a monitoring committee to continue assessing the water quality of Lake Namakagon through the Citizen Lake Monitoring Program that has been established by volunteers throughout the summer months.
3. NLA will actively protect and manage sensitive areas outlined in the *Namakagon Lake Sensitive Area Survey and Management Guidelines* report located in Appendix E.
4. NLA will recruit professional aquatic plant surveyors (a private firm or a public agency such as WDNR staff) to complete a 2014 full point intercept survey of the Lake Namakagon aquatic plant community for the subsequent five-year rewrite of this management plan.
5. NLA will continue to monitor the growth of Purple Loosestrife in Funny's Bay and consider options for control / eradication.
6. NLA will continue to recruit volunteers to monitor boat access points during special events (i.e. fishing tournaments).
7. NLA shall continue to obtain professional assistance in completing an annual survey of the aquatic vegetation surrounding the nine boat access points on the lake.
8. NLA shall characterize the common reed found on the west shore of Paines Island during the 2010 Annual Aquatic Plant Survey of the nine boat access points. A sample will be collected and native or exotic variety verified by the WDNR. GPS coordinates will be collected and mapped. Surrounding vegetation will also be documented.
9. NLA shall evaluate reducing the number of boat access locations on the lake in an effort to control where exotic invasive species may be introduced.

10. NLA shall respond immediately to the positive identification of an aquatic invasive species within the Chain of Lakes and pursue funding through Early Detection and Response Grant.
11. NLA shall continue to apply for funding through various grants to complete their management goals.
12. NLA shall begin the vetting process in the establishment of a Namakagon Lake District to aid and enhance their abilities to manage the Lake Namakagon resource.

9 Conclusion

An APMP is a living document that should be updated approximately every five years. As the NLA works towards their management goals, it is important to retain the input from the community. APMP rewrites work best when citizens are engaged in the implementing of the plan and the supplemental rewrites. As NLA moves forward, new ideas and tools can be incorporated to best manage any new issues that may arise. It is important for homeowners and users of the resource to understand they are also the protectors of this resource; and hopefully, with a management plan in hand, they will choose to become an active participant in the protection and preservation of this outstanding resource.

10 References

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Appendix A
Namakagon Chain of Lakes Sample Points Map
and
Point Intersect Coordinates

jackson_bayfield_2734200_40mpts.txt

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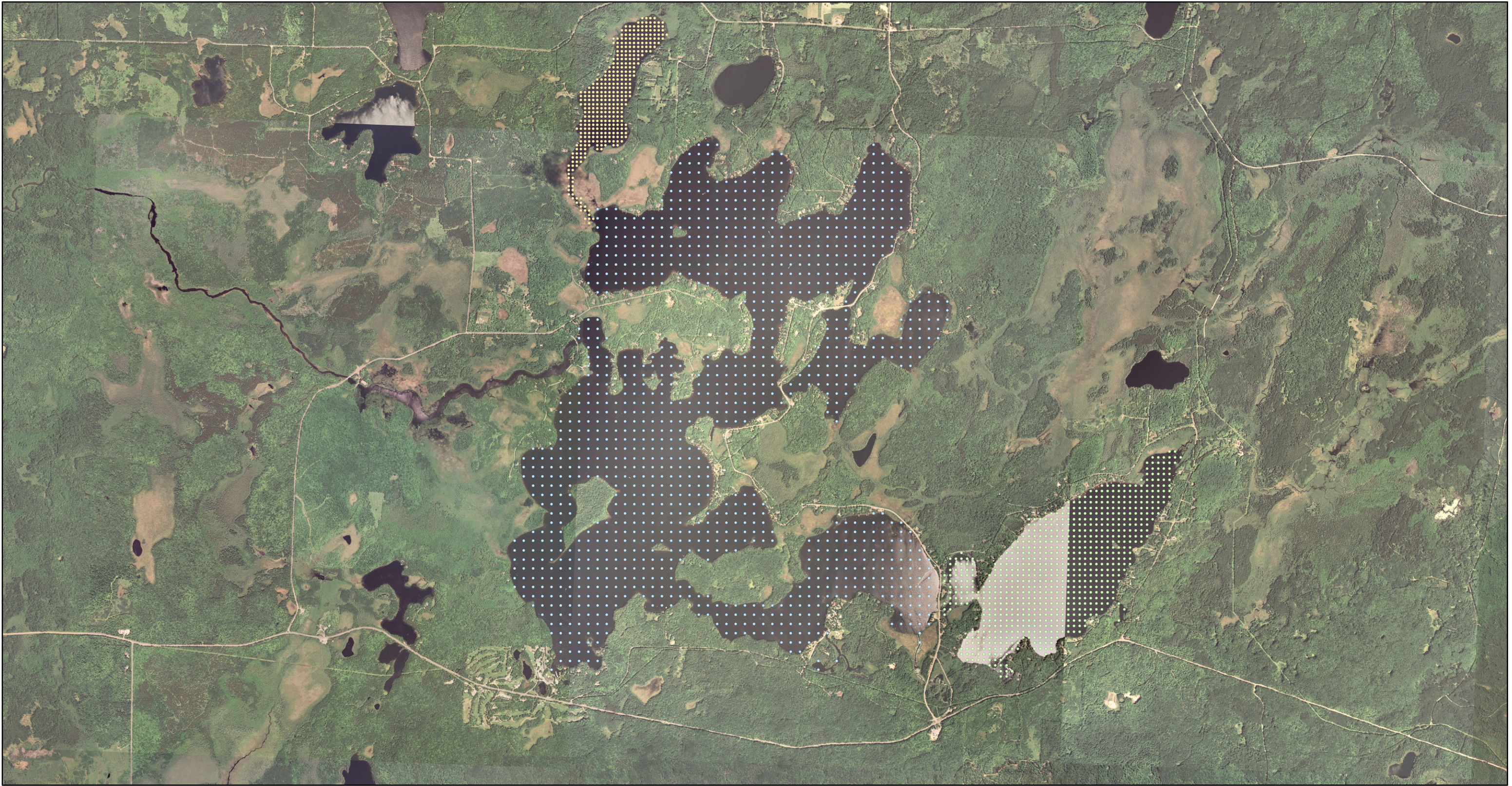
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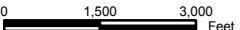
Legend

-  Lake Namakagon Sample Points
-  Jackson Lake Sample Points
-  Garden Lake Sample Points

This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and data used for reference purposes only.

Source: USDA Geospatial Data Gateway



NAMAKAGON LAKE ASSOCIATION		
FIGURE B		
LAKE NAMAKAGON, JACKSON LAKE AND GARDEN LAKE SAMPLE POINTS		
Scale: 	Date: NOVEMBER, 2009	
Drawn By: BJW1	Checked By: GJP	Scope: 08N015

Appendix B

Lake Use Opinion Survey Results and Correspondence

**Namakagon Lake Association
Lake Use and Opinion Survey**

1 Which lake borders your property? If you own property on more than one lake, please answer for the one you've owned the longest and use this property as your reference for the remaining questions.

(all 207 answered)

154 Namakagon Lake
39 Garden Lake
14 Jackson Lake

2 Do you:

(2 did not check either box)

205 own property on this lake
0 lease property on this lake

3 Which of the following best describes when you would be most likely to use the lake? (Please check x only one.)

*(all 207 answered in some way; 16 did not check a box, but provided a written 'other' or answered question a and/or b)
(some respondents checked more than one box)*

58 Year-round resident
54 Weekends -- Year-round
16 Weekends -- Summer
20 Weekends -- Occasional
36 Vacations / Holidays
21 Summertime resident
11 Other (please list)
1/month-year round
1/yr
30 to 40 days, most in spring, summer, autumn
7/1 - 10/15 yrly
hunting season
rent out when not using
spr thru fall
spring and fall
summer-week/time
X
weekly ?? Summer

a. How far is the one-way distance from your permanent residence?

ranged from 30 miles to 2,500 miles (142 answered)

b. About how many times do you visit each year?

ranged from once a year to 50 times per year (135 answered)

4 During the past 3 years, which of the following activities have you participated in on the lake that borders your property? (Check x all that apply.)

(206 answered; 1 respondent wrote "none" in the 'other' space)

192	a. boating (motor/pontoon)	47	g. picnicking	52	m. cross-county skiing
117	b. canoeing/rowing/kayaking	153	h. fishing/ice fishing	172	n. peace and solitude
12	c. sailing/windsurfing	153	i. wildlife observation	166	o. scenic enjoyment
31	d. personal watercraft (jet ski)	113	j. swimming/scuba	46	p. hunting
71	e. water skiing	19	k. ice skating	83	q. snowmobiling
162	f. entertaining friends	78	l. hiking	22	r. other <i>(1 provided 2 activities)</i>
				1	ATV
				4	biking, road/mountain
				2	bird watching
				1	dining
				1	flyng
				1	gathering
				2	golf
				1	none
				1	photography
				1	RC model boats
				5	snow shoeing
				1	tree & flower planting
				1	visiting friends
				1	work

**Namakagon Lake Association
Lake Use and Opinion Survey**

5 Of these activities, which three do you value the most? (enter the letters on the lines below)

(203 answered)

<u>Total</u>	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	
126	69	36	21	a. boating (motor/pontoon)
22	6	7	9	b. canoeing/rowing/kayaking
0				c. sailing/windsurfing
2		2		d. personal watercraft (jet ski)
9	2	4	3	e. water skiing
51	3	18	30	f. entertaining friends
2	1	1		g. picnicking
85	29	33	23	h. fishing/ice fishing
52	7	23	22	i. wildlife observation
12	2	3	7	j. swimming/scuba
0				k. ice skating
6		1	5	l. hiking
11	3	3	5	m. cross-county skiing
94	47	23	24	n. peace and solitude
75	18	27	30	o. scenic enjoyment
15	4	4	7	p. hunting
30	9	12	9	q. snowmobiling
				r. other _____
1	1			ATV
4	1	2	1	biking, road/mountain
2		2		bird watching
1	1			dining
1			1	flying
1			1	golf
2		1	1	snow shoeing

6 How many of the following types of recreational equipment are used at your property?

(197 answered; 10 left this section blank either because they have no equipment or because they chose not to respond)

(66 respondents checked the equipment, but did not put a count)

121	canoes or kayaks	33	jet skis	81	snowmobile
81	rowboats or paddle boats	95	motorboats (less than 75 hp)	61	cross-country skis
18	sailboats or sailboards	107	motorboats (75 hp or more)	94	pontoon boats

(these are not a count of the number of pieces of that equipment, but of the number of responses (either by count or a check mark) to that piece of equipment)

7 When you use other lakes or rivers in the area, which do you use?

(117 answered)

4	Atkins	1	Flambeau	1	Patsy
1	Beaver L.	11	Garden	1	Perry L.
6	Brule R.	8	Jackson L.	2	Porcupine
4	Cable L.	2	Lost Land L.	1	Rock
1	Chippewa L.	1	Manitawish Chain, Vilas	2	Round L.
4	Chippewa R.	5	Marengo R.	1	Spider L.
3	Clam L.	1	McCloud	1	Spyder
1	Cranberry L.	1	Minocqua L.	13	Superior L.
11	Crystal	1	Mississippi R.	2	Tahkoda L.
3	Day L.	12	Namakagon	1	Teal R.
1	Dekota	6	Namakagon L.	1	Three Lakes Chain
9	Diamond	45	Namakagon R.	1	Togotie L.
1	Eau Claire Fades	2	Nelson L.	1	Twin Lakes
1	Eau Claire Lake, Middle	23	Owen L.	5	White R.

8 How often do you use these lakes and rivers?

(116 answered)

66	once every year or two	110	1 to 10 times / year	22	more than 10 times / year
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**Namakagon Lake Association
Lake Use and Opinion Survey**

9 From the letters in question 4, please pick the top 2 activities for each lake or river

(104 answered)

53	boating	2	picnicking	21	peace and solitude
39	canoeing/kayaking	98	fishing/ice fishing	27	scenic enjoyment
1	sailing	22	wildlife observation	8	hunting
1	personal watercraft	9	swimming	15	snowmobiling
2	entertaining friends	2	hiking		

10 How important are the following attributes in your decision to use area lakes and rivers?

(174 answered)

<u>not at all important</u>	<u>not too important</u>	<u>somewhat important</u>	<u>very important</u>		
31	37	58	30	distance from home	<i>(156 answered)</i>
18	18	62	65	quality of fishing	<i>(163 answered)</i>
6	23	61	74	water clarity	<i>(164 answered)</i>
6	22	62	67	amount of aquatic weeds	<i>(157 answered)</i>
4	3	42	117	scenic quality	<i>(166 answered)</i>
3	20	86	53	low # of other users	<i>(162 answered)</i>
6	21	58	80	natural lakeshore	<i>(165 answered)</i>
24	39	37	60	person/family tradition	<i>(160 answered)</i>
				other	<i>(11 answered)</i>
				ATV/snowmobile trail system	
				community; friends; gathering	
				non-use of jet skis	
				number/variety of birds	
				peaceful, quiet	
				resorts & amenities	
				shoreline variety	

11 Which of the following best describes the situation where your property meets the lake? (Please check the one that best applies.)

(203 answered)

(24 respondents checked more than one box)

2	Masonry/concrete retaining wall	49	Rock/riprap added for stabilization
38	Lawn	14	Landscaped trees and shrubs
1	Wood retaining wall	133	Undeveloped, natural landscape

12 Which of the following describes the landscape between the shoreline up to the edge of your home? (Check all that apply.)

(200 answered)

124	Lawn	8	Retaining wall(s) or terraces
46	Landscaped trees and shrubs	13	Rock gardens or masonry areas
117	Undeveloped, natural landscape	6	Sand/developed beach

13 How long have you lived on or visited this property?

(185 answered)

22.4	Years	average of responses						
	20	0 - 5	10	26 - 30	4	51 - 55	1	76 - 80
	33	6 - 10	14	31 - 35	3	56 - 60		Other
	20	11 - 15	17	36 - 40	3	61 - 65	2	>15
	32	16 - 20	3	41 - 45	1	66 - 70	2	>50
	15	21 - 25	3	46 - 50	1	71 - 75	1	55-60

14 Please tell us what structures, if any, exist on your property

(205 answered)

- | | | | |
|-----|--------------------------------------|---|------------------------------------|
| 164 | Winterized house | | |
| 24 | Boathouse | | |
| 154 | Private dock/pier | | |
| 18 | Association dock/pier | | |
| 23 | Non-Winterized Cottage | | |
| 124 | Detached garage/shed | | |
| 21 | Other (Please List): _____ | | |
| | 1 attached garage | 1 | outhouse |
| | 1 bunkhouse (winterized) | 1 | pool |
| | 2 cabin (incl. log, part-winterized) | 1 | sauna |
| | 3 condo | 5 | shed (incl. garden, storage, wood) |
| | 2 fish cleaning house | 1 | trailer |
| | 1 guest cottage (winterized) | 1 | work shop |
| | 1 kids playhouse | | |
| 7 | No Structures exist on my property | | |

15 Does your property have any of the following? (Please check all that apply.)

(175 answered)

- | | |
|-----|--|
| 55 | Landscaped vegetation barrier that runoff water must flow through before leaving the property or entering the lake. |
| 156 | Undeveloped natural vegetation barrier that runoff water must flow through before it leaves the property or enters the lake. |
| 11 | Grass drainage ditch to divert runoff water away from the home? |
| 22 | Drainage tile. |
| 0 | Storm sewer inlet on your property or along any of its borders. |

16 Do you own undeveloped lakeshore property on this lake?

(175 answered)

- | | | |
|-----|-----|--|
| 152 | No | |
| 49 | Yes | would you ever consider placing your undeveloped lakeshore property in a type of conservation easement* or some other type of land trust that would protect it from development? |
| | 30 | No |
| | 10 | Yes |
| | 12 | Yes, but only if financial incentives are also offered |
| | | if so, which of the following might you use to protect your property? |
| | 14 | conservation easement* |
| | 8 | land trust* |
| | 3 | other |
| | | have conservation easement on property |
| | | property on lake is enrolled in managed forest law program |
| | | not sure |

17 Which term best defines the overall water "quality" of this lake? (Please check only one.)

(204 answered)

- | | |
|----|--------------------------|
| 0 | seriously polluted |
| 2 | poor |
| 13 | fair |
| 97 | good |
| 84 | very good / not polluted |
| 8 | don't know |

18 Which best describes the fishery of this lake? (Please check only one.)

(205 answered)

- | | |
|----|------------|
| 12 | very poor |
| 11 | poor |
| 62 | fair |
| 91 | good |
| 13 | very good |
| 16 | don't know |

19 Which term best defines the water "clarity" of this lake in the summer months of July and August? (Please check only one.)

(198 answered)

13 murky
86 cloudy
94 clear
3 crystal clear
2 don't know

20 Do you notice a change in water clarity as the summer progresses?

(198 answered)

123 yes, water becomes more cloudy
3 yes, water becomes more clear
70 no, water clarity stays about the same

21 How would you rate the tranquility and peace at this lake as measured by awareness of other people? (Please check only one.)

(203 answered)

0 unusable (too much noise and activity to enjoy the lake)
2 over-use (excessive noise and activities of others)
53 occasional over-use (some disturbance of my enjoyment)
135 moderate use (easy to share lake with others)
13 few disturbances (rarely see/hear others)

22 How has the quality of your experience here changed since you first became familiar with this lake? (Please check only one.)

(203 answered)

5 considerably degraded
24 degraded
149 remained about the same
21 improved
4 considerably improved

23 To what extent have you noticed the following occur on this lake?

<u>very often</u>	<u>moderately</u>	<u>rarely</u>	<u>haven't noticed</u>	<u>don't know</u>	
23	97	32	39		Algal blooms (191 answered)
24	87	54	30		Excessive lake weeds (195 answered)
11	31	66	73		Sedimentation (181 answered)
11	75	76	27		Large fluctuations in water levels (189 answered)
3	19	84	78		Erosion (184 answered)
0	4	62	118	1	Fish kills (185 answered)
3	4	61	117	1	Unusual water smell or coloration (186 answered)
0	3	30	150	2	Failing septic systems (185 answered)
6	43	78	62		Decreased water clarity (189 answered)

24 Do you feel the amount of aquatic plants in the lake is:

(196 answered)

40 too much
152 just right
1 too little
3 Don't Know

25 Would you like to see more native aquatic plant species in the lake?

(202 answered)

42 definitely no
55 probably no
81 unsure
20 probably yes
4 definitely yes

**26 How much, if at all, do you think each of the following are causing water quality problems for your lake?
(Please check x only one for each lettered item.)**

(203 answered)

(not all answered for each item)

<u>major cause</u>	<u>moderate cause</u>	<u>not a cause</u>	<u>don't know</u>	
19	66	53	64	fertilizers / pesticides
5	20	89	86	improper disposal of household chemicals, etc
11	47	47	97	septic systems
8	34	52	107	introduction of exotic species
3	23	103	74	erosion from construction sites
1	45	93	63	yard / grass clippings
4	43	93	61	stormwater from streets, highways, etc
2	32	98	71	stormwater from house roofs, driveways
7	65	62	68	accidental spills from boats
24	75	54	50	replacing natural shoreline

27 Of all of the items listed above in Question 26, which two do you feel contribute most to water quality problems in your lake?

(156 answered)

63	fertilizers / pesticides
3	improper disposal of household chemicals, etc
45	septic systems
31	introduction of exotic species
7	erosion from construction sites
12	yard / grass clippings
18	stormwater from streets, highways, etc
8	stormwater from house roofs, driveways
37	accidental spills from boats
70	replacing natural shoreline
1	acid rain

28 To what extent are the following actions needed to deal with your concerns for the lake? (Please check the one that best applies for each or leave blank if does not apply)

(203 answered)

(not all answered for each item)

<u>not needed</u>	<u>little need</u>	<u>moderate need</u>	<u>very needed</u>	
56	63	60	10	develop better boat safety programs (189)
82	81	21	1	develop better swimming safety programs (185)
10	25	98	66	stock fish (199)
18	33	94	51	develop a weed survey / control program (196)
45	64	53	35	use regulation to control boat wake (197)
91	50	40	13	use regulation to control motor size (194)
59	58	56	24	develop stronger zoning for lake development (197)
22	25	98	54	promote education concerning the use of lawn/garden pesticides (199)
23	51	68	54	enforce current zoning ordinances (196)
93	56	18	32	reduce the number of public access points on this lake (boat launches) (199)
43	49	79	29	perform shoreline restoration activities (add native plantings to shorelines to return natural character to lake) (200)

29 Which statement best describes the boat traffic this lake receives? (Please indicate one choice for weekdays and one for weekends)

(202 answered)

(not all answered for each timeframe)

<u>weekdays</u>	<u>weekends</u>	
79	7	lightly used – rarely see another boat
106	136	moderately used – not enough to bother my use
2	46	heavily used – on occasion I have to modify my plans because of boat traffic
1	5	over used – I have to regularly change my plans because of the boat traffic
0	1	unusable – there is so much boat traffic that I don't use the lake very much
7	5	don't know

**Namakagon Lake Association
Lake Use and Opinion Survey**

30 Which statement best describes your experiences with other boaters while on the water? (Please indicate one choice for weekdays and one for weekends)

(204 answered)

(not all answered for each timeframe)

<u>weekdays</u>	<u>weekends</u>	
135	82	no problem – boaters have been courteous and law abiding
52	99	little problem – a few boaters have been discourteous and broken rules
3	9	moderate problem – a significant number of boaters intimidate other boaters
0	3	significant problem – some boaters intimidate and harass other boaters
0	0	excessive problem – I have generally quit boating because of the behavior of other boaters
8	7	don't know – I do not use the lake for boating

31 Please indicate how aware you are of the requirements of the current Bayfield County shoreland zoning

(204 answered)

<u>not at all</u>	<u>not too aware</u>	<u>somewhat</u>	<u>very aware</u>	
18	4	26	156	minimum set back of 75 ft on lakes
40	28	48	87	removal of only 30 ft of vegetation for every 100 ft of shoreline to a depth of 35 ft inland
38	26	47	93	permit requirements for shoreline fill or grade below ordinary high water mark
54	45	49	53	permit requirement to fill grade within 300 ft of shoreline in some areas draining to lake depending on slope and amount of fill or grade

32 Would you favor changing these regulations to be even more restrictive to further protect shorelands?

(203 answered)

156	no	
41	yes	using the letters in question 31 please indicate which requirements you would support making more restrictive
		23 minimum set back of 75 ft on lakes
		29 removal of only 30 ft of vegetation for every 100 ft of shoreline to a depth of 35 ft inland
		25 permit requirements for shoreline fill or grade below ordinary high water mark
		27 permit requirement to fill grade within 300 ft of shoreline in some areas draining to lake depending on slope and amount of fill or grade
2	don't know	

33 For each well on your property (up to two), please put one check in the answer category that best describes the well. Well #1 should be your primary well.

