CRITICAL HABITAT DESIGNATION
PEPPERMILL LAKE
ADAMS COUNTY, WI

DECEMBER, 2006

Submitted by Reesa Evans
Adams County Land & Water Conservation Department

Wisconsin Department of Natural Resources

PEPPERMILL LAKE IN BRIEF :

(Brief by Neil Trombly, WIDNR)

Lake Area of Record : 100 acres (Wisconsin Lakes Book);
Recent Area : **64.92 acres** (Hartnett Map, 2006)
Area with Islands : 67.98 acres (Hartnett Map, 2006)

Lake Type : Drainage / Impoundment
Surface Elevation of Record : 909 feet. (Hartnett Map, 2006)
Lake Volume : 280.21 acre ft. (Hartnett Map, 2006)
Maximum Depth : 12.5 feet (Hartnett Map, 2006),
Maximum Depth of Record : 9 feet (Wisconsin Lakes Book)
Mean Depth : 4.3 feet (Based on data from Hartnett Map, 2006)
Miles of Shoreline : 4.4 miles (Hartnett Map, 2006)
Surface Watershed : 754.78 acres* (Trombly, 2010 using USGS Topo Map, Map is appended)
Surface Watershed to Lake Ratio : 11.6 : 1*
Ground Watershed : 2,750 acres (estimated using ArcMap and a georectified image from Adams County Lake Classification Report)

Maximum Rooting Depth in 2006 Survey : 8 ft.
Littoral Area : Over 95%

* The surface area of a lake collects precipitation rather than runoff and is therefore not included in the area of its own surface watershed. However, wetlands, ponds and lakes within the watershed are included because all of these 'shed' their runoff into the lake. By way of example, the Wisconsin portion of the Lake Michigan surface watershed does not include Lake Michigan (which would be impossible to justify) but does include Lake Winnebago. For Peppermill Lake, the surface watershed polygon is 819.7 acres including the lake, less the 64.92 acres of lake surface leaves 754.78 acres of surface whatershed draining into the lake in 2006.

CRITICAL HABITAT DESIGNATION
For Peppermill Lake, Adams County 2006

I. INTRODUCTION

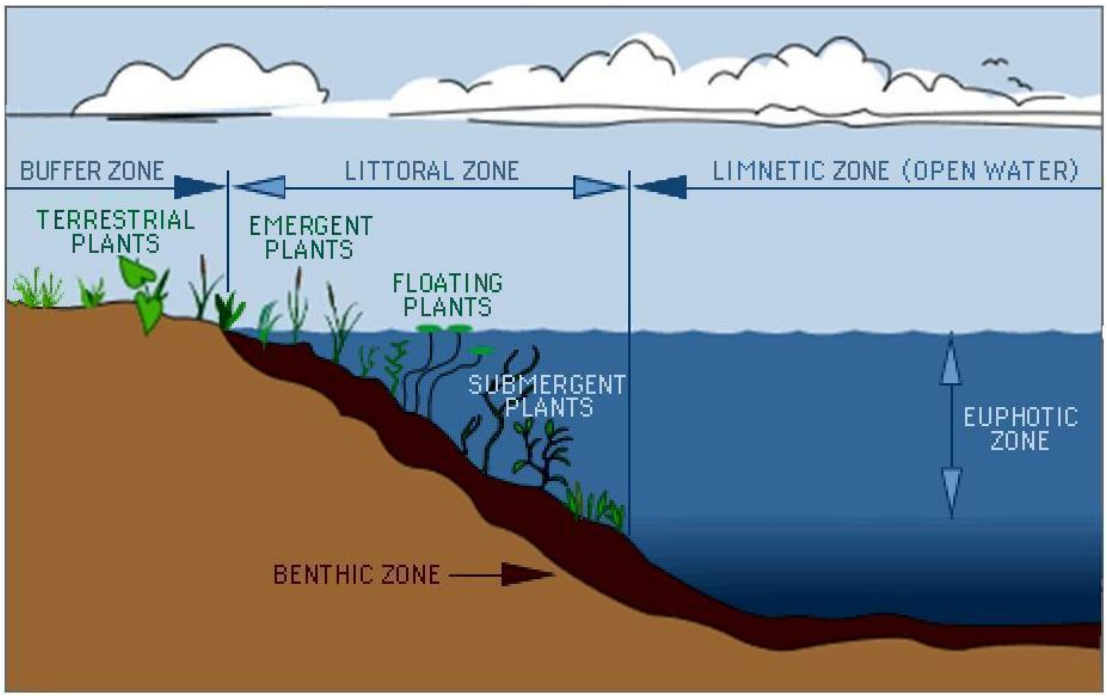
Designation of critical habitat areas within lakes provides a holistic approach for assessing the ecosystem and for protecting those areas in and near a lake that are important for preserving the qualities of the lake. Wisconsin Rule 107.05(3)(i)(I) defines "sensitive areas" as: "areas of aquatic vegetation 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.

