

***CRITICAL HABITAT DESIGNATION REPORT  
CROOKED LAKE  
ADAMS COUNTY, WI***

***May 24, 2006***



**Submitted by Reesa Evans  
Adams County Land & Water Conservation Department**

**Wisconsin Department of Natural Resources**

## **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 a “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; floating-leaf; rooted floating-leaf; and submergent.

## **II. CROOKED LAKE IN BRIEF**

Crooked Lake is a mesotrophic/oligotrophic seepage lake with good to very good water quality and clarity. It has 48 surface acres, with a maximum depth of 56 feet and a mean depth of 14 feet. Crooked Lake is a designated outstanding waterbody with a forested wetland corridor on the western/southwestern part of the lake that extends over 500' inland from the ordinary high water mark of the lake. As in the case in all seepage lakes, the water level on Crooked Lake fluctuates naturally with the underground water table.

**Lake Area:** 48 acres\*

**Lake Type:** Seepage

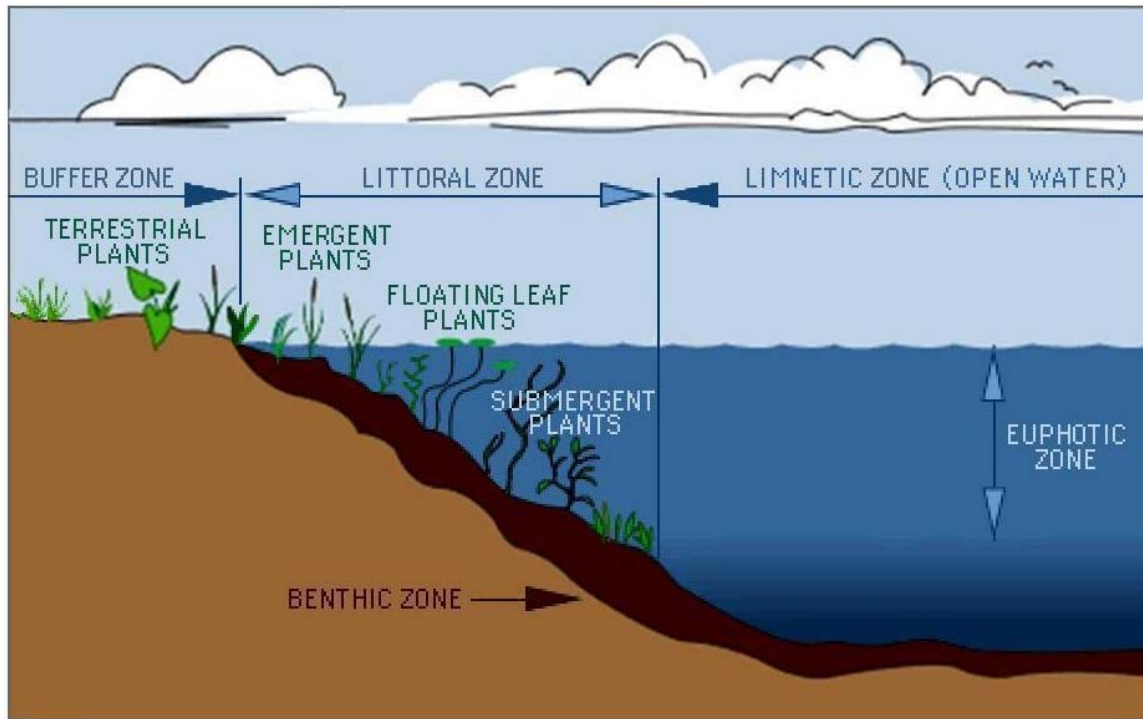
**Maximum Depth:** 56 Feet

**Mean Depth:** 14 Feet

**Miles of Shoreline:** 2.0 Miles (2.2 miles in September 1978, varies with groundwater table)

**Lake Volume:** 656.29 Acre Feet in September 1978 (Lake volume varies with groundwater table.)

\*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.



Field work for a critical habitat area study was performed on May 24, 2006, on Crooked Lake, Adams County. The designations were assisted by aquatic plant and shoreline assessment data collected previously. Areas were identified visually, with GPS readings and digital photos providing additional information.