Well #1 *(185 answered some parts of this question)*

Type of Well

182	household drinking well
0	barnyard/livestock well
0	combination well (house & barn)
1	field well
0	irrigation well

Year Last Tested

6	2010	3	2003
25	2009	6	2002
16	2008	1	2001
7	2007	7	2000
8	2006	31	before 2000
3	2005	9	never
7	2004	45	don't know

Well #2 *(185 answered some parts of this question)*

12	household drinking well
0	barnyard/livestock well
0	combination well (house & barn)
0	field well
0	irrigation well

2	2010	0	2003
3	2009	0	2002
2	2008	0	2001
0	2007	0	2000
0	2006	0	before 2000
0	2005	2	never
1	2004	2	don't know

What did you Test this Well #1 for? (check all that apply) *(74 answered)*

74	bacteria	6	bacteria
64	nitrate	6	nitrate
51	lead	5	lead
44	pesticides	5	pesticides

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How is this Well Protected at the Surface? (check all that apply) (179 answered)

138	sealed well cap	7	sealed well cap
11	wellhouse / shed	2	wellhouse / shed
9	concrete pad / slab	3	concrete pad / slab
8	covered pit	0	covered pit
21	well in basement	1	well in basement
3	other	0	other

How was this Well Constructed? (180 answered)

93	drilled	7	drilled
37	driven point	2	driven point
0	dug	0	dug
1	bored	0	bored
50	don't know	3	don't know
0	other	0	other

In what Year was Your Well Constructed, approximately?

2	before 1950	15	1980-89	0	before 1950	1	1980-89
5	1950-59	26	1990-99	0	1950-59	4	1990-99
6	1960-69	42	2000-09	1	1960-69	2	2000-09
23	1970-79	64	don't know	0	1970-79	5	don't know

About how Deep is your Well?

35	less than 50 feet	3	140-169	5	less than 50 feet	0	140-169
17	50-79	2	200-250	0	50-79	0	200-250
13	80-109	2	251-300	2	80-109	0	251-300
2	110-139	102	don't know	0	110-139	5	don't know

34 What type of septic system do you use at this lake residence? (Please check x only one.)

(190 answered)

(several had multiple systems)

37	Holding tank
151	Septic tank/drain field
6	Privy/outhouse

35 Which of the following categories best describes the age of your septic system? (Please check ☒ only one.)

(186 answered)

(one had multiple checks)

29	less than 5 years old
40	6 - 10 years old
30	11 - 15 years old
43	16 - 25 years old
27	more than 25 years old
17	don't know

36 On average, how often is this system pumped? Every:

(176 answered)

(one had multiple answer)

14	more than once a year	8	5 yrs
22	once a year	1	4-5 yrs
1	1 1/2 yrs	2	6 yrs
32	2 yrs	3	10 yrs
81	3 yrs	2	as needed
2	2-3 yrs	2	don't know
6	4 yrs	1	to be determined

In what year was your septic system last inspected by a qualified professional? (161 answered)

3	1995 - 1999
11	2000 - 2004
94	2005 - 2009
37	2010
13	don't know
1	none
2	not applicable

Were any deficiencies or code violations observed? (164 answered)

3 yes
161 no

Do you have plans to update your on-site waste water system in the next 5 years? (176 answered)

7 yes
168 no
1 don't know

37 Please estimate the distance and location of your sanitary system (holding tank or drain field) from the well you use most for household and drinking purposes.

The shortest distance between the household/drinking well and the holding tank or drain field (181 answered)

1 within 10 feet
50 10 - 50 feet
78 51 - 100 feet
52 beyond 100 feet

The household/drinking well is located: (143 answered)

45 uphill from the holding tank/drain field
26 downhill from the holding tank/drain field
72 level with the holding tank/drain field

38 Do you maintain a lawn at this property?

(204 answered)

28 no
176 yes

39 On average, how often do you mow your lawn during the summer months?

(184 answered)

(2 answered twice)

4 about twice a week
53 about once a week
51 about once every two weeks
74 no pattern, just when I think it needs it

40 Do you remove clippings from the lawn?

(141 answered)

(several answered both or neither, yet answered follow on questions)

133 no
13 yes

If no, do you use a mulching lawn mower?

60 no
80 yes
16 not sure

If yes, what do you do with those clippings?

0 burn them
4 compost - community pile
0 dispose along river bank or in water
17 compost - bin or pile on my property
8 compost - mulch on garden or plants
4 other (please specify):
1 depends on time of year
2 leave on grass
1 throw in woods

41 Do you use pesticides on your lake property lawn?

(180 answered)

158 no
22 yes

42 On average, how often are pesticides applied to this lawn?

(25 answered)

19	Spring (before June)	13 1/yr	1 every 4 yrs	1 x
		1 every 2 yrs	3 0 times	
13	Summer (June-August)	8 1/yr	3 0 times	
		1 1 to 2/yr	1 when find ant hills	
12	Fall (after August)	6 1/yr	4 0 times	
		1 twice/yr	1 x	

Who applies the pesticides? *(23 answered, 1 multiple)*

19	myself or family member
2	hire a lawn company
3	someone else

43 Are fertilizers and pesticides applied at the same time in a weed-and-feed mixture (one application of both fertilizer and herbicide)?

(55 answered)

32	no
18	yes
5	not sure

44 What is your current age?

(201 answered)

ages ranged from 38 to 92

3	30's
16	40's
68	50's
62	60's
40	70's
6	80's
1	90's
3	other
	>65
	50+
	NA

45 Do you belong to a lake association?

(204 answered)

66	no
138	yes
2	Eagle Point
2	Garmisch
1	Gull Area Lake Assoc
3	Lake Woods Homeowners Assoc
3	Missionary Pt Assoc
116	Namakagon Lake Assoc
1	NC / Namakagon

**Namakagon Lake Association
Lake Use and Opinion Survey**

46 Please rank the following groups according to how much authority they should have in managing this lake? (1 = most authority; if they should have no authority, enter 0.)

(196 answered in some manner)

(this was a confusing question to respondents; 89 used the anticipated ranking of 1 to 8 method, 107 used a 0 and 1/X system to 'rank')

Local residents

	those that ranked		those that used 1/0
35	1	90	"1/X"
13	2	5	"0"
7	3	1	"0.5"
7	4		
7	5		
2	6		
7	7		
1	8		

County government

	those that ranked		those that used 1/0
15	1	48	"1"
9	2	31	"0"
16	3	1	"0.5"
10	4	1	"?"
12	5		
10	6		
3	7		
0	8		
6	0		

Non-resident users

2	1	19	"1"
8	2	68	"0"
9	3		
1	4		
2	5		
7	6		
11	7		
8	8		
27	0		

State government

6	1	40	"1"
12	2	45	"0"
10	3	1	"0.5"
12	4	1	"?"
11	5	1	"50/50" with lake assoc.
12	6		
10	7		
1	8		
7	0		
1	10		

Local lake association or district

20	1	71	"1"
23	2	19	"0"
13	3	1	"50/50" with state
9	4		
13	5		
5	6		
0	7		
1	8		
2	0		

Federal government

4	1	17	"1"
4	2	71	"0"
5	3		
1	4		
7	5		
7	6		
5	7		
15	8		
30	0		
1	10		

City or Village government

6	1	42	"1"
10	2	36	"0"
19	3	2	"0.5"
18	4		
10	5		
5	6		
2	7		
0	8		
9	0		

Town government

11	1	56	"1"
14	2	25	"0"
19	3	2	"0.5"
16	4		
11	5		
3	6		
2	7		
0	8		
7	0		

47 From the list below, please check all of the actions which you think should be pursued to protect your lake.

(140 answered)

- 57 Form a lake district with authority to develop and enforce ordinances and collect fees to be used to protect and maintain the resource and watershed
- 87 Better enforcement of current zoning codes
- 22 Enact stricter zoning regulations
- 70 Better enforcement of current boating and water recreation laws
- 23 Enact stricter boating or water recreational use ordinances than presently exist
- 77 Restore the shoreline and improve habitat around the lake shoreline
- 51 Designate hours of operation for different lake users (e.g., jet skiers, fisherpersons, etc.)
- 26 Designate areas of operation for different lake users (e.g., jet skiers, fisherpersons, etc.)
- 21 Other: *(some listed multiple actions)*
- 1 all users of lakes should use a bit more common sense
 - 1 allow over water boathouses (like Mary Burke) under strict construction regulation
 - 3 ban/limit use jet ski and/or ATV use
 - 2 better education (zoning laws & landowners usage of pesticides, septic systems, boats, riparian rights/responsibilities)
 - 3 continue to enforce weed removal from boats, strict monitoring of boat landings to prevent harmful aquatic species spread
 - 1 monitoring of compliance of septic systems with remedial action on noncomplying systems
 - 1 current zoning & regs are adequate & enforced
 - 2 fewer public landings/launch ramp
 - 1 periodically offer safe boating classes on the Coast Guard Rules of the Road, especially for new boat owners and young boat drivers
 - 1 raise the dam flowage, too much water is lost, lake becomes 2-3' lower by July
 - 2 stop Native American spear fishing
 - 1 we have an association
 - 3 don't know
- 49 No actions should be taken

**48 From the actions listed in question 47, which two do you believe are the most important to protect your lake?
Place the letter of the corresponding actions in the spaces below.**

- 42 Form a lake district with authority to develop and enforce ordinances and collect fees to be used to protect and maintain the resource and watershed
- 62 Better enforcement of current zoning codes
- 8 Enact stricter zoning regulations
- 34 Better enforcement of current boating and water recreation laws
- 5 Enact stricter boating or water recreational use ordinances than presently exist
- 50 Restore the shoreline and improve habitat around the lake shoreline
- 18 Designate hours of operation for different lake users (e.g., jet skiers, fisherpersons, etc.)
- 4 Designate areas of operation for different lake users (e.g., jet skiers, fisherpersons, etc.)
- 15 Other

**Namakagon Lake Association
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Additional Comments

(46, form the "Additional Comments" section or from throughout the questionnaire)

Acid rain -moderate cause of water quality problems. Develop stronger zoning for lake developmnet by changing to a Class 3 from Class 2 lake. Limit the amount of permeable surface in th shoreland zoning ordinance

Authority rank 1-taxpayers on the lake

Better enforcement of snowmobile laws

CBCW Slow wake to protect shoreline

Condo owner Lakewoods Villages

DNR needs to control the wolf population, they are to hard on the wildlife. Deer population is way down since the wolf population increased. Also the few turkeys that we are starting to get will also be in danger along with the grouse.

Do not see any problems with current lake use. Think DNR is sometimes too restrictive to things like location of buildings near lake. we understand septic rules but once it is our property we should be able to add onto cabin if wanted. Pesticide use etc. should be controlled but it seems like there are more rules and fees constantly being applied with a few people making rules for everyone!

Don't over regulate the lake - we know from current D C. leaders how ineffective govt. is!! PS (I didn't vote for him')

Enforce existing laws

Enough in place now. Government is too intrusive & expensive.

Enough restrictions and taxes! Quit wasting money. Enforce current law, no need for new ones. Let people tear down junk and rebuild better on same footprint. Don't tread on me! Leave us alone! I can't use many lakes/rivers anymore - they are clsoed to access

Envelope was not stamped as indicated in cover letter

Even though I don't use property, I value canoing, picnicking, wildlife observation, peace/solitude, scenic enjoyment. I did (belong to lake assoc)at one time

For the most part boaters are safe on Lake Namakagon. Often jet skis are out of control. They are very young and chase behind boat to jump there wakes. I think there need to more enforcement on how and when these are used. I don't know the age limit but there are very young kids driving these with no understanding of boat safety.

I am against a lake district

I am definitely against the controlling nannies that try to legislate, regulate everything they like/don't like. Most people who own property and pay taxes are anxious to improve their investment if they understand the issue. These are the "stakeholders" in the area, not those who come and use the public boat landings. An active, friendly, helpful lake association is probably the best way to encourage the residents to comply with sensible regulations. The last thing we need is more government, more laws, more bureaucrats trying to justify their existence.

I believe the locals and owers care about our lake. I may not do the sports, but I desire health for all species that use or live on and or the lake. We do not need an extreme of rules.

I feel the water quality is fine

I would like to see more enforcement of the no wake zone in the channel between Jackson & Namakagon. I would also like to see a means of education of part time and year-round residents who are not NLA members as to county ordinances and boating regulations, i.e. lakeshore lighting, etc. I would love to see some time and/or speed restrictions on this lake. Waterskiing/jet skiing after dark and at dusk is not only annoying but dangerous.

Is this survey meant to provide fuel for the environmentalists whowould like to have more control over how the taxpayer uses his property? Or ist it meant to allow the owner of the property reasonable use considering the taxes we pay? And we are paying to send you these answers! Which may or may not result in action we like! Not good! don't we already have a weed survey/contrl program? water clarity becomes more cloudy from boats pulling rafts and jet ski use. questions no 'mild choice' for causes of water quality problems

Lake Namakagon is a large, beautiful underused lake, with islands, bays, wildlife, and a shoreline that is probably 1/3 to 1/2 in its pristine natural state, and likely to remain that way. Education (lists of native plants suitable to zone 3 and how/where to use them, the aforementioned safe boating classes, information concerning the use and safety of pesticides and fertilizers) and helpful suggestions are strongly urged rather than more and stricter laws, rules, and regulations. We have been coming to this lake every summer since 1965, and have witnessed a great increase in the number of loons and eagles during that time. Concurrently, there has been little, if any, increase in boat traffic. So let's try to keep our lake the charming, friendly area that we all enjoy.

Limit water skiing/wave runner hours

Locals don't see the big picture - only act in self interest

Need to help restore shoreline and have a meeting on what a land own can/can not do. Not necessary to be 30 ft back but to find ways to help cost to rock lake shore. Better enforcement of jet skis, get grant help with restoring shoreline, designate hours of operation for jet skiers.

NLA could be given more authority - Continue efforts to control exotic species - Do not limit use of lake

Own condo at Lakewoods Resort

**Namakagon Lake Association
Lake Use and Opinion Survey**

Quality of experience on lake has degraded because of more powerboat and personal watercraft usage

Regulate boat wake in canal

Restore shoreline where owners agree to have this done. Monitor water quality. Enhance fishing experience - stock fish

Restrict use of fertilizers, pesticides/herbicides. Restore shoreline natural habitats. Increase inspection of septic systems with followup enforcement of necessary improvements

Thanks to our NLA. They do a great job

The bars attract people that conflicts with the goals of the majority of owners. Bar lights are in violation of code snowmobilers break laws daily. Bars attract a reckless group of transient people who don't care about the lake in general. Actions regarding the snowmobile moise, snowmobile speed, and intoicated snowmobilers are very needed

The DNR, county zoning, town-Corp of Eng, Lake Ass., Land use plans, Comprehensive plans are beginning to stumble over one another. We have enough control and restrictions now. This questionnaire add to the confusion of what controls that we do have on this lake. Zoning for lake is excessive now. Those that have authroity are using it now (ranking groups)

The envelope was not "stamped"

The lack of water during drought periods contributes the most to water quality problems. Current laws and zoning are enough

The survey seems biased toward limited use of the lake. For example asking about boat use should include how many boats do you usually see. It is Sunday PM on Namakagon and I don't see a boat

The weeds are so thick we can not get our boat in & out frOm the docks without help! The algae is terrible and so is the green pea soup water. No one seems to care about Jackson. A big no to stricter/more regulations

This survey is poorly constructed and slanted towards more regulation and control. I know it will be quoted in the future to justify increased regulation and spending or tax increase

Too much government intervention now

Town government should give more credence to, or follow recommendations of, our Comprehensive Plan Commission/Committee and Bayfield County Lakes Forum.

Walleye fishing terrible (rest illegible)

Water quality excellent. Fewer launch ramps

We are very satisfied with the current level of regulations, restrictions, laws, and enforcement on Lake Namakagon. It is a beautiful place. Please do not change a thing!

We have a good boat safety program. The authority ranking question is not clear - how to rank - sometiess federal statutes are required to protect waters. Designate hours/areas of operation for different lake users only if needed.

We have enough rules & codes

We need new, fair, honest game wardens. It is my understanding that the DNR does not want erosion into the lake. So why are they refusing landowners permits to riprap their shoreline?

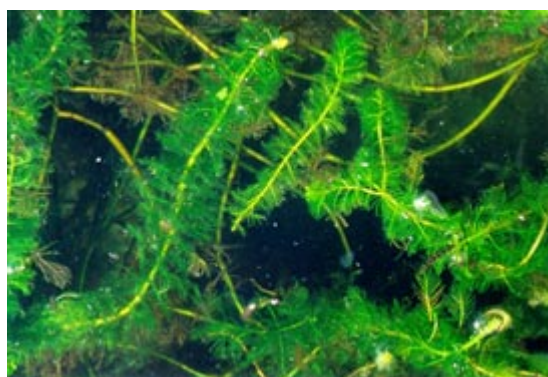
Appendix C

Common Aquatic Invasive Species

Eurasian Water Milfoil (*Myriophyllum spicatum*)

DESCRIPTION: Eurasian water milfoil is a submersed aquatic plant native to Europe, Asia, and northern Africa. It is the only non-native milfoil in Wisconsin. Like the native milfoils, the Eurasian variety has slender stems whorled by submersed feathery leaves and tiny flowers produced above the water surface. The flowers are located in the axils of the floral bracts, and are either four-petaled or without petals. The leaves are threadlike, typically uniform in diameter, and aggregated into a submersed terminal spike. The stem thickens below the inflorescence and doubles its width further down, often curving to lie parallel with the water surface. The fruits are four-jointed nut-like bodies. Without flowers or fruits, Eurasian water milfoil is nearly impossible to distinguish from Northern water milfoil. Eurasian water milfoil has 9-21 pairs of leaflets per leaf, while Northern milfoil typically has 7-11 pairs of leaflets. Coontail is often mistaken for the milfoils, but does not have individual leaflets.

DISTRIBUTION AND HABITAT: Eurasian milfoil first arrived in Wisconsin in the 1960s. During the 1980s, it began to move from several counties in southern Wisconsin to lakes and waterways in the northern half of the state. As of 1993, Eurasian milfoil was common in 39 Wisconsin counties (54%) and at least 75 of its lakes, including shallow bays in Lakes Michigan and Superior and Mississippi River pools.



(c) Barry A. Rice/The Nature Conservancy

Eurasian water milfoil grows best in fertile, fine-textured, inorganic sediments. In less productive lakes, it is restricted to areas of nutrient-rich sediments. It has a history of becoming dominant in eutrophic, nutrient-rich lakes, although this pattern is not universal. It is an opportunistic species that prefers highly disturbed lake beds, lakes receiving nitrogen and phosphorous-laden runoff, and heavily used lakes. Optimal growth occurs in alkaline systems with a high concentration of dissolved inorganic carbon. High water temperatures promote multiple periods of flowering and fragmentation.

LIFE HISTORY AND EFFECTS OF INVASION: Unlike many other plants, Eurasian water milfoil does not rely on seed for reproduction. Its seeds germinate poorly under natural conditions. It reproduces vegetatively by fragmentation, allowing it to disperse over long distances. The plant produces fragments after fruiting once or twice during the summer. These shoots may then be carried downstream by water currents or inadvertently picked up by boaters. Milfoil is readily dispersed by boats, motors, trailers, bilges, live wells, or bait buckets, and can stay alive for weeks if kept moist.

Once established in an aquatic community, milfoil reproduces from shoot fragments and stolons (runners that creep along the lake bed). As an opportunistic species, Eurasian water milfoil is adapted for rapid growth early in spring. Stolons, lower stems, and roots persist over winter and store the carbohydrates that help milfoil claim the water column early in spring, photosynthesize, divide, and form a dense leaf canopy that shades out native aquatic plants. Its ability to spread rapidly by fragmentation and effectively block out sunlight needed for native plant growth often results in monotypic stands. Monotypic stands of Eurasian milfoil provide only a single habitat,

and threaten the integrity of aquatic communities in a number of ways; for example, dense stands disrupt predator-prey relationships by fencing out larger fish, and reducing the number of nutrient-rich native plants available for waterfowl.

Dense stands of Eurasian water milfoil also inhibit recreational uses like swimming, boating, and fishing. Some stands have been dense enough to obstruct industrial and power generation water intakes. The visual impact that greets the lake user on milfoil-dominated lakes is the flat yellow-green of matted vegetation, often prompting the perception that the lake is "infested" or "dead". Cycling of nutrients from sediments to the water column by Eurasian water milfoil may lead to deteriorating water quality and algae blooms of infested lakes.

CONTROLLING EURASIAN WATER MILFOIL: Preventing a milfoil invasion involves various efforts. Public awareness of the necessity to remove weed fragments at boat landings, a commitment to protect native plant beds from speed boaters and indiscriminate plant control that disturbs these beds, and a watershed management program to keep nutrients from reaching lakes and stimulating milfoil colonies--all are necessary to prevent the spread of milfoil.

Monitoring and prevention are the most important steps for keeping Eurasian water milfoil under control. A sound precautionary measure is to check all equipment used in infested waters and remove all aquatic vegetation upon leaving the lake or river. All equipment, including boats, motors, trailers, and fishing/diving equipment, should be free of aquatic plants.

Lake managers and lakeshore owners should check for new colonies and control them before they spread. The plants can be hand pulled or raked. It is imperative that all fragments be removed from the water and the shore. Plant fragments can be used in upland areas as a garden mulch.

Curly-Leaf Pondweed (*Potamogeton crispus*)



Photo by Elizabeth J. Czarapata

DESCRIPTION: Curly-leaf pondweed is an invasive aquatic perennial that is native to Eurasia, Africa, and Australia. It was accidentally introduced to United States waters in the mid-1880s by hobbyists who used it as an aquarium plant. The leaves are reddish-green, oblong, and about 3 inches long, with distinct wavy edges that are finely toothed. The stem of the plant is flat, reddish-brown and grows from 1 to 3 feet long. The plant usually drops to the lake bottom by early July.

DISTRIBUTION AND HABITAT: Curly-leaf pondweed is commonly found in alkaline and high nutrient waters, preferring soft substrate and shallow water depths. It tolerates low light and low water temperatures. It has been reported in all states but Maine.

LIFE HISTORY AND EFFECTS OF INVASION: Curly-leaf pondweed spreads through burr-like winter buds (turions), which are moved among waterways. These plants can also

reproduce by seed, but this plays a relatively small role compared to the vegetative reproduction through turions. New plants form under the ice in winter, making curly-leaf pondweed one of the first nuisance aquatic plants to emerge in the spring.

It becomes invasive in some areas because of its tolerance for low light and low water temperatures. These tolerances allow it to get a head start on and outcompete native plants in the spring. In mid-summer, when most aquatic plants are growing, curly-leaf pondweed plants are dying off. Plant die-offs may result in a critical loss of dissolved oxygen. Furthermore, the decaying plants can increase nutrients which contribute to algal blooms, as well as create unpleasant stinking messes on beaches. Curly-leaf pondweed forms surface mats that interfere with aquatic recreation.

CONTROL METHODS: Turions and plant fragments can be carried on boats, trailers, motors and fishing gear from one water body to another, thus proper prevention techniques are essential to curb the spread of this aquatic invasive. An effective prevention and remediation program also addresses the overall health of a waterbody: Maintaining a healthy ecosystem with diverse native aquatic plants and animals as well as minimizing nutrient and pollutant inputs will deter invasions. Once introduced, curly-leaf pondweed spreads rapidly. Long-term management requires the reduction or elimination of turions to interrupt the lifecycle.

Manual/Mechanical Control: To have the maximum benefit, manual/mechanical control efforts should be undertaken in the spring or early summer. Mechanical control includes raking, hand-cutting or harvesting vegetation. Raking and hand cutting remove plants at the sediment surface, and there is some evidence that early season cutting of pondweed can prevent turion production. Harvesting generally removes the top 5 feet of the plant. Curly-leaf pondweed can spread from plant fragments, so it is important to clean all vegetation off boats and equipment before leaving water access.

Chemical Control: There are a small number of aquatic herbicides that can be used to control curly-leaf pondweed. In Minnesota, good to excellent control was obtained using formulations of diquat (Reward) and endothall (Aquathall K). These chemicals can be used in small areas and will usually knock down curly-leaf pondweed within 2 weeks. The best time for treatment is in spring or early summer when natives are still dormant and temperatures are low enough for endothall be effective. In early experiments with fluridone (Sonar), production of turions was completely inhibited following early season treatments. Fluridone usually has to be applied to an entire lake and requires 30 days to knock down curly-leaf pondweed.

