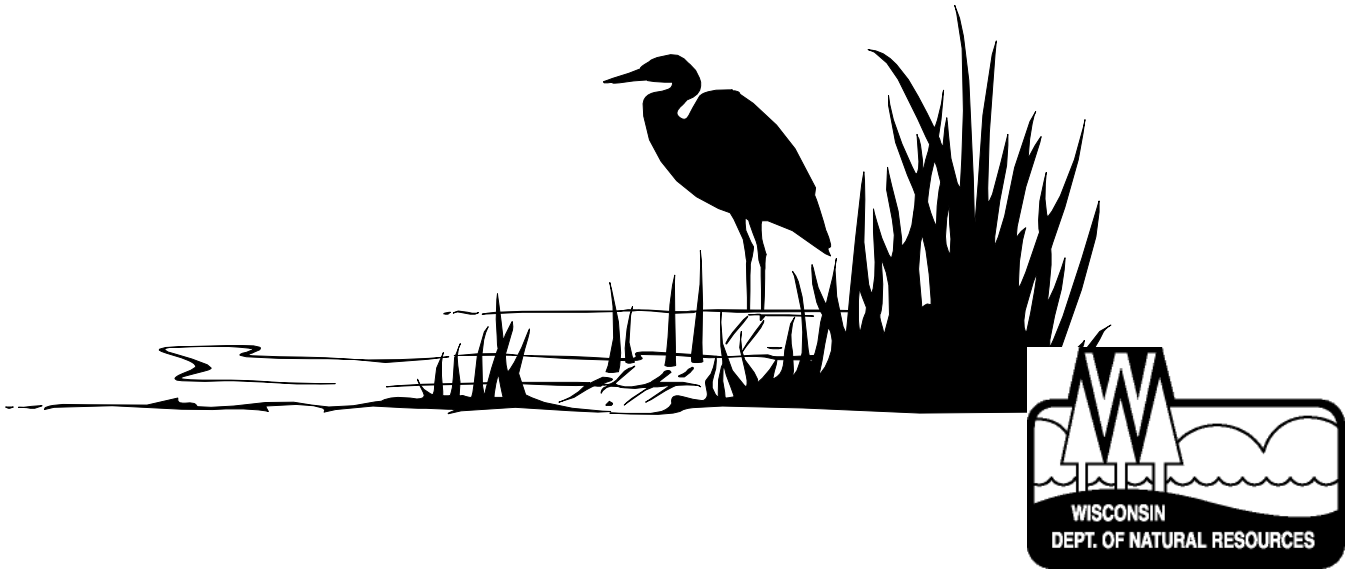
NORTH & SOUTH TWIN LAKES SENSITIVE AREA SURVEY REPORT AND MANAGEMENT GUIDELINES

2002



North & South Twin Lakes, Vilas County, Wisconsin
Integrated Sensitive Area Survey Report

Dates of Survey: August 6 & 27, 2002 Number of Sensitive Areas: North Twin-9
South Twin-3

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General Lake Information:

North Twin Lake in Vilas County, Township 41 North, Range 11 East, Sections 2, 3, 4, 5, 6, 7, 8, 9, 10, 16, 17, and 18 is 2,782 acres with a maximum depth of 45 feet. It is a drainage lake of high fertility, having clear, slightly alkaline water of moderate transparency. Drainage lakes have water coming into them from the surrounding drainage area and have an outlet stream. South Twin Lake in Vilas County, Township 41 North, Range 11 East, Section 18 is 630 acres with a maximum depth of 42 feet. South Twin Lake is a drainage lake of moderate fertility, having clear water of moderate transparency.

Shoreland areas on lakes provide optimum habitat for many species of wildlife. On the uplands, land directly above the water, standing dead and dying trees (snags) provide forage sites for insect eating birds and nest sites for woodpeckers and songbirds. Cavities in trees provide den sites for many species of birds and mammals. Downed and rotting logs (large woody cover) provide homes to many species of wildlife including reptiles and amphibians, small mammals, and invertebrates. To improve habitat for wildlife, snag trees and den trees as well as large woody cover, should be retained. Eagles and ospreys nest along the North and South Twin shorelines and within about a one-half mile of these lakes. The bald eagle is protected under the federal Bald Eagle Act and the federal Endangered Species Act. For those that have an eagle nest on their property, A Management Guide for Landowners is available from Department of Natural Resources wildlife staff. Some of the essential elements of the guidelines are that the nest tree can not be damaged or removed by any new development such as road construction, land clearing, timber cutting, or home

construction. Development should not take place within 300 feet of the nest and should occur between August 15th and March 15th – the period that eagles do not have eggs or young in the nest.

Loons use both North and South Twin Lakes for feeding, but no loon nests were observed during the survey. The shoreline did not appear to lend itself to loon nesting. Merlins, which were seen on North and South Twin Lakes in 2002, are most frequently found in areas with numerous lakes or large lakes. Lakes with a strong conifer component are more likely to have merlins. Merlins do not build their own nest, but nest in old crow stick nests, usually in a conifer. Ospreys, which were also seen on North and South Twin Lakes in 2002, readily nest on manmade nest structures on these lakes (refer to *Appendix B* for osprey and eagle nest sites).