Note: Reesa Evans is credited for all photographs in this report.



Field work for designation of critical habitat areas was done October 4, 2006, on Peppermill Lake, Adams County. Areas were identified visually, with GPS readings and digital photos providing additional information. The designation field team included :

Scot Ironside, DNR Fish Biologist
Deborah Konkel, DNR, Aquatic Plant Specialist
Reesa Evans, Adams County Land & Water Conservation Department

Additional input was sought from :
Terence Kafka, DNR Water Regulation
Jim Keir, DNR Wildlife Biologist
Buzz Sorge, DNR Lake Management Planner

Peppermill Lake is a mesotrophic/oliogotrophic impoundment with good to very good water quality and very good water clarity. It has 65 surface acres, with a maximum depth of 12.5 feet and an average depth about 4.3 feet. Peppermill Lake is at the head of a stream subsystem that flows eventually into the Fox River and Lake Michigan. There is a public boat ramp on the northeast end of the lake owned by the Town of Jackson. The dam is owned by Adams County and managed by the Adams County Land & Water Conservation Department.

II. CRITICL HABITAT CRITERIA

All the critical habitat areas on Peppermill 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 supported. Each of these sites needs to be preserved in their 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

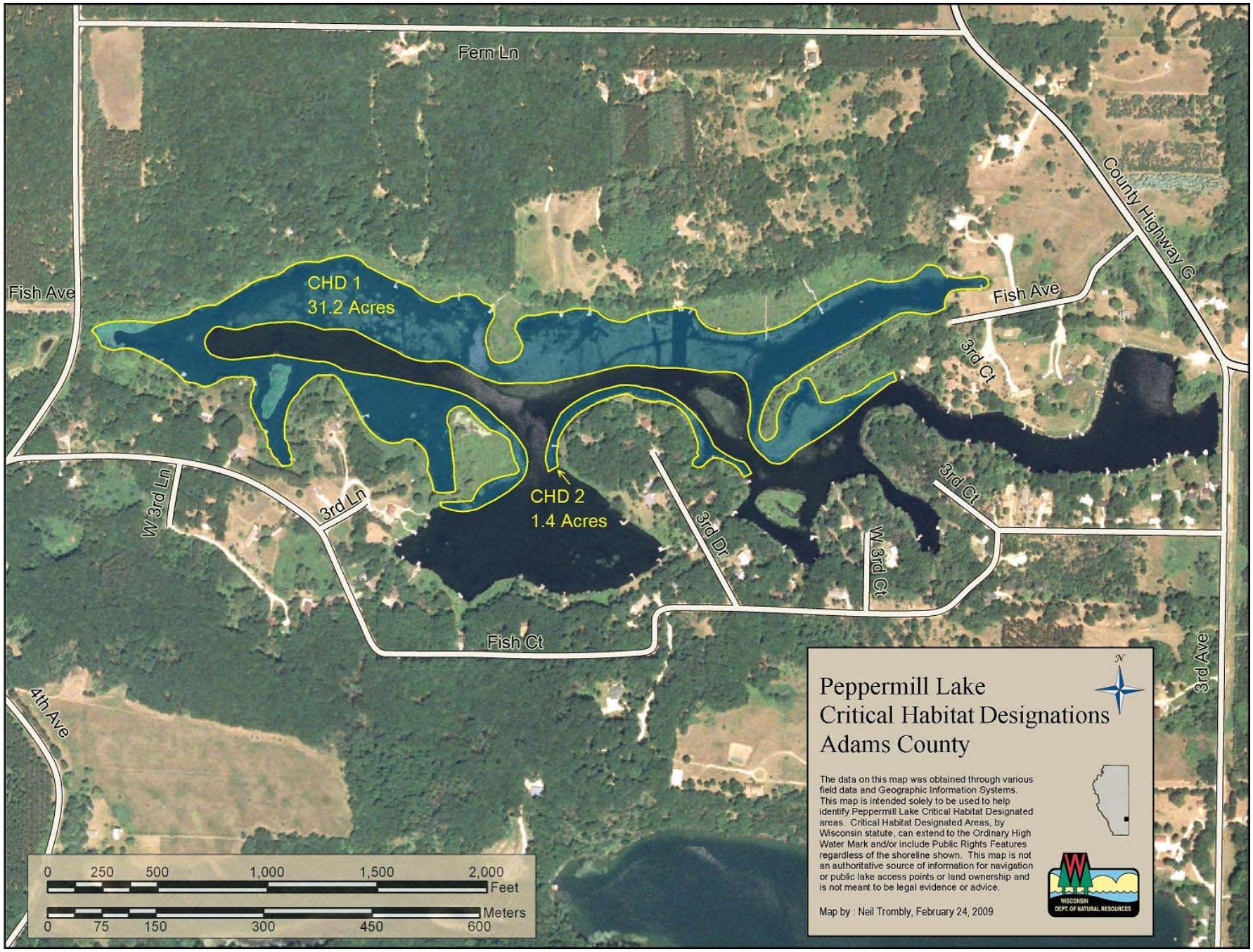
Water Quality: The vegetation at these sites (near shore and in the water) provide a nutrient buffer that reduces algal growth. Its service as a biological buffer reduces the opportunities for invasions by exotics. The physical buffer the vegetation gives protects against shore erosion and plant fragmentation, 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 providing conditions that encourage higher biodiversity at the site.

