CRITICAL HABITAT DESIGNATION
WOLF LAKE
ADAMS COUNTY, WI

JANUARY, 2007

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Wisconsin Department of Natural Resources

WOLF LAKE IN BRIEF :

(Brief by Neil Trombly, WIDNR)

Lake Area of Record : 49 acres* (Wisconsin Lakes PUB-FH-800, 2009)

Surface Watershed : 100.85 acres** (Trombly, using ArcMap and USGS Topo Map overlay)
Watershed to Lake Ratio : 2 : 1**

Lake Type : Seepage
Full Pool Elevation : 898 ft. (USGS National Topo Map online)
Lake Volume : 909.75 acre feet (Trombly, using best fit of 1941 Bathymetry to 2005 Ortho Photo)
Mean Depth : 18 feet (909.75 acre feet divided by approx. 50 acre lake)
Mean Depth of Record : 25 feet (This was not supported) (Wisconsin Lakes PUB-FH-800, 2009)

Maximum Depth : 58 feet (Wisconsin Lakes PUB-FH-800, 2009)
(1941 Bathymetry Survey)
Miles of Shoreline : 1.13 miles (Previous 1941 finding of 1.4 miles of shoreline was not supported by georectified 2005 Digital Ortho Photograph analysis despite essentially identical lake shape and size.)

Maximum Rooting Depth : 17.5 ft. (Konkel, July, 2005, aquatic plant survey)
Number of Aquatic Plant Species in 2005 Survey : 32 (29 native, 3 exotic)
Littoral Area : 26.2 acres (Trombly, using best fit of 1941 Bathymetry Map with Konkel 2005 rooting depth and 2005 georectified photo for lake size and shape)

*Wisconsin Statute **30.635 Motorboat prohibition.** On lakes 50 acres or less having public access, motorboats may not be operated in excess of slow-no-wake speed, except when such lakes serve as thoroughfares between 2 or more navigable lakes. The department by rule may modify or waive the requirements of this section as to particular lakes, if it finds that public safety is not impaired by such modification or waiver.

** A common mistake is to count the surface area of a lake as part of its own watershed. The surface watershed area for a given lake does not include the lake itself. However, wetlands, ponds and lakes within the watershed are included in the watershed area because all of these 'shed' water into the lake. By way of example, the Wisconsin portion of the Lake Michigan watershed does not include Lake Michigan but does include Lake Winnebago.