**The designation team included:**

- Scot Ironside, DNR Fish Biologist
- Terence Kafka, DNR Water Regulation
- James Keir, DNR Wildlife Biologist
- Deborah Konkell, DNR Aquatic Plant Specialist
- Buzz Sorge, DNR Lake Manager
- Reesa Evans, Adams County Land & Water Conservation Department. (author)

**Copy edit:**

- Neil Trombly, DNR Water Resources Specialist

### **III. SENSITIVE AREA CRITERIA**

All the sensitive areas on Crooked 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 Sensitive Areas**

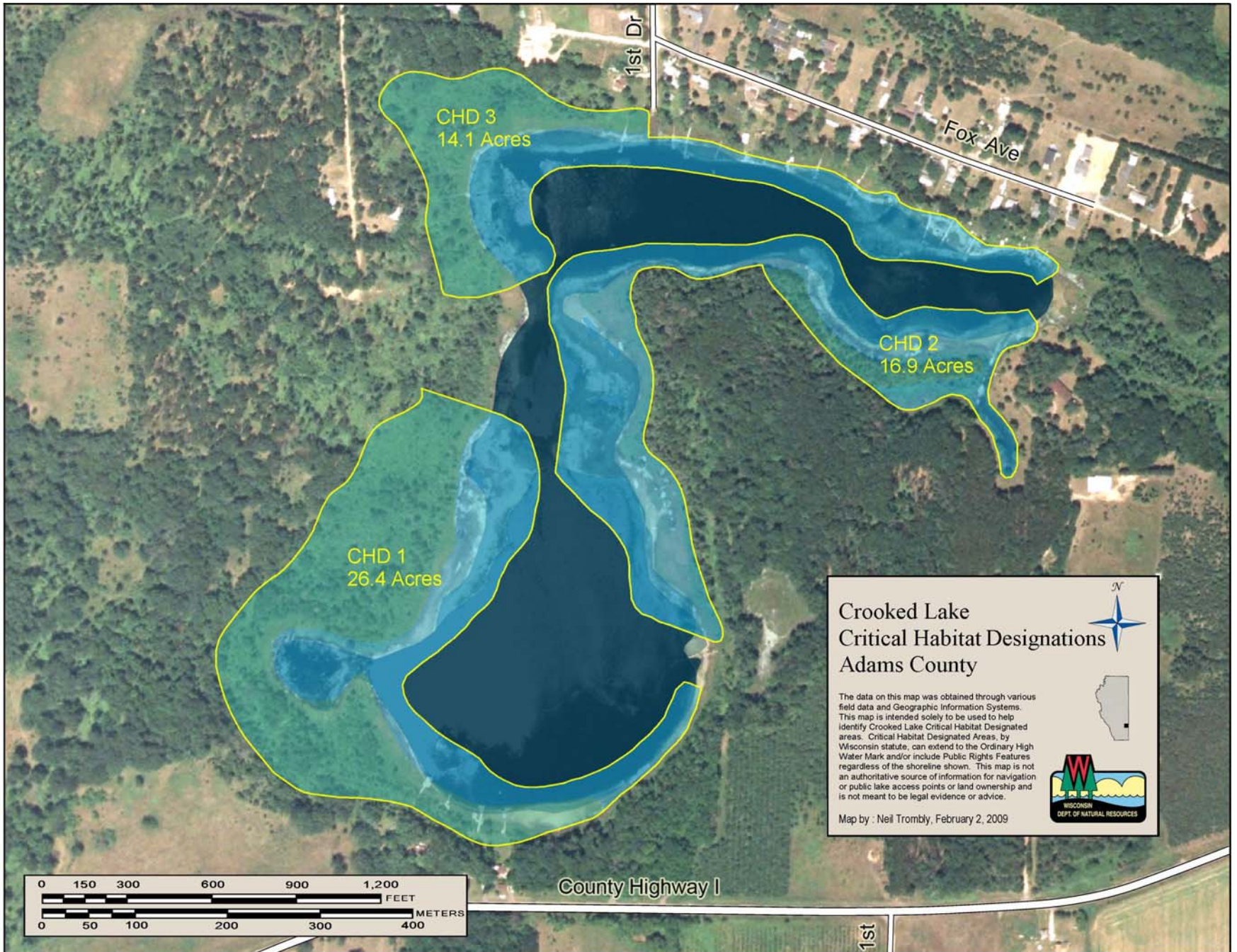
Water Quality: The vegetation at these sites (near and in the water) provide a nutrient buffer that reduces algal growth. Its service as a biological buffer reduces the opportunities for invasions by exotics. The physical buffer the vegetation gives protects against shore erosion and plant fragmentation,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