Wildlife habitat on North and South Twin Lakes is best where the shoreline is undeveloped or remains mostly natural. Diverse vegetative layers provide important structure within a forest stand. Some wildlife species occupy the canopy, some the subcanopy, another the sapling layer, and so forth, down through shrubs, tall herbs, short herbs, and ground cover (surface) plants. It is common for landowners to remove many of these vegetative layers destroying food, shelter and cover as well as nesting habitat for birds and wildlife. Additional management recommendations in this report provide a means to continue to maintain and improve habitat for healthy and diverse wildlife populations.

Twenty-four species of aquatic plants were found during the plant reconnaissance on North and South Twin Lakes. A more thorough plant survey would likely reveal some additional species of plants. Native aquatic plant beds in North and South Twin Lakes should be protected. Aquatic plants provide valuable fish and wildlife habitat. Aquatic plants also act like a sink and take up many nutrients that enter a lake, thus reducing nuisance algae blooms. Aquatic plant management permits are required for plant control in areas with any species of concern and for any chemical control and mechanical harvesting. A permit is not required for manual removal of aquatic plants in an area less than 30' wide along the shoreline. Please contact your aquatic plant management specialist before conducting any aquatic plant control on North or South Twin Lake.

The aquatic plant communities on North and South Twin Lakes were fairly uniform throughout the lakes. The submergent plant community consisted primarily of variable leaf pondweed and smaller rosettes of wild celery and grassy arrowhead. Emergent vegetation on both lakes consisted primarily of softstem bulrush beds. Floating vegetation, such as spatterdock, was sparse on North Twin Lake and slightly more abundant on South Twin Lake.

Eurasian water-milfoil (Myriophyllum spicatum) was found between the island and South Twin Lake, along the eastern edge of the bulrush bed on South Twin and at other areas on South Twin Lake. Care should be taken to protect all of the native aquatic vegetation beds on both North and South Twin Lake to prevent the spread of Eurasian water-milfoil in these areas.

Common reed grass (Phragmites australis) is a plant that is native to Wisconsin but may be potentially invasive. It was found in one of the softstem bulrush beds. No species of special concern, threatened or endangered aquatic plants were found on North or South Twin Lakes.

North Twin Lake has two improved boat landings on it. One landing is approximately one mile south of Phelps on Hwy 17. The other landing is on the southwest part of the lake approximately ½ mile off of CTH K. South Twin Lake has one improved boat landing on it. It is located on the north end of the lake off of Twin Lake Road.

Exotic Species

Eurasian water-milfoil, an exotic plant species, was found on both North Twin and South Twin Lakes. Eurasian water-milfoil can have many negative impacts on a body of water. Because of its potential for explosive growth and its incredible ability to regenerate, Eurasian water-milfoil can successfully outcompete most native aquatic plants, especially in disturbed areas. In a number of Wisconsin lakes, Eurasian water-milfoil has formed huge monoculture stands with vast mats of surface foliage that shade out native aquatic plants and diminish the aesthetic beauty. Recreational activities like swimming, boating and sport fishing are also diminished on Wisconsin lakes infested with Eurasian water-milfoil. A variety of techniques have emerged for controlling Eurasian water-milfoil populations on Wisconsin's lakes. These techniques include mechanical cutting and harvesting in open areas, limited use of herbicide treatments and more recently the introduction of weevils as a biological control agent.

The threat of purple loosestrife is always a concern and should be dealt with immediately. Methods for control are to remove the entire plant before it produces seeds or by cutting the flower head and spraying with an approved herbicide. You should contact the Department before any of these methods are implemented. To date, no purple loosestrife has been found on North or South Twin Lakes.

Many aquatic exotics such as Eurasian water-milfoil, curly-leaf pondweed and zebra mussels are brought in by human activity (boating, fishing, etc). Exotics have a greater chance of establishing in areas where the bed of the lake has been disturbed and/or where native plants are sparse. Protection of native aquatic plant beds will help slow the spread of exotics if exotics enter this system.

Shoreland Management

Wisconsin's Shoreland Management Program, a partnership between state and local government, works to protect clean water, habitat for fish and wildlife, and natural scenic beauty. The Program establishes minimum standards for lot sizes, structural setbacks, shoreland buffers, vegetation removal and other activities within the shoreland zone. The shoreland zone includes land within 1000 feet of lakes, 300 feet of rivers, and floodplains. With research demonstrating that current standards may be inadequate to protect water resources and the fish and animals that depend on them, many communities have chosen to go beyond the minimum standards to ensure our natural resources are adequately protected. This report will provide management guidelines for activities within the lake and in the immediate shoreland area. Before any recommendations in this report are completed please check with the DNR and local units of governments for required approvals.