CRITICAL HABITAT DESIGNATION

For Wolf Lake, Adams County, 2006

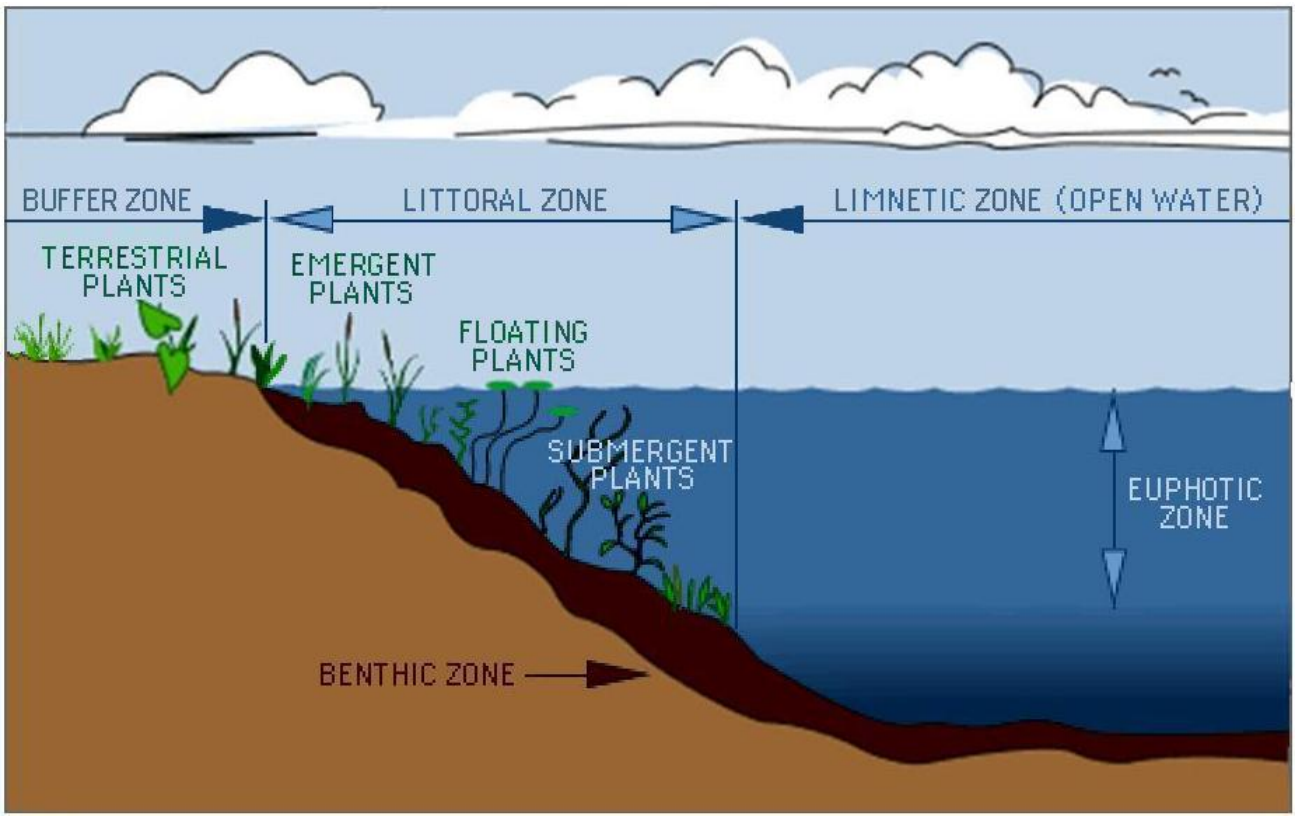
I. INTRODUCTION

Designation of critical habitat areas within lakes provides a holistic approach for assessing the ecosystem and for protecting those areas in and near a lake that are important for preserving the qualities of the lake. Wisconsin Rule 107.05(3)(i)(I) defines “sensitive areas” as: “areas of aquatic vegetation identified by the department as offering critical or unique fish & wildlife habitat or offering water quality or erosion control benefits to the body of water. Thus, these sites are essential to support the wildlife and fish communities. They also provide mechanisms for protecting water quality within the lake, often containing high quality plant beds. Finally, sensitive areas often provide the peace, serenity and beauty that draw many people to lakes in the first place.

Protection of critical habitat areas must include protecting the terrestrial shore area 'buffer zone' plant community of native vegetation that absorbs or filters nutrient & stormwater runoff, prevents shore erosion, maintains water temperature and provides important native habitat. Buffer zones can serve not only as habitats themselves, but may also provide corridors for species moving along the shore.

Besides protecting the landward buffer zone shore areas, preserving the littoral (shallow water) zone and its plant communities not only provides essential habitat for fish, wildlife, and the invertebrates that feed on them, but also provides further erosion protection and water quality protection by dampening wave action.

Critical habitat area designations provide information that can be used in developing a management plan for the lake that protects the lake’s ecosystem by identifying areas in need of special protection. These areas usually contain several types of aquatic plants: emergent; floating-leaf; rooted floating-leaf; and submergent.



Field work for a critical habitat area study was performed on June 6, 2006, on Wolf Lake, Adams County. Areas were identified visually, with GPS readings and digital aerial photos providing additional information.

The study team included:
Scot Ironside, DNR Fish Biologist
Deborah Konkel, DNR, Aquatic Plant Specialist
Reesa Evans, Adams County Land & Water Conservation Department (Author)

Additional input was received from:
Jim Keir, DNR Wildlife Biologist
Terry Kafka, DNR Water Regulation Specialist
Buzz Sorge, DNR Lake Management Planner

Wolf Lake is a mesotrophic/oligotrophic seepage lake with good to very good water quality and excellent water clarity. It has 49 surface acres, with a maximum depth of over 50 feet. As in the case in all seepage lakes, the water level on Wolf Lake fluctuates naturally with the underground water table. It has been a no-motor lake for some time. There is a public boat ramp on the west side of the lake owned by the Town of Jackson.

II. CRITICAL HABITAT AREA CRITERIA

The critical habitat areas on Wolf Lake were selected because of their importance for fish and wildlife habitat, importance for protecting water quality, importance of the natural buffer of terrestrial vegetation, and importance of protecting the aquatic plant communities they support. Each of these sites needs to be preserved in its current natural state and should not be further developed. All of the sites have potential to be used for educational purposes.

