CRITICAL HABITAT DESIGNATION
PATRICK LAKE
ADAMS COUNTY, WI

DECEMBER, 2006

Submitted by Reesa Evans
Adams County Land & Water Conservation Department

Wisconsin Department of Natural Resources

PATRICK LAKE IN BRIEF :

(Brief by Neil Trombly, WIDNR)

Lake Area of Record : 50.85 acres (1941 DNR online Bathymetry Map)
Recent Area : 50 acres (Wisconsin Lakes Book) (ArcMap 2005 Digital Ortho Photography)

Lake Type : Seepage
Surface Elevation of Record : 973 (USGS Topographic Map, 1981 using 1979 data)
Lake Volume : 357 acre feet (Trombly, 2010, based on 1941 Bathymetry Lines)
Maximum Depth of Record : 21 feet (1941 DNR bathymetry map)
Current Maximum Depth : (Lake level varies due to being a seepage lake)
Mean Depth : 7.14 feet (Based on 1941 Bathymetry Lines)
Miles of Shoreline : 1.64 miles (based on 50 surface acres in 2005)

Surface Watershed : 834 acres* (Trombly, 2010 using USGS Topo Map, Map is appended)
Surface Watershed to Lake Ratio : 16.7 : 1*
Ground Watershed : 481 acres (estimated using georectified image from Adams County Lake Classification Report)

Maximum Rooting Depth in July, 2005 Plant Survey : 13 ft.
Littoral Area : 92 % (Only 4 acres are deeper than 13 feet)

* 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 Patrick Lake, the surface watershed polygon is 884 acres including the lake, take away the 50 acres of lake surface leaves 834 acres of surface watershed draining into the lake in 2005.

CRITICAL HABITAT DESIGNATION
For Patrick Lake, Adams County 2006

I. INTRODUCTION

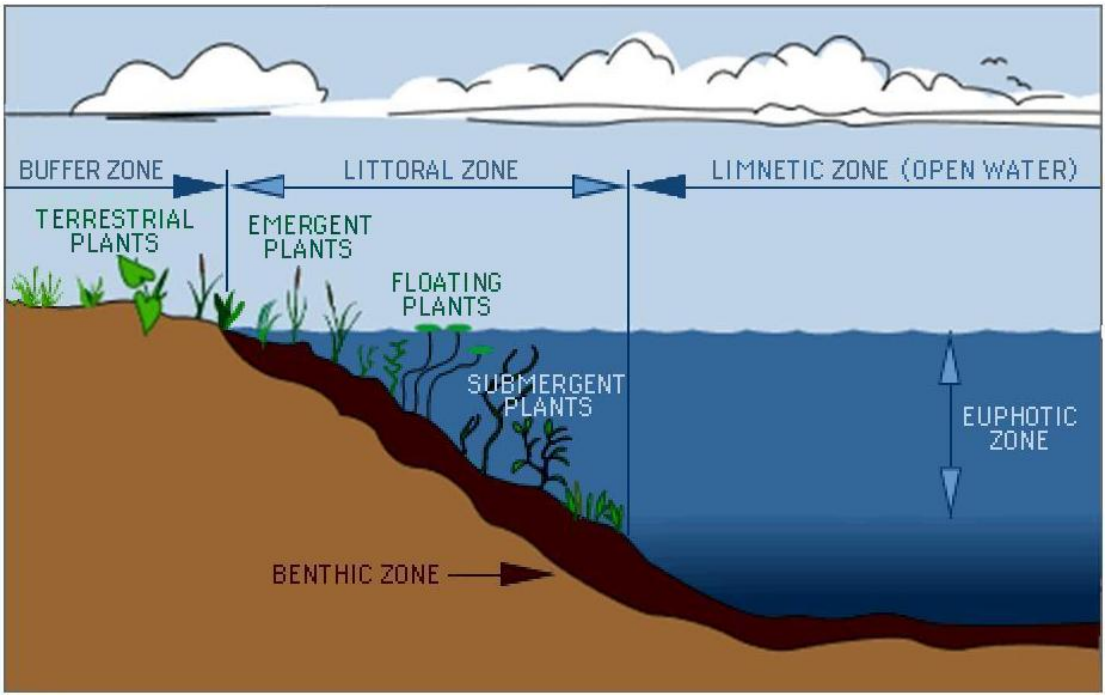
Designation of critical habitat areas within lakes provides a holistic approach for assessing the ecosystem and for protecting those areas in and near a lake that are important for preserving the qualities of the lake. Wisconsin Rule 107.05(3)(i)(I) defines "sensitive areas" as: "areas of aquatic vegetation 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 can 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 a critical habitat area study was performed on May 31, 2006, on Patrick 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
Buzz Sorge, DNR Lake Management Planner
Reesa Evans, Adams County Land & Water Conservation Department

Additional input was sought from :
Jim Keir, DNR Wildlife Biologist
Terence Kafka, DNR Water Regulation Specialist

Patrick Lake is a mesotrophic/oliogotrophic seepage lake with good to very good water quality and clarity. It has 50 surface acres, with a maximum depth of 21 feet and a mean depth of 7.1 feet. In the past few years, the water level in Patrick Lake has been declining substantially. As in the case in all seepage lakes, the water level on Patrick Lake fluctuates naturally with the underground water table, but studies are underway to determine if some other factors may be contributing to the low water levels.

