

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

***December, 2006***



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**Wisconsin Department of Natural Resources**

# **CRITICAL HABITAT DESIGNATION**

## **For Deep Lake, Adams County 2006**

### **I. INTRODUCTION**

Designation of critical habitats 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 “critical habitats” 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, critical habitats often can provide the peace, serenity and beauty that draw many people to lakes in the first place.

Protection of critical habitats 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 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. DEEP LAKE IN BRIEF

Deep Lake is a mesotrophic/oligotrophic seepage lake whose oval-shaped basin features a steeply-sloping littoral zone as well as steeply sloping banks above the water. This lake of 38 surface acres was formed from prehistoric glacier activity and has a maximum depth of about 50 feet with an average depth of 23 feet. It has good to very good water quality and clarity. As is the case with seepage lakes, the water level in Deep Lake fluctuates naturally in keeping with fluctuations in the groundwater table. The only public access is a steep stairway “carry-in”. There is no public boat ramp, although in the past, the resort owner on the east end allowed access for a fee. That private ramp is blocked off to the public at the time of writing this report.

**Lake Area:** 37.87 acres\* (Previous 1941 finding of 35 acres was not supported by 2005 Digital Ortho Photograph analysis.)

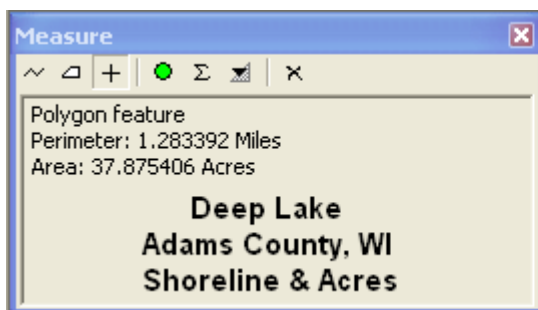
**Lake Type:** Seepage

**Maximum Depth:** 49+ Feet (1941 bathymetry survey)

**Mean Depth:** 23.2 Feet

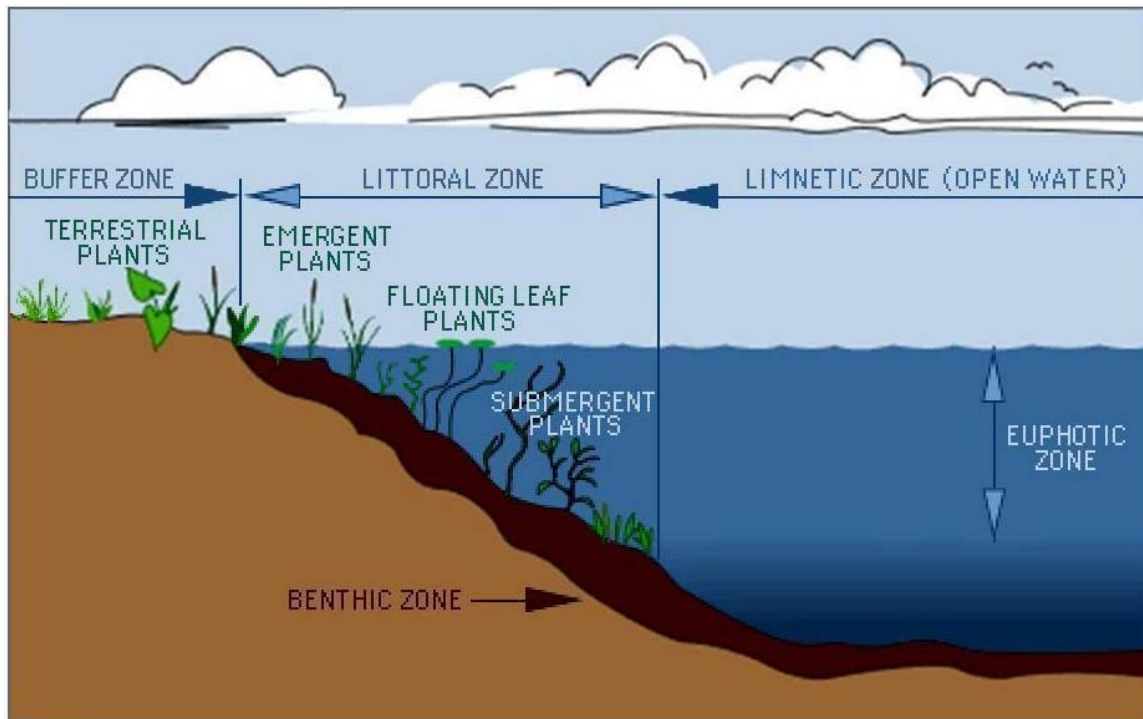
**Miles of Shoreline:** 1.28 Miles (This 1941 data was supported using the 2005 DOP)

**Lake Volume:** 878.54 Acre Feet using a 1941 georectified bathymetry image for subsurface layers and a 2005 digital ortho photo for lake surface area. (Lake volume varies with groundwater table affecting lake level.)