Common Attributes of All the Critical Habitat Areas

Water Quality: The vegetation at these sites (near shore and in the water) provide a nutrient buffer that reduces algal growth. Its service as a biological buffer reduces the opportunities for invasions by exotics. The physical buffer the vegetation gives protection against shore erosion and plant fragmentation, as well as stabilizes sediment, thus reducing nutrient recycling and likelihood of algal blooms. Many of these plant areas also provide microhabitat for fish and wildlife, as well as provide conditions that encourage higher biodiversity at the site. In the instance of a seepage lake like Wolf Lake, these areas may help protect the quality of the water entering the lake from groundwater seepage or springs.

Fish Habitat: All of these sensitive areas provide important fish habitat and are the most essential areas in the lake for a healthy fish community. These areas provide space for spawning, nursery sites, feeding sites, and protective cover from predator fish. Eliminating even one of these sites would reduce the amount of fish habitat available, resulting in a reduction of the size and diversity of the fish community that Wolf Lake can support.

Wildlife Habitat: Shoreline, emergent and floating-leaf vegetation are primary habitat for many kinds of wildlife. Shore and emergent vegetation are especially important as nesting and brood-rearing areas. This vegetation also provides cover during migrations and provides travel corridors throughout the year. Floating leaf vegetation also provides cover. Much of this vegetation is also used by various fish and other wildlife for food.

A map of the designated sensitive areas on Wolf Lake is seen on the next page.