II. CRITICAL HABITAT AREA CRITERIA

All the critical habitat areas on Patrick 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

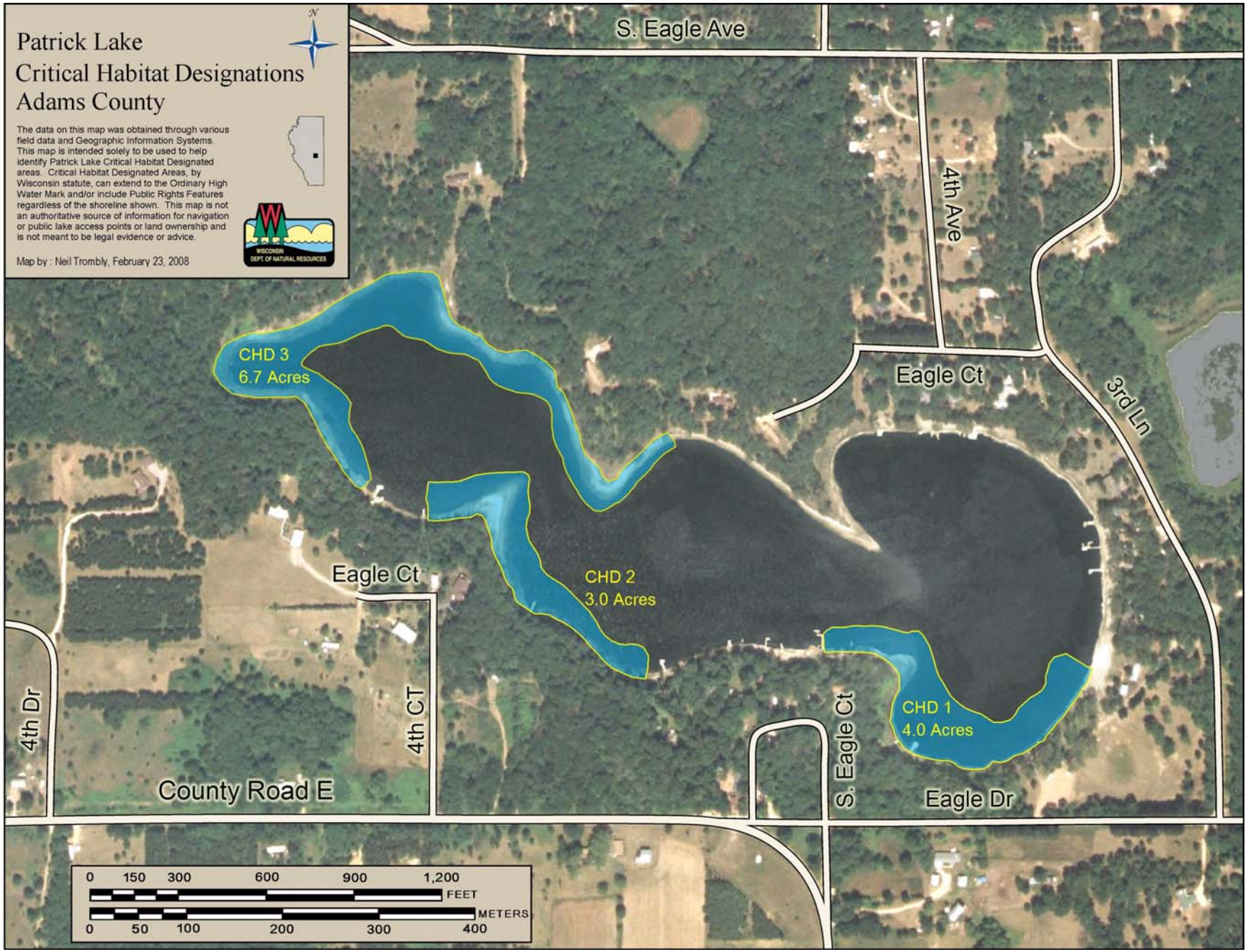
Water Quality: The vegetation at these sites (near and in the water) provide a nutrient buffer that reduces algal growth. Its service as a biological buffer reduces the opportunities for invasions by exotics. The physical buffer the vegetation gives protects against shore erosion and plant fragmentation, 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. In the instance of a seepage lake like Patrick Lake, these areas may help protect the quality of the water entering the lake from groundwater seepage or springs.

