CRITICAL HABITAT DESIGNATION REPORT
FRIENDSHIP LAKE
ADAMS COUNTY, WI

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Wisconsin Department of Natural Resources

CRITICAL HABITAT DESIGNATION
Friendship 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 shore area plant community, often by buffers of native vegetation that absorb or filter nutrient & stormwater runoff, prevent shore erosion, maintain water temperature and provide important native habitat. Buffers can serve not only as habitats themselves, but may also provide corridors for species moving along the shore.

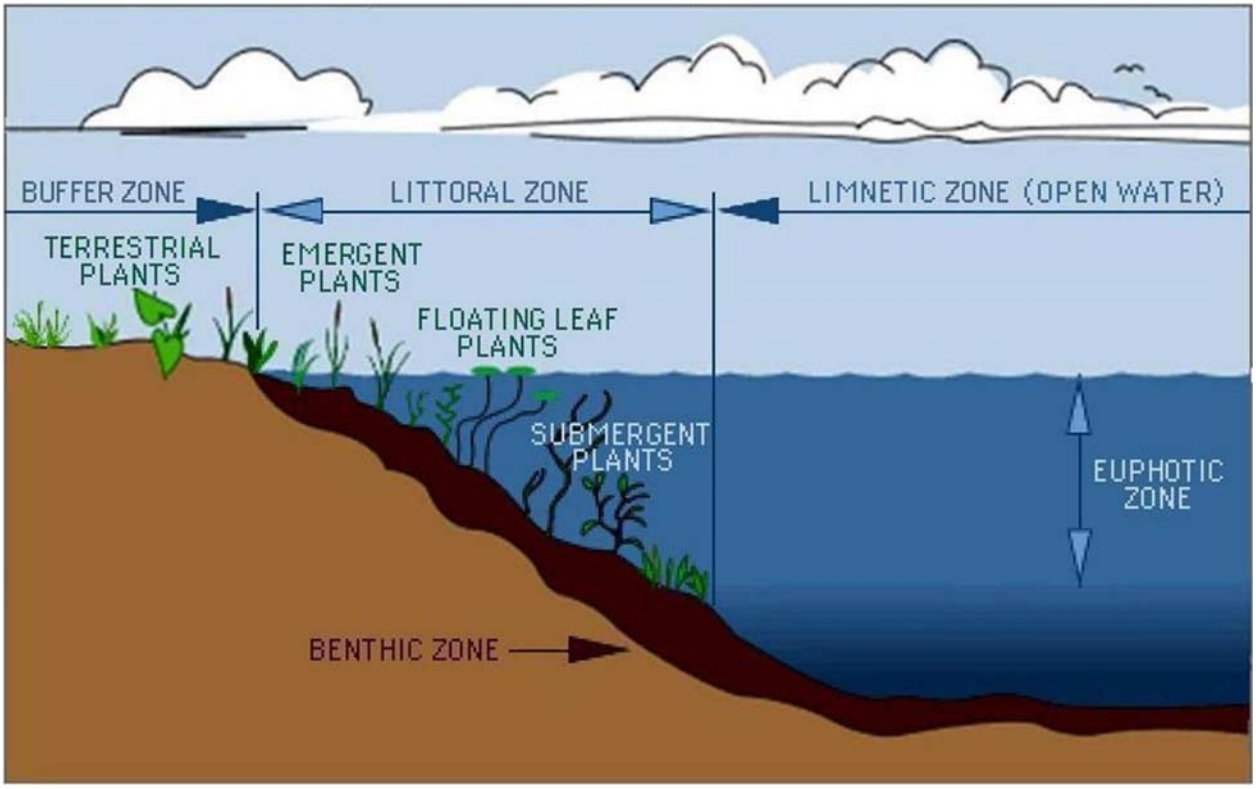
Besides protecting the landward shore areas, preserving the littoral (shallow) zone and its plant communities not only provides essential habitat for fish, wildlife, and the invertebrates that feed on them, but also provides further erosion protection and water quality protection.

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; free-floating; rooted floating-leaf; and submergent.