Critical Habitat Areas--Wolf Lake

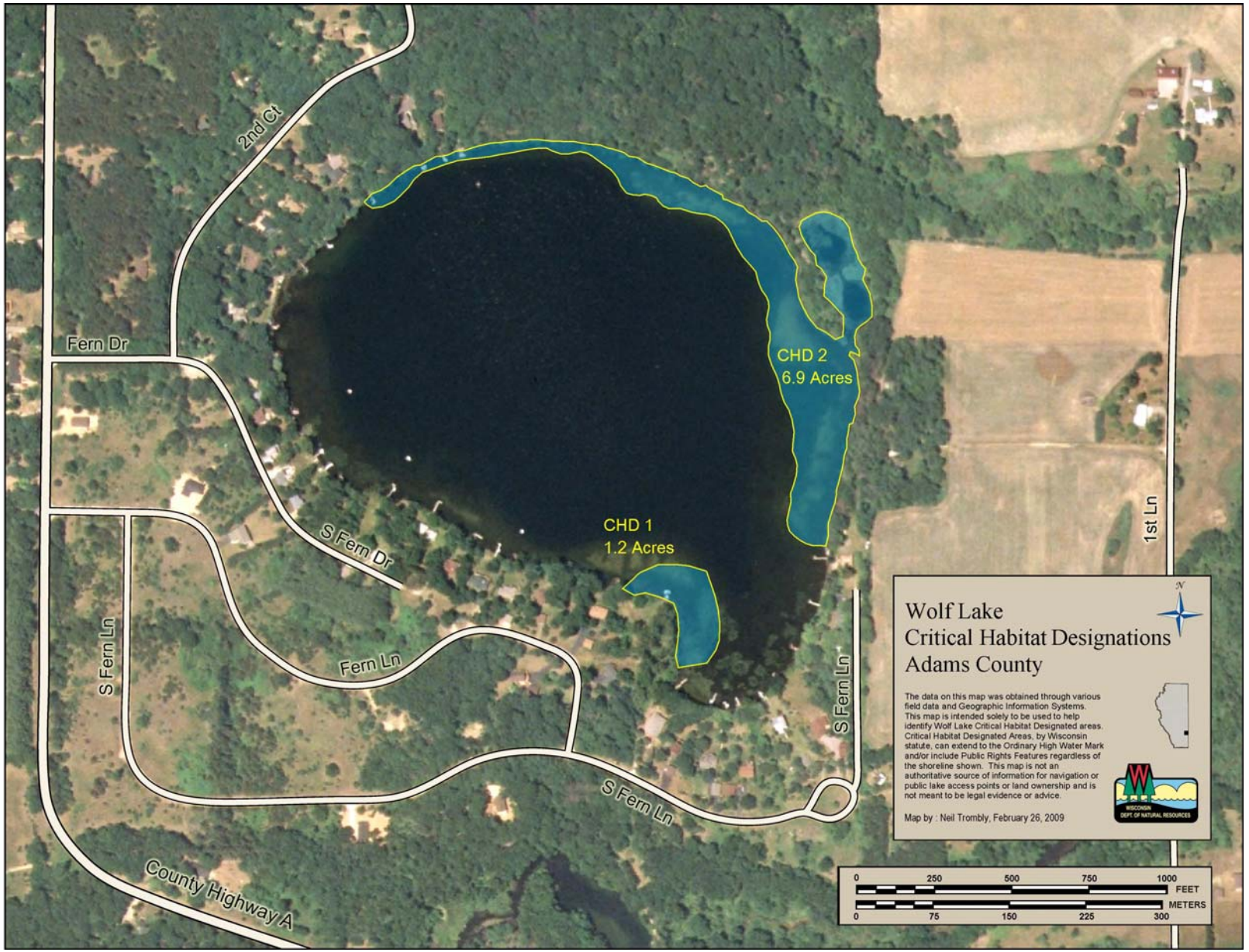


Figure 2. Critical Habitat Designated Areas

Critical Habitat Area WL1

This area extends along approximately 425 feet of the southeastern shoreline of Wolf Lake, up to the ordinary high water mark. Sediment includes marl, sand, silt and mixtures thereof. 65% of the shore is wooded; 5% is native herbaceous cover; the remaining 30% of shore is hard structure and rock riprap. Large woody cover is common for habitat. With little human disturbance along this shoreline, the area has natural scenic beauty.

This area of large woody cover, emergent aquatic vegetation, submergent and floating vegetation provides spawning and nursery areas for many types of fish: northern pike; largemouth bass; rock bass; bluegill; pumpkinseed; yellow perch; crappie; bullhead; and other panfish. All of these fish also feed and take cover in these areas. No exotic aquatic wildlife was noted in this area, i.e., no carp, smelt or rusty crayfish were seen.

Muskrat and mink are also known to use this habitat for cover, reproduction and feeding. Seen during the field survey were turkey and various types of waterfowl and songbirds. Frogs and salamanders are known to use this area for shelter/cover, nesting and feeding. Turtles and snakes also use this area for cover or shelter as well as nesting and feeding. Upland wildlife nest and feed here as well. Since human disturbance is largely absent in WL1, it provides high-quality habitat for many types of wildlife.

Maximum rooting depth of aquatic vegetation in WL1 was 15 feet. Six types of emergents were found here: *Calamagrostis; Carex; Eleocharis; Sagittaria; Scirpus* and *Typha.* Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Two species of floating-leaf plants were present here: *Nymphaea odorata* (white water lily) and *Polygonum amphibium* (water smartweed). Floating-leaf plants provide cover for fish and invertebrates, as well as help dampen waves to protect the shore. Filamentous algae were found at this site.

Submergents were *Ceratophyllum demersum* (coontail); *Chara* spp (muskgrass); *Elodea canadensis* (waterweed); *Myriophyllum sibiricum* (northern milfoil); *Najas guadelupensis* (southern naiad); *Nitella* spp (stonewort) *Potamogeton amplifolius* (large-leaf pondweed); *Potamogeton diversifolius* (water-thread pondweed); *Potamgeton gramineus* (grass-leaf pondweed); *Potamogeton illinoensis* (Illinois pondweed); *Potamogeton natans* (floating-leaf pondweed); *Potamogeton pectinatus* (sago pondweed); *Potamogeton praelongus* (white-stem pondweed); *Potamogeton richardsonii* (clasping-leaf pondweed); *Potamogeton robbinsii* (fern pondweed); *Potamogeton zosteriformis* (flat stem pondweed); *Ranunculus* (buttercup); and *Zosterella dubia* (water stargrass). Such a diverse submergent community provides many benefits.

One exotic invasive plant was found in this area: *Potamogeton crispus*. Another exotic, *Myriophyllum spicatum* (Eurasian watermilfoil) is known to be in Wolf Lake.

Most of the aquatic vegetation in this area has multiple uses for fish and wildlife (see Table 1). Because this site provides all three structural types of vegetation, the plant community has a diversity of structure and species that supports an even greater diversity of fish and wildlife.