A vital step in protecting our water resources is to maintain an adequate vegetative buffer. A shoreland buffer should extend from the water onto the land at least 35 to 50 feet. Studies have shown that buffers less than 35 feet are not effective at preventing water pollution. Deeper buffers of 50 feet or more can help provide important wildlife habitat for songbirds, turtles, frogs, and other animals, as well as help to filter out pollutants from runoff. In general, no mowing should occur in the buffer area, except perhaps in a viewing access corridor. This buffer should match the typical ecosystem in Northern Wisconsin, and include the following three layers; herbaceous, shrub and tree layers.

In addition, the reader should also investigate other innovative ways to reduce the impacts of runoff flowing into the lake while improving critical shoreline habitat. This may include using phosphorus-free fertilizer, installing rain gardens, setting the lawnmower at a higher mower height, decreasing the area of impervious surfaces, or restoring aquatic plant communities.

Special Concern and Threatened Species

Special concern species are those species about which some problem of abundance or distribution is suspected but not yet proven. The main purpose of this category is to focus attention on certain species before they become threatened or endangered. Threatened species are species that may in the future become endangered and a problem of abundance or distribution has been proven. The following chart lists special concern and threatened species present in North and South Twin and the last year they were observed:

Common Name	Scientific Name	Last Observed/Class	
Lake Herring	Coregonus artedi	1907	Special Concern
Merlin	Falco columbarius	2002	Special Concern
Common Loon	Gavia immer	2002	Special Concern
Bald Eagle	Haliaeetus leucocephalus	2002	Special Concern
Osprey	Pandion haliaetus	2002	Threatened

Introduction:

Since North and South Twin Lakes are so large, with just over thirteen miles of shoreline, two days were needed to complete the survey. The survey was conducted on August 6th and 27th, 2002 using the Wisconsin Department of Natural Resources protocol guidelines for conducting and implementing sensitive area surveys. Surveys of this type are an integrated team approach to resource management, utilizing the expertise of many DNR resource managers. As a team, resource experts collaborate to identify locations around a lake which are critical to the future health and balance of the lake's ecosystem. Sensitive area surveys will provide lake organizations, owners of shoreline property, county zoning officials, DNR personnel, and other interested individuals with specific management recommendations that can be used to help protect and improve the overall health of lakes.

Twelve sites identified on North and South Twin Lake contain critical habitat and were designated as sensitive areas (refer to *Appendix A* for site location). Natural resource managers identified these areas and recommend the need for additional protection for the future.

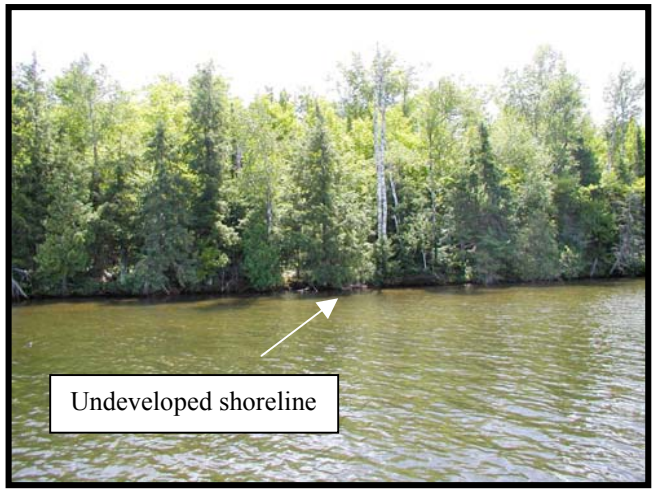
Overview of Sensitive Area Designations:

Sensitive areas are often located in areas that consist of aquatic or wetland vegetation, terrestrial vegetation, gravel or rubble lake substrate, or areas that contain large woody cover (fallen trees or logs). These areas may provide water quality benefits to the lake, reduce shoreline erosion, and provide habitat that is necessary for seasonal and/or life stage requirements of fish, invertebrates and wildlife. A designated sensitive area alerts interested individuals (ie. DNR personnel, county zoning personnel, lake associations, etc.) that the area contains critical habitat vital to sustaining a healthy lake ecosystem or may feature an endangered plant or animal. Consequently, permit reviews and decisions regarding water-based actions within a sensitive area should be highly scrutinized by management personnel. Information presented in a sensitive area report may discourage certain permits from being approved within these sites. Although only twelve specific areas have been designated as sensitive areas, this entire body of water is unique and should be considered sensitive to development and loss of habitat.

Resource Value of Sensitive Area Site 1 - North Twin

Site 1 (refer to Appendix A) is located on the eastern shore of the lake, south of the Phelps boat landing. Primary reasons for site selection include fisheries, wildlife, terrestrial vegetation and natural scenic beauty. This site is unique in that it provides quality smallmouth bass habitat that is not common in other areas of the lake.

This site offers a physical buffer zone where existing upland vegetation provides protection against shoreline erosion. Site length is approximately 8,500 feet with an average water depth of 6 feet. Substrate is primarily sand and gravel. The shoreland area is approximately 90% wooded, dominated by trees, with shrubs present. Lawn comprises the other 10% of the shoreland. Large woody cover is present with less than 1-2 pieces per 100 feet of shoreline. The natural scenic beauty rating, herein referred to as NSB, is outstanding compared to other areas of the lake. The homes that are present within this sensitive area have maintained an adequate buffer as to minimize impacts to the lake.