Habitat manipulation: Habitat manipulation such as drawdowns and dredging can also be used to manage curly-leaf pondweed. Fall drawdown can kill the plants by exposing them to freezing temperatures and dessication. Dredging can be used as a control by increasing the water depth. In deep water, the plants do not receive enough light to survive. This method can be detrimental to desired plants, as all macrophytes would be prevented from growing for many years. This high level of disturbance may also create favorable conditions for the invasion of other invasive species.

Hydrilla (*Hydrilla verticillata*)

DESCRIPTION: Hydrilla is a prolific, rapidly-growing submerged aquatic plant that can thrive in water from a few inches to 20 feet deep. Leaves are small (1/2 - 3/4 inches), triangular-pointed and occur in whorls of 4 to 8 leaves along the stem. Unlike many native water plants, hydrilla leaves have serrated edges and one or more protruding barbs or bumps along the midrib on the underside. They are usually green but may bleach in the sun to yellow or brown. Stems are heavily branched near the surface and grow horizontally, forming dense mats of vegetation. Small tubers are present at the rooted base of the plant.

WI Invasive Plants
Reporting & Prevention



Photo by Elizabeth J. Czarapata

LOOK-ALIKES: Hydrilla is often confused with the [native waterweeds](#) (*Elodea canadensis* and *Elodea nuttallii*), whose leaves -- typically in whorls of 3 -- appear smooth-edged and lack spines on the midrib. It also resembles the invasive [Brazilian waterweed](#) (*Egeria densa*), which is not yet in Wisconsin and has finely serrated leaves (3/4 - 1.5 inches) in whorls of 3 to 6.

HABITS AND HABITAT: Hydrilla - a native of Africa - was brought to the U.S. as an aquarium plant. It is now widespread in southern states and has been reported as far north as Washington, Indiana and Maine. In summer 2007 hydrilla was documented in a private artificial pond in Marinette County, Wisconsin. The pond is not connected to any natural aquatic systems, and the hydrilla population is believed to be contained at this site. Wisconsin's Department of Agriculture, Trade and Consumer Protection is taking the lead on investigating this occurrence--see their [press release PDF \(Exit DNR\)](#) for more information. Hydrilla has not been found in any natural lakes or rivers in Wisconsin. If you believe that you have found hydrilla in a Wisconsin water body contact your [local DNR office](#).

Hydrilla has several methods of reproduction. Within a water body, branch or root fragments from broken plants can drift to new areas. Also, it can spread to new locations from plant fragments attached to boats and trailers. Turions - tiny, compact buds which form in leaf axils along the stem - break free and drift to new areas. Studies at the University of Minnesota have indicated that the turions of the monoecious form are likely to survive in northern climates. The dioecious form appears to be less cold tolerant. Tubers, which form on the roots and can lie dormant for several years, can propagate new plants. Hydrilla can grow in a wide range of conditions, including low light, flowing or still waters, shallow or deep. It out-competes the widespread invasive Eurasian water-milfoil with its even more rapid growth and reproduction. It is a serious threat to lakes and streams everywhere because of its adaptability.

CONTROL: Because hydrilla is similar to native waterweeds, be sure of proper identification before beginning control measures. Plants can be collected by hand or mechanical harvesters, with all parts composted away from aquatic environments. Use of chemical herbicides in all Wisconsin aquatic environments (streams, lakes & wetlands) requires a permit from the WDNR. Mechanical harvesting may require a permit.

Appendix D

Aquatic Invasive Plant Incident Report

The purpose of this form is to notify DNR of a new species of AIS in a waterbody. Only use if you found an aquatic invasive plant on a lake where it hasn't been found previously.

To find where aquatic invasives have already been found, visit: <http://dnr.wi.gov/lakes/ais>.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector				
Name		Phone Number		Email
Monitoring Location				
Waterbody Name		Township Name		County
Boat Landing (if you only monitor at a boat landing)				
Date and Time of Monitoring or Discovery				
Monitoring Date	Start Time	End Time		
Information on the Aquatic Invasive Plant Found (Fill out one form for each species found.)				
Which aquatic invasive plant did you find?: ☐ Curly-leaf Pondweed ☐ Eurasian Water-milfoil ☐ Purple Loosestrife ☐ Brittle Naiad ☐ Hydrilla ☐ Brazilian Waterweed ☐ Yellow Floating Heart				
Where did you find the invasive plant?				
Latitude:		Longitude:		
Approximately how large an area do the plants occupy? ☐ A Few Plants ☐ One or a few beds ☐ Many beds ☐ A Whole Bay or Portion of Lake ☐ Widespread, covering most shallow areas of lake ☐ Don't know (e.g. didn't check the whole lake)				
Was the plant floating or rooted? ☐ Floating ☐ Rooted				
Estimated percent cover in the area where the invasive was found (optional)				
Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %
Voucher Sample				
Did you collect a sample of the plant (a voucher specimen) and bring it to your local DNR office? If so, which office?				
☐ Rhinelander	☐ Spooner	☐ Green Bay	☐ Oshkosh	☐ Did not take plant sample to a DNR office
☐ Fitchburg	☐ Waukesha	☐ Eau Claire	☐ Superior	☐ Other Office _____

Please collect up to 5-10 intact specimens. Try to get the root system, all leaves as well as seed heads and flowers when present. Place in ziplock bag with no water. Place on ice and transport to refrigerator. Bring samples, a copy of this form, along with a map showing where you found the suspect plants to your regional AIS or Citizen Lake Monitoring Coordinator at the DNR.

For DNR AIS Coordinator to fill out	
AIS Coordinator(s) or qualified field staff who verified the occurrence: _____	
Statewide taxonomic expert who verified the occurrence: _____ (for list see http://dnr.wi.gov/invasives/aquatic/whattodo/Staff/AisVerificationExperts.pdf)	
Was the specimen confirmed as the species indicated above?	☐ Yes ☐ No If no, what was it? _____
Herbarium where specimen is housed: _____	Herbarium Specimen ID: _____
Have you entered the results of the voucher in SWIMS?	☐ Yes ☐ No
AIS Coordinator: Please enter the incident report in SWIMS under the Incident Report project for the county the AIS was found in. Then, keep the paper copy for your records.	

Appendix E

*Namakagon Lake Sensitive Area Survey and
Management Guidelines*

NAMEKAGON LAKE SENSITIVE AREA SURVEY AND MANAGEMENT GUIDELINES



Photo: Frank Koshere

Namekagon Lake Sensitive Area Survey and Management Guidelines

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NAMEKAGON LAKE (BAYFIELD COUNTY) SENSITIVE AREA SURVEY REPORT

Survey Date(s): 17 July 2000
18 July 2000
19 July 2000
15 August 2000

Number of Sensitive Areas: 33

Site Evaluators: Frank Koshere, Aquatic Plant Mgmt. Coordinator (17-18 July, 15 Aug)
Carolyn Scholl, Water Resources Mgmt. Specialist (17-19 July)
Dennis Scholl, Fisheries Biologist (17-19 July)
Laura Herman, Lake Mgmt. Specialist (18-19 July)
Mark Sundeen, Aquatic Plant Specialist (18 July, 15 Aug)
Todd Naas, Wildlife Biologist (19 July)
Sarah Boles, Lakeshore Restorations (19 July)
Beth Bartol, Brule Area Dispatcher (15 Aug)

Authors: Pamela Stubbe, Water Resources Mgmt. Specialist
Carolyn Scholl, Water Resources Mgmt. Specialist
Frank Koshere, Aquatic Plant Mgmt. Coordinator

INTRODUCTION

General Lake Information

Namekagon Lake in Bayfield County is a large drainage lake, which has both inlet and outlet stream flows. The lake includes a number of basins with natural surface water connections: Jackson Lake, Cranberry Lake, Namekagon Lake, and Garden Lake. Namekagon Lake is 3227 acres with a maximum depth of 50 feet and an average depth of 16 feet.

The habitats present in Namekagon Lake are very diverse and support a balanced fishery. Muskellunge, northern pike, walleye, and large- and smallmouth bass are the top predators in the lake. Walleye are abundant with the present population being supported solely by natural reproduction. Fall recruitment surveys show above average numbers of fingerling walleye in most years. There is no minimum length for walleye, but only one fish over 14 inches is allowed in order to preserve the adult spawning population. Smallmouth bass are abundant in the lake, as well, and natural reproduction maintains the population. Largemouth bass are relatively abundant in the lake. Muskellunge are present in the lake and are stocked every other year at a rate of one fish per acre. The current muskellunge size limit of 50 inches promotes a trophy fishery. Bluegills are the dominant panfish species present. Their numbers and size structure are above average. Black crappie are moderate in numbers and above average in size structure. Other panfish species (i.e. yellow perch and rock bass) are also present. Wisconsin Department of Natural Resources fisheries staff comprehensively surveyed Namekagon Lake in 2002 as part of treaty assessment studies, and a report will be prepared in 2003.

Shoreland areas on Lake Namekagon provide optimum habitat for many species of wildlife. On the upland, standing dead and dying trees (snags) provide forage sites for insect-eating birds and eventually nesting sites for woodpeckers and songbirds. Cavities in trees provide den sites for many species of birds and mammals. Downed and rotting logs provide homes to many species of wildlife including salamanders, small mammals and invertebrates. Downed logs in or near the water (large woody cover) are especially valuable for resting and feeding areas. Vegetation near the shore and in the water is used for nesting shelter as well as food. Wildlife habitat on Namekagon Lake is best where the shoreline is undeveloped or has been allowed to remain mostly natural. Much of the woody cover has been removed from the water and upland along developed shorelines. Removing large woody cover in the water and understory cover (brush) on the shore degrades fish and wildlife habitat.

The aquatic plant diversity (number of different species) in Namekagon Lake is above average for northern Wisconsin, and the aquatic plant community is balanced and ecologically beneficial. Forty-five aquatic/wetland plant species were found during the survey. Generally plant densities are low to moderate, with only a few large plant beds on the lake. Aquatic plant management permits are required for plant control in areas with any species of concern and for chemical control and mechanical harvesting. A permit is not required for manual removal of aquatic plants in an area less than 30 feet wide along the shoreline, provided the removal is authorized or performed by the riparian property owner and is not located within a designated sensitive area. Please contact your aquatic plant management specialist before conducting any aquatic plant control on Namekagon Lake.

Sensitive Area Designations

Wisconsin Department of Natural Resources staff conducted the Namekagon Lake sensitive area designation survey in July and August of 2000 as part of a pilot study to produce DNR protocol guidelines for conducting and implementing sensitive area surveys. Surveys of this type are an integrated team approach to resource management because they utilize DNR resource managers with expertise in water resources, fisheries, wildlife, water management, and law enforcement. As a team, resource experts collaborate to identify locations around a lake that are critical to the future health and balance of the lake's ecosystem. Sensitive area surveys provide lake organizations, owners of shoreline property, county zoning officials, DNR personnel, and other interested individuals with site information that can be used to make management recommendations that will help protect and improve the overall health of lakes.

Thirty-three sites in Namekagon Lake contain critical habitat and were designated as sensitive areas (Appendix A). Natural resource managers identified these areas and recommended how these sites may be protected under Wisconsin's existing natural resource protection laws. For a discussion of basic actions that people can take to help manage sensitive areas, refer to the document *Guidelines for Protecting, Maintaining, and Understanding Lake Sensitive Areas* (Appendix B). Department staff wrote this document to explain to citizens what they can do to help preserve or restore critical lake

habitat and to further explain to those people why certain habitat types are important to the health of lakes.

Sensitive Areas Defined

What is meant by the term ‘designated sensitive area’? Sensitive areas are usually located in areas that consist of endangered or rare species, aquatic/wetland vegetation, terrestrial vegetation, gravel/rubble lake bottom substrate, and/or areas that contain large woody cover. These areas often provide water quality benefits to the lake, reduce shoreline erosion, and contain the habitat needed to sustain many species of fish and wildlife. A designated sensitive area alerts interested individuals (e.g. DNR personnel, county zoning personnel, and lake associations) that the area contains important habitat that is vital to sustaining a healthy lake ecosystem and/or features an endangered plant or animal. Therefore, existing data that describe sensitive area habitat features and concerns at a site will facilitate permit reviews and decisions regarding water-based actions affecting that site. These data will guide a permit decision to protect important ecological features of the site.

Shoreland Management

Wisconsin’s Shoreland Management Program, a partnership between state and local government, works to protect clean water, habitat for fish and wildlife, and natural scenic beauty. The Program establishes minimum standards for lot sizes, structural setbacks, shoreland buffers, vegetation removal and other activities within the shoreland zone. The shoreland zone includes land within 1000 feet of lakes, 300 feet of rivers, and floodplains. With research demonstrating that current standards may be inadequate to protect water resources and the fish and animals that depend on them, many communities have chosen to go beyond the minimum standards to ensure that Wisconsin’s natural resources are adequately protected. This report will provide management guidelines for activities within the lake and in the immediate shoreland area. Before any recommendations in this report are completed please check with the DNR and/or local governments for required approvals.

A vital step in protecting Wisconsin’s water resources is to maintain an adequate buffer. A shoreland buffer should extend from the water onto the land at least 35 to 50 feet. Studies have shown that buffers less than 35 feet are not effective at preventing water pollution. Deeper buffers of 50 feet or more can help provide important wildlife habitat for songbirds, turtles, frogs, and other animals, as well as help to filter out pollutants from runoff. In general, no mowing should occur in the buffer area, except perhaps in a viewing access corridor. This buffer should match the typical ecosystem in Northwestern Wisconsin and include three layers of vegetation: herbaceous, shrub and tree canopy.

In addition, the reader should also investigate other innovative ways to reduce the impacts of runoff flowing into the lake while improving critical shoreline habitat. This may include using phosphorus-free fertilizer; installing rain gardens; setting the lawnmower blade at a higher mower height; decreasing the area of impervious surfaces by redirecting water flow to where it can seep and filter; and/or restoring aquatic plant communities.

Exotic Species Alert

The survey team found Purple Loosestrife (*Lythrum salicaria*) in one sensitive area site: Site 3 (Upper Lake – UL/3). Purple loosestrife is an invasive plant species that can quickly overtake native plant species, which provide wildlife habitat, thus reducing the overall biological diversity of the area. Prompt action should be given to the control of this plant. There are many methods to control purple loosestrife and other exotic species, so contact a DNR aquatic plant specialist for assistance. No other exotic plant or animal species was discovered in Lake Namekagon during this survey.

Many aquatic exotic species (e.g. eurasian watermilfoil, smelt, and zebra mussels) are introduced by human activities such as boating, fishing, and releasing aquarium pets. Exotic species are more likely to become established in disturbed areas (e.g. boat landings, dredge sites, or docks) or where native plants are sparse. Protection of native plant beds may thwart or slow the establishment and spread of exotics should they be introduced into the lake system.

WHOLE-LAKE MANAGEMENT RECOMMENDATIONS

Survey participants identified a total of 33 sensitive area sites (Table 1) in Lake Namekagon. These sites include approximately 17.5 miles, or about 40%, of Namekagon Lake shoreline. The sites have been selected primarily because of two major habitat features: 1) aquatic vegetation or 2) gravel/rubble substrate. To assist in site descriptions, survey staff divided the main lake into three areas that correspond to natural delineations in the basins. These areas include: Upper Lake, Middle Lake, and Lower Lake.

Table 1. Namekagon Lake sensitive area designation sites and corresponding primary reason, based on habitat features, for site selection.

NAMEKAGON LAKE		Aquatic Vegetaion Habitat	Gravel/Rubble Substrate Habitat
Site Name	Site Code	Site Numbers	
Upper Lake	UL	1, 3, 4, 5, 6, 7, 9	2, 8, 10, 11, 13
Jackson Lake	JL	5	
Anderson Bay	AB	12	
Middle Lake	ML	19, 20, 21, 22, 24	14, 15, 18, 23, 25, 26
Mumms Bay	MB	16, 17	
Lower Lake	LL	27, 28, 29	
Garden Lake	GL	30, 31, 32	33

1. Sensitive Area Sites Based on Aquatic Vegetation Habitat

The twenty-two aquatic vegetation-based sites contain aquatic plant communities that provide critical habitat for fish and wildlife, as well as for shoreline erosion prevention and bank stabilization. Refer to Appendix C for a summary list of all aquatic plants that were identified in this survey.

Management Recommendations:

1. Limit the removal of aquatic vegetation to the construction of navigation channels only. If navigation channels are necessary, minimize the length and width of the channel. Note that at some sensitive area sites, removal of any aquatic vegetation is not recommended.
2. Control the spread of exotic species such as purple loosestrife. Contact a DNR aquatic plant specialist for assistance in controlling exotic species.
3. Prohibit littoral zone alterations covered by Chapter 30 Wisconsin Statutes, unless there is clear evidence that such alterations would benefit the lake's ecosystem. Examples of such alterations regulated in Chapter 30 include: placement of rip-rap on lake beds or banks with the intent to improve stability; dredging of lake bottom material with the intent to improve recreational habitat or navigable access; and placement of fish cribs or similar devices with the intent to improve fishing habitat.
4. Do not remove large woody cover such as logs, downed trees, and stumps within the littoral zone in order to provide cover habitat for fish, wildlife, and other organisms.
5. Preserve/restore the terrestrial vegetation for shoreline cover. Keep lake view corridors to a minimum of 30 feet or less. Natural vegetative cover acts as a buffer against shoreline erosion and silt runoff. Rock rip-rap is often not required for shoreline stabilization if a healthy plant community already exists.
6. Use best management practices within the lake's watershed (such as those covered in *Wisconsin's Forestry Best Management Practices for Water Quality*, WDNR publication # FR093) to reduce the potential of silt, debris, or nutrients from entering the lake system.
7. Encourage local contractors and town and county road crews to learn and implement best management practices in road design, maintenance, and construction to protect water quality. Training is available at University of Wisconsin Extension workshops.

2. Sensitive Area Sites Based on Gravel/Rubble Substrate Habitat

The eleven fishery-based sensitive area designation sites contain gravel and rubble lake bottom substrate that provides important seasonal habitat for successful walleye and/or smallmouth bass spawning. Walleyes require areas of clean gravel/rubble substrate void of sediment for natural reproduction to occur in a lake. The ideal spawning habitat for smallmouth bass is an area of gravel/rubble substrate containing a shallow layer of fine sediments. The bass clears away a small portion of the fine sediment layer to expose gravel, therein constructing a “nest” in which to spawn. If these types of habitat are degraded, the natural walleye and smallmouth bass populations may decline or be lost altogether.

Management Recommendations:

1. Prohibit alterations of gravel/rubble substrate at these sites, unless alterations would improve fish spawning success. Chapter 30 Wisconsin Statutes requires permits for such alterations.
2. Utilize proper erosion control measures to preserve gravel/rubble habitat if near-shore construction should occur in these areas. Uncontrolled or poorly conducted construction activities would threaten important fish spawning habitat.
3. Preserve/restore natural vegetative buffers along the shoreline to provide the best long-term and natural protection against shoreline erosion and silt runoff.
4. Aquatic plant management may be appropriate in certain circumstances (e.g. exotic species control). In general, however, aquatic vegetation removal is not advisable because aquatic plants provide protective cover, shade, food sources, and reproductive areas for fish, macroinvertebrates, and/or wildlife.

RESOURCE VALUES SITE BY SITE

Site 1. Upper Lake 1 (UL/1)

Site 1 is located in the north central bay of the upper basin, near the Namekagon Lake Recreation Area (start point 46.244377 N, 91.093855 W). The area consists of undisturbed aquatic (Table 2) and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 990 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Bottom substrate consists of silt, detritus, and wood chips. The riparian zone consists of wetland and developed areas. Herbs, shrubs, trees and lawn are present and make up the shoreland buffer character from the water's edge to 35 feet inland. The wetland type present at the site is shrub/scrub deciduous. Large woody cover is not present at the site, and the natural scenic beauty (NSB) is poor.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for Northern Pike, Muskellunge, Largemouth Bass, and panfish species at this site.

Table 2. Aquatic plants found at Site 1 by plant category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>Eleocharis acicularis</i> .	<i>Pontederia cordata</i> , <i>Typha</i> spp., <i>Sagittaria</i> spp.	
Floating-Leaf Plants:	<i>Nymphaea</i> spp.	<i>Nuphar</i> spp.	
Submersed Plants:	<i>Ceratophyllum</i> spp., <i>Vallisneria americana</i> , <i>Myriophyllum sibiricum</i> , <i>Najas</i> spp., <i>Drepanopocladus</i>	<i>Bidens beckii</i> , <i>Elodea canadensis</i> , <i>Utricularia</i> spp., <i>Myriophyllum heterophyllum</i>	
Pondweeds (Potamogetons):	<i>Potamogeton gramineus</i> , <i>Potamogeton robbinsii</i> , <i>Potamogeton amplifolius</i> , <i>Potamogeton praelongus</i> , <i>Potamogeton zosteriformis</i> ,	<i>Potamogeton richardsonii</i>	
Turf Formers/Rosettes:	<i>E. acicularis</i>	<i>Sagittaria</i> spp.	
Algae:	Filamentous		
Exotics:			

Emergent and floating leaf vegetation as well as shoreland shrubs and brush provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, and/or feeding include upland wildlife, furbearers, reptiles, amphibians, and birds. Survey participants noted numerous ducks at this site.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 2. Upper Lake 2 (UL/2)

Site 2 is located on the gravel bar point west of Missionary Point (start point 46.242103 N, 91.101912 W). The shoreline consists of gravel substrate suitable for the natural reproduction habits of walleye and smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 506 feet. The important habitat of the sensitive area is located within the littoral zone. Shrubs, trees, and lawn

characterize the riparian zone. Large woody cover is not present at the site, and the NSB is average.

This site provides unique features and important seasonal habitat for walleye, smallmouth bass, perch, and suckers. The area offers gravel lake bottom substrate and aquatic vegetation nearby for the benefit of natural reproduction and feeding opportunities for fish.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.

Site 3. Upper Lake 3 (UL/3)

Site 3 is located in the northwestern bay of the upper basin, close to Cranberry Lake (start point 46.24293 N, 91.103592 W). The area consists of undisturbed aquatic and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 3523 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Bottom substrate consists of muck and detritus. The shoreland buffer consists of wetland and developed areas. Herbs, shrubs, trees and lawn are present and make up the shoreland buffer character from the water's edge to 35 feet inland. The wetland type present at the site is shrub/scrub deciduous. No large woody cover is visible, and NSB is average.

Table 3. Aquatic plants found at Site 3 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Carex</i> spp., <i>Eleocharis</i> spp.	<i>Scirpus</i> spp., <i>P. cordata</i>	<i>Typha</i> spp., <i>Sparganium fluctuans</i>
Floating-Leaf Plants:	<i>Lemna</i> spp., <i>Nuphar</i> spp.	<i>Nymphaea</i> spp.	
Submersed Plants:	<i>V. americana</i>	<i>E. canadensis</i> , <i>Ceratophyllum</i> spp.	<i>M. heterophyllum</i>
Pondweeds (Potamogetons):	<i>Potamogeton epihydrus</i> , <i>P. praelongus</i> , <i>P. zosteriformis</i> , <u><i>fineleaf pondweed</i> spp.</u>	<i>P. amplifolius</i>	
Turf Formers/Rosettes:	<i>Eleocharis</i> spp.		
Algae:	<i>Nitella flexilis</i> , filamentous		
Exotics:	<i>Lythrum salicaria</i>		

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site.