II. FRIENDSHIP LAKE IN BRIEF

Friendship Lake is a mesotrophic/oliogotrophic impoundment with good to very good water quality and very good water clarity. It has 115 surface acres, with a maximum depth of 16 feet and an average depth of 5.5 feet. The lake is created by the damming of Little Roche a Cri Creek and is fed by a large stream system that extends into the next county eastward. The dam is privately owned and generates a small amount of electricity, which is sold to a power company.

Lake Area of record : 115 acres (with 0.8 acres of islands) given on Sept., 1965 map.
Actual Lake Area : 123 acres (using 2005 DOP and same upstream extent)
Lake Type : Impoundment
Lake Surface Elevation : 936 Ft (USGS 1979 Topographic Map)
Mean Depth : 5.5 feet
Maximum Depth : 16 feet
Shoreline Length : 5.9 miles of shoreline (1965 survey and 2005 DOP confirms)
3.21 miles of shoreline west of 11th Ave. crossing
2.69 miles of shoreline east of 11th Ave. crossing incl. islands
Lake Volume : 680.6 acre feet computed Sept., 1965
79.6% of total volume is west of 11th Ave. crossing (Trombly)
20.4% of total volume is east of 11th Ave. crossing (Trombly)
Maximum Rooting Depth : 13 ft. in FR3, July, 2005 aquatic plant survey



Field work for critical habitat area designations was performed on September 19, 2006, on Friendship Lake, Adams County. The designation team was assisted by aquatic plant and shoreline assessment data collected in July, 2005. Potential areas were identified visually, with GPS readings and digital photos providing additional information.

The designation team included:

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

Additional input from:

Terence Kafka, DNR Water Regulation
James Keir, DNR Wildlife Biologist
Buzz Sorge, DNR Lakes Manager
Neil Trombly, DNR Water Resources Specialist (Copy edit / statistics / maps.)

II. CRITICALHABITAT AREA CRITERIA

All the critical habitat areas on Friendship 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 Friendship 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.

Maps of the designated critical habitat areas on Friendship Lake follow on the next pages. (CHD 1, 2, 3 on the maps are the same as FR1, FR2, FR3 in text.)