Fisheries was chosen as one of the primary reasons for site selection. Gravel and rubble substrate, large woody cover and submergent plants provide valuable habitat critical for a variety of game and non-game fish species. Walleye use this site for spawning and rearing, musky for spawning and feeding, and smallmouth bass for spawning, rearing, feeding, and protection. Bluegill, pumpkinseed and yellow perch also rely on this site for one or more of their functional needs. Fish surveys that were conducted in the spring of 1996 and 2002 showed concentrations of spawning fish in this area. The combination of gravel substrate and large woody cover makes this an attractive area for smallmouth bass. This type of cover combination is limited on this lake.

Wildlife was chosen as one of the primary reasons for site selection. Shrubs, brush, snag trees and fallen logs provide valuable wildlife habitat within this sensitive area. Upland wildlife, muskrats, ducks, song birds, frogs, toads, turtles and salamanders all rely on this area for shelter, nesting and feeding. Otters, mink and eagles also rely on this area for shelter and feeding. Osprey will feed at this site as well. The lightly developed and undeveloped areas provide the best wildlife habitat. The uplands in these areas generally provide a greater diversity of tree species and structure, including ground cover, shrubs, and some snag and den trees. The best of the developed habitat is where landowners have maintained a narrow corridor to the lake, have retained shrubs for structure on the uplands, and have maintained a buffer along the shoreline.

The aquatic plant community was somewhat diverse within this sensitive area. The following is a list of aquatic plants that were found:

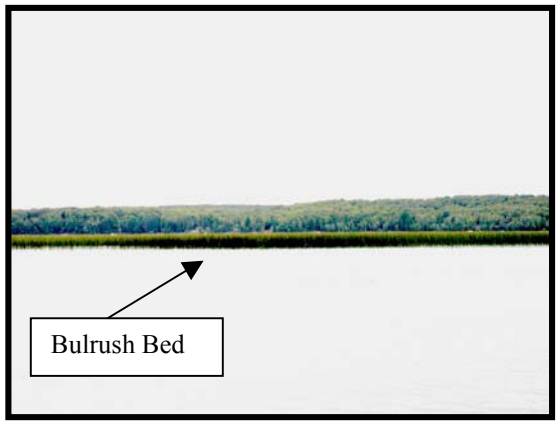
PRESENT	COMMON	ABUNDANT	DOMINANT
Emergents Sagittaria graminea (arrowhead) Sparganium angustifolium (narrow-leaf bur-reed)	**Submergents** Vallisneria americana (wild celery)		
Algae Chara (muskgrass)	**Turf Formers/Rosettes** Sagittaria sp. (arrowhead)		
Submergents Myriophyllum sibiricum (northern water milfoil) Myriophyllum alterniflorum (alternate flowered water milfoil) Zosterella dubia (water stargrass)			
Turf Formers/Rosettes Isoetes sp. (quillwort) Ranunculus flammula (creeping spearwort) Ranunculus longirostris (stiff water crowfoot)			
Potamogetons P. gramineus (variable) P. amplifolius (large-leaf) P. richardsonii (clasping-leaf)			

Management Recommendations:

1. No chemical, physical or mechanical removal of native aquatic plants. Need to monitor for new infestations and prevent establishment of Eurasian water-milfoil in this area due to proximity to the boat landing and lack of plants.
2. Protect gravel substrate. Pea gravel or sand blankets would cover quality spawning habitat and should not be permitted within this area.
3. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the ordinary high water mark, herein referred to OHWM, 35-foot shoreland buffer and within the shoreland zone.
4. Protect snag trees, large woody cover and live den trees in the upland and near-shore habitat.
5. Addition of large woody cover (half logs, tree drops) would create more habitat for fish. You must talk to a local DNR fish biologist before doing this.
6. If using fertilizers on lawns, limit the amount applied and use phosphorus-free fertilizers.

Resource Value of Sensitive Area Site 2 - North Twin

Site 2 (refer to Appendix A) consists of a large bulrush bed located near the southern part of the lake. Primary reasons for site selection include fisheries, wildlife, aquatic vegetation, and natural scenic beauty. Site provides a nutrient and a physical buffer zone. The extensive bulrush bed takes up large amounts of nutrients from the lake (nutrient buffer zone) and protects against shoreline erosion (physical buffer zone). Average water depth is approximately 4 feet with a gravel and sand substrate. Large woody cover was not present at this site. The NSB rating is outstanding compared to other areas of the lake.



Fisheries was chosen as one of the primary reasons for site selection. A very large bulrush bed that extends out into the lake provides valuable habitat for a variety of game and non-game fish species. Musky, largemouth bass, bluegill, pumpkinseed and black crappies use this site for spawning, rearing, feeding and protective cover. Smallmouth bass and perch also rely on this area for rearing, feeding and protective cover. Walleye will mostly use this site as a rearing area in the fall.