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

Figure 2. Critical Habitat Designated Areas



## **Sensitive Area CR1**

This area extends along approximately 4200 feet of the shoreline. Sediment includes marl, muck, peat, sand, silt and mixtures thereof. 24% of the shore is wooded; 27% has shrubs; 49% is native herbaceous cover. Several types of wetlands are found along this shoreline: shallow marsh; deep marsh; sedge meadow; shrub-carr; and tamarack bog. Large woody cover is common for habitat. With virtually no human disturbance along this shoreline, the area has natural scenic beauty.

### **SEDGE MEADOW in CR1**





Tamarack Swamp in CR1



Shallow Marsh in CR1



One threatened aquatic species, *Eleocharis quadrangulata*, was found along this sensitive area. Filamentous algae was found at just over 21% of the sites in this sensitive 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; 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.

A beaver lodge in the area suggested beaver use CR1. Muskrat and mink are also known to use this habitat for cover, reproduction and feeding. Seen during the field

survey were various types of waterfowl, songbirds, and turkey. A sandhill crane nesting pair was also noted. 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 CR1, it provides high-quality habitat for many types of wildlife.

Maximum rooting depth of aquatic vegetation in CR1 was 19 feet. Seventeen types of aquatic plants, plus aquatic moss, were found in this sensitive area: three emergents; four floating-leaf or floating-free plants; ten submergent plants. Emergents found were the threatened *Eleocharia quadrangulata*, *Scirpus validus* (soft-stem bulrush), and *Typha latifolia* (narrow-leaf cattail). Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Floating plants included *Lemna minor* (small duckweed) and *Spirodela polyrhiza* (great duckweed). *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. Submergents were *Ceratophyllum demersum* (coontail); *Chara* spp (muskgrass); *Myriophyllum heterophyllum* (variable-leaf milfoil); *Myriophyllum sibiricum* (northern milfoil); *Najas flexilis* (bushy pondweed); *Potamogeton natans* (floating-leaf pondweed); *Potamogeton pectinatus* (Sago pondweed); *Potamogeton zosteriformis* (flat-stem pondweed); *Utricularia gibba* (creeping bladderwort); and *Utricularia vulgaris* (common bladderwort). A diverse submergent community provides many benefits.

No exotic invasive plants were found in this area. 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**

	<u>Fish</u>	<u>Water</u>	<u>Shore</u>	<u>Upland</u>	<u>Muskrat</u>	<u>Beaver</u>	<u>Deer</u>
		<u>Fowl</u>	<u>Birds</u>	<u>Birds</u>			
<i>Ceratophyllum demersum</i>	F,I,C,S	F,I,C			F		
<i>Chara</i>	F,S	F,I,C					
<i>Eleocharis quadrangulata</i>	F,I,C,S	F,I,C	F,C		F	F	
<i>Lemna minor</i>	F,I,C,S	F	F		F	F	
<i>Myriophyllum heterophyllum</i>	F,I,C,S	F,I	F		F		
<i>Myriophyllum sibiricum</i>	F,I,C,S	F,I	F		F		
<i>Najas flexilis</i>	F,C	F	F				
<i>Nuphar variegataa</i>	F,I,C,S	F	F		F	F	F
<i>Nymphaea odoratoa</i>	F,I,C,S	F	F		F	F	
<i>Potamogeton natans</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton pectinatus</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton zosteriformis</i>	F,I,C,S	F,I	F		F	F	F
<i>Scirpus validus</i>	F,C,I	F,C	F,C,N	F	F	F	F
<i>Typha latifolia</i>	I,C,S	F	F,C,N		F,C,N	F	
<i>Spirodela polyrhiza</i>	F,I,C,S	F	F		F	F	
<i>Utricularia gibba</i>	F,I,C,S						
<i>Utricularia vulgaris</i>	F,I,C,S						