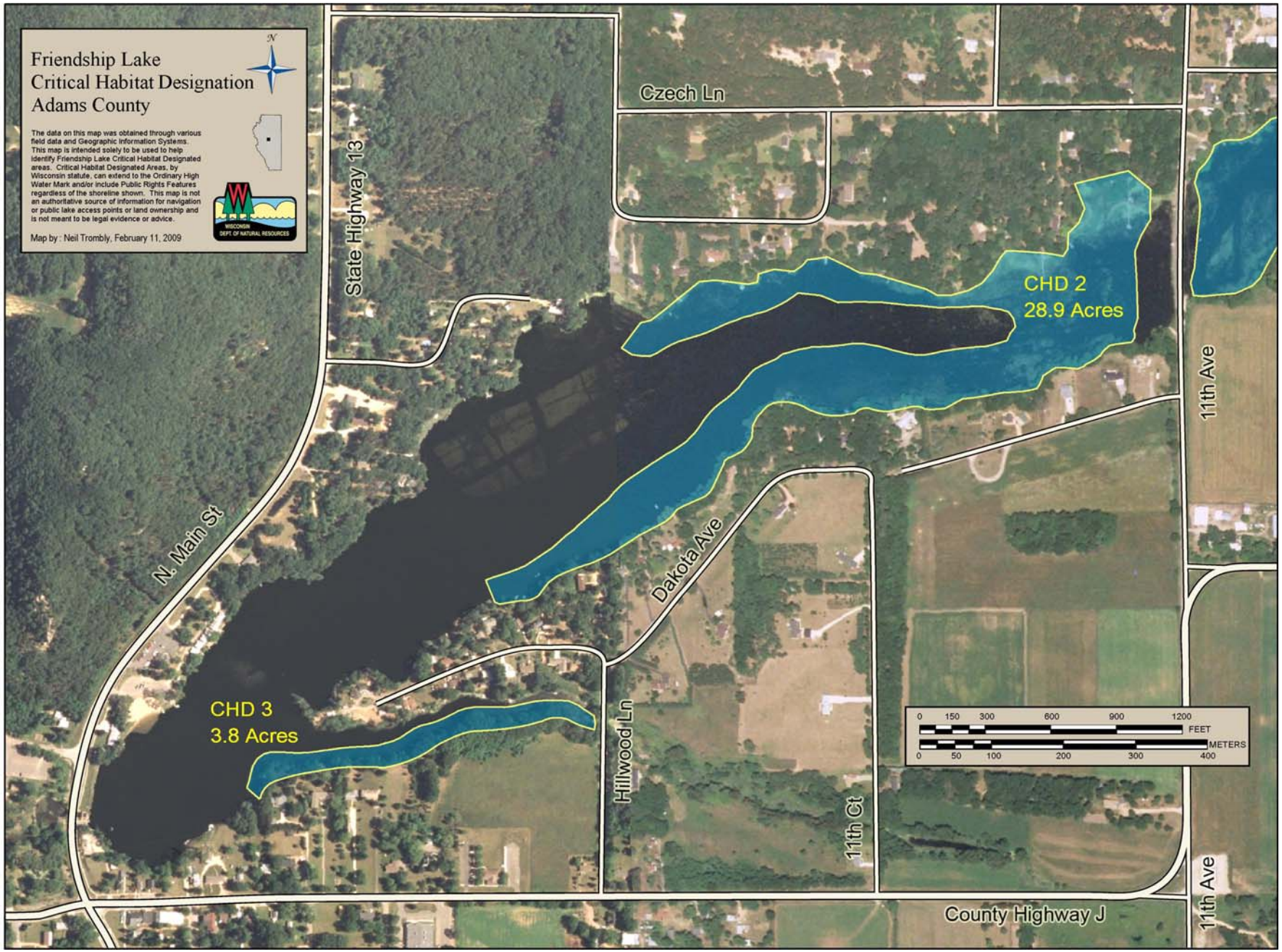
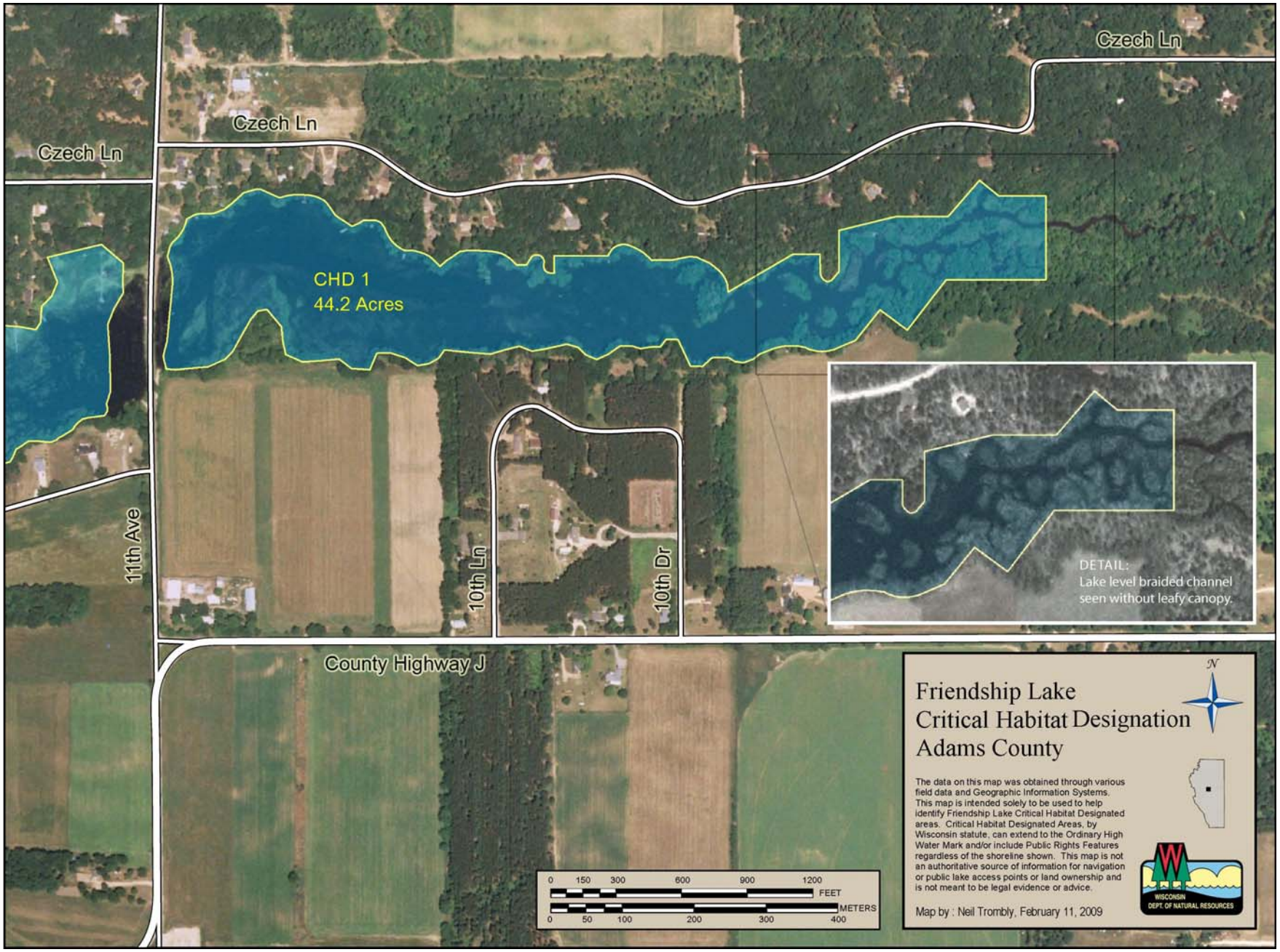


