2005
Designation of Sensitive Areas

Lake Emily

Portage County

Wisconsin Department of Natural Resources
Eau Claire, WI

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Sensitive Area Designation
Emily Lake, Portage County

I. INTRODUCTION

Designation of sensitive areas within lakes provide a holistic approach to ecosystem assessment and the protection of those areas within a lake that are most important for preserving the very character and qualities of the lake. These sites are those sensitive and fragile areas that provide the wildlife and fish habitat, provide the mechanisms that protect the water quality in the lake, harbor quality plant communities and preserve the places of serenity and aesthetic beauty for the enjoyment of lake residents and visitors. Sensitive areas are dependent on the protection of shoreline and in-lake habitat.

Protecting the terrestrial plant community on shore provides a buffer that absorbs nutrient runoff, prevents erosion, protects water quality, maintains water temperatures and provides important habitat. The habitat is important for species that require habitat on shore and in the water as well as those species that require a corridor in order to move along the shore (Figure 1).

Protecting the littoral zone and littoral zone plant communities is critical for fish, wildlife and the invertebrates that both feed upon (Figure 1).

The sensitive area designation will provide a framework for management decisions that impact the ecosystem of the lake.

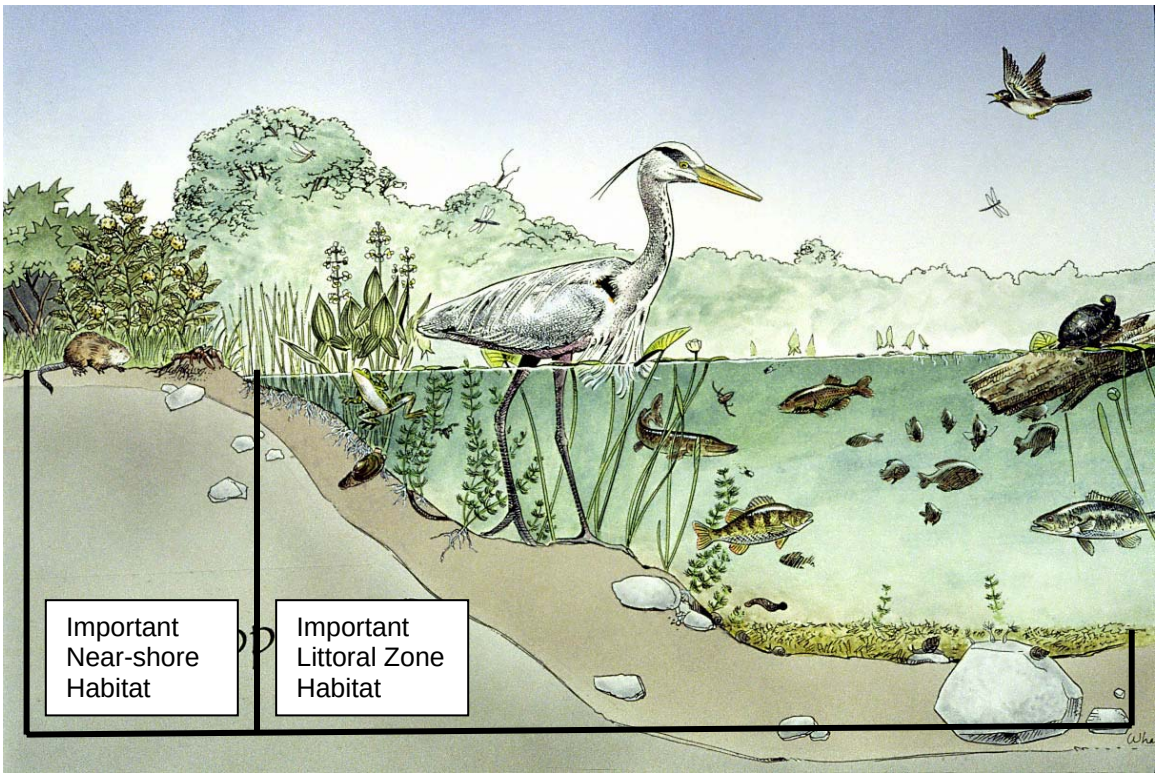

Figure 1. Location of important near-shore and littoral zone habitat.