Emergent and floating leaf vegetation as well shoreland shrubs and brush provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, and/or feeding include upland wildlife, furbearers, reptiles, amphibians, and birds. Survey participants observed a beaver lodge and an osprey fishing at this site.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Control the presence and prevent the spread of purple loosestrife.
4. Maintain biological integrity of the site to preserve the existing wildlife species.

Site 4. Upper Lake 4 (UL/4)

Site 4 consists of the entire channel between the upper basin of Namekagon Lake and Jackson Lake (start point 46.239485 N, 91.11427 W). The area consists of undisturbed aquatic (Table 4) and terrestrial/wetland vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1.2 miles. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Bottom substrate consists of muck and detritus. The riparian zone consists of wetland and wooded areas. Herbs, shrubs, and trees are present and make up the shoreland buffer character from the waters edge to 35 feet inland. The wetland type present at the site is shrub/scrub deciduous. No large woody cover is visible at the site, and the NSB is outstanding.

Table 4. Aquatic plants found at Site 4 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>Sagittaria</i> spp., <i>Eleocharis</i> spp., <i>Iris</i> spp., <i>Decodon verticillatus</i> , <i>Dulichium arundinaceum</i>	<i>Typha</i> spp.	<i>P. cordata</i> , <i>Sparganium</i> spp.
Floating-Leaf Plants:	<i>Lemna</i> spp., <i>Nuphar</i> spp., <i>Nymphaea</i> spp., <i>Brasenia schreberi</i>		
Submersed Plants:	<i>E. canadensis</i>		
Pondweeds (Potamogetons):	<i>P. amplifolius</i> , <i>P. richardsonii</i> , <i>P. epihydrus</i> , <i>P. zosteriformis</i> , fine-eaf pondweed spp.		
Turf Formers/Rosettes:	<i>Sagittaria</i> spp., <i>Eleocharis</i> spp.		
Algae:	Filamentous		
Exotics:			

This site is unique in comparison to the rest of the lake in that it offers a large continuous channel of littoral zone habitat. It provides a corridor for fish and wildlife, as well as a connection between lakes, and it contains a highly diverse biological community.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. This site contains some of the best largemouth bass habitat in the entire lake.

Emergent and floating leaf vegetation as well shoreland shrubs and brush provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, and/or feeding include upland wildlife, furbearers, reptiles, amphibians, and birds. Indeed survey participants noted a beaver lodge, an osprey, and several ducks at this site.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Ensure that future development preserves outstanding natural scenic beauty.
5. Create a "Slow – No Wake" zone to protect the biological integrity of the wetland area and the surface water connection corridor.

Site 5. Jackson Lake 1 (JL/1)

Site 5 is located along the northern shore of Jackson Lake (start point 46.254503 N, 91.109627 W). The area consists of undisturbed aquatic (Table 5) and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 3542 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Bottom substrate consists of muck and detritus. The gently sloping riparian zone consists of wetland, woodland, and developed areas. Herbs, shrubs, trees and lawn are present and make up the shoreland buffer character from the water's edge to 35 feet inland. There is no visible large woody cover, nor is there a NSB rating at Site 5.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site.

Emergent and floating leaf vegetation as well as shoreland shrubs and brush provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, and/or feeding include upland wildlife, furbearers, reptiles, amphibians, and birds. Indeed survey participants noted numerous ducks at this site.

Table 5. Aquatic plants found at Site 5 by plant category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	Burreed spp.	<i>Scirpus</i> spp., <i>Eleocharis</i> spp., <i>Typha</i> spp., <i>S. fluctuans</i>	<i>P. cordata</i>
Floating-Leaf Plants:	<i>Lemna</i> spp.	<i>Nuphar</i> spp., <i>Nymphaea</i> spp.	
Submersed Plants:		<i>E. canadensis</i> , <i>M. heterophyllum</i>	<i>Ceratophyllum</i> spp.
Pondweeds (Potamogetons):	<i>P. gramineus</i> , <i>P. amplifolius</i> , <i>P. praelongus</i> , fineleaf pondweed spp.	<i>P. epiphydrus</i>	<i>P. zosteriformis</i>
Turf Formers/Rosettes:	<i>Eleocharis</i> spp.		
Algae:	Filamentous		
Exotics:			

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.

Site 6. Upper Lake 5 (UL/5)

Site 6 is located around the entire shoreline of the Chief Namekagon Island in the upper basin (start point 46.238003 N, 91.107302 W). The area consists of undisturbed aquatic and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1395 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Bottom substrate consists of gravel and sand. The riparian zone consists of wooded area. Shrubs and trees are present and make up the shoreland buffer character from the waters edge to 35 feet inland. Large woody cover is present at the site, and the NSB is good.

This site is unique in comparison to the rest of the lake because it is a state-owned, non-developed island that contains a high level of plant and animal diversity and habitat.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site.

Table 5. Aquatic plants found at Site 6 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>Carex</i> spp., <i>Eleocharis</i> spp., <i>Typha</i> spp.	<i>Sagittaria</i> spp.	
Floating-Leaf Plants:	<i>Nuphar</i> spp., <i>Nymphaea</i> spp., <i>Polygonum amphibium</i>		
Submersed Plants:	<i>E. canadensis</i> , <i>Ceratophyllum</i> spp., <i>V. americana</i> ., <i>M. heterophyllum</i> , <i>Myriophyllum alterniflorum</i> , <i>Zosterella dubia</i>	<i>Najas</i> spp.	
Pondweeds (Potamogetons):	<i>P. richardsonii</i>	<i>P. gramineus</i> , <i>P. amplifolius</i> , <i>P. epiphydrus</i> , <i>P. zosterformis</i>	
Turf Formers/Rosettes:	<i>Isoetes</i> , <i>Eleocharis</i> spp.	<i>Sagittaria</i> spp.	
Algae:	<i>Chara</i> spp., Filamentous		
Exotics:			

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, and/or feeding include upland wildlife, furbearers, reptiles, amphibians, and birds.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 7. Upper Lake 6 (UL/6)

Site 7 is located just south of the Jackson Lake outlet, on the western shoreline of the upper basin (start point 46.236623 N, 91.117383 W). The area consists of undisturbed aquatic and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1385 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Bottom substrate consists of gravel and sand. The gently sloping riparian zone consists of wetland, wooded, and developed areas. Herbs, shrubs and trees are present and make up the shoreland buffer character from the waters edge to 35 feet inland. There is no visible large woody cover, and the NSB is outstanding.

This site is unique in comparison to the rest of the lake in that it offers a large continuous area of emergent, floating leafed, and submersed aquatic vegetation that contains a high level of plant and animal diversity and habitat.

Table 6. Aquatic plants found at Site 7 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Sagittaria</i> spp., <i>Typha</i> spp., <i>Dulichium arundinaceum</i>	<i>P. cordata</i>	<i>Eleocharis</i> spp., <i>Sparganium</i> spp.
Floating-Leaf Plants:	<i>P. amphibium</i>	<i>Nuphar</i> spp., <i>Nymphaea</i> spp.	
Submersed Plants:	<i>B. beckii</i> , <i>E. canadensis</i> , <i>Utricularia</i> spp., <i>V. americana</i> , <i>M. alterniphlorum</i> , <i>Najas</i> spp.	<i>M. heterophyllum</i>	
Pondweeds (Potamogetons):	<i>P. praelongus</i> , <i>P. richardsonii</i> , <i>P. epiphydrus</i> , fineleaf pondweed spp.	<i>P. amplifolius</i> , <i>P. zosterformis</i>	<i>P. gramineus</i>
Turf Formers/Rosettes:	<i>Sagittaria</i> spp.		<i>Eleocharis</i> spp.
Algae:	<i>Chara</i> spp., Filamentous		
Exotics:			

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, and/or feeding include upland wildlife, furbearers, reptiles, amphibians, and birds. Survey participants observed gadwall and mallard ducks, and they heard mink and bullfrogs at this site.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain the biological integrity of the area to preserve the existing wildlife species found in the area.
4. Ensure that future development preserves outstanding natural scenic beauty.

Site 8. Upper Lake 7 (UL/7)

Site 8 is located on the southern shoreline of the upper basin on the point bar prior to the corridor that connects the upper and middle basins (start point 46.233183 N, 91.105207

W). The shoreline consists of gravel substrate suitable for the natural reproduction habits of walleye and smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 1838 feet. The important habitat of the sensitive area is located within the littoral zone. The gently sloping riparian zone includes wooded and developed areas. There is no large woody cover, and NSB is average.

This site provides unique features and important seasonal habitat for walleye, smallmouth bass, perch, and suckers. The area contains gravel lake bottom substrate and aquatic vegetation nearby that enhance natural reproduction and feeding opportunities for fish.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.

Site 9. Upper Lake 8 (UL/8)

Site 9 is located on the northern shore of the eastern bay in the upper basin (start point 46.244342 N, 91.083588 W). The area consists of undisturbed aquatic (Table 7), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1604 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Sand and muck constitute the bottom substrate. The gently sloping riparian zone consists of wetland and wooded areas with woody cover present at the site. There is no NSB description for this site.

Table 7. Aquatic plants found at Site 9 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:		<i>Scirpus</i> spp., <i>Sagittaria</i> spp., <i>P. cordata</i> , <i>Typha</i> spp.	<i>Eleocharis</i> spp., <i>Sparganium</i> spp.
Floating-Leaf Plants:		<i>Nuphar</i> spp., <i>Nymphaea</i> spp.	
Submersed Plants:	<i>Utricularia</i> spp., <i>V. americana</i> , <i>Najas</i> spp.	<i>M. heterophyllum</i>	
Pondweeds (Potamogetons):	<i>P. praelongus</i> , <i>P. richardsonii</i>	<i>P. epiphydrus</i> , <i>P. zosterformis</i>	<i>P. gramineus</i> , <i>P. amplifolius</i>
Turf Formers/Rosettes:		<i>Sagittaria</i> spp.	<i>Eleocharis</i> spp.
Algae:		Filamentous	
Exotics:			

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, and/or feeding include upland wildlife, furbearers, reptiles, amphibians, and birds.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 10. Upper Lake 9 (UL/9)

Site 10 is located in the northeastern portion of the eastern bay of the upper basin (start point 46.244032 N, 91.079913 W). The shoreline consists of sand substrate suitable for the natural reproduction habits of panfish, and thus the substrate provides the primary reason for site selection. Site length is approximately 428 feet. The important habitat of the sensitive area is located within the littoral zone. The gently sloping riparian zone contains wooded and developed areas. Large woody cover is not visible, and there is no NSB description for this site.

This site provides unique features and important seasonal habitat for panfish species. These fish utilize the sand substrate to create spawning nests in addition to the nursery and feeding benefits.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.

Site 11. Upper Lake 10 (UL/10)

Site 11 is located in the central portion of the eastern bay of the upper basin (start point 46.238037 N, 91.07845 W). The shoreline consists of rubble, gravel, and sand substrate with intermittent boulders suitable for the natural reproduction habits of walleye and smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 2270 feet. The important habitat of the sensitive area is located within the littoral zone. The gently sloping riparian zone contains wooded and developed portions. Large woody cover is present at the site. There is no NSB description for this site.

This site provides unique features and important seasonal habitat for walleye and smallmouth bass. In addition to the gravel/rubble substrate that provides spawning,

nursery, and feeding areas for these fish species, there are boulders that enhance fish habitat. There are also microhabitats containing woody cover and aquatic plants that provide additional protective cover for fish.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.
2. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 12. Anderson Bay 1 (AB/1)

Site 12 includes almost the entire bay(s) east of Anderson Island (start point 46.22777 N, 91.083992 W). The area consists of undisturbed aquatic (Table 9) and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 2.4 miles. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Bottom substrate consists of muck and wood. The gently sloping riparian area is mostly wooded and wetland with some developed areas, and the littoral zone is expansive and very biologically diverse. Large woody cover is present at this site, and NSB is outstanding.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. The woody cover enhances protective cover for fish.

Table 9. Aquatic plants found at Site 12 by plant category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>Eleocharis</i> spp., <i>Typha</i> spp.	<i>P. cordata</i>	<i>Sparganium</i> spp.
Floating-Leaf Plants:	<i>Nuphar mycophylla</i> , <i>B. schreberi</i> , <i>P. amphibium</i> .	<i>Nuphar</i> spp. (largeleaf)	<i>Nymphaea</i> spp.
Submersed Plants:	<i>E. canadensis</i> , <i>Ceratophyllum</i> spp., <i>Utricularia</i> spp., <i>V. americana</i> , <i>M. heterophyllum</i> , <i>Najas</i> spp.		
Pondweeds (Potamogetons):	<i>P. robbinsii</i> , <i>P. praelongus</i> , <i>P. epiphydrus</i> ,	<i>P. amplifolius</i> , <i>P. richarsonii</i> , <i>P. zosteriformis</i>	<i>P. gramineus</i>
Turf Formers/Rosettes:	<i>Eleocharis</i> spp.		
Algae:	<i>Chara</i> spp., Filamentous		
Exotics:			

Emergent and floating leaf vegetation as well shoreland shrubs and brush provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding and/or nursery purposes include upland wildlife,

furbearers, reptiles, amphibians, and/or birds. Survey participants saw an otter, beaver lodges, loon nesting areas and deer at this site.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
5. Ensure that future development preserves outstanding natural scenic beauty.

Site 13. Upper Lake 11 (UL/11)

Site 13 is located in the central portion of the eastern bay of the upper basin (start point 46.233213 N, 91.085153 W). The shoreline consists of gravel and sand substrate suitable for the natural reproduction habits of walleye and smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 3487 feet. The important habitat of the sensitive area is located within the littoral zone. The steeply sloping riparian zone is mostly wooded. There is no visible large woody cover at the site, and there is no NSB description.

This site provides unique features and important seasonal habitat for walleye and smallmouth bass. The site contains gravel, rubble, and overhanging trees that provide spawning, nursery, feeding, and/or protective cover areas for fish.

Shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover include upland wildlife, furbearers, reptiles, amphibians, and birds.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.

Site 14. Middle Lake 1 (ML/1)

Site 14 is located on the gravel/sand bar off of Eagle Point (start point 46.22112 N, 91.10265 W). The shoreline consists of rubble, gravel, and sand substrate suitable for the natural reproduction habits of walleye and smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 1522 feet. The important habitat of the sensitive area is located within the littoral zone. The moderately sloping riparian area contains wooded and developed areas. Large woody cover is not visible at the site, and the NSB is average.

This site provides unique features and important seasonal habitat for walleye and smallmouth bass. The site contains gravel, rubble, and overhanging trees that provide spawning, nursery, feeding, and/or protective cover areas for fish.

Shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover include upland wildlife, furbearers, reptiles, amphibians, and birds.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.

Site 15. Middle Lake 2 (ML/2)

Site 15 is located on the gravel/rubble bar on the north side of Picnic Point (start point 46.213885 N, 91.102848 W). The shoreline consists of gravel and rubble substrate suitable for the natural reproduction habits of walleye, and thus the substrate provides the primary reason for site selection. Site length is approximately 1066 feet. The important habitat of the sensitive area is located within the littoral zone. The moderately sloping riparian area contains wooded and developed areas. There is no large woody cover visible at the site, and there is no NSB description.

This site provides unique features and important seasonal habitat for walleye. The site contains gravel and rubble that provides spawning, nursery, and/or feeding areas for walleye and other fish. The site is unique because the gravel substrate a good distance out from the shoreline.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.

Site 16. Mumms Bay 1 (MB/1)

Site 16 is located on the northern shore of Mumms Bay, which is on the eastern side of the middle basin (start point 46.214782 N, 91.099392 W). The area consists of undisturbed aquatic (Table 10), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 718 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Sand, silt, and muck constitute the bottom substrate. The gently sloping riparian zone consists of wetland with woody cover present at the site. The NSB is average.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. The large woody cover that is present enhances the protective cover available to fish.

Table 10. Aquatic plants found at Site 16 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Sagittaria</i> spp., <i>Sparganium</i> spp., <i>Iris</i> spp., Bog rosemary	<i>Carex</i> spp., <i>P. cordata</i> , <i>Typha</i> spp.	
Floating-Leaf Plants:	<i>N. mycophylla</i> , <i>Nymphaea</i> spp.	<i>Nuphar</i> spp.(largeleaf)	
Submersed Plants:	<i>E. canadensis</i> , <i>Ceratophyllum</i> spp., <i>Utricularia</i> spp., <i>M. heterophyllum</i>	<i>V. americana</i>	
Pondweeds (Potamogetons):	<i>P. gramineus</i> , <i>P. amplifolius</i> , <i>P. richardsonii</i> , <i>P. epihydrus</i> , <i>P. zosterformis</i>		
Turf Formers/Rosettes:	<i>Sagittaria</i> spp.		
Algae:	Filamentous		
Exotics:			

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds. Survey participants observed many birds at Site 16.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain the biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 17. Mumms Bay 2 (MB/2)

Site 17 is located along the eastern shore of Mumms Bay, which is on the eastern side of the middle basin (start point 46.211783 N, 91.094748 W). The area consists of undisturbed aquatic (Table 11), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1720 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Gravel, sand, and muck constitute the bottom substrate. The gently sloping riparian zone consists of wetland and wooded areas with large woody cover present at the site. The NSB is outstanding because of the high diversity and large wetland complex.

Table 11. Aquatic plants found at Site 17 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Carex lacutris</i> , <i>Sagittaria latifolia</i> , <i>Sparganium fluctuans</i> , <i>Sparganium</i> spp.	<i>P. cordata</i> , <i>Typha</i> spp.	
Floating-Leaf Plants:	<i>Lemna</i> spp., <i>P. amphibium</i>	<i>Nuphar</i> spp., <i>Nymphaea</i> spp.	
Submersed Plants:	<i>E. canadensis</i> , <i>Utricularia</i> spp., <i>V. americana</i>	<i>M. heterophyllum</i>	
Pondweeds (Potamogetons):	<i>P. amplifolius</i> , <i>P. richardsonii</i> , <i>P. zosterformis</i>	<i>P. gramineus</i>	
Turf Formers/Rosettes:	<i>S. latifolia</i>		
Algae:	<i>Chara</i> spp., <i>Nitella</i> spp., Filamentous		
Exotics:			

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. The large woody cover that is present enhances the protective cover available to fish.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds. Additionally, Site 17 is the only site where survey participants observed a freshwater sponge (phylum porifera).

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
5. Ensure that future development preserves outstanding natural scenic beauty.

Site 18. Middle Lake 3 (ML/3)

Site 18 is located along the entire shoreline of Champaign Island, which is just outside Mumms Bay (start point 46.209715 N, 91.107987 W). The area consists of undisturbed aquatic (Table 12), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1231 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone.

Gravel and sand constitute the bottom substrate. The moderately sloping riparian zone is wooded with large woody cover present at the site. The NSB is good.

Table 12. Aquatic plants found at Site 18 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>Eleocharis</i> spp., <i>Sagittaria</i> spp., <i>P. cordata</i> , <i>Typha</i> spp.		
Floating-Leaf Plants:	<i>P. amphibium</i>		
Submersed Plants:	<i>Ceratophyllum</i> spp., <i>M. heterophyllum</i> , <i>Najas</i> spp.	<i>E. canadensis</i> , <i>V. americana</i>	
Pondweeds (Potamogetons):	<i>P. amplifolius</i> , <i>P. richardsonii</i>	<i>P. gramineus</i>	
Turf Formers/Rosettes:	<i>Isoetes</i> spp., <i>Eleocharis</i> spp., <i>Sagittaria</i> spp.		
Algae:	<i>Chara</i> spp.		Filamentous
Exotics:			

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. The large woody cover that is present enhances the protective cover available to fish. The gravel and sand substrates provide spawning and nursery areas for walleye and/or smallmouth bass.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds. Survey participants observed an eagle's nest and outstanding heron habitat at Site 18.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 19. Middle Lake 4 (ML/4)

Site 19 is located along the southwestern shoreline of Bergundy Point (start point 46.20751 N, 91.106998 W). The area consists of undisturbed aquatic (Table 13), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site

selection, although this site is important for fisheries, as well. Site length is approximately 354 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Rubble, gravel, sand, and rock constitute the bottom substrate. The gently sloping riparian zone is wooded with large woody cover present at the site. There is no NSB description this site.

Table 13. Aquatic plants found at Site 19 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:			
Floating-Leaf Plants:	<i>Nuphar spp.</i> , <i>Nymphaea spp.</i>		
Submersed Plants:	<i>E. canadensis</i> , <i>Ceratophyllum spp.</i> , <i>V. americana</i> , <i>M. heterophyllum</i>		
Pondweeds (Potamogetons):	<i>P. gramineus</i> , <i>P. richardsonii</i> , <i>P. zosteriformis</i>	<i>P. amplifolius</i> , fineleaf pondweed spp.	
Turf Formers/Rosettes:			
Algae:			
Exotics:			

Emergent and submersed aquatic vegetation in addition to rock, rubble, and wood provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, walleye, smallmouth bass, and panfish at this site. The large woody cover that is present enhances the protective cover available to fish. The gravel, rubble, and sand substrate provides superior spawning and nursery areas for walleye and/or smallmouth bass.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds. Survey participants observed turtles sunning themselves here.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
6. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for walleye and smallmouth bass.

Site 20. Middle Lake 5 (ML/5)

Site 20 is located along the central western shoreline in the middle basin and includes two large bays that constitute a continuous wetland complex (start point 46.2083 N, 91.127945 W). The area consists of undisturbed aquatic (Table 14), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 5154 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Sand, muck, and detritus constitute the bottom substrate. The gently sloping riparian zone includes wooded and wetland areas with woody debris present at the site. The NSB is outstanding because of its high diversity and large wetland complex.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. The abundant bulrushes are especially important for muskellunge spawning and nursery habitat. The large woody cover that is present enhances the protective cover available to fish.

Table 14. Aquatic plants found at Site 20 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>P. cordata</i> , <i>Typha</i> spp.	<i>Sagittaria</i> spp.	<i>Eleocharis</i> spp.
Floating-Leaf Plants:	<i>Nymphaea</i> spp.	<i>Nuphar</i> spp.	
Submersed Plants:	<i>E. canadensis</i>	<i>V. americana</i> , <i>M. alterniflorum</i>	<i>M. heterophyllum</i>
Pondweeds (Potamogetons):	<i>P. amplifolius</i> , fineleaf pondweed spp.	<i>P. gramineus</i> , <i>P. richardsonii</i>	
Turf Formers/Rosettes:	<i>Isoetes</i> spp.	<i>Sagittaria</i> spp.	<i>Eleocharis</i> spp.
Algae:	Filamentous		
Exotics:			

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds.

Site 20 is unique in that there are three wetland habitat types with undisturbed corridors that connect each: 1) shrub carr; 2) tamarack/blue spruce bog; and 3) shallow marsh. These areas may potentially contain endangered species.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
5. Ensure that future development preserves outstanding natural scenic beauty.
6. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.

Site 21. Middle Lake Site 6 (ML/6)

Site 21 is located along the northeastern shoreline of Paines Island (start point 46.215833 N, 91.11781 W). The area consists of undisturbed aquatic (Table 15) and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1052 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone, and rubble, gravel, sand, and detritus constitute the bottom substrate. The riparian zone is a woody area with large woody cover present at the site. There is no NSB description for Site 21.