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

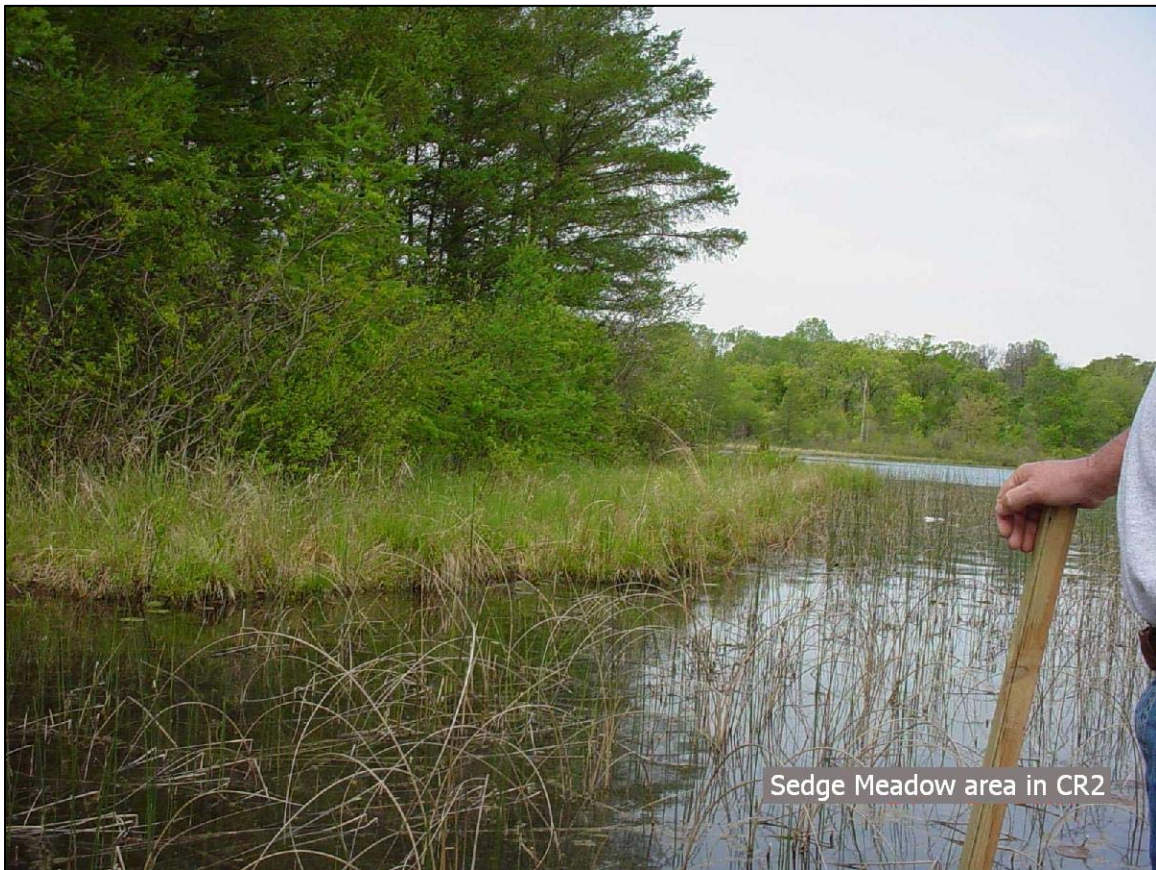


## **RECOMMENDATIONS FOR AREA CR1**

- (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) Leave nest boxes.
- (7) Maintain or increase wildlife corridor.
- (8) Maintain no-wake zone.
- (9) Protect emergent vegetation, especially *Eleocharis quadrangulata*.
- (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.
- (14) No bank grading or grading of adjacent land.
- (15) No pier placement, boat landings, development or other shoreline disturbance in the shore area of the wetland corridor.
- (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 buffer in undisturbed condition for wildlife habitat, fish use and water quality protection.

## **Sensitive Area CR2**

This area extends along approximately 2900 feet of the shoreline. Sediment includes marl, peat, silt and mixtures thereof. 40% of the shore is wooded; 10% has shrubs; 50% is native herbaceous cover. Sedge meadow and tamarack bog wetlands are found along this shoreline. Large woody cover is abundant for habitat. With little human disturbance along this shoreline, the area is has natural scenic beauty.