Current data at left shows identical shoreline length as was computed in 1941 so lake area should also be equal. However, the lake area is now shown to be 37.88 acres which does not support the 35.01 acre figure reported in 1941.

\*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 Deep Lake, Adams County. The designations were assisted by aquatic plant and shoreline assessment data collected in August 2005. 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, statistical and GPS data updates:**

Neil Trombly, DNR Water Resources Specialist

### **III. CRITICAL HABITAT CRITERIA**

Both critical habitats on Deep 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 diverse 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 habitats**

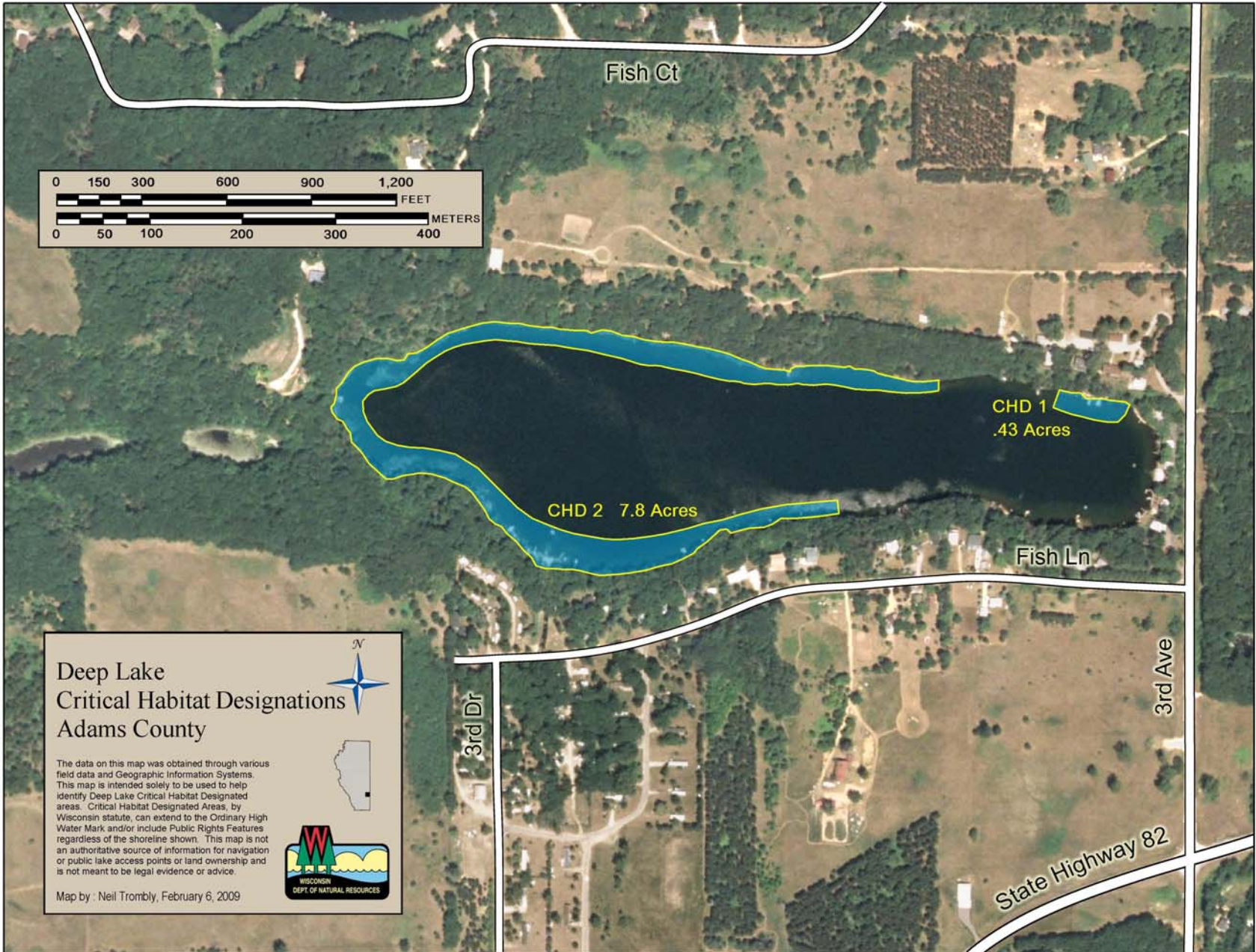
Water Quality: The vegetation at these sites (near and in the water) provides a nutrient buffer that reduces algal growth. It serves as a biological buffer that reduces the opportunities for invasions by exotics. The physical buffer the vegetation gives protects against shore erosion and plant fragmentation, 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 Deep 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 habitats 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 Deep 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 critical habitats on Deep Lake is on the next page.