Table 1: Aquatic Plant Benefits

	Fish	Water Fowl	Shore Birds	Upland Birds	Muskrat	Beaver	Deer
Carex spp		F	F,I				
Ceratophyllum demersum	F,I,C,S	F,I,C			F		
Chara spp	F,S	F,I,C					
Eleocharis spp	F,I,C,S	F,I,C	F,C	F,C	F	F	
Elodea canadensis	F,I,C	F,I			F,I		
Juncus spp	F,I,C,S	F,I,C	F,C				
Myriophyllum spp	F,I,C,S	F,I	F		F		
Najas spp	F,C,I	F	F	F	F		
Nitella spp	F,C,I	F,I					
Nymphaea odoratoa	F,I,C,S	F	F		F	F	
Polygonum amphibium	C,I	F,I	F,I	F,I	F		F
Potamogeton spp	F,I,C.S	F,I	F		F	F	F
Ranunculus spp	F,I,C	F,I	F,I	F,I			
Sagittaria spp	C,I	F,C,I	F,C,I	F,C,I	F	FF	
Scirpus spp	F,C,I	F,C	F,C,N	F	F	F	F
Typha spp	I,C,S	F	F,C,N		F,C,N	F	
Zosterella dubia	F,I,C	F,I					

F = Food; I = Shelters Invertebrates; C = Cover; S = Spawning; N = Nesting

RECOMMENDATIONS FOR AREA WL1

(1) Maintain current habitat for fish and wildlife.
(2) Do not remove fallen trees along the shoreline.
(3) No alteration of littoral zone unless to improve spawning habitat.
(4) Seasonal protection of spawning habitat.
(5) Maintain snag/cavity trees for nesting.
(6) Install nest boxes.
(7) Maintain or increase wildlife buffer zone corridor.
(8) Maintain no-wake and no-motor zone.
(9) Protect emergent vegetation.
(10) Minimize aquatic plant and shore plant removal to maximum 30' wide viewing/access corridor. Leave as much vegetation as possible to protect water quality and habitat.
(11) Use forestry best management practices.
(12) No use of lawn products.
(13) No bank grading or grading of adjacent land.
(14) No pier placement, boat landings, development or other shoreline disturbance in the shore area of the wetland corridor.
(15) No pier construction or other activity except by permit using a case-by-case evaluation.
(16) No installation of pea gravel or sand blankets.
(17) No bank restoration unless the erosion index scores moderate or high.
(18) If the erosion index does score moderate or high, bank restoration only using biologs or similar bioengineering, with no use of riprap or retaining walls.
(19) Placement of swimming rafts or other recreational floating devices only by permit.
(20) Maintain buffer of shoreline vegetation.
(21) Maintain aquatic vegetation in undisturbed condition for wildlife habitat, fish use and water quality protection.
(22) Post exotic vegetation notice at the public boat landing.

Critical Habitat Area WL2

This area extends along approximately 2600 feet of the northern and eastern shoreline. This area extends landward from the shore to include the deep marsh and wetlands located near the shore. Sediment includes marl, peat, silt and mixtures thereof. 46.4% of the shore is wooded; 14.3% has shrubs; 20% is native herbaceous cover. The remaining 19.3% of shoreline is rock, cultivated lawn and hard structure. Sedge meadow and deep marsh wetlands are found along this shoreline. Large woody cover is abundant for habitat. With no apparent human disturbance along this shoreline, the area has natural scenic beauty.

This area of abundant large woody cover, emergent aquatic vegetation, submergent and floating vegetation provides spawning and nursery areas for many types of fish: northern pike; largemouth bass; bluegill; pumpkinseed; yellow perch; crappie; bullhead; suckers, and other panfish. All of these fish also feed and take cover in these areas. No exotic aquatic wildlife was noted in this area, i.e., no carp, smelt or rusty crayfish were seen. No shore development was present in WL2.

Seen during the field survey were various types of waterfowl and songbirds as well as turtles and snakes. Frogs were heard. A pair of eagles has nested here for the past several years and their nest was observed to be in good repair. It appeared that all these find cover or shelter in this area, as well as nesting and feeding opportunities. Downed logs serving as habitat were also seen. Muskrat and mink as well as frogs and salamanders are known to use WL2 for cover, reproduction and feeding. In addition to aquatic and riparian species, upland wildlife feed and nest here as well. With recent human disturbance absent in WL2, it provides remarkably high quality habitat for many types of wildlife.

Eagle's Nest in WL2

Maximum rooting depth of aquatic vegetation in WL2 was 11 feet. No threatened or endangered species were found in this area. Three exotic invasives, *Myriophyllum spicatum* (Eurasian watermilfoil), *Phalaris arundinacea* (reed canarygrass) and *Potamogeton crispus* (curly-leaf pondweed), were found in this area. Filamentous algae were found, especially near the shore.