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 Patrick 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. Most of this vegetation is also used by various fish and other wildlife for food.

Figure 2 shows Critical Habitat Designated (CHD) areas on Patrick Lake.

Figure 2. Critical Habitat Designated Areas



Critical Habitat Area PA1

This 4 acre area extends along approximately 1300 feet of the shoreline. Sediment includes muck and silt. 70% of the shore is native herbaceous vegetation; 23.3% of the shore is cultivated lawn; the remaining shore is hard structure. There are downed logs in the water that provide fish and wildlife cover. Filamentous algae were found in this area. There is a moderate level of human disturbance in this area.

Photo Showing Area PA1

This area provides spawning and nursery areas for many types of fish: northern pike; largemouth bass; bluegill; pumpkinseed; yellow perch; crappie; bullhead; and other panfish. All of these fish also feed and take cover in these areas. No exotic fish or wildlife were noted in this area, i.e, no carp, smelt or rusty crayfish were seen. Geese and songbirds are known in this area of Patrick Lake, as well as reptiles and amphibians.

Maximum rooting depth of aquatic vegetation in PA1 was 5.5 feet. An emergent plant, bulrush is found is this area. Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Nymphaea odorata (white water lily) and *Nuphar variegata* (yellow pond lily) were the rooted floating-leaf plants found. Floating-leaf vegetation provides cover and dampens waves, protecting the shore. Submergent plants were *Najas guadelupensis* (Southern naiad), *Potamogeton amplifolius* (Large-Leaf Pondweed), *Potamogeton crispus* (Curly-Leaf Pondweed), *Potamogeton gramineus* (Variable-Leaf Pondweed), *Potamogeton illinoensis* (Illinois Pondweed), *Potamogeton natans* (Floating-Leaf Pondweed), and *Potamogeton richardsonii* (Clasping-Leaf Pondweed). A diverse submergent community provides many benefits.

Potomogeton Crispus (Curly-Leaf Pondweed), an exotic invasive plant, was found in this area. *Myriophyllum spicatum* (Eurasian Watermilfoil) has been found in Patrick Lake in the past. 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 in PA1

	Fish	Water Fowl	Shore Birds	Upland Birds	Muskrat	Beaver	Deer
Najas spp	F,C,I	F	F	F	F		
Nuphar variegata	F,I,C,S	F	F		F	F	F
Nymphaea odorata	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

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

RECOMMENDATIONS FOR AREA PA1

(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 zone.
(9) Protect emergent vegetation.
(10) Seasonal control of Curly-Leaf Pondweed. If needed, seasonal control of Eurasian Watermilfoil.
(11) 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.
(12) Use best management practices.
(13) No use of lawn products.
(14) No bank grading or grading of adjacent land.
(15) No additional 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 buffer in undisturbed condition for wildlife habitat, fish use and water quality protection.
(22) Post landing with exotic species alert and educational signs to prevent introduction and/or spread of exotic species

Critical Habitat Area PA2

This 3 acre area extends along approximately 1000 feet of the shoreline. Sediment includes peat, sand, silt and mixtures thereof. 25% of the shore is wooded; 10% has shrubs; 45% is native herbaceous cover. The remaining shore is cultivated lawn and hard structure. Large woody cover and downed logs are common in the shallow water for habitat.

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

Seen during the field survey were geese and songbirds. Upland wildlife is also known in this area. Frogs and salamanders as well as turtles and snakes are known to use this area for shelter/cover, nesting and feeding. Although human disturbance is present in PA2, the area still provides quality habitat for many types of wildlife.

Maximum rooting depth in PA2 was 13 feet. No threatened or endangered species were found in this area. One exotic invasive, *Potamogeton crispus* (Curly-Leaf Pondweed), was found in this area. *Myriophyllum spicatum* (Eurasian Water Milfoil) had previously been found here. Most of the area had filamentous algae, especially near the shores and the plant-like algae, *Chara spp,* was also abundant. PA2 exhibited a shortage of emergent plants, which is unfortunate, since emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

One floating-leaf rooted plant was found, *Nymphaea odorata* (White Water Lily). Floating-leaf vegetation provides cover and dampens waves, protecting the shore. The remaining plants were submergent: *Najas guadelupensis* (Southern naiad), *Potamogeton amplifolius* (Large-Leaf Pondweed), *Potamogeton gramineus* (grass-leaved pondweed), *Potamogeton illinoensis* (Illinois pondweed), *Potamogeton praelongus* (White-Stem Pondweed), and *Potamogeton richardsonii* (Clasping-Leaf Pondweed). Such a submergent community provides many benefits (see Table 2).