**SEDGE MEADOW AREA IN CR2**



Photo of CR2



Tamarack Bog at CR2

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 CR2.

Seen during the field survey were various types of waterfowl, songbirds, and turkey. A sandhill crane nesting pair was also noted. Frogs were heard. Turtles and snakes were seen along this area. It appeared that all these took cover or shelter in this area, as well as nested and fed in this area. Downed logs serving as habitat were also seen. Muskrat and mink are known to use CR2 for cover, reproduction and feeding. 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 relatively light in CR2, it provides high-quality habitat for many types of wildlife.

Maximum rooting depth in CR2 was 18 feet. No threatened or endangered species were found in this area. One exotic invasive, *Myriophyllum spicatum* (Eurasian watermilfoil), was found in this area. About 1/3 of the area has filamentous algae, especially near the shores. Of the eighteen aquatic plant species found here, three were emergent: *Eleocharis palustris* (creeping spikerush), *Scirpus validus* and *Typha latifolia*. Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Two were floating-leaf rooted plants: *Nuphar variegata* and *Nymphaea odorata*. Floating-leaf vegetation provides cover and dampens waves, protecting the shore. The remaining thirteen were submergent: *Ceratophyllum demersum*, *Chara*, *Myriophyllum heterophyllum*, *Myriophyllum sibiricum*, *Myriophyllum spicatum*, *Najas flexilis*, *Potamogeton gramineus* (grass-leaved pondweed), *Potamogeton illinoensis* (Illinois pondweed), *Potamogeton natans*, *Potamogeton pectinatus*, *Potamogeton zosteriformis*, *Utricularia gibba*, *Utricularia vulgaris*. Such a diverse 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 CR2**

	<b>Fish</b>	<b>Water</b>	<b>Shore</b>	<b>Upland</b>	<b>Muskrat</b>	<b>Beaver</b>	<b>Deer</b>
		<b>Fowl</b>	<b>Birds</b>	<b>Birds</b>			
<i>Ceratophyllum demersum</i>	F,I,C,S	F,I,C			F		
<i>Chara</i>	F,S	F,I,C					
<i>Eleocharis palustris</i>	F,I,C,S	F,I,C	F,C		F	F	
<i>Myriophyllum heterophyllum</i>	F,I,C,S	F,I	F		F		
<i>Myriophyllum sibiricum</i>	F,I,C,S	F,I	F		F		
<i>Najas flexilis</i>	F,C	F	F				
<i>Nuphar variegata</i>	F,I,C,S	F	F		F	F	F
<i>Nymphaea odorata</i>	F,I,C,S	F	F		F	F	
<i>Potamogeton gramineus</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton illinoensis</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton natans</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton pectinatus</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton richardsonii</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton zosteriformis</i>	F,I,C,S	F,I	F		F	F	F
<i>Scirpus validus</i>	F,C,I	F,C	F,C,N	F	F	F	F
<i>Typha latifolia</i>	I,C,S	F	F,C,N		F,C,N	F	
<i>Utricularia gibba</i>	F,I,C,S						
<i>Utricularia vulgaris</i>	F,I,C,S						

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





## **RECOMMENDATIONS FOR CR2**

- (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.
- (10) Seasonal control of Eurasian Watermilfoil.
- (11) 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.
- (12) Use forestry best management practices.
- (13) No use of lawn products.
- (14) No bank grading or grading of adjacent land.
- (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 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.

### Sensitive Area CR3

This area extends along approximately 3300 feet of the shoreline. Sediment includes marl, muck, peat, sand, silt and mixtures thereof. 7% of the shore is wooded; 20% has shrubs; 57% is native herbaceous cover—the remaining 21% is cultivated lawn. This sensitive area includes the most developed area of Crooked Lake. However, there are areas of wetlands: shallow marsh; sedge meadow; conifer swamp. Large woody cover is present, but not as much as in the other two sensitive areas. Scenic beauty in part of the area is lessened due to the human development.

Most development in this area has been carried out so as to preserve habitat and minimize negative human impact.



This area does still provide 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.