In addition to *Phalaris arundinacea*, other emergents present at WL2, included *Caltha* (marsh marigold); *Eleocharis* (spikerush), *Iris versicolor* (blue-flag iris), *Juncus* (rush), *Sagittaria* (arrowhead), *Scirpus* (bulrush), *Sparganium* (burreed), *Spirea* (meadowsweet) and *Typha* (cattail). Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Three species of floating-leaf rooted plants were present: *Nuphar variegata* (yellow pond lily); *Nymphaea odorata* (white water lily) and *Polygonum amphibium* (water smartweed). Floating-leaf vegetation provides cover and dampens waves, protecting the shore. The remaining aquatic vegetation was submergent: *Chara* spp (muskgrass), *Elodea canadensis* (waterweed); *Najas guadalupensis* (southern naiad), *Nitella* spp (stonewort), *Potamogeton crispus* (curly-leaf pondweed), *Potamogeton diversifolius* (water-thread pondweed), *Potamogeton foliosus* (leafy pondweed), and *Potamogeton gramineus* (grass-leaved pondweed). Filamentous algae were found, especially near the shores.

Such a diverse submergent community provides many benefits. Most of these plants are multi-use for wildlife and fish (see Table 2). Because this site provides all three structural types of vegetation the community has a diversity of structure and species that supports even more diversity of fish and wildlife.

Table 2: Aquatic Plant Benefits

	Fish	Water Fowl	Shore Birds	Upland Birds	Muskrat	Beaver	Deer
Carex spp		F	F,I				
Chara spp	F,S	F,I,C					
Eleocharis spp	F,I,C,S	F,I,C	F,C	F,C	F	F	
Elodea canadensis	F,I,C	F,I			F,I		
Juncus spp	F,I,C,S	F,I,C	F,C				
Myriophyllum spp	F,I,C,S	F,I	F		F		
Najas spp	F,C,I	F	F	F	F		
Nitella spp	F,C,I	F,I					
Nuphar variegata	F,I,C,S	F	F		F	F	
Nymphaea odoratoa	F,I,C,S	F	F		F	F	
Polygonum amphibium	C,I	F,I	F,I	F,I	F		F
Potamogeton spp	F,I,C.S	F,I	F		F	F	F
Ranunculus spp	F,I,C	F,I	F,I	F,I			
Sagittaria spp	C,I	F,C,I	F,C,I	F,C,I	F	FF	
Scirpus spp	F,C,I	F,C	F,C,N	F	F	F	F
Typha spp	I,C,S	F	F,C,N		F,C,N	F	

F = Food; I = Shelters Invertebrates; C = Cover; S = Spawning; N = Nesting

Middle Area of WL2

Deep Marsh Area of WL2

RECOMMENDATIONS FOR WL2

(1) Maintain current habitat for fish and wildlife.
(2) Do not remove fallen trees along the shoreline nor logs in the water.
(3) No alteration of littoral zone unless to improve spawning habitat.
(4) Seasonal protection of spawning habitat.
(5) Maintain snag/cavity trees for nesting.
(6) Maintain or increase wildlife corridor.
(7) Maintain sedge meadow and deep marsh areas.
(8) Maintain no-wake zone.
(9) Protect emergent vegetation for habitat and shoreline protection.
(10) Removal of submergent vegetation for navigation purposes only.
(11) Seasonal control of Eurasian Watermilfoil and Curly-leaf Pondweed by using control methods selective for exotics.
(12) Minimize aquatic plant and shore plant removal to maximum 30' wide access/viewing corridor. Leave as much vegetation as possible to protect water quality and habitat.
(13) Use forestry best management practices.
(14) No use of lawn products.
(15) No bank grading or grading of adjacent land.
(16) No pier construction or other activity except by permit using a case-by-case evaluation.
(17) No installation of pea gravel or sand blankets.
(18) No bank restoration unless the erosion index scores moderate or high.
(19) If the erosion index does score moderate or high, bank restoration only using biologs or similar bioengineering, with no use of riprap or retaining walls.
(20) Placement of swimming rafts or other recreational floating devices only by permit.
(21) Maintain buffer of shoreline vegetation.
(22) Maintain aquatic vegetation in undisturbed condition for wildlife habitat, fish use and water quality protection.
(23) Post landing with exotic species alert and educational signs to prevent introduction and/or spread of exotic species.
(24) Maintain no motor designation.