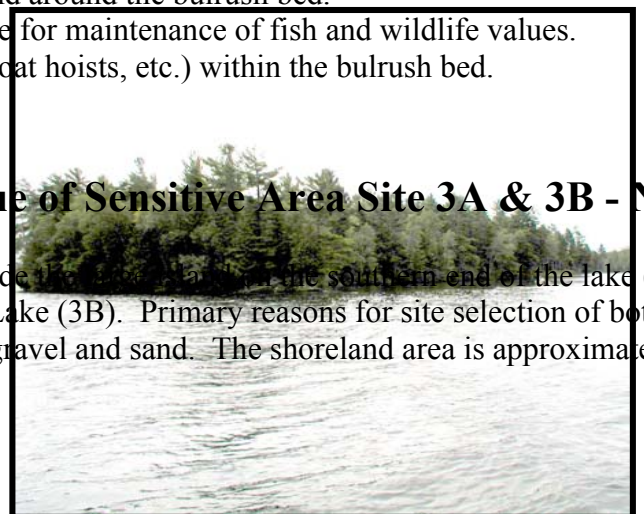
Wildlife was also chosen as one of the primary reasons for site selection. The bulrush bed provides wildlife benefits for a variety of species. It provides cover, shelter, food and nesting areas for furbearers, waterfowl and other birds, reptiles and amphibians.

The aquatic plant community was somewhat diverse at this site, thus one of the primary reasons for site selection. The plant bed extends out into the lake to a water depth of approximately 4 feet. There is minimal plant growth out further as the substrate is predominately sand. The following is a list of aquatic plant species that were found:

PRESENT	COMMON	ABUNDANT	DOMINANT
Emergents Typha latifolia (cattail)	**Emergents** Phragmites australis (giant reed)		**Emergents** Scirpus validus (softstem bulrush)
Floating Leaf Nuphar variegata (spatterdock)	**Turf Formers/Rosettes** Sagittaria sp. (arrowhead)		
Algae Chara (muskgrass)			
Submergents Vallisneria americana (wild celery) Myriophyllum alterniflorum (alternate flowered water-milfoil) Myriophyllum sibiricum (northern water milfoil) Zosterella sp. (water stargrass) Najas flexilis (bushy pondweed)			
Turf Formers/Rosettes Isoetes sp. (quillwort)			
Potamogetons P. gramineus (variable) P. praelongus (white-stem) P. richardsonii (clasping-leaf) P. zosteriformis (flat-stem)			

Management Recommendations:

1. No chemical, physical or mechanical removal of native aquatic plants unless required for navigation. Need to prevent establishment of Eurasian water-milfoil in this area.
2. Reduce boat traffic (slow-no-wake) in and around the bulrush bed.
3. Dredging within this area is inappropriate for maintenance of fish and wildlife values.
4. Reduce or remove all structures (piers, boat hoists, etc.) within the bulrush bed.



Resource Value of Sensitive Area Site 3A & 3B - North Twin

Sites 3A and 3B (refer to Appendix A) include the [illegible] the southern end of the lake (3A) and the stretch of shoreline south of the island to the entrance of South Twin Lake (3B). Primary reasons for site selection of both areas include fisheries and wildlife. Substrate is primarily comprised of rubble, gravel and sand. The shoreland area is approximately 85% wooded with a herb, shrub and

tree layer, and 15% developed. Wetlands are not present within this site. Large woody cover is present with less than 1-2 pieces per 100 feet of shoreline. The NSB rating is average for the shoreline to the south of the island and outstanding for the island, compared to other areas of the lake. The island does contain one home on it, but overall the island has unique aesthetics, thus the reason for an outstanding NSB rating.

Fisheries was chosen as one of the primary reasons for site selection. The island (Site 3A) contains a gravel/rubble substrate that provides a quality spawning and feeding area for walleyes. Musky will also use the area around the island for feeding. Smallmouth bass will also rely on this site for rearing, feeding and spawning. The shoreline south of the island (Site 3B) provides valuable walleye and musky habitat. Submergent vegetation provides a rearing area for walleyes in the fall and a spawning area for musky.

Wildlife was chosen as one of the primary reasons for site selection. The mostly undeveloped shoreline around the island and the mainland provides habitat for a variety of upland wildlife species, furbearers, birds, amphibians and reptiles. Osprey nest on the point of the mainland and on the north end of the island.

The aquatic plant community at this site was not very diverse. Eurasian water-milfoil, an exotic plant species was found at this site. The following is a list of aquatic plant species that were found:

PRESENT	COMMON	ABUNDANT	DOMINANT
Submergents Elodea canadensis (waterweed) Ceratophyllum demersum (coontail) Vallisneria americana (wild celery) Myriophyllum alterniflorum (alternate-flowered water-milfoil) Myriophyllum sibiricum (northern water-milfoil)	**Submergents** Najas flexilis (bushy pondweed)		**Potamogetons** P. gramineus (variable)
Potamogetons P. praelongus (white stem)	**EXOTICS** Myriophyllum spicatum (Eurasian water-milfoil)		