Seen during the field survey were various types of waterfowl, shorebirds including a green heron, and songbirds. Muskrat and mink are also known to use this habitat for cover, reproduction and feeding. Seen during the field survey were various types of waterfowl and songbirds. A sandhill crane nesting pair was also noted, as was a green heron. 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. CR3 has the most human disturbance of all the Crooked Lake shore, but it still provides high-quality habitat for many types of wildlife.



Spawning Area in CR3

Maximum rooting depth in CR3 was 18 feet. No threatened or endangered species were found in this area. One exotic invasive, *Myriophyllum spicatum* (Eurasian watermilfoil), was found in this area. 45% of the area has filamentous algae, especially near the shores. Of the seventeen aquatic plant species found here, four were emergent: *Carex* spp (unknown sedge/sedges), *Potentilla palustris* (marsh cinquefoil), *Scirpus validus* and *Typha latifolia*. Emergents provide important fish habitat and spawning areas, as well as food and cover for wildlife.

Two species were floating-leaf rooted plants: *Nuphar variegata* and *Nymphaea odorata*; one was a free-floating plant: *Spirodela polyrhiz*. Floating-leaf vegetation provides cover and dampens waves, protecting the shore. The other ten were submergent: *Ceratophyllum demersum*, *Chara*, *Myriophyllum heterophyllum*, *Myriophyllum sibiricum*, *Myriophyllum spicatum*, *Najas flexilis*, *Potamogeton illinoensis* (Illinois pondweed), *Potamogeton natans*, *Utricularia gibba*, *Utricularia vulgaris*. Such a diverse submergent community provides many benefits.

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

**Table 3: Aquatic Plant Benefits for CR3**

	<u>Fish</u>	<u>Water</u>	<u>Shore</u>	<u>Upland</u>	<u>Muskrat</u>	<u>Beaver</u>	<u>Deer</u>
		<u>Fowl</u>	<u>Birds</u>	<u>Birds</u>			
<i>Carex</i> spp	I,C,S	F	F	F	F	F	F
<i>Ceratophyllum demersum</i>	F,I,C,S	F,I,C			F		
<i>Chara</i>	F,S	F,I,C					
<i>Myriophyllum heterophyllum</i>	F,I,C,S	F,I	F		F		
<i>Myriophyllum sibiricum</i>	F,I,C,S	F,I	F		F		
<i>Myriophyllum spicatum</i>	F,I,C,S	F,I	F		F		
<i>Najas flexilis</i>	F,C	F	F				
<i>Nuphar variegata</i>	F,I,C,S	F	F		F	F	F
<i>Nymphaea odorata</i>	F,I,C,S	F	F		F	F	
<i>Potentilla palustris</i>	I,C	F	F	F			
<i>Potamogeton illinoensis</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton natans</i>	F,I,C,S	F,I	F		F	F	F
<i>Scirpus validus</i>	F,C,I	F,C	F,C,N	F	F	F	F
<i>Typha latifolia</i>	I,C,S	F	F,C,N		F,C,N	F	
<i>Spirodela polyrhiza</i>	F,I,C,S	F	F		F	F	
<i>Utricularia gibba</i>	F,I,C,S						
<i>Utricularia vulgaris</i>	F,I,C,S						

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



West Side of CR3  
In Less Developed Area



East End of CR3

## RECOMMENDATIONS FOR CR3

- (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 in more developed areas.
- (7) Establish shore buffers of native vegetation in areas now in cultivated lawn.
- (8) Maintain buffer of shoreline vegetation where there is currently a buffer.
- (9) Protect emergent vegetation.
- (10) Removal of submergent vegetation only and only for navigation.
- (11) Seasonal control of Eurasian Watermilfoil.
- (12) 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.
- (13) Enforce 30' per 100' of shorefront for access corridor regulations.
- (14) Reestablish aquatic vegetation in water areas where it has been cleared, except for the 30' per 100' front of shoreline for each property.
- (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) Use forestry best management practices in undeveloped areas.
- (19) No bank restoration unless the erosion index scores moderate or high.
- (20) 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.
- (21) Placement of swimming rafts or other recreational floating devices only by permit.
- (22) Maintain no-wake zone.
- (23) Maintain aquatic vegetation buffer in undisturbed condition for wildlife habitat, fish use, erosion mitigation and water quality protection.
- (24) No use of lawn products.
- (25) Post "exotics alert" sign at boat ramp.