Table 2: Aquatic Plant Benefits in PA2

	Fish	Water Fowl	Shore Birds	Upland Birds	Muskrat	Beaver	Deer
Myriophyllum spp	F,I,C,S	F,I	F		F		
Najas spp	F,C,I	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

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

Many of these plants are used by fish and wildlife for multiple purposes. Because this site provides two structural types of vegetation, the community has a diversity of structure and species that supports even more diversity of fish and wildlife.

Photo of Area PA2

RECOMMENDATIONS FOR PA2

(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 no-wake zone.
(8) Protect emergent vegetation for habitat and shoreline protection.
(9) Removal of submergent vegetation for navigation purposes only and only in narrow channels.
(10) Seasonal control of Curly-Leaf Pondweed. If needed, seasonal control of Eurasian Watermilfoil.
(11) No use of chemicals for control of native vegetation.
(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 best management practices on shoreline properties
(14) No use of lawn products on shoreline properties.
(15) No bank grading or grading of adjacent land.
(15) No additional 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 buffer in undisturbed condition for wildlife habitat, fish use and water quality protection.
(22) Post landing with exotic species alert and educational signs to prevent introduction and/or spread of exotic species.

CRITICAL HABITAT AREA PA3

This 6.7 acre area extends along approximately 2850 feet of the shoreline. Sediment includes marl, muck, peat, sand, silt and mixtures thereof. 6.7% of the shore is wooded; 5% has shrubs; 85% is native herbaceous cover—the remaining is cultivated lawn. Large woody cover is present in shallow water for fish and wildlife cover. Scenic beauty in part of the area is lessened due to the human impact of development.

This area does provide spawning and nursery areas for many types of fish: northern pike, largemouth bass, bluegill, pumpkinseed, yellow perch, crappie, bullhead, and other panfish. All of these fish also feed and take cover in these areas. No exotic fish or wildlife were noted in PA3, i.e, no carp, smelt or rusty crayfish were seen.

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

Maximum rooting depth in PA3 was 7 feet. No threatened or endangered species were found in this area. The plant-like algae, *Chara spp,* and filamentous algae were present in area PA3. The only emergent species found in this area is *Scirpus* (bulrush). White water lily, a floating-leaf rooted plant, was present here. Floating-leaf plants provide cover for fish and invertebrates. *Potamogeton crispus* was common here. Another exotic invasive, *Myriophyllum spicatum* (Eurasian watermilfoil), was previously found in this area.

The remaining aquatic vegetation was submergent: *Najas guadelupensis, Potamogeton amplifolius, Potamgeton gramineus, Potamogeton illinoensis* and *Potamogeton praelongus.* Such a submergent community provides many benefits.

Many of these plants are used by wildlife and fish for multiple purposes (see Table 3). 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 3: Aquatic Plant Benefits in PA3

	Fish	Water Fowl	Shore Birds	Upland Birds	Muskrat	Beaver
Najas spp	F,C,I	F	F	F	F	
Nymphaea odorata	F,I,C,S	F	F		F	F
Potamogeton spp	F,I,C.S	F,I	F		F	F

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

Photo of Area PA3

RECOMMENDATIONS FOR PA3

(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 wildlife corridor in some areas and increase corridor in more developed areas.
(7) Establish shore buffers of native vegetation in areas now in cultivated lawn.
(8) Maintain no-wake zone.
(9) Protect emergent vegetation.
(10) Removal of submergent vegetation only and only for navigation in narrow channels.
(11) Seasonal control of Curly-Leaf Pondweed and Eurasian Watermilfoil.
(12) No use of chemicals for control of native vegetation.
(13) Minimize aquatic plant and shore plant removal by limiting removal to 30' wide access/viewing corridor. Leave as much vegetation as possible to protect water quality and habitat.
(14) Use best management practices in undeveloped areas on shoreline properties.
(15) No use of lawn products on shoreline properties.
(16) No bank grading or grading of adjacent land.
(17) No additional pier construction or other activity except by permit using a case-by-case evaluation.
(18) No installation of pea gravel or sand blankets.
(19) No bank restoration unless the erosion index scores moderate or high. Enforce 30'per 100' of shorefront for access corridor regulations.
(20) Where erosion index scores moderate or high, bank restoration only using biologs or similar bioengineering -- no use of riprap or retaining walls.
(21) Placement of swimming rafts or other recreational floating devices only by permit.
(22) Maintain buffer of shoreline vegetation where there is currently a buffer.
(23) Maintain aquatic vegetation buffer in undisturbed condition for wildlife habitat, fish use and water quality protection.
(24) Post "exotics alert" sign at boat ramp.

Surface Watershed Map