Fish Habitat: All of these critical habitat 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 Peppermill 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 all throughout the year. Floating-leaf vegetation also provides cover. Most of this vegetation is also used by various fish and other wildlife for food.

Figure 2 shows Designated Critical Habitat areas on Peppermill Lake.

Figure 2. Critical Habitat Designated Areas



Critical Habitat Area PE1

This area extends along approximately 7000 feet of the shoreline up to the ordinary high water mark, comprised of about 2/3 of the northern shore of the lake and the southwest shore of the lake. Sediment includes marl, muck, peat, silt and mixtures thereof. 12% of the shore is wooded; 61% has shrubs; 27% is native herbaceous cover. Shrub-carr is found along part of the shore. Large woody cover is common for habitat. With minimal human disturbance along this shoreline, the area has natural scenic beauty.

Northeast Area of PE1

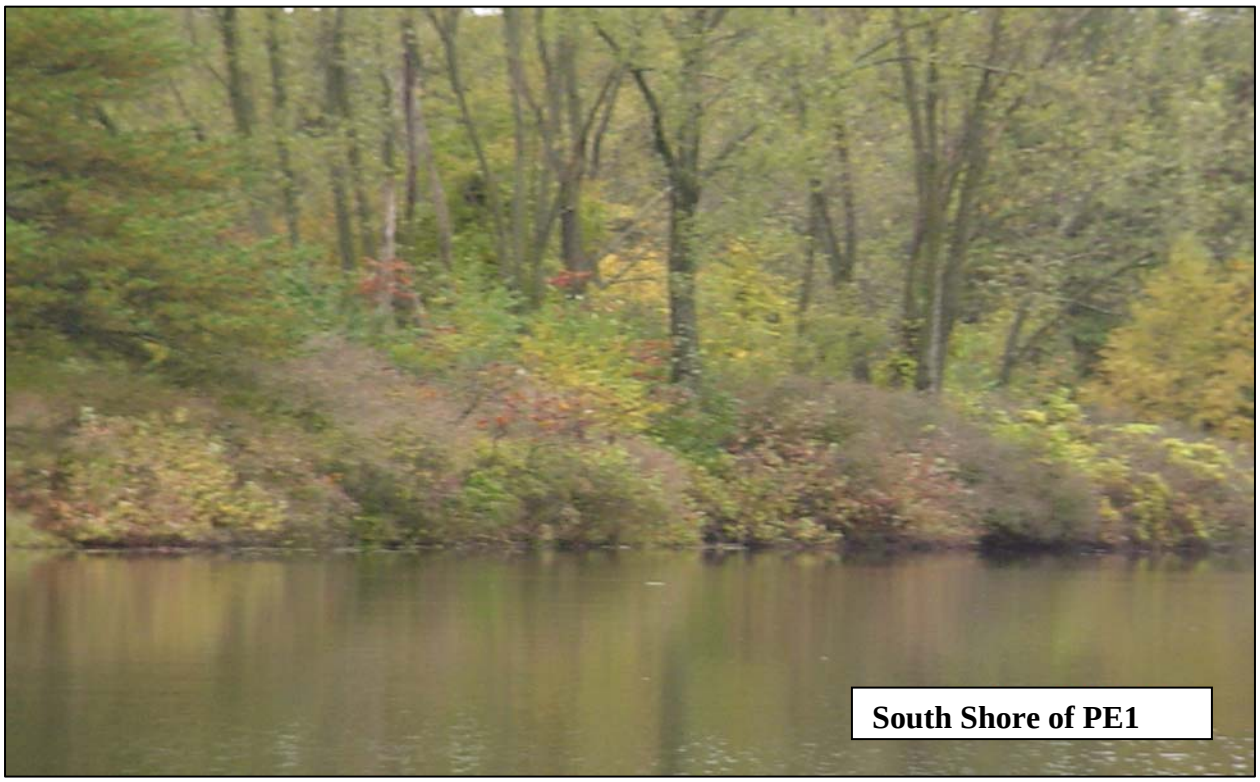
This area of large woody cover, emergent aquatic vegetation, submergent and floating vegetation provides spawning and nursery areas for many types of fish: northern pike; largemouth bass; rock bass; bluegill; pumpkinseed; yellow perch; black crappie; bullhead; white suckers, and other panfish. All of 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.