Figure 3. Critical Habitat Designated Areas (Detail West)

Figure 4. Critical Habitat Designated Areas (Detail East)



Critical Habitat Area FR1

This area extends along over 6000 feet of the shoreline on both sides of the eastern end of Friendship Lake. Sediment is muck. This area of Friendship Lake is very shallow and is largely undeveloped. 46.7% of the shore is wooded; 21.7% has shrubs; the remaining shore (31.6%) is native herbaceous cover. Much of this area is a marsh. Large woody cover is common for habitat. With little human disturbance along this shoreline, the area has natural scenic beauty.

Filamentous algae were found at 100% of the sites in this critical habitat area.

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; bluegill; pumpkinseed; yellow perch;

crappie; bullhead; and other panfish. All of these fish also feed and take cover in these areas. Rusty crayfish, an exotic invasive species, is known to occur in Friendship Lake, although none were seen during the field survey for this report.


Middle North Area of FR1

Beaver, muskrat, mink and otter are known to use this habitat for cover, reproduction and feeding. Seen during the field survey were 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 in this area, as well as nested and fed in this area. Upland wildlife feed and nest here as well. Since human disturbance is especially light in FR1, it provides excellent habitat for many types of wildlife.

Maximum rooting depth of aquatic vegetation in FR1 was 5 feet. Several types of emergent aquatic plants occurred in this area: *Asclepias incarnata* (Swamp Milkweed); *Calamagrostis* (Canada Bluejoint Grass); *Carex spp* (Sedges); *Cornus amomum* (Silky Dogwood); *Iris versicolor* (Blue-Flag Iris); *Leerisa oryzoides* (Rice Cutgrass); *Phalaris arundinacea* (Reed Canarygrass, an invasive); *Salix spp* (Willow); and *Scirpus spp* (Bulrush). Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Free-floating plants included *Lemna minor* (Small Duckweed), *Spirodela polyrhiza* (Great Duckweed) and *Wolffia columbiana* (Watermeal). *Nymphaea odorata* (White Water Lily) was the rooted floating-leaf plant found. Floating-leaf vegetation provides cover and dampens waves, protecting the shore. Submergents present were *Ceratophyllum demersum* (Coontail); *Elodea canadensis* (Waterweed); *Myriophyllum spicatum* (Eurasian Watermilfoil, an invasive); *Najas flexilis* (Bushy Pondweed); *Potamogeton amplifolius* (Large-Leaf Pondweed); *Potamogeton natans* (Floating-Leaf pondweed); *Potamogeton pectinatus* (Sago Pondweed); *Potamogeton zosteriformis* (Flat-Stem Pondweed); *Ranunculus* spp (Water Buttercup); *Vallisneria americana* (Water Celery); and *Zosterella dubia* (Water Stargrass). A diverse submergent community provides many benefits.