Figure 2. Critical Habitat Designated Areas



## Critical Habitat DE1

This 0.43 acre area extends along 270 feet of the shoreline. Sediment here is marl and sand. 10% of the shore is wooded; 55% has shrubs; 25% is native herbaceous cover; 5% is rock and 5% is hard structure. Large woody cover is present. This is a small area of the lake between a resort that has a riprap shore and a stairway plus dock structure going to another residence. There are downed trees in the water at this site that provide fish habitat and wildlife structure.



Although small, this area provides large woody cover and submergent vegetation for spawning and nursery of many types of fish: northern pike; largemouth bass; bluegill; pumpkinseed; yellow perch; crappie; bullhead; suckers, and other panfish. All of these fish feed and take cover in areas such as this. No exotic aquatic wildlife was noted in this area, i.e, no carp, smelt or rusty crayfish were seen. Trout are stocked in Deep Lake, but do not spawn in this lake.

Various waterfowl and songbirds were present. Nesting sandhill cranes were seen. Muskrats and various upland wildlife are known to utilize this area. Frogs were heard. Turtles and snakes were observed. It appears that all these creatures find nesting, feeding and shelter aspects of desirable habitat here.

Maximum rooting depth of aquatic vegetation in DE1 was 18.5 feet.

No filamentous algae was found at this site. One emergent exotic invasive was found in this area, *Phalaris arundinacea* (reed canarygrass) which has a low food value because it is difficult to digest and has alkaloids that make it unattractive to wildlife.

Ten other aquatic plants were found in this critical habitat, all submergents: *Ceratophyllum demersum* (coontail); *Chara* spp (muskgrass); *Elodea canadensis* (common waterweed); *Najas guadelupensis* (Southern naiad); *Potamogeton amplifolius* (large-leaf pondweed); *Potamogeton diversifolius* (water-thread pondweed); *Potamogeton foliosus* (leafy pondweed); *Potamogeton pectinatus* (Sago pondweed); *Potamogeton pusillus* (small pondweed); *Potamogeton richardsonii* (clasping-leaf pondweed); *Potamogeton zosteriformis* (flat-stem pondweed). Except for Reed Canarygrass, no emergents, free-floating or rooted floating-leaf plants were found at this site. The diverse submergent community provides many wildlife and fish benefits (see Table 1).



**Table 1: Aquatic Plant Benefits**

	Fish	Water	Shore	Upland	Muskra t	Beaver	Deer
		Fowl	Birds	Birds			
<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>Elodea canadensis</i>	F,I,C	F,I,C			F		
<i>Iris versicolor</i>	F,C,I	F,C	F,C		F	F	
<i>Phalaris arundinacea</i>	C	C					
<i>Potamogeton amplifolius</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton diversifolius</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton foliosus</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 praelongus</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton pusillus</i>	F,I,C,S	F,I			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

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



SHALLOW MARSHY AREA SHOWING EMERGENTS AND EDGE OF DOWNED TREE IN DE1

## **RECOMMENDATIONS FOR AREA DE1**

- (1) Maintain current habitat for fish and wildlife.
- (2) Maintain or increase wildlife corridor.
- (3) Do not remove fallen trees along the shoreline.
- (4) No alteration of littoral zone unless to improve spawning habitat.
- (5) Seasonal protection of spawning habitat.
- (6) Maintain snag/cavity trees for nesting.
- (7) Establish emergent & floating-leaf plants in the area, then protect them for habitat and water quality protection.
- (8) Remove submergent vegetation only and then only for navigation.
- (9) Reduce presence of Reed Canarygrass by establishing native emergents.
- (10) Maintain no-wake zone.
- (11) Minimize aquatic plant and shore plant removal to 30' wide viewing/access corridor.
- (12) Use forestry best management practices.
- (13) No use of lawn products, even uphill from site.
- (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 to protect water quality.
- (21) Maintain aquatic vegetation buffer in undisturbed condition for wildlife habitat, fish use and water quality protection.

## **Critical Habitat DE2**

This 7.8 acre area extends along approximately 4300 feet of the shoreline. Sediment includes marl muck, peat, sand, silt and mixtures thereof. 54% of the shore is wooded; 7% has shrubs; 28% is native herbaceous cover, with 10% rock, 7% hard structure and 3% bare sand. Large woody cover is abundant for habitat. There are shallow marsh areas along many areas of this shoreline. With little human disturbance along this shoreline, the area is scenic.