Table 15. Aquatic plants found at Site 21 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>P. cordata</i> , <i>Typha</i> spp.	<i>Sagittaria</i> spp.	<i>Eleocharis</i> spp.
Floating-Leaf Plants:	<i>Nymphaea</i> spp.	<i>Nuphar</i> spp.	
Submersed Plants:	<i>E. canadensis</i>	<i>V. americana</i> , <i>M. alterniflorum</i>	<i>M. heterophyllum</i>
Pondweeds (Potamogetons):	<i>P. amplifolius</i> , fineleaf pondweed spp.	<i>P. gramineus</i> , <i>P. richardsonii</i>	
Turf Formers/Rosettes:	<i>Isoetes</i> spp.	<i>Sagittaria</i> spp.	<i>Eleocharis</i> spp.
Algae:	Filamentous		
Exotics:			

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, walleye, smallmouth bass, and panfish at this site. The large woody cover that is present enhances the protective cover available to fish. The gravel, rubble, and sand substrate provides superior spawning and nursery areas for walleye and/or smallmouth bass.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, feeding, and/or nursery areas include birds.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
5. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for walleye and smallmouth bass.

22. Middle Lake Site 7 (ML/7)

Site 22 is located in the northwestern bay of the middle basin near the Namekagon River outlet, which is southwest of Juneks Point (start point 46.225087 N, 91.11776 W). The area consists of undisturbed aquatic (Table 16), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 2971 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Muck and detritus constitute the bottom substrate. The gently sloping riparian zone includes wetland, wooded, and developed areas with large woody cover present at the site. There is not a NSB description for Site 22.

Table 16. Aquatic plants found at Site 22 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Typha</i> spp.	<i>Eleocharis</i> spp., <i>P. cordata</i>	
Floating-Leaf Plants:	<i>Nymphaea</i> spp.	<i>Nuphar</i> spp.	
Submersed Plants:	<i>B. beckii</i> , <i>Ceratophyllum</i> spp.	<i>E. canadensis</i> , <i>Utricularia</i> spp., <i>M. heterophyllum</i>	<i>V. americana</i>
Pondweeds (Potamogetons):	<i>P. amplifolius</i> , <i>P. zosteriformis</i>	<i>P. gramineus</i> , <i>P. richardsonii</i>	<i>P. robbinsii</i>
Turf Formers/Rosettes:			
Algae:	<i>Chara</i> spp.	Filamentous	
Exotics:			

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. Large woody cover enhances protective cover for fish.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland

wildlife, furbearers, reptiles, amphibians, and birds. Indeed survey participants saw turtles at Site 22.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
5. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for walleye and smallmouth bass.
6. Create a “Slow – No Wake” zone to protect the biological integrity of the wetland bay and stream outlet.

23. Middle Lake Site 8 (ML/8)

Site 23 is located off the tip of the first southern peninsula on Juneks Point (start point 46.223745 N, 91.115783 W). The shoreline consists of rubble, gravel, and sand substrate that is suitable for the natural reproduction habits of walleye and smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 807 feet. The important habitat of the sensitive area is located within the littoral zone. The gently sloping riparian zone includes wooded and developed areas, and large woody cover is present at the site. There is no NSB description for Site 23.

This site provides unique features and important seasonal habitat for walleye and smallmouth bass. The site contains gravel, rubble, and rocks that provide spawning, nursery, feeding, and/or protective cover areas for fish.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.
2. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

24. Middle Lake Site 9 (ML/9)

Site 24 is located in the northern bay of the middle basin, which is also the southcentral bay of Juneks Point (start point 46.226015 N, 91.110493 W). The site extends from the Juneks Point shoreline to the small island in the middle of the bay. The area consists of undisturbed aquatic (Table 17), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1.0 mile. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Muck and detritus constitute the bottom substrate. The gently sloping

riparian zone includes wetland, wooded, and developed areas with large woody cover present at the site. There is not a NSB description for this site.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. The abundant bulrushes are especially important for muskellunge spawning and nursery habitat. Woody debris enhance protective cover available to fish.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds. Survey participants observed numerous birds at Site 24.

Table 17. Aquatic plants found at Site 24 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Carex</i> spp., <i>Sparganium</i> spp.	<i>Scirpus</i> spp., <i>Eleocharis</i> spp., <i>P. cordata</i>	<i>Typha</i> spp.
Floating-Leaf Plants:	<i>Nuphar</i> spp., <i>Nymphaea</i> spp.		
Submersed Plants:		<i>E. canadensis</i> , <i>Ceratophyllum</i> spp., <i>M. heterophyllum</i> , <i>Najas</i> spp.	<i>V. americana</i>
Pondweeds (Potamogetons):	<i>P. amplifolius</i> , <i>P. zosteriformis</i>	<i>P. gramineus</i> , <i>P. richardsonii</i>	<i>P. robbinsii</i>
Turf Formers/Rosettes:		<i>Eleocharis</i> spp.	
Algae:			<i>Chara</i> spp., Filamentous
Exotics:			

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

25. Middle Lake Site 10 (UL/10)

Site 25 is located off the tip of the second southern peninsula/island on Juneks Point (start point 46.22285 N, 91.107923 W). The shoreline consists of rubble, gravel, and sand substrate that is suitable for the natural reproduction habits of walleye and

smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 590 feet. The important habitat of the sensitive area is located within the littoral zone. The gently sloping riparian zone includes developed areas, and there is no visible large woody cover. There is no NSB description for Site 25.

This site provides unique features and important seasonal habitat for walleye and smallmouth bass. The site contains gravel, rubble, and rocks that provide spawning, nursery, feeding, and/or protective cover areas for fish.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.

26. Middle Lake Site 11 (UL/11)

Site 26 is located along the eastern shoreline of Juneks Point in the corridor between the upper and middle basins (start point 46.227395 N, 91.098087 W). The shoreline consists of rubble, gravel, and sand substrate that is suitable for the natural reproduction habits of walleye and smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 1369 feet. The important habitat of the sensitive area is located within the littoral zone. The gently sloping riparian zone includes wooded and developed areas, and large woody cover is present at the site. The NSB is average.

This site provides unique features and important seasonal habitat for walleye and smallmouth bass. The site contains gravel, rubble, rocks, and wood that provide spawning, nursery, feeding, and/or protective cover areas for fish.

Management Recommendations:

1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.
2. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

27. Lower Lake Site 1 (LL/1)

Site 27 is located in the southeastern bay of the lower basin (start point 46.203678 N, 91.075075 W). The area consists of undisturbed aquatic (Table 18), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 3258 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Muck constitutes the bottom substrate. The gently sloping riparian zone includes a floating bog wetland with woody debris common at the site. The NSB is good.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site. Large woody cover and floating bog enhance protective cover available to fish.

Table 18. Aquatic plants found at Site 27 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:		<i>Sagittaria</i> spp., <i>P. cordata</i> , <i>Typha</i> spp., <i>Sparganium</i> spp.	
Floating-Leaf Plants:		<i>Nuphar</i> spp., <i>Nymphaea</i> spp.	
Submersed Plants:	<i>B. beckii</i> , <i>Ceratophyllum</i> spp., <i>Utricularia</i> spp., <i>Zosterella dubia</i> , <i>Najas</i> spp.	<i>V. americana</i> , <i>M. heterophyllum</i> ,	
Pondweeds (Potamogetons):	<i>P. gramineus</i> , <i>P. praelongus</i> , <i>P. richardsonii</i> , <i>P. epiphydrus</i> , Fineleaf pondweed spp.	<i>P. pectinatus</i> , <i>P. amplifolius</i> , <i>P. zosteriformis</i>	
Turf Formers/Rosettes:		<i>Sagittaria</i> spp	
Algae:	Filamentous		
Exotics:			

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
5. Create a “Slow – No Wake” zone to protect the biological integrity of the wetland bay and connection corridor.

Site 28. Lower Lake 2 (LL/2)

Site 28 is located along the northcentral shoreline of the lower basin (start point 46.21305 N, 91.082039 W). The area consists of undisturbed aquatic (Table 19), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1492 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Sand constitutes the bottom substrate. The gently sloping riparian zone includes shrub/scrub deciduous wetland, wooded, and developed areas with woody debris present at the site. The NSB is poor.

Emergent and submersed aquatic vegetation provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, muskellunge, largemouth bass, and panfish species at this site.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for

protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds.

Table 19. Aquatic plants found at Site 28 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>B. beckii</i> , <i>Carex</i> spp., <i>Sagittaria</i> spp., <i>P. cordata</i> , <i>Typha</i> spp.	<i>Scirpus acutus</i> , <i>Eleocharis</i> spp.	<i>Sparganium</i> spp.
Floating-Leaf Plants:	<i>Nuphar</i> spp.		
Submersed Plants:	<i>B. beckii</i> , <i>Ceratophyllum</i> spp., <i>V. americana</i> , <i>Myriophyllum hydrophyllum</i>		
Pondweeds (Potamogetons):			
Turf Formers/Rosettes:			
Algae:			
Exotics:			

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 29. Lower Lake 3 (LL/3)

Site 29 is located along the northwestern shoreline of the lower basin (start point 46.205194 N, 91.096558 W). The area consists of undisturbed aquatic (Table 20), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1.1 miles. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Rubble and gravel constitute bottom substrate. The gently sloping riparian zone includes shrub/scrub deciduous and evergreen wetlands and wooded areas with large woody cover common at the site. The NSB is good.

Emergent and submersed aquatic vegetation, overhanging trees, rubble, gravel, and woody cover provide spawning, nursery, feeding, and/or protective cover habitat for walleye, northern pike, muskellunge, smallmouth and largemouth bass, panfish species, and perch at this site.

Table 20. Aquatic plants found at Site 29 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>Carex</i> spp., <i>Eleocharis</i> spp., <i>Sagittaria</i> spp., <i>P. cordata</i> , <i>Typha</i> spp.	<i>Sparganium</i> spp.	
Floating-Leaf Plants:	<i>Nuphar</i> spp.		
Submersed Plants:	<i>Ceratophyllum</i> spp., <i>V. americana</i> ,	<i>M. heterophyllum</i>	
Pondweeds (Potamogetons):	<i>P. amplifolius</i> , <i>P. richardsonii</i> , <i>P. zosteriformis</i>		
Turf Formers/Rosettes:	<i>Eleocharis</i> spp., <i>Sagittaria</i> spp.		
Algae:			
Exotics:			

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
5. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for walleye and smallmouth bass.

Site 30. Garden Lake 1 (GL/1)

Site 30 is located in the far northeastern bay of Garden Lake (start point 46.215978 N, 91.049792 W). The area consists of undisturbed aquatic (Table 21), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 4960 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Sand and muck constitute bottom substrate. The gently sloping riparian zone includes shrub/scrub deciduous and evergreen wetland areas with large woody cover present at the site. The riparian zone is adjacent to a contiguous upland wooded wetland complex. The NSB is good.

Table 21. Aquatic plants found at Site 30 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., <i>Eleocharis</i> spp., <i>P. cordata</i> , <i>Typha</i> spp., <i>Zizania</i> spp.	<i>Sagittaria</i> spp.	<i>Sparganium</i> spp.
Floating-Leaf Plants:	<i>Nuphar</i> spp., <i>Nymphaea</i> spp.		
Submersed Plants:	<i>B. beckii</i> , <i>E. canadensis</i> , <i>Ceratophyllum</i> spp., <i>Utricularia</i> spp., <i>Myriophyllum sibiricum</i>	<i>V. americana</i> , <i>Najas</i> spp.	
Pondweeds (Potamogetons):	<i>P. richardsonii</i>	<i>P. gramineus</i>	
Turf Formers/Rosettes:			
Algae:	Filamentous		
Exotics:			

Emergent and submersed aquatic vegetation and woody cover provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, largemouth bass, panfish species, and perch at this site.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 31. Garden Lake 2 (GL/2)

Site 31 is located in James Bay, which is a natural connection between Garden Lake and the middle basin (start point 46.206253 N, 91.068839 W). The area consists of undisturbed aquatic (Table 22), wetland, and terrestrial vegetation, and thus plants provide the primary reason for site selection. Site length is approximately 1.3 miles. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Sand constitutes bottom substrate. The gently sloping riparian zone

includes shrub/scrub deciduous wetland and wooded areas with large woody cover present at the site. The NSB is average.

Table 22. Aquatic plants found at Site 31 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Scirpus</i> spp., jewel weed spp.	<i>Sagittaria</i> spp., <i>P. cordata</i> , <i>Typha</i> spp., <i>Sparganium</i> spp., <i>Decodon verticillatus</i>	
Floating-Leaf Plants:	<i>Nuphar</i> spp.	<i>Nymphaea</i> spp.	
Submersed Plants:	<i>Ceratophyllum</i> spp., <i>M. hydrophyllum</i>	<i>Elodea</i> spp.	<i>V. americana</i>
Pondweeds (Potamogetons):	<i>P. gramineus</i> , <i>P. amplifolius</i> , <i>P. epiphydrus</i> , <i>P. zosteriformis</i>		
Turf Formers/Rosettes:		<i>Isoetes</i> spp., <i>Sagittaria</i> spp.	
Algae:	Filamentous		
Exotics:			

Emergent and submersed aquatic vegetation, overhanging trees, and woody cover provide spawning, nursery, feeding, and/or protective cover habitat for northern pike, largemouth bass, panfish species, and perch at this site.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.
5. Create a "Slow – No Wake" zone to protect the biological integrity of the bay and connection corridor.

Site 32. Garden Lake 3 (GL/3)

Site 32 is located in Michigan Bay, which in the southwestern portion of Garden Lake (start point 46.202911 N, 91.068692 W). The area consists of undisturbed aquatic (Table 23), wetland, and terrestrial vegetation, and thus plants provide the primary reason for

site selection. Site length is approximately 841 feet. The important habitat of the sensitive area is located from the littoral to the near-shore terrestrial zone. Muck constitutes bottom substrate. The gently sloping riparian zone includes shrub/scrub deciduous wetland and wooded areas with large woody cover present at the site. The NSB is average.

Table 23. Aquatic plants found at Site 32 by category and abundance.

Aquatic Vegetation Category	Present	Common	Abundant
Emergents:	<i>Calla palustris</i>	<i>Sagittaria</i> spp., <i>Sparganium</i> spp.	
Floating-Leaf Plants:	<i>Lemna</i> spp., <i>P. amphibium</i>		
Submersed Plants:	<i>Ceratophyllum</i> spp., <i>M. hydrophyllum</i> , <i>Z. dubia</i>		<i>E. canadensis</i>
Pondweeds (Potamogetons):	<i>P. gramineus</i> , <i>P. richarsonii</i>	Fineleaf pondweed spp.	
Turf Formers/Rosettes:		<i>Sagittaria</i> spp.	
Algae:			
Exotics:			

Emergent and submersed aquatic vegetation, overhanging trees, and woody cover provide nursery, feeding, and/or protective cover habitat for northern pike, largemouth bass, and panfish species at this site.

Emergent and floating leaf vegetation as well as shoreland shrubs, brush, and snag trees provide important habitat for wildlife. Wildlife that may potentially use this site for protective cover, nesting, migration, feeding, and/or nursery areas include upland wildlife, furbearers, reptiles, amphibians, and birds.

Management Recommendations:

1. Shorelands and wetlands should be protected as much as possible under existing regulations, and shoreland management that is more protective than the minimum standards is encouraged.
2. No chemical or mechanical treatments for aquatic plants should be allowed within this area.
3. Maintain biological integrity of the site to preserve the existing wildlife species.
4. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

Site 33. Garden Lake 4 (GL/4)

Site 33 is located along the shoreline of the small island off the northeastern shore of Garden Lake (start point 46.210697 N, 91.078333 W). The shoreline consists of rubble and gravel substrate that is suitable for the natural reproduction habits of walleye and

smallmouth bass, and thus the substrate provides the primary reason for site selection. Site length is approximately 850 feet. The important habitat of the sensitive area is located within the littoral zone. The riparian zone is wooded, and large woody cover is common at the site. The NSB is good.

This site provides unique features and important seasonal spawning habitat for walleye and smallmouth bass. The site contains gravel, rubble, rocks, and wood that provide spawning, nursery, feeding, and/or protective cover areas for fish. Additionally, the island and its shoreline provide important habitat for cover, nesting, feeding, and/or resting areas for upland wildlife and raptors.

Management Recommendations:

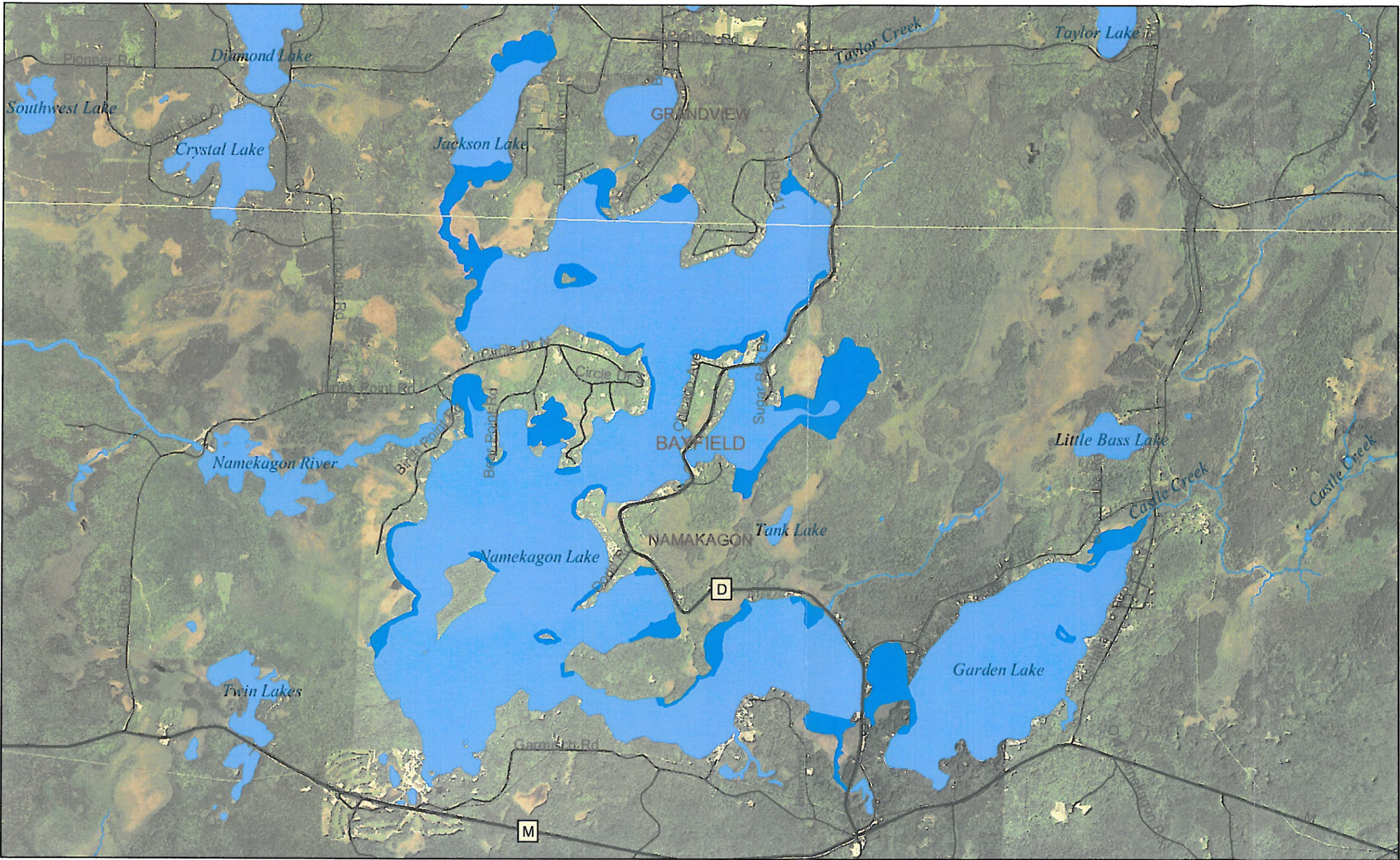
1. No alterations of the shoreline or littoral zone should occur at this site location unless an alteration would improve the spawning habitat for these species.
2. Keep large woody cover in tact for beneficial macroinvertebrate, fish, and wildlife habitat.

CONCLUSION

Wisconsin Department of Natural Resources staff designated thirty-three sites on Namekagon Lake, Bayfield County as sensitive areas that contain important habitat for aquatic plants, fish, and/or wildlife. There are general and specific management recommendations to protect these sites and the entire lake as a whole. This report is a tool to use in conjunction with *Guidelines for Protecting, Maintaining, and Understanding Lake Sensitive Areas* (Appendix B) to guide management decisions. As shoreline development continues to increase, decision-makers and the general public must find ways to ensure that fish and wildlife habitat is not degraded. Sensitive area designations and reports provide detailed data that describe specific sites as well as the means to protect those sites.

All the data used to compile this report are available at the Department's Superior Service Center.

Namakagon Lake Sensitive Habitat Areas



Legend

Major Highways

- Interstate
- State Highway
- U.S. Highways
- County Roads
- Local Roads

24K County Boundaries

Civil Towns

- Civil Town

Critical Habitat Areas

- Sensitive Area Designation
- Other Public Rights Feature
- 24K Open Water
- 24K Rivers and Shorelines

Intermittent

- Intermittent
- Fluctuating
- Perennial

0 3500 7000 10500 ft.

Scale: 1:35,615

Wisconsin Wetland Inventory (WWI) maps show graphic representations of the type, size and location of wetlands in Wisconsin. These maps have been prepared from the analysis of high altitude imagery in conjunction with soil surveys, topographic maps, previous wetland inventories and field work. State statutes define a wetland as "an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions." The principal focus of the WWI is to produce wetland maps that are graphic representations of the type, size and location of wetlands in Wisconsin. Within this context, the objective of the WWI is to produce reconnaissance level information on the location, type, size of these habitats such that they are accurate at the nominal scale of the 1:24,000 (1 inch = 2000 feet) base map. The DNR recognizes the limitations of using remotely sensed information as the primary data source. They are to be used as a guide for planning purposes. There is no attempt, in either the design or products of this inventory, to define the limits of jurisdiction of any Federal, State, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State, or local agencies concerning specified agency regulatory programs and jurisdictions that may affect such activities. The most accurate method of determining the legal extent of a wetland for federal or state regulations is a field delineation of the wetland boundary by a professional trained in wetland delineation techniques.

Source: WDNR Interactive Web Mapping Applications

Appendix F

Bayfield County Shoreland Management Guide

A Property Owner's Guide For
Protecting & Managing Shorelands in
Bayfield County

Contacts for your Shorelands Property Questions in Bayfield County

Questions About...

Who to Call...

Alterations to Your Shoreline.....	Bayfield County Zoning Department of Natural Resources
Aquatic Plants/Algae.....	Department of Natural Resources
Backyard Conservation.....	UW-Extension Department of Natural Resources
*Building/Remodeling.....	Bayfield County Zoning
County or Local Lake Association.....	Bayfield County Lakes Forum UW-Extension
*Cutting Trees & Shrubs.....	Bayfield County Zoning
*Driveways & Garages.....	Bayfield County Zoning
Fish & Wildlife.....	Department of Natural Resources
*Piers, Docks & Boathouses.....	Bayfield County Zoning Department of Natural Resources
Quiet Hours, Boat & Jet Ski Use.....	Your Township's Officials Bayfield County Sheriff
*Sanitary/Septic Requirements.....	Bayfield County Zoning
*Shoreline Buffer Protection or Restoration.....	Land Conservation Department Bayfield County Zoning UW-Extension
*Setback Requirements.....	Bayfield County Zoning
Yard Care & The Environment.....	UW-Extension

***IMPORTANT:** These activities may require a permit or have specific guidelines to follow.
Please contact the appropriate agency for more information.