A Sensitive Area Study was conducted July12-13 and October 17, 2005 on Emily Lake, Portage County.

The study team included:
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Greg Dahl, DNR Wildlife Biologist

Emily Lake is a 105-acre seepage lake with a maximum depth of 36 feet and an average depth of 16 feet. The lake is fed by run-off, groundwater and an intermittent flow from Mud Lake.

Lake Emily is a mesotrophic lake with good water quality and clarity. Nutrients and algae have increased and water clarity has decreased during 2000-2005. Filamentous algae is common, especially in the 0-1.5ft depth zone. *Chara* spp. is the dominant species within the plant community, dominating all depth zones. *Vallisneria americana* was sub-dominant. All dominant, abundant and common species were distributed throughout the lake.

The aquatic plant community is characterized by high quality, good species diversity, a below average amount of disturbance and an above average tolerance to disturbance. The aquatic plant community colonized 92% of the littoral zone to a maximum depth of 15.5 feet.

A comparison of the aquatic plant community at natural shoreline sites and disturbed shoreline sites in Lake Emily illustrates the importance of protecting those areas that still have natural cover. The comparison measured several parameters that were higher at natural shoreline.

1) A higher Species Richness (the mean number of species per site), at natural shoreline, especially in the two shallowest depth zones where shoreline disturbance would naturally have a greater impact
2) A greater diversity of aquatic plant species at natural sites, Simpson's Diversity Index.
3) More vegetation cover in the littoral zone at natural shorelin
    a) Higher occurrence of submergent species
    b) Higher occurrence of emergent species
    c) Higher occurrence of floating-leaf species
4) A higher occurrence of sensitive species (Nichols 2000) at natural shoreline
5) A higher quality aquatic plant community at natural shoreline, as measured by the AMCI Index
6) A higher frequency of occurrence of sensitive aquatic plant species
7) A better balance of coverage of various vegetation structure types (emergent, floating-leaf, submergent)

Conversely, the disturbed shoreline sites have a greater

1) occurrence, mean density and “density where present” of the exotic invasive species, Eurasian watermilfoil
2) A higher dominance, frequency of occurrence and mean density of *Najas flexilis,* an annual aquatic plant species favored by disturbance

The differences in the aquatic plant community at the natural and disturbed shoreline sites can have a big impact on fish and wildlife habitat in the lake. Lower cover of emergent vegetation, lower cover of floating-leaf vegetation, less diversity of the physical plant structure, lower occurrence of sensitive species that also happen to be valuable plants for habitat, lower plant species diversity and species richness at disturbed shoreline sites combine, resulting in a less diverse habitat that will support a less diverse fish and wildlife community.

II. THE SENSITIVE AREAS

The reasons for selection of each sensitive area are important, as this is what drives the selection process, their importance to the whole lake community.
All sites were selected because of their: importance for fish habitat, importance for wildlife habitat, importance for protecting water quality, the natural buffer of terrestrial vegetation, the high quality aquatic plant communities they supported and for their outstanding, natural scenic beauty (Figure 2).
All of the sensitive areas that were selected have the potential to be used for educational purposes; they provide visual and sound buffers, buffers against the invasion of non-native species and areas of beauty for lake residents and visitors.

All sensitive areas were geo-referenced.

Common Attributes for All the Sensitive Areas

Eurasian Watermilfoil Control

All sites will provide wintering hibernation habitat for the native milfoil weevil. The importance of this can not be overstated. Since Eurasian watermilfoil occurs in Lake Emily, controlling the milfoil is an important objective. The weevil could provide the most economical, least expensive and most environmentally friendly long-term control of the weevil. Without abundant natural shoreline around the lake, the weevil population will not survive the winter.