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 this area. Trout are stocked, but do not maintain their population in Deep Lake. No exotic aquatic wildlife was noted in this area, i.e, no carp, smelt or rusty crayfish were seen. Only a little shore development was present in DE2.

Seen during the field survey were various waterfowl, songbirds, and turkey. A sandhill crane nesting pair was also noted. There is an active great blue heron rookery just off the west end of the lake. Upland wildlife uses this area for shelter, reproduction and feeding, as do frogs, toads and salamanders. 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. Muskrats and mink are also found in DE2, using it for shelter, reproduction and feeding. Downed logs serving as habitat were also seen. Much of the shoreline in DE2 is undeveloped, relatively steep and heavily wooded, all of which results in high wildlife value for many species.



**AREA DE2 SHOWING SNAGS, DOWNED TREES AND FLOATINGLEAF PLANTS**



EXAMPLES OF LARGE WOODY COVER IN DE2



Maximum rooting depth in DE2 was 20 feet.

No threatened or endangered species were found in this area. 29% of the area has filamentous algae, especially near the shores.

One emergent exotic invasive, *Phalaris arundinacea*, was found in this area. Of the 20 aquatic plant species found here, seven were emergent: *Carex* spp (sedges), *Cirsium* spp (thistle), *Eleocharis palustris* (creeping spikerush), *Iris versicolor* (blue-flag iris), *Phalaris arundinacea*, *Scirpus validus* and *Typha latifolia*. Emergents provide important fish habitat and spawning areas, as well as areas for wildlife.

Two plants were floating-leaf rooted plants: *Nuphar variegata* and *Polygonum amphibium* (smartweed). Floating-leaf plants provide cover and dampen waves, protecting the shore.

The remaining eleven species were submergent: *Ceratophyllum demersum*, *Chara*, *Elodea canadensis*, *Myriophyllum sibiricum*, *Najas flexilis*, *Potamogeton amplifolius*, *Potamogeton foliosus* (leafy pondweed), *Potamogeton natans*, *Potamogeton pectinatus*, *Potamogeton praelongus* (white-stemmed pondweed), *Potamogeton richardsonii*, *Potamogeton zosteriformis*. Such a diverse submergent community provides many benefits. All these plants are used for multiple purposes (see Table 2).

Because this site provides three structural types of vegetation, (emergent, floating-leaf and submergent) the community has a diversity of structure and plant species that supports an even greater fish and wildlife diversity.

**Table 2: Aquatic Plant Benefits**

	<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>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>Eleocharis palustris</i>	F,I,C,S	F,I,C	F,C		F	F	
<i>Elodea canadensis</i>	F,I,C	F,I,C			F		
<i>Iris versicolor</i>	F,C,I	F,C	F,C		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	
<i>Phalaris arundinacea</i>	C	C					
<i>Polygonum amphibium</i>	F,I,C,S	F,I	F	F	F	F	F
<i>Potamogeton amplifolius</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton foliosus</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 praelongus</i>	F,I,C,S	F,I	F		F	F	F
<i>Potamogeton pusillus</i>	F,I,C,S	F,I			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	

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



AUTUMN VIEW SHOWING NORTH SHORE AREA OF DE2



## **RECOMMENDATIONS FOR DE2**

- (1) Maintain current habitat for fish and wildlife.
- (2) Maintain wildlife corridor.
- (3) Do not remove fallen trees along the shoreline nor logs in the water.
- (2) No alteration of littoral zone unless to improve spawning habitat.
- (3) Seasonal protection of spawning habitat.
- (4) Maintain snag/cavity trees for nesting.
- (5) Maintain no-wake zone.
- (6) Minimize human development, especially to protect the great blue heron rookery.
- (7) Protect emergent and floating-leaf vegetation for habitat and water quality protection.
- (8) Removal of submergent vegetation only and for navigation only.
- (9) Reduce presence of Reed Canarygrass.
- (9) Minimize aquatic plant and shore plant removal to 30' wide access/viewing corridor.
- (10) Use forestry best management practices.
- (11) No use of lawn products.
- (12) No bank grading or grading of adjacent land.
- (13) No pier construction or other activity except by permit using a case-by-case evaluation.
- (14) No installation of pea gravel or sand blankets.
- (15) No bank restoration unless the erosion index scores moderate or high.
- (16) 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.
- (17) Placement of swimming rafts or other recreational floating devices only by permit.
- (18) Maintain buffer of shoreline vegetation.
- (19) Maintain aquatic vegetation buffer in undisturbed condition for wildlife habitat, fish use and water quality protection.
- (20) Minimize development of shore and steep banks that would increase erosion and decrease water quality.