Two exotic invasive plants were found in this area: *Myriophyllum spicatum* and *Phalaris arundinacea*. 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

	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		
Elodea canadensis	C,I	F,I			F		
Iris versicolor	C,I	F,I,C		C	F		
Leersia oryzoides		F,I,C			F		
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		
Nymphaea odoratoa	F,I,C,S	F	F		F	F	
Phalaris arundinacea		C					
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	
Utricularia spp	F,I,C,S						
Vallisneria americana	F,I,C	F,I	F,I		F	F	F
Wolffia columbiana	F,I,C	F	F		F	F	
Zosterella dubia	F,I,C	F					

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

RECOMMENDATIONS FOR AREA FR1

(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) Make area a no-wake zone. Seek town assistance if necessary to gain this designation..
(9) Protect emergent vegetation.
(10) Seasonal control of Eurasian Water Milfoil, using methods selective for exotics.
(11) Minimize aquatic plant and shore plant removal to maximum 30' wide viewing/access corridor and/or for navigation purposes. Leave as much vegetation as possible to protect water quality and habitat.
(12) Use forestry best management practices.
(13) Consider purchase of conservation easement to protect most of this area, which is currently not developed.
(14) Identify watershed sources of nutrient input and investigate feasibility of reducing them.
(15) No use of lawn products.
(16) No bank grading or grading of adjacent land.
(17) No additional pier placement, boat landings, development or other shoreline disturbance in the shore area of the wetland corridor.
(18) No additional pier construction or other activity except by permit using a case-by-case evaluation and using light-penetrating material.
(19) No installation of pea gravel or sand blankets.
(20) No bank restoration unless the erosion index scores moderate or high.
(21) 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.
(22) Placement of swimming rafts or other recreational floating devices only by permit.
(23) Maintain buffer of shoreline vegetation.
(24) Maintain aquatic vegetation in undisturbed condition for wildlife habitat, fish use and water quality protection.
(25) Post exotic vegetation and crayfish information at boat ramp.

Critical Habitat Area FR2

This area extends along approximately 5000 feet of the north and south shoreline in the middle of the lake's length. Sediment includes muck, sand and silt. 35% of the shore is wooded; 14% has shrubs; 38% is native herbaceous cover. The remaining shoreline is bare/eroded sand and some hard structures. Large woody cover is common for habitat. With minimal human disturbance along this shoreline, some of the area is has natural scenic beauty.

Part of North Shore of FR2

Northeast Shore of FR2

Southeast Corner of FR2

This area of commonly-occurring 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; and other panfish. All of these fish also feed and take cover in these areas. Rusty crayfish are known to occur in Friendship Lake, although none were seen during the field survey. Some shore development was present in FR2.

Seen during the field survey were various types of waterfowl and songbirds. Frogs were heard. 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 in this area, as well as nested and fed in this area. Upland wildlife feed and nest here as well. It appeared that all these took cover or shelter in this area, as well as nested and fed in this area. Muskrat and mink are known to use this area. Downed logs serving as habitat were also seen

Maximum rooting depth in FR2 was 10 feet. No threatened or endangered species were found in this area. Two exotic invasives, *Myriophyllum spicatum* (Eurasian watermilfoil) and *Phalaris arundinacea* (Reed Canarygrass) were found in this area. Filamentous algae occurred at most sites, especially near the shores. The following emergent vegetation was present in this area: *Ascelpias; Calamagrostis; Carex; Cornus; Iris; Salix;* and *Scirpus*. Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

One floating-leaf rooted plant, *Nymphaea odorata,* was found here. Floating-leaf vegetation provides cover and dampens waves, protecting the shore. Three free-floating plants were present: *Lemna minor; Spirodela polyrhiza;* and *Wolffia Columbiana.* All of these are used for cover and food by fish and wildlife. The remaining aquatic plants were submergent: *Ceratophyllum demersum, Elodea canadensis, Myriophyllum spicatum, Najas flexilis, Potamogeton amplifolius*, *Potamogeton natans, Potamogeton pectinatus, Potamogeton zosteriformis, Vallisneria americana,* and *Zosterella dubia.* Such a submergent community provides many benefits.