Bayfield County UW-Extension..... (715) 373-6104
www.uwex.edu/ces/cty/bayfield/ (click on Community Resource Development)

Bayfield County Land & Water Conservation Department..... (715) 682-7187
Department of Natural Resources †Ashland Office †Water Regulations & Zoning..... (715) 685-2923
www.dnr.state.wi.us/org/water/wm/dsfm/ (click on Shoreland Management)

Bayfield County Zoning..... (715) 373-6138
www.bayfieldcounty.org/zoning

Bayfield County Lakes Forum..... Email: bclf_2000@yahoo.com

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- Bayfield County Land & Water Conservation Department • Bayfield County Office - University of Wisconsin Extension

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This document is intended to provide general information regarding shoreland zoning requirements. Please check with the Bayfield County Zoning Department for specific and updated regulations that may apply to your property.

June 2004

A Property Owner's Guide For Protecting & Managing Shorelands in Bayfield County

Introduction

This guide is intended to provide information about shoreland regulations in Bayfield County, assist you in what to consider when buying shoreland property, and how to better manage these delicate natural systems through sound environmental practices.

As a shoreland owner, your responsibilities go beyond an individual property. How you care for your shoreland impacts an entire lake or river system.

Land Use Requirements

Land use is regulated in all shoreland areas in Bayfield County and throughout the townships with comprehensive zoning. Permitted uses vary from zoning district to district. Shoreland is all property within 1,000 feet of a lake, pond or flowage, or within 300 feet of a river or stream or to the landward side of a floodplain, whichever is greater. Therefore, it is recommended that the Zoning Office be consulted when purchasing or considering a building project or other property use.

Land Use Permits

Requirement. A land use permit shall be required for any new residence, any building erected, relocated or structurally altered, any change in the use of the land, or where any use of the land is altered. A land use permit shall be obtained prior to the initiation of construction or a change in land use from the Bayfield County Zoning Office.

Improvements to Nonconforming Structures. Exterior improvements and additions to nonconforming structures shall require a land use permit. Exterior improvements shall include, but not be limited to, structural alteration for installation of new doors and windows and the complete replacement of siding materials. Re-roofing without changing the pitch of the roof and installation of gutters are exempt from a land use permit.

Setback Compliance; Storage Shed Compliance. All structures shall meet prescribed setback standards for the zoning district in which they are located. All structures in floodplain areas shall require a land use permit. A land use permit shall not be required for a residential storage shed of less than two hundred (200) square feet in area. A temporary structure of more than two hundred (200) square feet shall require a temporary permit.

Sanitary Permits. A permit is required in ALL areas of the county for sanitary system installations, privy construction and sanitary system repairs. All installation and repair work on a sanitary system must be performed by a plumber licensed in the State of Wisconsin, and the permit must be obtained by him. Generally, the first step to implement lot development is to arrange for soil and site evaluation by a Certified Soil Tester. *A land use permit for a habitable building will not be issued until after the necessary sanitary permit is issued.*

An Overview of Watershed Management

The consequences of uncontrolled or unplanned development can be disastrous to land and water resources. Overbuilt and poorly designed shoreland areas degrade the value of the entire water body. Increasing demand for shoreline building sites has led to skyrocketing land costs; without controls, land with water frontage tends to be divided into smaller and smaller parcels. Marginal lands with high water tables or steep slopes fall under increasing development pressure after suitable lands are taken.

Overdevelopment increases the risks of lake pollution and scenic degradation. Nutrients such as nitrogen and phosphorus and improperly operating sewage treatment systems can contaminate wells and surface waters.

Sound management of our shorelands is important and will help maintain high water quality, sustained property values and the scenic quality of Bayfield County's lakes, rivers and streams.

Beginning in 1999, Bayfield County began development of a countywide land use plan, which in part was driven by lake and river development issues. The plan was completed and adopted by the County Board of Supervisors in 2003. An important element of the plan addresses shoreland development.

Shoreland Areas

Shoreland development within Bayfield County is currently regulated under the Bayfield County shoreland zoning ordinance. Development standards within the ordinance are based on the Bayfield County Lakes Classification System (see pages 4-7), which defines the vulnerability of water bodies based on environmental factors such as area, depth, and shoreline irregularity. The lakes classification system also considers existing development patterns in order to develop a shoreline development density factor.

Recommendations for the Residential Designation (Shoreland) are:

- 1) Encourage the formation of local lake property owners associations and support association activities aimed at protection of county water resources.
- 2) Encourage the use of shoreland buffers.
- 3) Support and enforce existing shoreland zoning ordinances.
- 4) Support the re-introduction of native shoreland vegetation to control and filter run-off and to stabilize the existing shoreline.



- 5) Development of restrictions/guidelines related to the use of fertilizers.
- 6) Creation of a Lake Superior shoreland zoning district. This district would reflect the unique features, processes, and environments of the Lake Superior coastline and should contain specific types of land uses allowed within the district, the type of development permitted for each land use, and coastal development standards. In lieu of developing a new zoning district, the county may wish to modify the current lakes classification system in order to include provisions for coastal resources.
- 7) Review existing shoreland zoning requirements based on the results of the shoreline recession study and develop new ordinances as appropriate.
- 8) Provide additional protection to unique coastal resources including estuaries, coastal barriers, and coastal wetlands through management, cooperative efforts with private landowners, and transfer into public ownership.

Bayfield County's Waters

Outlying Waters: Lake Superior

The Bayfield County mainland shore bordering Lake Superior is 86.2 miles in length, more than one-third of Wisconsin's Lake Superior shore. Four of the Apostle Islands (Eagle, Sand, York and Raspberry) are within the county's boundary. The combined area of the four islands is 3,470 acres, all of which is in public ownership. They have a total shoreline of 18.5 miles, all of which is public frontage.



Inland Surface Waters

The total inland surface water area of the county is 23,676 acres. Of this figure, 22,685 acres are the surface water area of

966 natural lakes and impoundments, and 991 acres are the surface area of 125 streams. Total stream length is 531.1 miles, of which trout streams comprise 429.8 miles. Frontage on both sides of streams totals 1,062.2 linear miles, with 381.9 miles in public ownership. Total lake shoreline totals 732.1 miles, of which 258.7 miles is in public ownership. Even though stream frontage is greater than lake frontage, the ratio of water area to frontage on streams is much less than that on lakes.

Bayfield County Lakes Classification

In order to provide a better management and protection tool for shoreland development, a lakes classification plan was developed and adopted for all lakes in the county. The plan measures a lake's sensitivity to development and provides different standards for different lake types.

Classification of Inland Lakes

Class 1 (Most Developed Lakes). Objectives:

Preserve and enhance water quality to provide conditions for recreational use and aesthetics; retain existing natural shorelines and encourage restoration; acknowledge a mix of natural and developed shorelines; protect or restore a self-sustaining local ecosystem capable of supporting diverse native flora and fauna; promote peace and quiet; balance public and riparian interests in recreational uses.

Class 2 (Moderately Sensitive Lakes and Moderately Developed). Objectives:

Preserve and enhance water quality to provide conditions for recreational use and aesthetics; balance the current level of development with the sensitivity of these lakes to maintain and protect water quality; maintain and restore natural shoreline aesthetics and encourage restoration; identify and protect current natural and undeveloped areas; promote peace and quiet; protect or restore a self-sustaining local ecosystem capable of supporting diverse native flora and fauna; balance public and riparian interests in recreational uses.

Class 3 (Most Sensitive Developed and Undeveloped Lakes). Objectives:

Maintain and protect water quality; protect and restore the natural/wild appearance of shorelines and lands visible from the water; promote a quiet and peaceful experience; protect or restore a self-sustaining local ecosystem capable of supporting diverse native flora and fauna; discourage commercial use.



*The classification lists on the next three pages identify lakes named in **Surface Water Resources of Bayfield County**, published by Wisconsin Department of Natural Resources, and appearing by name on the 1:24,000 scale topographic maps, published by the U.S. Geological Survey, commonly referred to as the U.S.G.S. Quadrangle Maps.*

*All unnamed lakes listed in the **Surface Water Resources of Bayfield County**, Wisconsin Department of Natural Resources, and all named lakes 50 acres in size or less are considered Class 3 protection lakes.*

Class 1 Lakes

Lake Name	Section-TWP-Range
Atkins	19-44-5
Birch	4-44-9
Bony	4-44-9
Buskey Bay	28-47-8
Devils	16-44-9
Diamond	29-44-6
Eagle	3-46-8
Hart	27-47-8
Hilder	2-46-8
Lower Eau Claire	25-44-10
Middle Eau Claire	17-44-9
Millicent	28-47-8
Namekagon	10-43-6
Owen	14-44-7
Siskiwit	21-50-6
Swett	35-45-9
Trapper	27-44-6
Twin Bear	33-47-8
Upper Eau Claire	10-44-9

Class 2 Lakes

Lake Name	Section-TWP-Range
Ahmeek	26-47-9
Angus	10-47-8
Balsam Pond	19-45-7
Bark Bay Slough	35-51-7
Bass	28-46-7
Bellevue	29-46-7
Bibon	29-50-8
Birch	22-45-5
Buffalo	35-43-5
Bullhead	8-46-7
Cable	12-43-8
Camp One	4-46-7
Camp Two	4-46-7
Chippewa	15-43-5
Cisco	21-45-7
Club	13-44-6
Coffee	24-44-5
Cranberry	34-44-6
Crystal	15-47-9
Crystal	32-44-6
Deep	14-47-9
Dells	27-43-5
Delta	7-46-7
Drummond	29-45-7
Duck	13-43-5
Ellison	30-45-9
Esox	21-45-7
Everette	18-46-7
Hammil	25-44-8
Hay	7-46-7
Hollibar	17-46-7
Iron River Flowage	12-47-9

Class 2 Lakes (continued)

Lake Name	Section-TWP-Range
Iron	24-47-9
Island	18-45-9
Jackman	33-48-8
Jackson	33-44-6
Kelly	26-45-9
Kern	27-46-7
Knotting	21-44-6
Little Hidden	1-44-7
Little Star	11-45-7
Long	2-47-8
Marengo	34-45-5
McCarry	28-47-8
Muskellunge	4-46-8
Nymphia	14-45-7
Ole	27-43-8
Orienta Flowage	10-49-9
Overby	21-45-7
Perch	21-47-8
Perch	5-45-7
Pickereel	5-44-9
Pond	14-45-8
Porcupine	17-44-6
Richardson	23-47-9
Robinson	4-44-9
Rust Flowage	5-44-7
Ruth	31-47-8
Samoset	36-44-8
Sand Bar	20-45-9
Sawmill	9-46-7
Shunenberg	2-44-9
Smith	2-44-9
Spider	19-47-8
Spirit	12-46-8
Star	10-45-7
Tahkodah	34-44-7
Tars Pond	12-44-9
Tomahawk	20-45-9
Totogatic	32-43-8
White Bass	25-43-5
Wiley	1-43-8

Class 3 Lakes

Lake Name	Section-TWP-Range
Adeline	7-44-6
Anderson	1-45-8
Anodanta	15-45-7
Armstrong	20-45-7
Arrowhead	16-45-7
Bailey	26-48-8
Barnes	24-44-9
Bass	13-44-7
Bass	16-47-9
Bass	24-44-6
Bass	33-44-7

Class 3 Lakes (continued)

Lake Name	Section-TWP-Range
Bass	33-47-8
Bass	6-45-9
Basswood	13-46-8
Bear Pond	1-45-8
Bear	6-46-7
Bearsdale Spring (lower)	8-44-8
Bearsdale Spring (upper)	8-44-8
Beaver House	2-47-8
Beaver	32-46-7
Bell	12-46-8
Big Brook	28-44-8
Bismark	19-47-8
Bladder	31-48-7
Blazer Creek Springs	34-44-5
Blue	7-45-9
Bog	2-46-8
Breakfast	7-45-9
Buck	19-47-7
Bufo	6-45-7
Bullhead	20-45-7
Bullhead	29-44-5
Camp Eleven	28-47-9
Camp Nine	8-45-8
Camp Two	6-46-8
Camp	20-44-8
Canthook	15-46-8
Carroll	20-47-9
Carson Pond	17-46-7
Casper	20-43-5
Castle Creek Springs	34-44-5
Cat	28-47-8
Claire	5-45-8
Clay Conner	8-45-7
Conner	14-44-7
Cranberry	30-44-9
Cranberry	3-45-7
Crane	15-44-7
Crooked	26-47-8
Crystal	10-49-6
Dawn	9-43-8
De Champs Creek Spring	33-48-8
Deep	4-46-7
Deer	27-45-6
Dinner Camp	25-44-8
Dry Well	7-45-7
Ducetts	4-45-9
Duck	26-47-8
East Davis	11-44-6
East Eightmile	35-46-9
Egg	29-45-7
Eighteen Mile Creek Spring	18-44-6
Eko	36-49-6
Erick	34-47-9
Finger	32-47-7
Fire	5-47-8

Class 3 Lakes (continued)

Lake Name	Section-TWP-Range
Fish Creek Flowage	27-47-7
Fish Creek Spring	10-47-5
Five Island	34-47-8
Five	34-43-5
Flakefjord	5-45-7
Flynn	30-45-7
Flynn	3-46-8
Freibaurs	27-44-6
Frog	25-46-8
Fuller	33-43-8
George	18-45-9
Getsey	6-46-7
Ghost	20-43-5
Half Moon	17-47-8
Half Moon	24-44-8
Happles	9-46-8
Hay	18-45-9
Heart	7-46-7
Henderson	33-45-9
Henry	1-43-8
Hicks	11-47-8
Hidden	20-43-6
Hildebrandt	31-43-6
Hobbs	3-47-8
Hoist	2-48-7
Holly	25-44-8
Honey	18-47-7
Horseshoe	13-48-7
Horseshoe	19-44-7
Hostrassers	14-47-9
Hyatt Spring	5-44-8
Idlewild	6-44-9
Inch	3-46-8
Indian	23-45-5
Island	24-47-8
Jesse	26-47-9
JoAnn	15-43-7
Johnson Spring	22-45-7
Johnson	2-47-8
Jones	22-47-9
Lamereau	6-45-8
Lee	12-45-8
Lemon	8-46-7
Lenawee	12-49-7
Lerche	22-43-8
Lester	1-46-8
Lindgren	21-47-9
Line	33-46-7
Little Bass	7-43-5
Little Island	21-45-9
Little Siskwit	22-50-6
Lizzy	15-44-6
Long	6-48-5
Loon	12-47-8
Lost	21-47-8

Class 3 Lakes (continued)

Lake Name	Section-TWP-Range
Louise	10-47-6
Lund	5-45-7
McCloud	31-43-5
McGinnis	24-48-6
Mimi	20-44-9
Mirror	16-45-7
Mirror	6-47-7
Moon	18-47-8
Moose	5-48-6
Motyka	32-44-7
Mountain	28-45-8
Mud Flat	6-46-7
Mud	13-47-9
Mud	29-46-7
Mud	35-44-7
Mullenhoff	20-47-8
Muskie Springs	34-43-5
Mystery	6-46-7
Nancy	6-45-8
Nelson	18-45-7
Nokomis	30-47-7
Northeast	26-44-7
Ole	18-45-9
Olson	20-45-5
Osborn	33-45-6
Patsy	20-47-7
Perch	22-50-6
Perry	17-43-7
Peterson	16-47-8
Phantom	6-46-7
Physa	6-45-7
Picture	31-44-7
Pigeon	34-45-8
Pike	21-47-8
Pine	10-48-7
Pine	22-47-8
Planorbis	5-45-7
Pond	17-44-8
Porter	9-43-7
Pot	27-45-7
Preemption Creek Pond	11-44-6
Price	8-43-7
Priest	19-45-9
Rainbow	36-46-8
Rana	20-45-7
Range Line	36-43-5
Ree	28-44-6
Reynard	7-45-7
Rib	2-48-7
Rock	29-43-6
Roger	10-44-7
Roger	30-47-8
Rosa	6-44-7
Russell	22-47-9
Ryberg	23-44-7

Class 3 Lakes (continued)

Lake Name	Section-TWP-Range
Sage	6-44-6
Sawdust	8-47-7
Shunenberg Springs	4-44-8
Siegal	22-44-6
Silver Sack	26-48-8
Silver	9-46-8
Simpson	11-47-9
Siskiwit Springs	24-50-6
Sixteen	16-44-8
Smear	36-44-8
Southwest	31-44-6
Spider	22-47-7
Spring	11-47-9
Spring	32-43-6
Spruce	27-44-5
Square	22-46-8
Steckbaur	3-47-8
Steelhead	15-46-8
Stewart	18-44-7
Swede	12-46-8
Tank	11-43-6
Tank	20-45-6
Taylor	30-44-5
Tea Cup	29-46-7
Toothpick	31-47-7
Topside	12-47-8
Tower	25-46-8
Travers	6-45-8
Trout	4-46-8
Tub	32-47-7
Turtle	17-45-9
Twin (East)	36-49-6
Twin (North)	17-43-6
Twin (Northeast)	17-47-7
Twin (Northwest)	17-47-7
Twin (South)	20-43-6
Twin (Southwest)	17-47-7
Twin (West)	36-49-6
Twin	25-45-9
Two	19-46-7
Wabigon	13-45-8
Wanoka	20-47-7
Wentzel	13-47-8
West Davis	10-44-6
West Eightmile	34-46-9
West	14-46-8
West	22-43-8
Wilderness	6-45-8
Wilipyro	36-44-8
Wishbone	8-45-7
Wolf	4-46-7
Wright	27-47-9

Inland Lake Lot Requirements

	Class 1	Class 2	Class 3
Lot Size	30,000 sq ft	60,000 sq ft	120,000 sq ft
Lot Width	150 ft	200 ft	300 ft
Lot Depth	200 ft	300 ft	400 ft
Shoreline Setback	75 ft	75 ft	100 ft
Shoreline Vegetation Protection Area	50 ft	50 ft	75 ft
Side Yard Setback	10 min/ 40 min total	20 min/ 50 min total	30 min/ 60 min total



Lake Superior Lot Requirements

Lots having frontage on Lake Superior and any improvements thereon shall be subject to the requirements applicable to lots on Class 1 lakes, except that if a lot has a bank or a bluff fronting the lake, the top of which is discernible due to evidence of erosion, (including but not limited to exposed rock), the required shoreline setback shall be 75 feet back from the top edge of the bank or bluff, and if a lot is located in an area of active or potential erosion designated on a map entitled Erosion Hazard Areas-Bayfield County, a greater setback may be required as determined by the Zoning Committee or its duly designated agent, based on projected shoreland recession rates.

Lots on Rivers and Streams

Lots adjoining or including rivers or streams shall meet the following minimum requirements:

Lot Size	120,000 square feet
Lot Width	300 feet
Shoreline Setback	100 feet
Lot Depth	400 feet
Side Yard Setback	30 feet/60 feet total
Shoreline Vegetation Protection Area	75 feet
View Corridor	30 feet

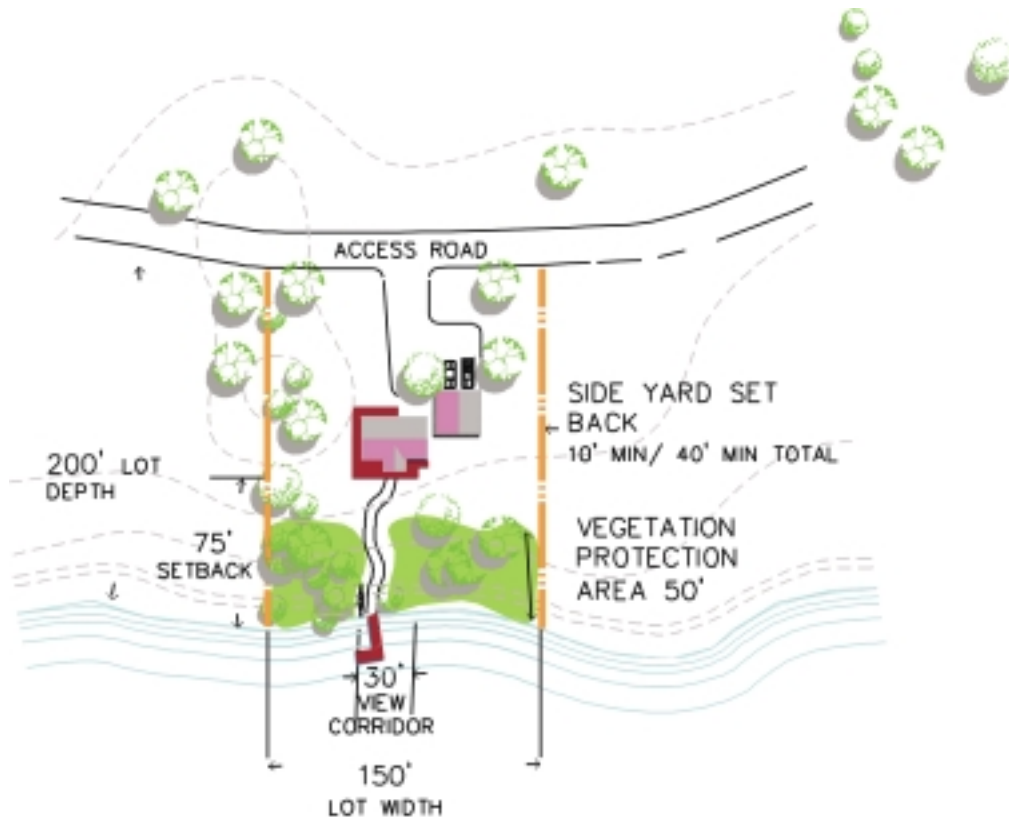
Planned Unit Developments and Other Multiple Unit Developments

	Class 1 Lakes & Lake Superior	Class 2 Lakes	Class 3 Lakes, Rivers & Streams
Shoreline Frontage	150 feet for every 4 dwelling units; 600 feet minimum	200 feet for every 3 dwelling units; 800 feet minimum	300 feet for every 2 dwelling units; 1,200 feet minimum
Open Space	30,000 square feet per dwelling unit	60,000 square feet per dwelling unit	120,000 square feet per dwelling unit
Open Space in UVOD	7,500 square feet per dwelling unit	15,000 square feet per dwelling unit	30,000 square feet per dwelling unit
Open Space Public Sewer System	10,000 square feet per dwelling unit	20,000 square feet per dwelling unit	40,000 square feet per dwelling unit
Shoreline Setback	200 feet	200 feet	225 feet
Viewing Corridors	20% of frontage	15% of frontage	10% of frontage



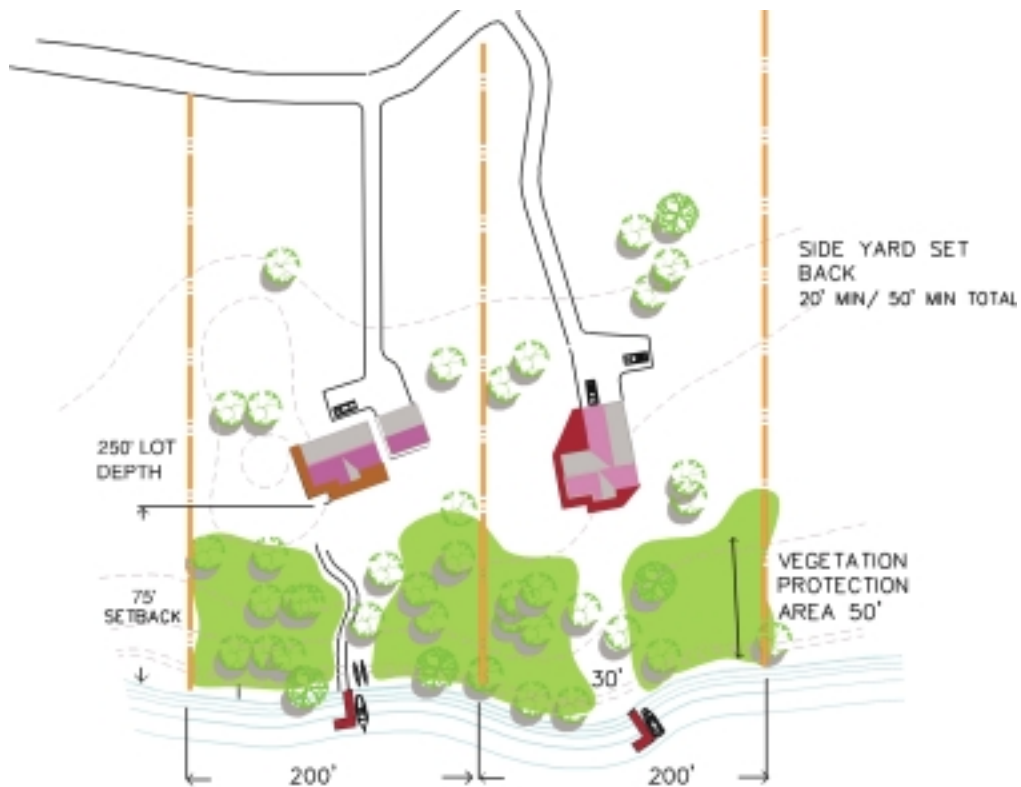
Backlot Access to Waters

Except for waterfront lots on Lake Superior in RRB or Commercial zoning districts, the use of waterfront lots to provide deeded shoreline access to back lots is specifically prohibited, and no land division shall be recorded and no land use permit(s) shall be issued for a waterfront parcel unless the minimum lot area, width and water frontage are provided for each dwelling unit which is located or proposed to be located on the waterfront property or located on a back lot where the owner has a deeded interest in the waterfront property.