Water Quality

The vegetation at all of the sites provides important water quality protections. The plants provide a nutrient buffer by absorbing nutrients thus reducing algae growth. The plants provide a physical buffer that protects the shoreline against wave erosion. Aquatic plants provide sediment stabilization, their roots anchoring the sediments and preventing resuspension by boat motors and waves and the resulting turbidity. They provide a biological buffer that reduces the severity of invasion by exotic species.

Fish Habitat

All of the sensitive areas provide important fish and aquatic life habitat. The sensitive areas are the areas in the lake that are most important for the fish community. The emergent, submergent and floating-leaf plant beds are important habitat at all sites. All sensitive areas provide

1) spring spawning sites, feeding areas and protective cover for northern pike, pumpkinseed, yellow perch and black crappie.
2) spring and summer spawning sites, feeding areas and protective cover for large-mouth bass and bluegill.
3) habitat for walleye that are stocked in the lake. Walleye do not spawn in Lake Emily.

Wildlife Habitat

All of the sensitive areas provide very important wildlife habitat. Some values are unique to a sensitive area and some habitat values are shared by all the sensitive areas.

The emergent vegetation, floating-leaf vegetation, shoreline shrubs, snag trees, perch trees and fallen logs are the key habitat structures at these sites.

All of the sites provide

1) shelter, cover, nesting/denning and feeding areas for all common upland wildlife, muskrat, mink, ducks, songbirds, frogs, toads, salamanders, turtles and snakes.
2) feeding areas for eagles and osprey.

Sensitive Area Emily 1 – West Bay

This sensitive area is the approximately 15-acre south bay, encompassing about 3000 feet of shoreline (Figure 2). The bay includes deep marsh and shallow marsh wetlands and supports important near-shore terrestrial habitat, shoreline habitat and littoral zone habitat. The shoreline is composed of mostly wetland with some hardwood forest and shrub growth and two small areas of development (Figure 3). About 75% of the shoreline is wetland. The sediment is composed of sand, silt, marl, organic muck and detritus.

Water Quality

Wisconsin State Hydrology maps indicate that this sensitive area is within the area of the lake that likely supports groundwater flow to Lake Emily. Maintaining the integrity of this sensitive area is especially important for protecting the water quality of Emily Lake. The cold water inflow provides temperature fluctuations in the shallow water area that increase the probability of high species diversity.

The Plant Community:

The aquatic plant community supports 15 species of plants at this site that provide a diversity of structural types for a diversity of habitat. The plant community extends to a depth of 11.5 feet at this site.

Wet edge and emergent vegetation, cattails and bulrush, protect the shoreline and provide important food sources and cover for wildlife and fish spawning habitat.

Floating-leaf vegetation, white water lilies, yellow pond lilies and forked duckweed, dampen wave action and provide important fish cover and wildlife food.

A diverse submerged plant community provides many important habitat components for the fish and wildlife community (Table 1). Muskgrass is dominant; elodea is present; coontail and northern watermilfoil are common; wild celery and bushy pondweed are abundant at this site. The pondweed family, which is an important food source for waterfowl and fish, is represented at this site by a premier habitat plant, large-leaf pondweed; small pondweed is abundant; sago pondweed and Illinois pondweed are common and at this site.

Two exotic species are also found at this site. Eurasian watermilfoil is present and curly-leaf pondweed is common.

Fish Habitat

In addition to the habitat value provided by all the sensitive areas (page 3), the plant beds provide:

1) protective cover for walleye and silverside minnows
2) summer nursery areas for northern pike, large-mouth bass, bluegill, pumpkinseed, yellow perch and black crappie
3) summer spawning and nursery areas for bullhead

Wildlife Habitat

In addition to the habitat values found at all the sites, this site also provides:

1) feeding areas for loon
2) nesting and feeding areas for geese

Recommendations for Area 1

1) Maintain current habitat of fish and wildlife habitat at this site.
2) Do not remove fallen trees along shoreline that provide fish and wildlife habitat.
3) Provide season protection for spawning.
4) Maintain snag trees on shore for cavity nesting and perch sites.
5) Maintain and increase the current shore buffer for a wildlife corridor.
6) Maintain natural shoreline as winter hibernation habitat for milfoil weevils
7) Increase the width of the buffer on the northwest side along the agricultural fields.
8) Protect emergent vegetation.
9) Minimize removal of any shoreline. Allow removal of a maximum corridor width of 30 feet.
10) Maintain the aquatic vegetation in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection. Allow removal only for navigational channels.
11) Manage aquatic plant community only for exotic species control: early season, selective control of Eurasian watermilfoil.
12) Protect the large-leaf pondweed.
13) Recommend “slow-no-wake” designation in this bay.
14) Protect the aquatic plant community to maintain the current level of water quality protection, such as reducing erosion and nutrient run-off.
15) No permitting for shoreline erosion control or retaining walls needed.
16) No bank grading.
17) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
18) No dredging or lake bed removal or modifications.
19) Pier placement by permit only. Minimum number and size to reduce disturbance; require light-penetrating pier material such as metal grating.
20) No boat ramp placement.
21) Permit required for recreational floating devices.

Sensitive Area Emily 2 – North Shore

This sensitive area extends along approximately 1600 feet of shoreline on the north shore at the west end of the lake out to the 13-foot depth contour (Figure 2). The sediment is sand, silt and marl.

The bay includes deep marsh habitat and shallow marsh habitat that support shoreline and shallow water littoral zone habitats (Figure 4). The shoreline is a mixture of wooded cover, shrub growth, herbaceous growth and small areas of lawn. About 75% of the shoreline is wooded with a pine plantation.

The Plant Community:

The aquatic plant community supports 15 species of plants at this site that provide a diversity of structural types for a diversity of habitat.

Wet edge and emergent vegetation that includes cattails and bulrushes provide wildlife cover and food sources, protect the shoreline and provide spawning habitat.

Floating leaf-species, white water lily and yellow pondweed, provide cover and food sources.

A diverse submergent plant community provides a diverse habitat (Table 2). Muskgrass and wild celery are dominant in the submerged community; common water-nymph is present; coontail, northern watermilfoil and bushy pondweed are common. The pondweed family is likely the most important producer of habitat and is represented here by sago pondweed, flat-stem pondweed, Illinois pondweed and small pondweed which are all common at this site. A premier habitat plant, large-leaf pondweed, is present also.

One exotic species, Eurasian watermilfoil is present at this site.

Fish Habitat

This site also provides large woody cover from trees fallen in the water, an important habitat feature. In addition to the habitat value provided by all the sensitive areas (page 3), the fallen logs and plant beds provide:

1) protective fall nursery areas for walleye
2) fall and winter nursery areas for northern pike, large-mouth bass, bluegill, pumpkinseed, yellow perch and black crappie

Wildlife Habitat

The emergent vegetation, floating-leaf vegetation, shoreline shrubs, snag trees, perch trees and fallen logs are the key habitat structures at these sites.

All of the sites provide

1) shelter, cover, nesting/denning and feeding areas for all common upland wildlife, muskrat, mink, ducks, songbirds, frogs, toads, salamanders, turtles and snakes.
2) feeding areas for eagles and osprey.

Recommendations for Area 2

1) Maintain and protect current habitat for fish and wildlife.
2) Do not remove fallen trees along shoreline that provide fish and wildlife habitat.
3) Do not alter the littoral zone except for improvement of spawning habitat.
4) Provide seasonal protection of spawning areas
5) ?Greg – did you want to say something particular about the pine plantation
6) Maintain snag trees on the shore for cavity nesting and perch sites.
7) Maintain the current shoreline buffer for a wildlife corridor.
8) Maintain natural shoreline as winter hibernation habitat for milfoil weevils
9) Protect emergent vegetation.
10) Minimize removal of any shoreline vegetation. Allow removal of a maximum corridor width of 30 feet.
11) Limit aquatic plant removal to navigational channels
12) Manage aquatic plant community for control of exotic species only, early-season, selective Eurasian watermilfoil control.
13) Protect large-leaf pondweed and minimize removal of lily pads.
14) No chemical use on lawns.
15) Maintain integrity of plant community to reduce erosion and nutrient run-off to protect water quality.
16) Issues relating to compliance with zoning ordinances occur at this site: one house is too close to the shoreline. Recommend no waivers for additions to this structure.
17) No permitting for shoreline erosion control or retaining walls needed.
18) No bank grading.
19) No pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
20) No dredging or lake bed removal or modifications.
21) Pier placement by permit only. Minimum number and size to reduce disturbance; require light-penetrating pier material such as metal grating.
22) No boat ramp placement.
23) Permit required for recreational floating devices.