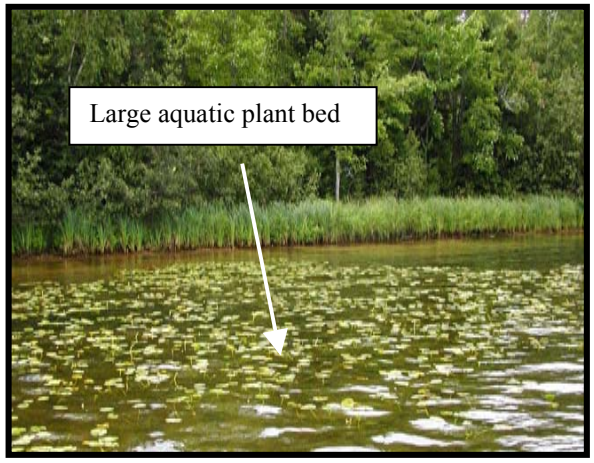
Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.
2. No chemical, physical or mechanical removal of native aquatic plants.
3. Control of Eurasian water-milfoil through use of selective control chemicals or mechanical control is recommended.
4. Restrict location of piers on the island (group piers together) to minimize impacts.
5. Pea gravel or sand blankets should not be permitted within this area.
6. Do not remove fallen trees along the shoreline.

7. Addition of large woody cover (cribs, half logs, tree drops) would create more habitat for fish. You must talk to a local DNR fish biologist before doing this.

Resource Value of Sensitive Area Site 4 - North Twin

Site 4 (refer to Appendix A) is located on the southwest side of the lake before the entrance into South Twin Lake. The primary reason this site was selected as a sensitive area was the aquatic vegetation. Site offers a nutrient buffer zone where existing vegetation provides a sink for nutrients, thus reducing nuisance algae blooms. Aquatic vegetation also stabilizes the sediments which reduces nutrient recycling and the likelihood of nuisance algae blooms. Site length is approximately 1,100 feet with an average water depth of approximately 3 feet. Substrate is primarily comprised of sand and gravel. The shoreland area is approximately 40% wooded and 60% meadow. Large woody cover is present with less than 1-2 pieces per 100 feet of shoreline. With no human influence and unique aesthetics, the NSB rating was outstanding at this site compared to other areas of the lake.



Fisheries was not selected as a primary reason for site selection, however aquatic plants provide valuable fish habitat. Walleye will use this site for feeding throughout the year and rearing in the fall. Musky spawn at this site also.

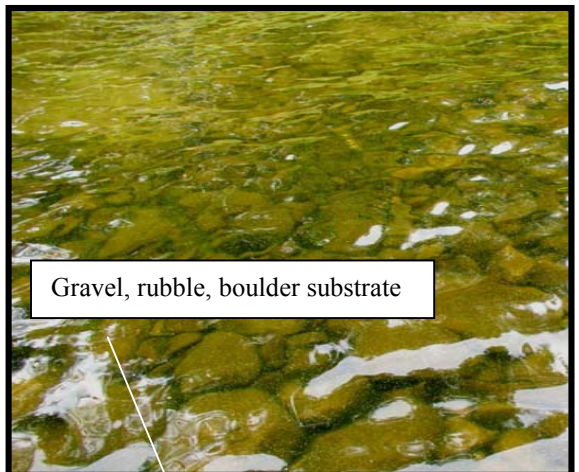
Wildlife was not selected as a primary reason for site selection. This site does however have a large area of undeveloped shoreline, providing valuable wildlife habitat. The uplands in these areas generally have a greater diversity of tree species and structure, including ground cover, shrubs, and some snag and den trees. The floating leaf aquatic vegetation and undeveloped shoreline provide habitat for a variety of upland wildlife species, furbearers, waterfowl and other birds, reptiles and amphibians.

The aquatic plant community at this site is somewhat diverse, thus was the primary reason for site selection. The following is a list of aquatic plant species that were found:

PRESENT	COMMON	ABUNDANT	DOMINANT
Emergents Sagittaria graminea (slender arrowhead) Sparganium angustifolium (bur-reed)	**Submergents** Najas flexilis (bushy pondweed)	**Submergents** Vallisneria americana (water celery) Zosterella dubia (water stargrass)	**Floating Leaf** Nuphar variegata (spatterdock)
Algae Chara (muskgrass)		**Turf Formers/Rosettes** Sagittaria graminea (arrowhead)	
Submergents Elodea canadensis (waterweed) Myriophyllum alterniflorum (alternate flowered water-milfoil) Myriophyllum sibiricum (northern water-milfoil)			
Potamogetons P. richardsonii (clasping-leaf)			

Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.
2. No chemical, physical or mechanical removal of native aquatic plants. Need to prevent the establishment of Eurasian water-milfoil in this area.
3. Pea gravel or sand blankets should not be permitted within this area.
4. Protect snag trees, large woody cover and live den trees in the upland and near-shore habitat.