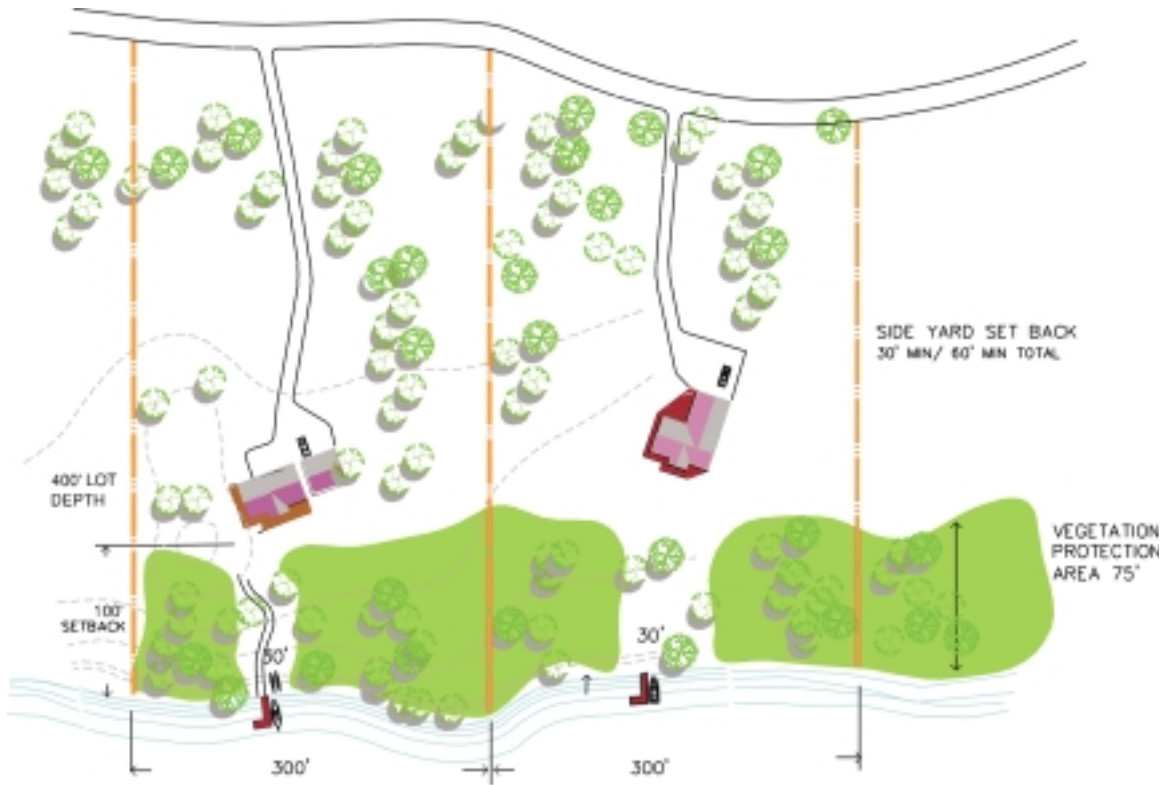
CLASS 1 LAKES · MINIMUM REQUIREMENTS

30,000 Square Feet



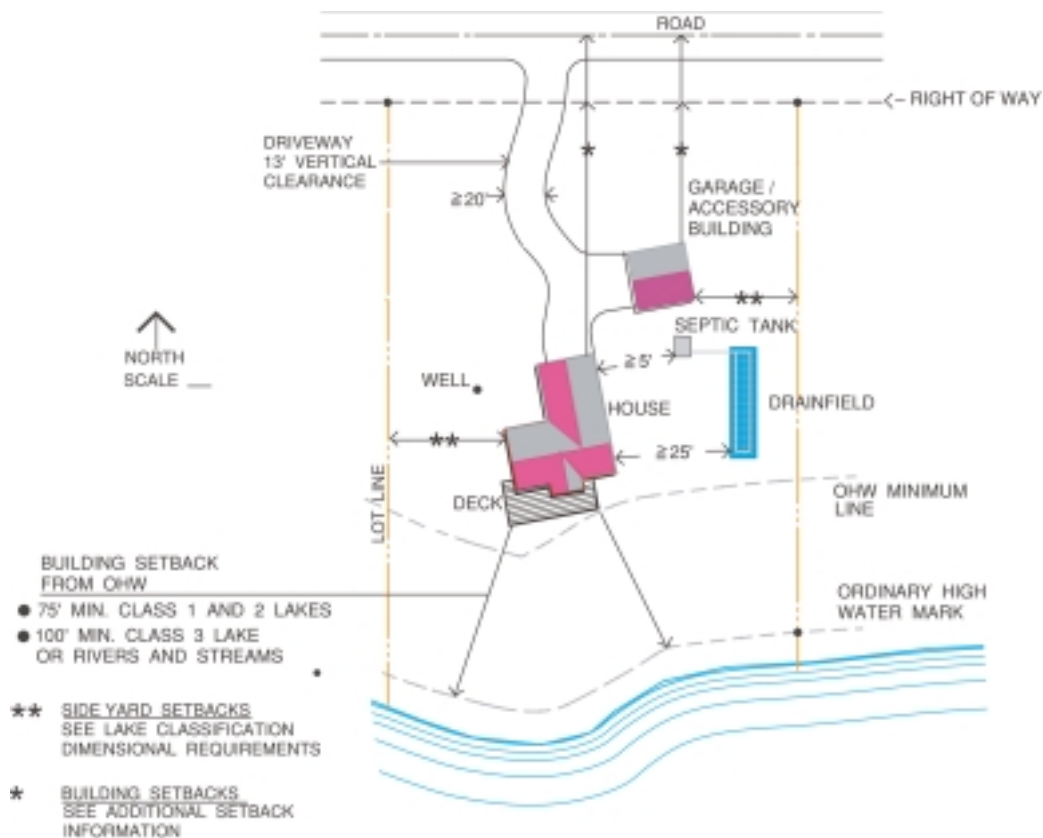
CLASS 2 LAKES · MINIMUM REQUIREMENTS

60,000 Square Feet



CLASS 3 LAKES · MINIMUM REQUIREMENTS

120,000 Square Feet



EXAMPLE OF PLOT PLAN NEEDED FOR PERMIT

Shoreland Regulations in Bayfield County

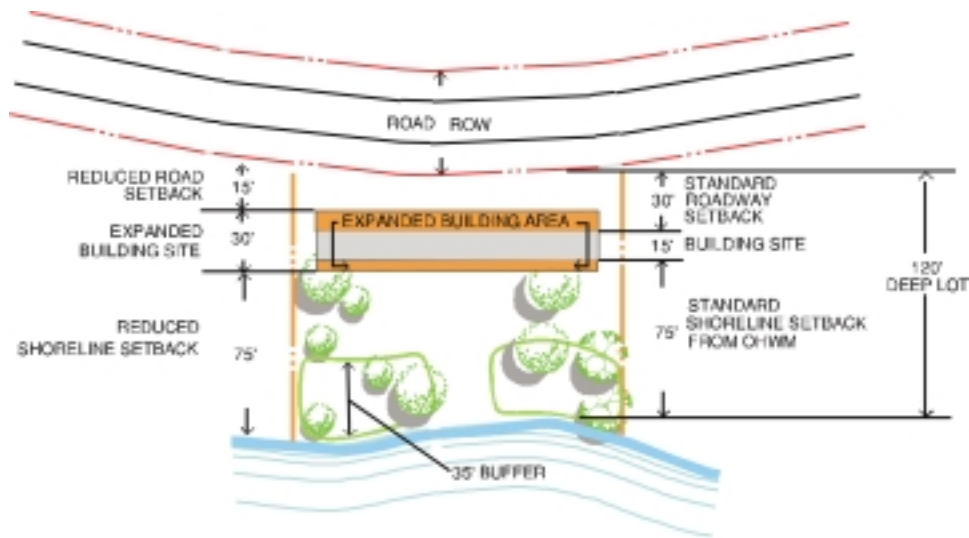
That Affect Your Waterfront Property Shoreline Setbacks

Reduced Roadway, Rear Yard and Shoreline Setbacks for Undeveloped and Redeveloped Lots of Record.

Nonconforming Plats. If a lot platted prior to December 12, 2000, is not deep enough to accommodate required roadway or rear yard and shoreline setbacks, the roadway or rear yard setback may be reduced until a thirty-foot deep building site is established provided the resulting setback is not less than one-half the distance of the required setback. In such case, in order to avoid visual and other obstructions, no garage doorway may open toward and no parking area may be located in the reduced roadway setback area.

Shoreland Adjustment. If the road or rear yard setback reduction above does not provide a thirty-foot deep building site, the shoreline setback may then be reduced until a thirty-foot deep building site is established provided the resulting shoreline setback is not less than two-thirds the distance of the required setback.

Mitigation. A property owner shall comply with the mitigation requirements in order to qualify for the setback reductions.



REDUCED ROADWAY AND SHORELINE SETBACKS FOR UNDEVELOPED NONCONFORMING LOTS

Additional Setback Information

Highway Setbacks:

Class of Highway	Setback from Centerline	Setback from Right of Way Line
State & Federal	110	50 , whichever is greater
County	75	42 , whichever is greater
Town	63	30 , whichever is greater

Stairways and Piers. Stairways, elevated walkways and that portion of piers landward of the ordinary high water mark are exempted from the shoreline setback requirement provided:

- The structure is necessary to access the shoreline because of steep slopes or wet, unstable soils.
- The structure shall be located so as to minimize earth disturbing activities and shoreline vegetation removal during construction and to be visually inconspicuous as viewed from the adjacent waterway and public thoroughfares.
- The structure shall be no more than four (4) feet wide.
- Structures shall be inconspicuously colored.
- Railings are permitted only where required by safety concerns.
- Canopies and roofs on such structures are prohibited.
- Landings for stairways or docks are permitted only where required by safety concerns and shall not exceed forty (40) square feet.
- No stairway, landing, elevated walkway, or similar structure shall be constructed without a land use permit having been issued, and any such structure shall be constructed in accordance with best management practices for minimizing adverse impact on the shoreland area and adjoining water. In determining whether a structure will comply with best management practices the Zoning Department may seek the assistance of the county land conservationist.

Greater Setbacks. In cases of adverse soil to topographical conditions, the Zoning Administrator and/or Zoning Committee may require greater setbacks.

Intermittent Streams. No structure shall be constructed or placed within 25 feet of the top edge of the eroded bank of an intermittent stream.

Wetlands. No structure shall be constructed or placed within 25 feet of a mapped wetland two acres or greater in area.

Measurements. All setbacks shall be measured horizontally. Structural setbacks shall be measured from the furthest extension of the structure (including eaves and decks) to the closest point of the line in question.



EXAMPLE OF STAIRWAY
REQUIRING LAND USE PERMIT



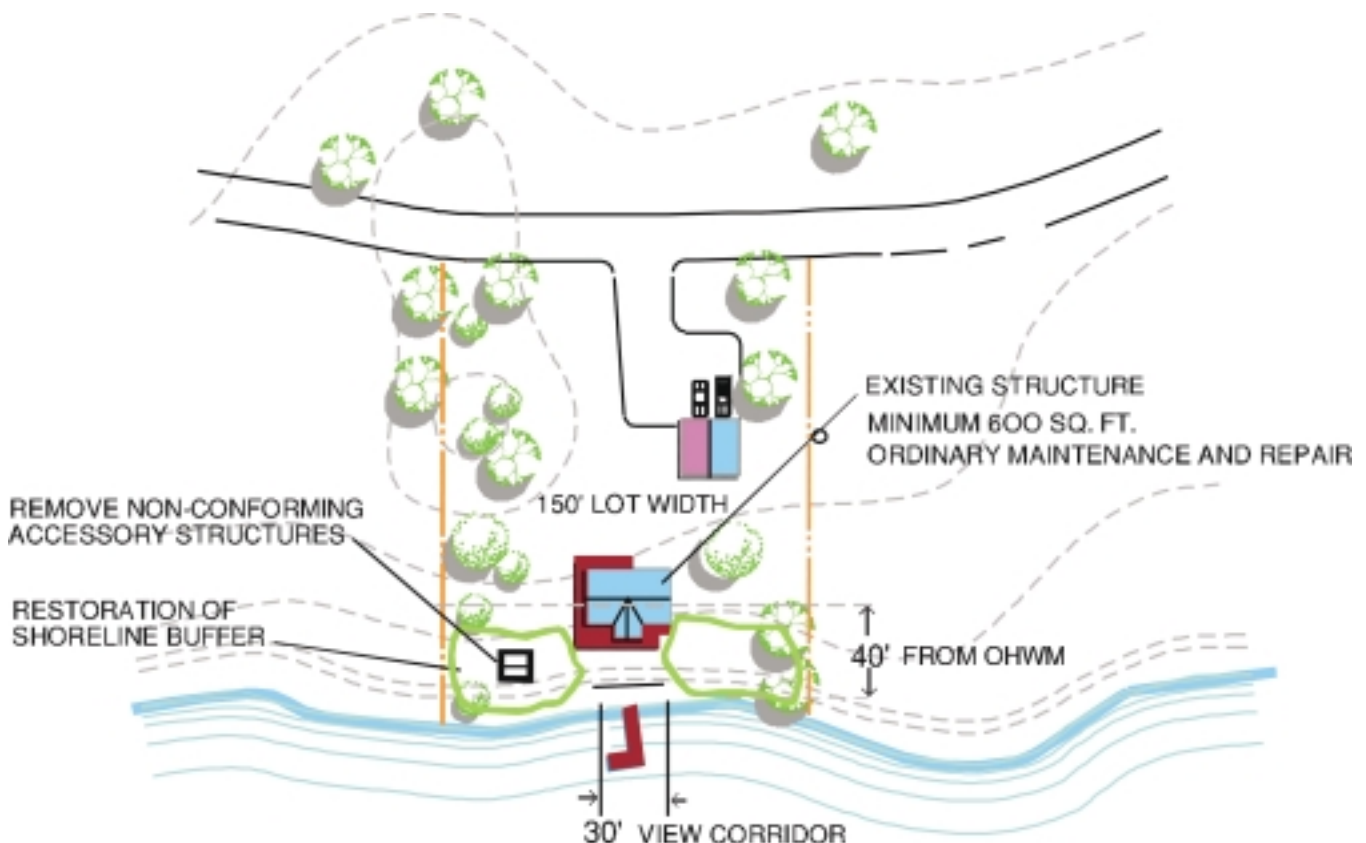
Standards for Nonconforming Structures

A nonconforming structure refers to a structure which was existing prior to the adoption of an ordinance and which does not meet the requirements of the new ordinance. The dimensions, location or other physical characteristics of the structure do not conform to the standards of the zoning ordinance and therefore it is considered nonconforming.

The standards for nonconforming structures recognize the need to allow for some improvement to structures while not allowing major construction that results in replacement of structures that do not meet setback requirements.

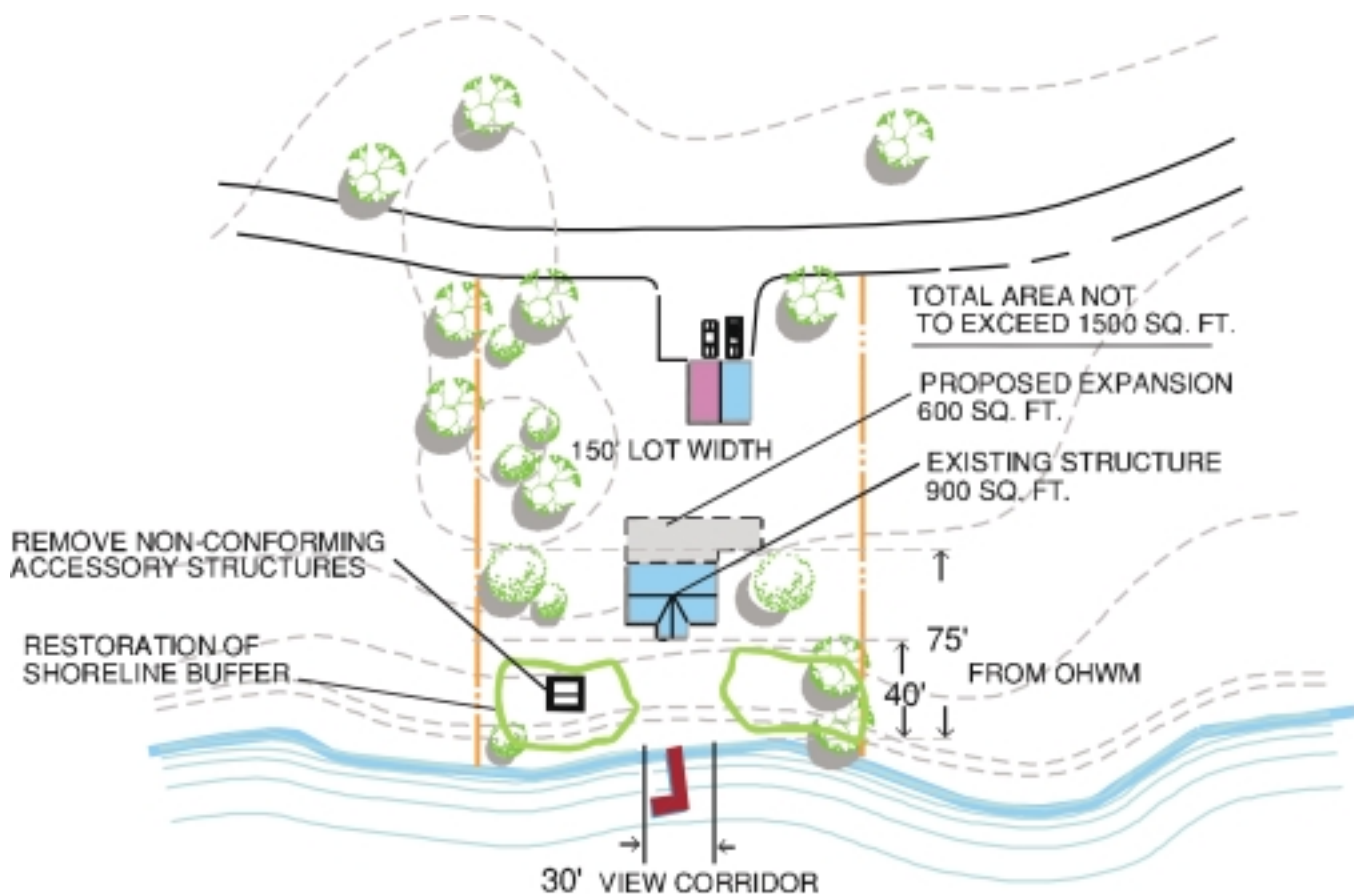
Structures Located Less Than 40 Feet From the Ordinary High Water Mark and Have a Minimum of 600 Square Feet Enclosed Dwelling Space:

- Internal improvements shall be confined to the building envelope and may be constructed without a land use permit.
- No new basements, additional stories, other expansion, or accessory construction outside the perimeter of the existing enclosed dwelling space shall be permitted.
- Exterior improvements shall be limited to structural alterations for the replacement or addition of doors, windows, the replacement of a flat roof with a pitched roof, and/or the complete replacement of siding materials. They shall require a land use permit.
- Mitigation requirements are met.



Structures Located Between 40 Feet and 75 Feet From the Ordinary High Water Mark and Having a Minimum of 600 Square Feet of Enclosed Dwelling Space, One Addition Shall Be Permitted:

- The resulting structure shall not exceed twenty-six (26) feet in height.
- The addition shall be within the existing footprint or landward thereof and shall not increase the existing footprint by more than fifty percent (50%) nor increase the resulting footprint (of the existing structure and addition combined) beyond one thousand five hundred (1,500) square feet (but this provision does not prohibit an addition to a structure whose existing footprint is more than one thousand five hundred (1,500) square feet if the addition does not increase the footprint).
- The resulting structure shall not exceed one thousand nine hundred (1,900) square feet of roof overhang (measured in a horizontal plane).
- The resulting structure shall not exceed two thousand five hundred (2,500) square feet of enclosed dwelling space (measured for all stories excluding the basement).
- No new or raised basement for the existing structure or any attached accessory structure shall be permitted, though a basement may be constructed under a permitted lateral addition.
- Any expansion or exterior improvement shall require a land use permit.
- Mitigation requirements are met.





Structures Located Between 20 Feet and 40 Feet From the Ordinary High Water Mark and Having a Minimum of 600 Square Feet of Enclosed Dwelling Space, One Addition Shall Be Permitted:

- Not exceeding one hundred seventy-five (175) square feet of enclosed dwelling space and located on the landward side of the structure.
- Shall be permitted if the resulting structure's height does not exceed twenty-six (26) feet, its footprint does not exceed one thousand five hundred (1,500) square feet.
- Its roof overhang does not exceed one thousand nine hundred (1,900) square feet.
- Its enclosed dwelling space does not exceed two thousand five hundred (2,500) square feet.
- A plan meeting all of the following requirements is submitted to and approved by the Bayfield County Zoning Department and is fully implemented and complied with:
 - ¥ The septic system shall be upgraded in accordance with COM 83, Wis. Adm. Code, and the Bayfield County Sanitary Private Sewage Ordinance.
 - ¥ Water runoff from the structure shall be handled in accordance with best management practices.
 - ¥ A shoreline vegetation protection area shall be established and maintained for not less than one-half the distance from the ordinary high water mark to the structure. Any natural vegetation located closer to the structure than one-half the distance from the ordinary high water mark shall also be maintained.
- Mitigation Requirements are met.