Most of these plants are used by wildlife and fish for multiple purposes (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				
Ceratophyllum demersum	F,I,C,S	F,I,C			F		
Elodea canadensis	C,I	F,I			F		
Iris versicolor	C,I	F,I,C		C	F		
Leersia oryzoides		F,I,C			F		
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		
Nymphaea odoratoa	F,I,C,S	F	F		F	F	
Phalaris arundinacea		C					
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	
Vallisneria americana	F,I,C	F,I	F,I		F	F	F
Wolffia columbiana	F,I,C	F	F		F	F	
Zosterella dubia	F,I,C	F					

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

RECOMMENDATIONS FOR FR2

(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) Designate area along the shores as no-wake zones.
(9) Protect emergent vegetation.

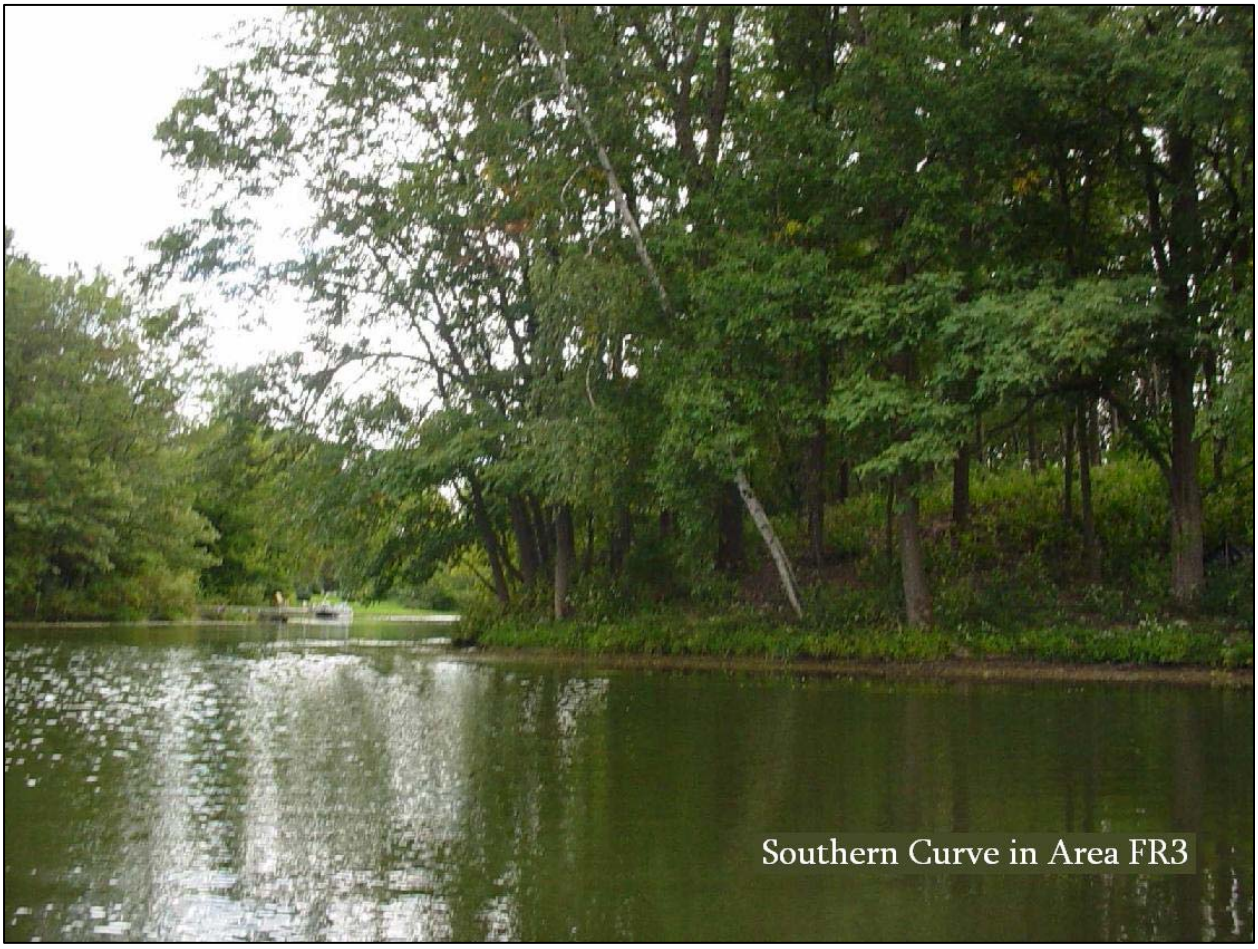
(10) Seasonal control of Eurasian Water Milfoil. Use target machine harvesting to achieve this goal. More information is contained in the aquatic plant report and the Friendship Lake Management Plan.
(11) Minimize aquatic plant and shore plant removal to maximum 30' wide
(12) Use forestry best management practices.
(13) 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 material.
(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 exotic vegetation and crayfish information at boat ramp.