Muskrat and mink are also known to use this habitat for cover, reproduction and feeding. Seen during the field survey were various types of songbirds. Frogs, salamanders, turtles and snakes are known to use this area for shelter/cover, nesting and feeding. Upland wildlife feed and nest here as well. Since human disturbance is light in PE1, it provides quality habitat for many types of wildlife.

Middle Section of PE1

Maximum rooting depth of aquatic vegetation in PE1 was 7.5 feet. Several types of emergent aquatic plants were found in this area: *Acorus* (Sweet Flag); *Asclepias* (Swamp Milkweed); *Carex* spp (Sedge); *Cicuta* (Water Hemlock); *Leersia* (Rice Cutgrass); *Onoclea* (Sensitive Fern); *Rumex* (Water Dock); and *Scutelleria* (Scullcap). Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Free-floating plants included *Lemna minor* (Small Duckweed) and *Spirodela polyrhiza* (Great Duckweed). These provide cover for fish and invertebrates and are eaten by fish and waterfowl. *Nymphaea odorata* (White Water Lily), *Nuphar variegata* (Yellow Pond Lily) and *Polygonum amphibium* (Water Smartweed) were the rooted floating-leaf plants found. Floating-leaf vegetation provides cover and dampens waves, protecting the shore. Filamentous algae were common in this area.



A variety of submergent aquatic plants characterized this area. These included *Ceratophyllum demersum* (Coontail); *Chara spp* (Muskgrass); *Elodea canadensis* (Waterweed); *Myriophyllum sibiricum* (Northern Milfoil); *Myriophyllum spicatum* (Eurasian Watermilfoil); *Najas flexilis* (Bushy Pondweed); *Potamogeton natans* (Floating-Leaf Pondweed); *Potamogeton pectinatus* (Sago Pondweed); *Potamogeton zosteriformis* (Flat-Sem Pondweed); *Utricularia vulgaris* (Common Bladderwort); and *Zosterella dubia* (Water Stargrass). A diverse submergent community provides many benefits.

The only exotic invasive plant found in this area was *Myriophyllum spicatum* (Eurasian Watermilfoil).

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 community has a diversity of structure and species that supports even more diversity of fish and wildlife.

Table 1: Aquatic Plant Benefits

PE1	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	F,S	F,I,C					
Eleocharis spp	F,I,C,S	F,I,C	F,C	F,C	F	F	
Juncus spp	F,I,C,S	F,I,C	F,C				
Lemna minor	F,I,C,S	F	F		F	F	
Myriophyllum spp	F,I,C,S	F,I	F		F		
Najas spp	F,C,I	F	F	F	F		
Nuphar variegataa	F,I,C,S	F	F		F	F	F
Nymphaea odoratoa	F,I,C,S	F	F		F	F	
Phalaris arundinacea		C					
Polygonum amphibium	C,I	F,I	F,I	F,I	F		F
Potamogeton spp	F,I,C.S	F,I	F		F	F	F
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	
Spirodela polyrhiza	F,I,C,S	F	F		F	F	
Utricularia spp	F,I,C,S						
Zosterella dubia	F,I,C	F					