Sensitive Area Emily 3 – East Basin

This sensitive area encompasses approximately 33 acres of the east basin and includes Mud Lake, approximately 5200 feet of shoreline (Figure 2). It includes deep marsh and shallow marsh habitats that support important near-shore terrestrial habitat, shoreline habitat and shallow water habitat (Figure 5). The sediment is sand, silt, marl and detritus. The shoreline at this sensitive area is composed of a mixture of shrub cover, wooded areas, herbaceous growth and lawn. About 45% of the shoreline is wetland. Large woody cover from fallen trees is present in the shallow water. This woody cover provides important habitat for fish cover and wildlife resting areas.

The Plant Community:

The aquatic plant community supports 15 native species of plants at this site that provide a diversity of structural types for a diversity of habitat. The plant community extends to a depth of 13 feet at this site.

The wet edge and emergent vegetation, cattails and bulrushes, are protecting water quality and providing excellent wildlife habitat vegetation.

Floating-leaf vegetation, white water lilies, are abundant, damping erosional wave action and providing important fish habitat (Table 3).

A diverse submergent plant community provides many fish and wildlife benefits (Table 3). Muskgrass and wild celery are dominant in the submerged community; bushy pondweed is abundant; common water-nymph is commonly occurring; coontail and northern watermilfoil are present at this site.

The pondweed family is an important food source for fish and waterfowl and is represented at this site by an abundance of Illinois pondweed; commonly occurring small pondweed and flat-stem pondweed. Sago pondweed, variable-leaf pondweed and the premier habitat pondweed, large-leaf pondweed are also present at this site.

One exotic species, Eurasian watermilfoil, is present at this site.

Fish Habitat

This site also provides large woody cover from trees fallen in the water, an important habitat feature. In addition to the habitat value provided by all the sensitive areas (page 3), the fallen logs and plant beds provide:

1) protective winter nursery areas for walleye and northern pike
2) fall and winter nursery areas for large-mouth bass, bluegill, pumpkinseed, yellow perch and black crappie

Wildlife Habitat

In addition to the habitat components at all the sites, this site also contains boulders and rocks for wildlife habitat. In addition to the habitat values found at all the sites, this site also provides

1) feeding areas for geese.

Recommendations for Area 3

1) Maintain current protection of habitat for fish and wildlife.
2) Do not remove fallen trees along shoreline that provide fish and wildlife habitat.
3) Do not alter the littoral zone except for improvement of spawning habitat.
4) Provide seasonal protection of spawning areas
5) Maintain snag trees for cavity nesting and perch sites.
6) Maintain the current shoreline buffer for a wildlife corridor and winter hibernating habitat for milfoil weevils.
7) Maintain "Exotic Alert" signs at the boat landing.
8) Maintain slow no-wake designation at this site.
9) Protect emergent vegetation.
10) Minimize removal of any shoreline vegetation. Allow removal of a maximum corridor width of 30 feet.
11) Limit plant removal to navigational channels only.
12) Manage aquatic plant community for control of exotic species only; early-season, selective Eurasian watermilfoil control.
13) Minimize removal of lily beds and protect large-leaf pondweed.
14) Maintain the aquatic vegetation in an undisturbed condition for water quality protection.
15) No chemical use on lawns or grassy areas.
16) No permitting for shoreline erosion control or retaining walls needed.
17) No bank grading.
18) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
19) No dredging or lake bed removal or modifications.
20) Pier placement by permit only. Minimum number and size to reduce disturbance; require light-penetrating pier material such as metal grating.
21) No boat ramp placement.
22) Permit required for recreational floating devices.