Resource Value of Sensitive Area Site 5 - North Twin

Site 5 (refer to Appendix A) is located near the boat landing off of CTH K on the northwest shoreline. The primary reason for site selection was fisheries. Site

length is approximately 5,600 feet. Substrate is primarily comprised of sand, gravel and rubble. The shoreland area is approximately 50% wooded and 50% developed with impervious areas and lawn. There was very little woody cover present within this area. The NSB rating was very poor compared to other areas of the lake due to concentrated human impacts.

Fisheries was chosen as one of the primary reasons for site selection. Gravel and rubble substrate is abundant in this area, creating a valuable spawning site for walleye. Past spring fyke netting surveys have captured many walleyes in this area. Smallmouth bass also use this area for spawning, rearing and feeding.

As a result of human disturbances, wildlife was not chosen as one of the primary reasons for site selection. The best of the developed habitat is where landowners have maintained a narrow corridor to the lake, have retained shrubs for structure on the uplands, and have maintained a buffer along the shoreline.

The aquatic plant community was not very diverse at this particular site. The following is a list of aquatic plant species found:

PRESENT	COMMON	ABUNDANT	DOMINANT
Submergents Ranunculus longirostris (stiff water crowfoot) Elodea canadensis (waterweed) Myriophyllum alterniflorum (alternate-flowered water-milfoil Myriophyllum sibericum (northern water-milfoil) Zosterella dubia (water stargrass)	**Submergents** Najas flexilis (bushy pondweed)	**Submergents** Vallisneria americana (wild celery)	
Potamogetons P. gramineus (variable) P. zosteriformis (flat-stem)	**Turf Formers/Rosettes** Sagittaria graminea (grass-leaved arrowhead)		

Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.
2. No chemical, physical or mechanical removal of native aquatic plants. Need to prevent the establishment of Eurasian water-milfoil in this area.
3. Pea gravel or sand blankets should not be permitted within this area.
4. If using fertilizers on lawns, limit the amount applied and use phosphorus-free fertilizers.

Resource Value of Sensitive Area Site 6 - North Twin

Site 6 (refer to Appendix A) is located adjacent to site 5 on the northern part of the lake. Primary reasons for site selection include fisheries and wildlife. Site length is approximately 2,470 feet. Substrate consists of rubble and gravel near shore and sand and silt out in deeper water. The shoreland area is approximately 50% wooded and 50% developed. Large woody cover is present with 1-2 pieces per 100 feet of shoreline. There are many piers within this area, however many of the homes have an adequate shoreland buffer. The NSB rating is poor compared to other areas of the lake.

Fisheries was chosen as one of the primary reasons for site selection. Large woody cover, submergent and emergent aquatic vegetation provide valuable habitat for fish. Walleye use this shoreline for rearing in the fall and feeding throughout the year. Musky use this site for spawning, rearing, feeding and protection.

Wildlife was chosen as one of the primary reasons for site selection. The emergent aquatic vegetation provides cover, food and nesting areas for a variety of wildlife. Upland wildlife, furbearers, song birds, amphibians and reptiles all rely on this area for one or more of their functional needs. The lightly developed and undeveloped areas on the shores and uplands provide the best wildlife habitat. The best of the developed habitat is where landowners have maintained a narrow corridor to the lake, have retained shrubs for structure on the uplands, and have maintained a buffer along the shoreline.

The aquatic plant community was not diverse at this site. The following is a list of aquatic plant species that were found:

PRESENT	COMMON	ABUNDANT	DOMINANT

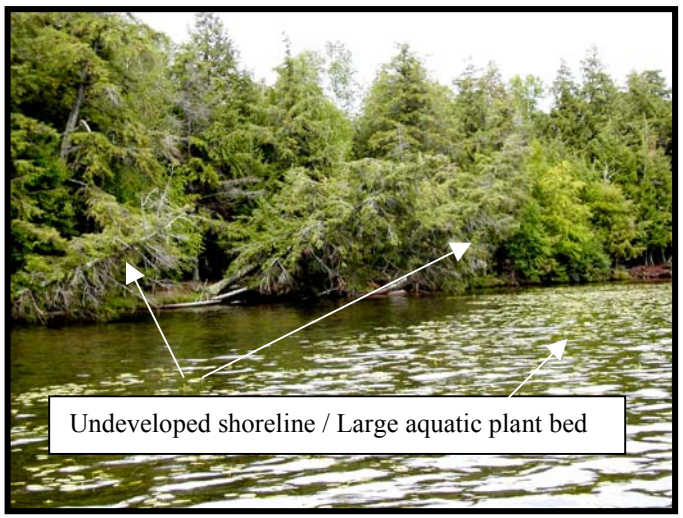
Submergents Elodea canadensis (waterweed) Vallisneria americana (wild celery) Najas flexilis (bushy pondweed)	**Potamogetons** P. gramineus (variable)		**Emergents** Scirpus validus (softstem bulrush)
Turf Formers/Rosettes Sagittaria graminea (grass-leaved arrowhead)			

Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.
2. No chemical, physical or mechanical removal of native aquatic plants. Need to prevent the establishment of Eurasian water-milfoil in this area.
3. Pea gravel or sand blankets should not be permitted within this area.
4. Protect snag trees, large woody cover and live den trees in the upland and near-shore habitat.
5. Protect the large white pines for wildlife. Even dead trees should be left alone unless the tree poses a safety risk.
6. If using fertilizers on lawns, limit the amount applied and use phosphorus-free fertilizers.