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

RECOMMENDATIONS FOR AREA PE1

(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 corridor.
(8) Maintain no-wake lake designation.
(9) Protect emergent vegetation.
(10) Minimize aquatic plant and shore plant removal to maximum 30' wide viewing/access corridor or for navigational purposes only. Leave as much vegetation as possible to protect water quality and habitat.
(11) Use forestry best management practices.
(12) No use of lawn products.
(14) No bank grading or grading of adjacent land.
(15) No additional pier placement, boat landings, development or other shoreline disturbance in the shore area of the wetland corridor.
(16) No additional pier construction or other activity except by permit using a case-by-case evaluation and using light-penetrating materials.
(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) Maintain sign for exotic species alert at boat landing.

Critical Habitat Area PE2

This area extends along approximately 800 feet of the shoreline along the middle south part of the lake. Sediment includes gravel, marl, muck, peat, and mixtures thereof. 35% of the shore is wooded; 10% is native herbaceous cover; the remaining shore is cultivated lawn and a little hard structure. Shallow marsh covers part of the shore. Large woody cover is common for habitat.

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; rock bass; bluegill; pumpkinseed; yellow perch; black crappie; bullhead; white 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. Some shore development was present in PE2.

Seen during the field survey were various types of songbirds. Frogs, salamanders, turtles and snakes are known to use this area for shelter/cover, nesting and feeding. Upland wildlife feed and nest here as well.

Maximum rooting depth in PE2 was 8 feet. No threatened or endangered species were found in this area. One exotic invasive, *Myriophyllum spicatum* (Eurasian watermilfoil), was found in this area. Filamentous algae were present, especially near the shores. Only two types of emergents were found here: *Carex* and *Sparganium*. Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Two floating-leaf rooted plants were present: *Nuphar variegata* and *Nymphaea odorata*. Floating-leaf vegetation provides cover and dampens waves, protecting the shore. Two free-floating plants, *Lemna* minor and *Spirodela* polyrhiza, were also at this site. The remaining aquatic plants were

Submergents : *Chara spp.*, *Myriophyllum sibiricum, Myriophyllum spicatum, Najas flexilis,* and *Potamgeton friesii..* A diverse submergent community can provide many benefits. All of these plants have multiple fish and wildlife uses (see Table 2).