CRITICAL HABITAT AREA FR3

This area extends along approximately 2100 feet of the southwest shoreline. Sediment includes muck, peat, and sand. 47.5% of the shore is wooded; 5% has shrubs; 15% is native herbaceous cover—the remaining shore is bare sand and hard structure. This critical habitat area includes some of most developed area of Friendship Lake, although the southeast side of this area is currently undeveloped. Large woody cover is present, but not as much as in the other two critical habitat areas. Scenic beauty in part of the area is lessened on the north and southwest sides due to the human development, but the southeast area of this site is still pretty.

This area does still 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. Rusty crayfish are known to inhabit Friendship Lake.

Seen during the field survey were 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 in this area, as well as nested and fed in this area. Upland wildlife feed and nest here as well. FR3 has some of the most human disturbance of the Friendship Lake shore, but it still provides some habitat for many types of wildlife.



Southern Curve in Area FR3

Maximum rooting depth in FR3 was 13 feet. No threatened or endangered species were found in this area. Much of the area had filamentous algae, especially near the shores. The only emergent plant found in this area was *Cornus* (dogwood). Two floating-leaf rooted plants, *Nuphar variegata* and *Nymphaea odorata*, were present. Floating-leaf vegetation provides cover and dampens waves, protecting the shore. Also present were three free-floating plants: *Lemna minor, Spirodela polyrhiza* and *Wolffia columbiana.*

The remaining plants were submergent: *Ceratophyllum demersum, Elodea canadensis, Najas flexilis, Potamogeton zosteriformis, Vallisneria americana* and *Zosterella dubia.* This is a less diverse submergent community than the other critical habitat sites in Friendship Lake.

Most 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 some diversity of structure and species that supports some diversity of fish and wildlife.

Table 3: Aquatic Plant Benefits

	Fish	Water Fowl	Shore Birds	Upland Birds	Muskrat	Beaver	Deer
Ceratophyllum demersum	F,I,C,S	F,I,C			F		
Elodea canadensis	C,I	F,I			F		
Leersia oryzoides		F,I,C			F		
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		
Nymphaea odoratoa	F,I,C,S	F	F		F	F	
Potamogeton spp	F,I,C,S	F,I	F		F	F	F
Spirodela polyrhiza	F,I,C,S	F	F		F	F	
Vallisneria americana	F,I,C	F,I	F,I		F	F	F
Wolffia columbiana	F,I,C	F	F		F	F	
Zosterella dubia	F,I,C	F					

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

RECOMMENDATIONS FOR FR3

(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) Designate area close to shore as no-wake zone.
(9) Protect and restore emergent vegetation.
(10) Seasonal control of Eurasian Water Milfoil. Use target machine harvesting to achieve this goal, as outlined in the aquatic plant report and lake management plan.
(11) Minimize aquatic plant and shore plant removal to maximum 30' wide
(16) No additional pier construction or other activity except by permit using a case-by-case evaluation and using light-penetrating material.
(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 exotic vegetation and crayfish information at boat ramp