Structures Located on Class 3 Lakes or Rivers and Streams Between 75 Feet and 100 Feet From the Ordinary High Water Mark, Improvements & Expansions Shall Be Permitted:

- Upon the issuance of a land use permit to the same extent as if they were conforming structures, provided that:
 - ¥ Any addition is located no closer to the ordinary high water mark than the existing structure.
 - ¥ Mitigation requirements are met.

Mitigation Measures

Mitigation is required to compensate for lost shore buffer area functions when nonconforming structures are improved or expanded within the shore setback area. A site plan and implementation schedule describing any required mitigation shall be submitted by the property owner or owner's authorized agent and approved by the Zoning Department prior to issuance of the related land use permit(s). Mandatory mitigation measures shall include:

- Evaluation and upgrading of any existing sanitary system on the subject property to comply with COM 83, Wis. Adm. Code, and the Bayfield County Sanitary and Private Sewage Ordinance.
 - Implementation of erosion and storm water runoff control measures in accordance with best management practices.
 - Accumulating at least four (4) points from among the following proposed or current practices:
 - 1 Point ¥ Restoration or maintenance of a shoreline vegetation protection area within twenty-five (25) feet of the ordinary high water mark (OHWM).
 - 2 Points ¥ Restoration or maintenance of a shoreline vegetation protection area within forty (40) feet of the OHWM.
 - 3 Points ¥ Restoration or maintenance of a shoreline vegetation protection area within seventy-five (75) feet of the OHWM.
 - 1 Point ¥ Restoration of native vegetation along both side yards.
 - 1 Point ¥ Removal of nonconforming accessory buildings from the shoreline setback area.
Per Bldg
 - 1/2 Point ¥ Use of exterior building materials or treatments that are inconspicuous and blend with the natural setting of the site.
 - 1/2 Point ¥ Compliance with any shoreland exterior lighting requirements that may be adopted.
 - ¥ Other practices agreed upon by the Zoning Department (seawall removal, removal of excessive dockage and mooring, removal of artificial sand beaches, etc.).
- Points as determined by the Zoning Department*

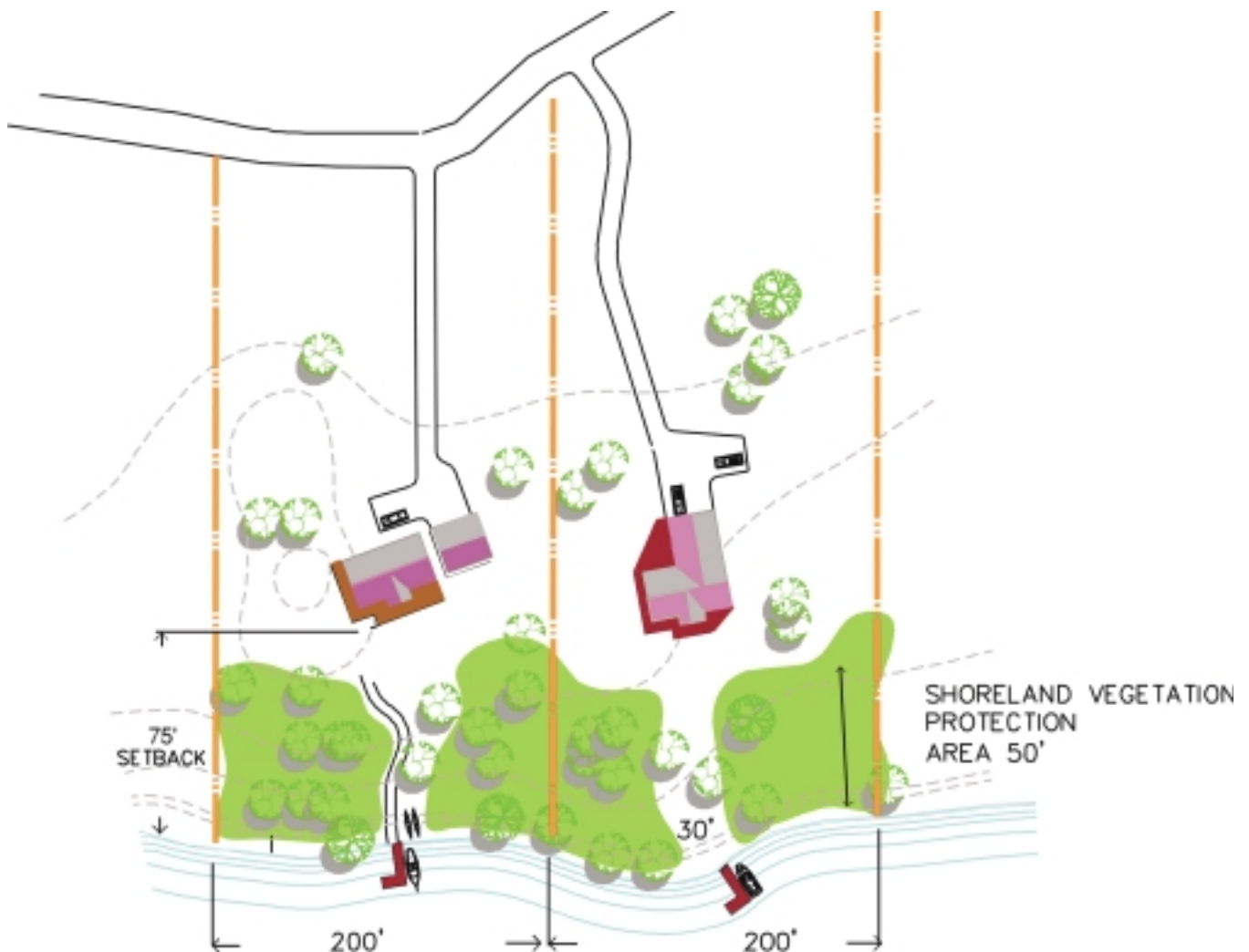
In exchange for permitting an addition to a nonconforming structure, mitigation is required to restore the natural values of a shoreline. The goal of these mitigation requirements is to restore the benefits of a healthy, functioning buffer zone. Benefits of mitigation include:

- ★ A shoreline rich in diverse vegetation to curb runoff and enhance wildlife habitat.
- ★ A shoreline where structures blend in with natural surroundings thereby enhancing aesthetic beauty.
- ★ An upgraded septic system that meets water quality standards.

Shoreland Vegetation Protection Areas

There shall be a shoreland vegetation protection area on each lot adjoining or including navigable water extending from the ordinary high water mark to a line that is 25 feet closer to the ordinary high water mark than the required shoreline setback. Within such area, the removal of trees, shrubs, and ground cover and land disturbing activities are prohibited with the following exceptions:

- One viewing corridor for each lot may be established by pruning and selective removal of trees and shrubbery. Clear cutting, filling, grading, and other land disturbing activities are prohibited.
- Sufficient trees and shrubbery shall be retained to screen development from view from the water.
- The viewing corridor shall be more or less perpendicular to the shore, no more than 30 feet wide in the dimension paralleling the shore, and shall be set back at least ten (10) feet from each side lot line.
- For lots with less than 100 feet of frontage, the width of the viewing corridor shall be no more than 30% of the frontage.
- No fences shall be allowed in the shoreland vegetation protection area.



Maintaining and Restoring Your Vegetative Shoreline Buffer

Shoreline Buffer Restoration

Definition:

A shoreline buffer is a zone of native vegetation that extends from the ordinary high water mark inland. A buffer restoration design seeks to restore functions provided by the original, natural vegetation. Buffers of vegetation provide habitat, hold soil in place, intercept and purify runoff water, and provide natural beauty.



BEFORE BUFFER
RESTORATION

AFTER BUFFER
RESTORATION



Evaluating Your Shoreland Property

Physical Characteristics

- **Parcel Size.** The lot should be large enough to accommodate your intended use, as well as comply with the local zoning requirements. Lots that have been created since the statewide shoreland zoning standards took effect are large enough for most residential uses and comply with local zoning requirements. However, there are many lots that were created prior to the shoreland rules that may be substantially smaller than the new lot size requirements. These substandard lots may still be bought and sold if separately owned, but they may be too small to accommodate a structure or a sewage treatment system. If you are considering buying such a lot, you should carefully review your intended use and the limitations of the property.
- **Parcel Shape.** Although the size of the lot may meet zoning requirements, the shape can restrict the use and location of structures. Long, narrow lots or pie-shaped lots may make it difficult to meet some of the requirements for setbacks, lot widths and sewage treatment systems. Carefully consider the compatibility of a lot shape with your intended use.
- **Topography.** Land surface elevations are important for several reasons. First, the lot should be high enough so that the dwelling will not be flooded by water level fluctuations. The site should be able to accommodate the lowest portion of the building, including the basement, at least three feet above the highest known water level. The site must also accommodate an on-site sewage treatment system and enough room for an alternate system. It is necessary to have a qualified professional determine if a site can accommodate a standard sewage system.
- **Soil Conditions.** The soils should be suitable for your intended use as both structures and sewage treatment systems have specific requirements. Wet or clay soils are generally unsuitable for soil absorption sewage treatment systems and can also make building construction difficult.
- **Vegetation.** The aesthetic and ecological value of shoreland property is linked to the type and quality of existing vegetation. Large trees and wooded landscapes are attractive and help to screen structures from the lake. Shoreland zoning ordinances regulate the amount of vegetation that can be removed. The natural vegetation gives you clues as to the suitability of your intended use. Inventory the types of trees on the property; remember white birch and aspen tend to be short lived compared to oak and maple.
- **Parcel Orientation.** Generally, the most desirable orientation is south or west which provides daytime sun and off-lake breezes. Remember, deciduous trees such as oak, maple, etc., will allow sun in the winter while pines will provide year-round shade.



■ **Adjacent Development.** Locate adjacent properties waste treatment systems and wells to determine setback restrictions on your property and consider side-yard setbacks and privacy.

■ **Potential Building Sites.** After an analysis of your site, select an appropriate location for your building based on the above factors. Remember the best building sites in many cases are back beyond the required minimum setback. A maximum height restriction of the structure measured from the lowest exposed point on the foundation to the highest point on the roof is 35'.



Shoreland Lighting

All outdoor lighting on shoreland lots which is within 300 feet of the ordinary high water mark shall meet the following requirements:

■ Lighting shall be controlled so as not to shine up into the sky or onto any neighboring property or onto navigable waters. This may be accomplished by use of fully shielded cut-off fixtures, directing light fixtures downward rather than upward, or by other similarly effective means.

■ Where lighting is for security purposes or to illuminate walkways, roadways, equipment yards or parking lots, only fully shielded cut-off style light fixtures shall be used.

■ All illuminated signs for commercial purposes visible from navigable waters shall be turned off between 11:00 p.m. and sunrise except that signs may be illuminated while the business facility is open to the public.

■ All forms of flashing, rotating, or moving lights shall be prohibited.

Filling & Grading & Dredging & Lagooning

■ **General Requirements.** Only filling, grading, dredging, lagooning, ditching, and excavating which is done in a manner designed to minimize erosion, sedimentation and impairment of fish and wildlife habitat and which is accomplished in conformity with all applicable federal, state and local laws is permissible in the shoreland.

■ **Lake Superior.** A special land use permit shall be required for excavating, grading, or filling of two hundred (200) square feet or more within one thousand (1,000) feet of the ordinary high water mark of Lake Superior (roadway maintenance exempt).

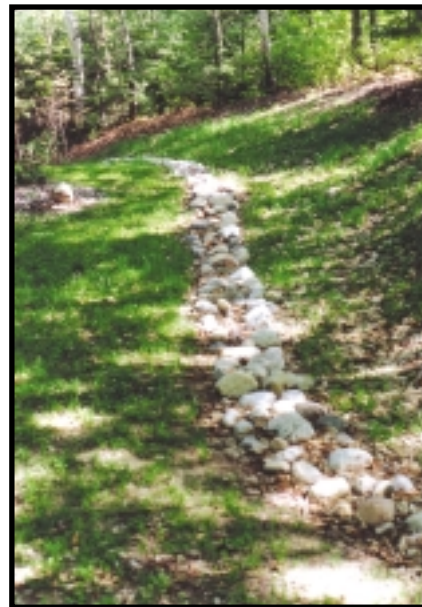
■ **Filling.** A special land use permit shall be required for the filling of five hundred (500) square feet or more of any wetland. In addition, a permit may be required from the Department of Natural Resources under Ch. 30, Wis. Stats, or from any other state agency having jurisdiction.

■ **Grading.** A special land use permit shall be required for the grading or filling of one thousand (1,000) square feet or more within a strip paralleling the shoreland and extending inland three hundred (300) feet from the ordinary high water mark (roadway maintenance exempt).

Long Term Best Management Practices

Follow these long-term BMP s to minimize runoff and prevent sediments from going into the lake:

- Limit hard surface and covered areas that prevent water from seeping into the ground.
- Provide permanent stabilization practices for long-term protection of your shoreland property by planting new vegetation and diverting drainage away from the lake whenever possible.
- Retain native trees and shrubs, as trees provide a natural umbrella by shedding water and can reduce runoff by as much as 50%.
- Limit clearing and grading on slopes which drain to the water and minimize cutting and filling for roads, driveways, side-walks, stairways and footpaths to reduce erosion and still provide adequate access.



Why Is Runoff A Problem?

The way water flows is changed when an area is developed or the landscape is altered. Covering land surfaces with roads, driveways or impervious surfaces (rooftops, decks, walkways and parking lots), causes less water to seep into the soil, increasing runoff. This increased runoff is usually channeled into ditches, drainageways or downslope towards nearby lakes and streams.

High flows of water often cause flooding or erosion, increasing sediment in streams and lakes. Fine sediment can transport nutrients such as nitrates or phosphorus. All of these processes have an adverse effect on water quality and the lake s environment.

Follow these guidelines for erosion control during and after construction. Erosion control practices must be installed PRIOR to any land disturbing activities and must remain in place until the site is stabilized (no bare soil).

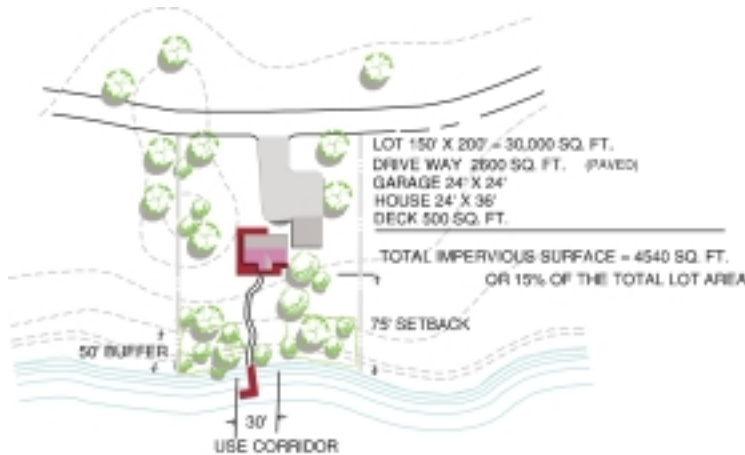
- **Minimize disturbance of the existing groundcover layer** to avoid soil erosion.



- **Keep the construction site covered with a hay or straw mulch** immediately after seeding or reseeded.
- **Consider working only in a small area** and stabilizing that site before disturbing another.
- **Protect groups of trees from heavy equipment by encasing them** with snowfence. Avoid compacting soil above tree roots by excluding heavy equipment and not stockpiling building materials over roots.
- **Maintain a filter strip of natural vegetation** along the banks of lakes and streams; the best filter strips are native trees with undisturbed native understory plants.

Impervious Surfaces

Impervious surfaces such as asphalt pavement and building roofs result in increased volumes and velocities of stormwater runoff. This runoff carries nutrients, sediment and other pollutants as it flows toward the lake or river. Limits on the amount of impervious surfaces on a shoreland lot reduce the potential for runoff that adversely effects the water quality and provide areas for the retention and infiltration of runoff. Natural shoreland buffer zones are encouraged for their effectiveness in handling runoff.



IMPERVIOUS SURFACE LIMITATIONS

Requirements. That part of a shoreland lot within 300 feet of the ordinary high water mark shall not contain more than 4,500 square feet or 15% of impervious surfaces, whichever is greater, except pursuant to a fully implemented storm water management plan approved by the Department and providing that there will be no increase in storm water discharge from the lot as a result of the construction for storms up to and including the 10-year 24-hour storm event. Such plan shall be certified by a registered professional engineer or, at the County's option, the applicant shall provide funds to defray the costs of County preparation of the plan.

Access Roads, Driveways & Sidewalks

- Minimize the amount of impervious surfaces.
- Use gravel driveways instead of asphalt or concrete pavement.
- Where paved areas are necessary, locate them as close to the main road as possible to minimize the length of paved driveway and keep the paved areas as far from the water as possible.
- Because steeper slopes have greater erosion potential, locate driveways, sidewalks, stairways and footpaths away from slopes. Follow the contour of the slope if your walkway goes across a hillside.
- Use steps when a walkway must go directly up and down a slope, particularly near the shore.
- Sweep driveways or sidewalks instead of washing them down with a hose, to prevent sediment, salt and petroleum products from washing into the lake.
- Use paving stones or treated wood instead of solid concrete for walkways; this allows water to seep through instead of running off.



Helpful Definitions

Accessory Structure

A detached, subordinate structure which is clearly incidental to and customarily found in connection with the principal structure to which it is related and which is located on the same lot as the principal structure.

Erosion and Stormwater Runoff Control Measures

Best management practices, maintenance or operational procedures, structural devices, or technologies to prevent or reduce the negative impacts of snowmelt or ice runoff, surface runoff and drainage, and soil, sediment, or rock fragments detached from the earth's surface by wind, water, ice or gravity from depositing in areas of lower elevation and/or waters of Bayfield County.

Expansion

Any structural modification which increases the existing structure's size and shape.

Exterior Improvement

Upgrades in aesthetics, function, or worth of the outside surface(s) or components of a structure. Such improvements may include, but are not limited to, structural alteration for the expansion or addition of doors or windows, or the replacement of basement/foundation walls and footings. Complete siding or a complete change in siding materials will require a land use permit.

Floodplains

The area adjoining a watercourse which has been and hereafter may be covered by the regional flood.

Footprint

That portion of a lot covered by a building or structure at the surface level, measured on a horizontal plane.

Impervious Surface

A surface consisting of asphalt, concrete, roofing material, brick, paving block, plastic, or other similar material which does not readily absorb water.

Internal Improvement

Upgrades in aesthetics, function, or worth of the interior surface(s) or components of a structure. Such improvements may include, but are not limited to, replacement or the addition of interior doors, cabinets, drywall, insulation, or plumbing, heating, and electrical system components.

Mitigation

Compensatory action(s) to restore natural functions and values lost through development and human alterations.

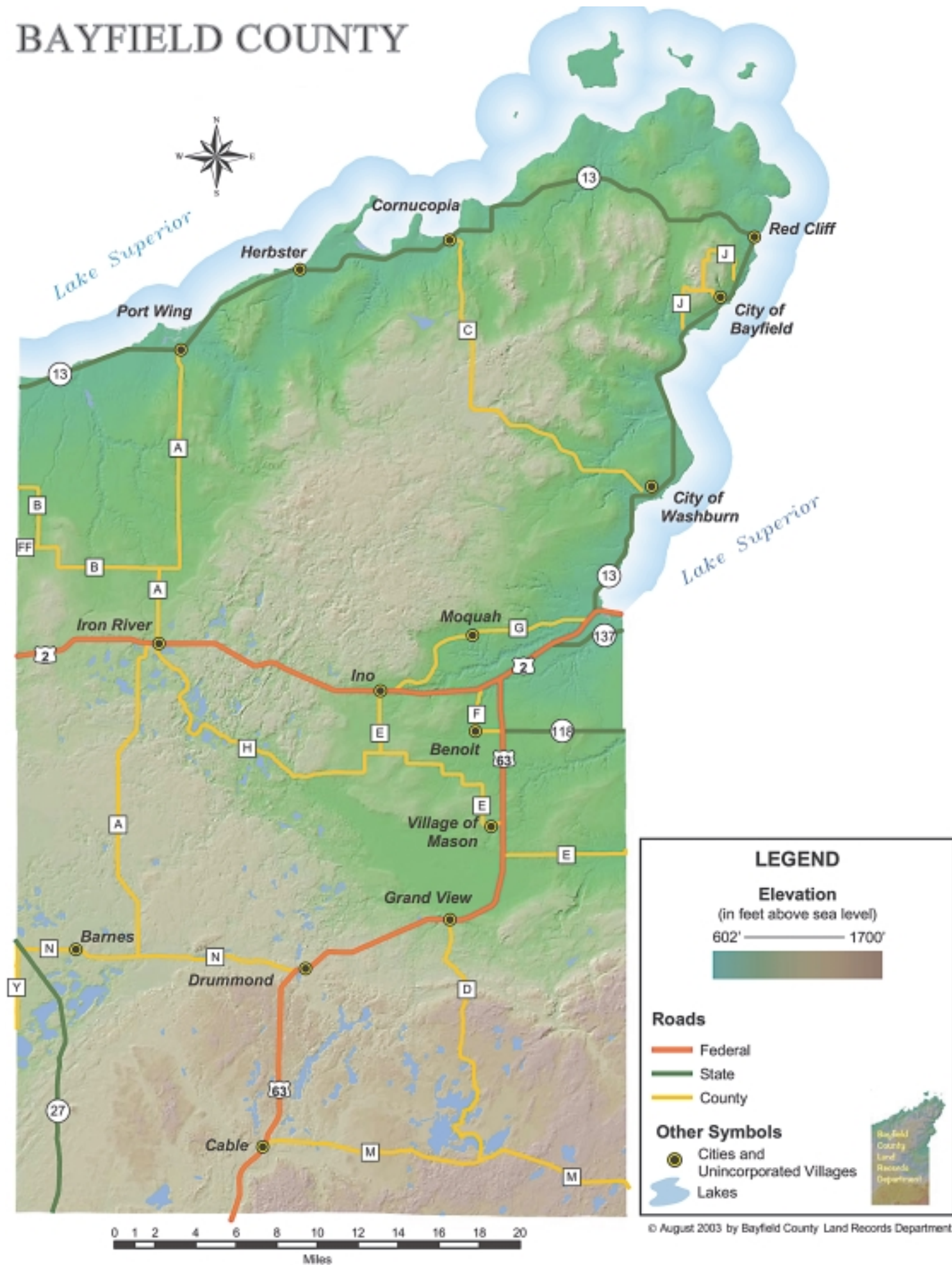
Structural Alteration

Any activity not considered ordinary maintenance and repair that results in a change to the internal framework, or the exterior silhouette or footprint of a structure.

Wetlands

Those areas where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which have soils indicative of set conditions.

BAYFIELD COUNTY





A PROPERTY OWNER'S GUIDE FOR PROTECTING & MANAGING SHORELANDS IN **BAYFIELD COUNTY**

Helpful Checklist

- ☐ Initial contact with Zoning Office to discuss plans, site location, etc.
- ☐ Gather and access information on the lake and property you are interested in.
- ☐ Review shoreland regulations to determine how these effect your lake and property.
- ☐ Obtain soil tests from Certified Soil Tester.
- ☐ Obtain necessary permits from the Zoning Office and the local town, village, city, state or federal agencies, if required.
- ☐ Because the greatest impact to water quality occurs during home construction, discuss the best management practices (BMP s) with your contractor prior to the construction phase.

Compliments of

BAYFIELD COUNTY ZONING ADMINISTRATION
POST OFFICE BOX 58
WASHBURN, WISCONSIN 54891-0058