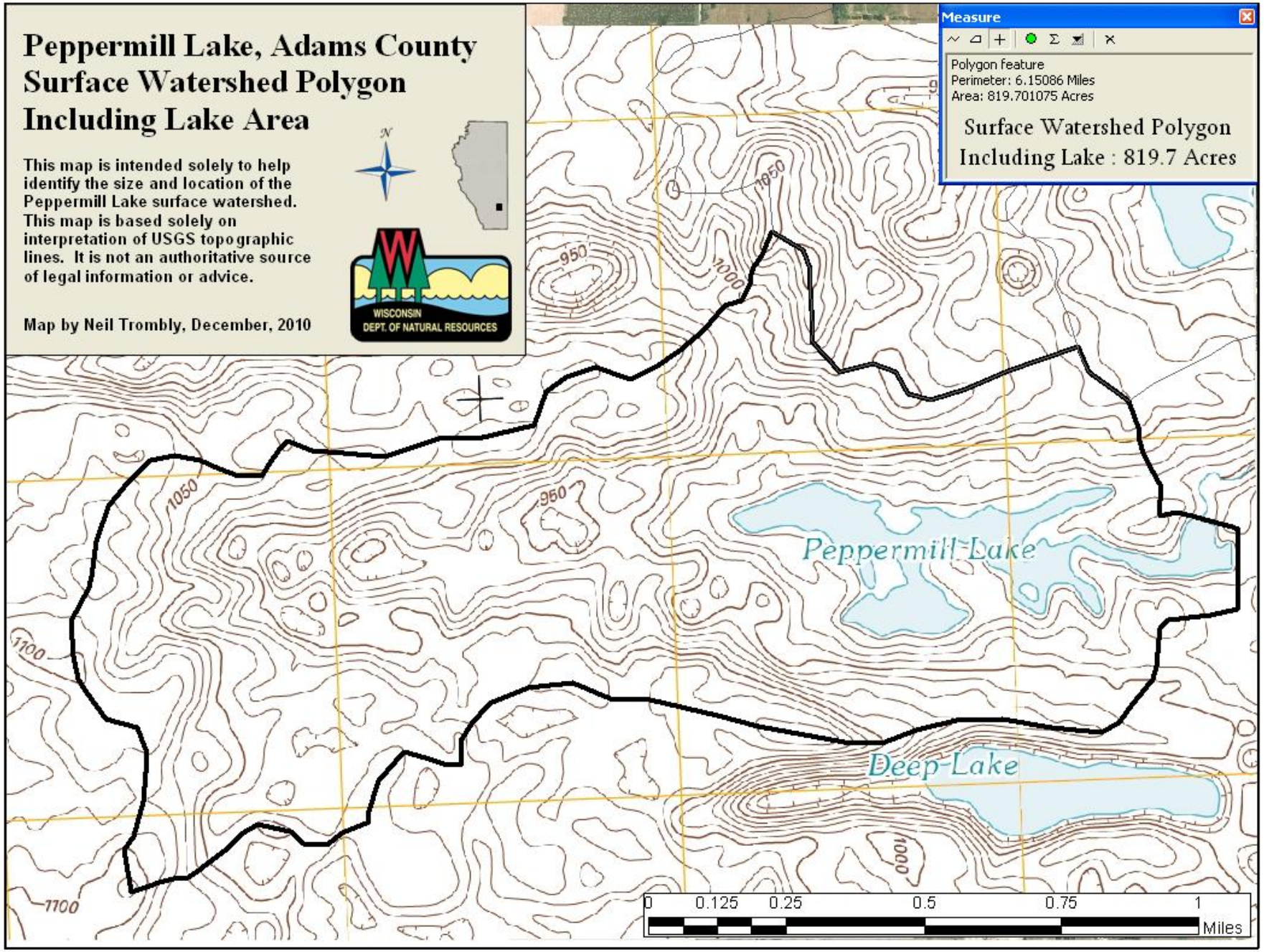
Table 2: Aquatic Plant Benefits

PE2	Fish	Water Fowl	Shore Birds	Upland Birds	Muskrat	Beaver	Deer
Carex spp		F	F,I				
Chara	F,S	F,I,C					
Lemna minor	F,I,C,S	F	F		F	F	
Myriophyllum spp	F,I,C,S	F,I	F		F		
Najas spp	F,C,I	F	F	F	F		
Nuphar variegataa	F,I,C,S	F	F		F	F	F
Nymphaea odoratoa	F,I,C,S	F	F		F	F	
Potamogeton spp	F,I,C.S	F,I	F		F	F	F
Scirpus spp	F,C,I	F,C	F,C,N	F	F	F	F
Spirodela polyrhiza	F,I,C,S	F	F		F	F	
Sparganium spp	F,I,C,S	F,C,N	F,C,N		F		F

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

RECOMMENDATIONS FOR PE2

(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 corridor.
(8) Maintain no-wake lake designation.
(9) Protect and, if possible, enhance emergent vegetation.
(10) Minimize aquatic plant and shore plant removal to maximum 30' wide viewing/access corridor or for navigational purposes only. Leave as much vegetation as possible to protect water quality and habitat.
(11) Use forestry best management practices.
(12) No use of lawn products.
(14) No bank grading or grading of adjacent land.
(15) No additional pier placement, boat landings, development or other shoreline disturbance in the shore area of the wetland corridor.
(16) No additional pier construction or other activity except by permit using a case-by-case evaluation and using light-penetrating materials.
(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 where present. Install buffer where there is currently cultivated lawn.
(22) Maintain aquatic vegetation in undisturbed condition for wildlife habitat, fish use and water quality protection.
(23) Maintain sign for exotic species alert at boat landing


Peppermill Lake, Adams County
Surface Watershed Polygon
Including Lake Area
This map is intended solely to help identify the size and location of the Peppermill Lake surface watershed. This map is based solely on interpretation of USGS topographic lines. It is not an authoritative source of legal information or advice.
Map by Neil Trombly, December, 2010
WISCONSIN
DEPT. OF NATURAL RESOURCES
Measure
Polygon feature
Perimeter: 6.15086 Miles
Area: 819.701075 Acres
Surface Watershed Polygon
Including Lake : 819.7 Acres
Peppermill Lake
Deep Lake
950
1000
1050
1100
0
0.125
0.25
0.5
0.75
1
Miles