Resource Value of Sensitive Area Site 7 - North Twin

Site 7 (refer to Appendix A) is located on the northern part of the lake. Primary reasons for site selection include fisheries and aquatic vegetation. Site offers a nutrient, biological, and physical buffer zone. Vegetation provides a sink for nutrients (nutrient buffer zone), reduces the likelihood of exotic invasion (biological buffer zone) and reduces erosion by stabilizing soils (physical buffer zone). The aquatic plant beds also provide a micro-habitat which fluctuates water temperature and creates higher biodiversity at the site. Site length is approximately 2,400 feet with an average water depth of approximately 2 feet. Substrate is primarily comprised of rubble and gravel near shore, and sand in deeper water. Large woody cover is abundant with more than 6 pieces per 100 feet of shoreline. With no human disturbances, the NSB rating is



outstanding at this site compared to other areas of the lake.

Fisheries was chosen as one of the primary reasons for site selection. Floating leaf, submergent and emergent vegetation along with an abundance of large woody cover provide valuable fish habitat within this site. Walleye feed throughout the year and use this site for rearing in the fall. Musky rely on this site for spawning and feeding. Smallmouth bass also rely on this area for spawning, rearing and feeding.

Although wildlife was not a primary reason for site selection, floating leaf vegetation and large woody cover provide valuable habitat for a variety of wildlife species. Upland wildlife, furbearers, song birds, amphibians and reptiles all rely on this area for one or more of their functional needs. The areas that are lightly developed and undeveloped provide the best wildlife habitat. The uplands in these areas generally have a greater diversity of tree species and structure, including ground cover, shrubs, and some snag and den trees. The best of the developed habitat is where landowners have maintained a narrow corridor to the lake, have retained shrubs for structure on the uplands, and have maintained a buffer along the shoreline.

The aquatic plant community was not very diverse at this particular site, however the plants act as a barrier for exotics, protect the shoreline and provide fish cover. The following is a list of aquatic plant species that were found:

PRESENT	COMMON	ABUNDANT	DOMINANT
Emergents Sparganium angustifolium (narrow-leaf bur-reed)	**Emergents** Sagittaria graminea (grass-leaved arrowhead)		**Floating Leaf** Nuphar variegata (water lily)
Submergents Ranunculus longirostris (stiff water crowfoot) Myriophyllum alterniflorum (alternate-flowered water-milfoil) Zosterella dubia (water stargrass)	**Submergents** Vallisneria americana (wild celery)		
Potamogetons P. amplifolius (large-leaf) P. richardsonii (clasping-leaf)	**Potamogetons** P. gramineus (variable)		

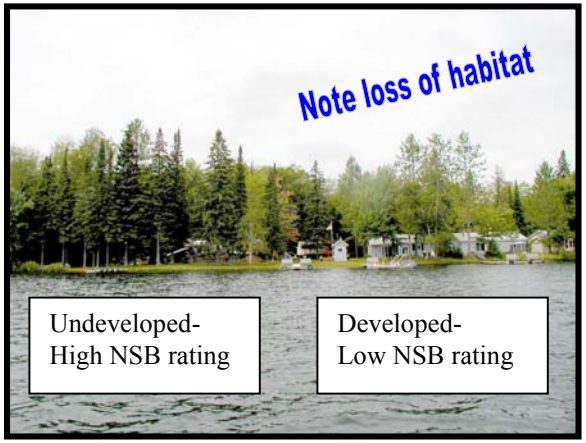
Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.
2. No chemical, physical or mechanical removal of native aquatic plants. Need to prevent the establishment of Eurasian water-milfoil in this area.
3. Pea gravel or sand blankets should not be permitted within this area.

4. Protect snag trees, large woody cover and live den trees in the upland and near-shore habitat.
5. Creation of a slow-no-wake zone within this area would protect critical habitat.

Resource Value of Sensitive Area Site 8 - North Twin

Site 8 (refer to Appendix A) is located on the northernmost part of the lake near the entrance of Military Creek. Fisheries was the primary reason for site selection. Site length is approximately 4,390 feet. Most of the shoreland area is wooded, however there are homes present and lawn makes up approximately 25% of the shoreland. Substrate is mostly sand with some gravel near shore. Development within this site generates a poor NSB rating.



Fisheries was the primary reason this site was selected as a sensitive area. Walleye and smallmouth bass rely on the gravel and rubble substrate for spawning, rearing and feeding. Past fyke netting surveys indicate that musky and cisco spawn in this area also.

Wildlife was not a primary reason for site selection, however shoreland habitat and aquatic vegetation still provide valuable habitat. The lightly developed and undeveloped areas provide the best wildlife habitat. The uplands in these areas generally have a greater diversity of tree species and structure, including ground cover, shrubs, and some snag and den trees. The best of the developed habitat is where landowners have maintained a narrow corridor to the lake, have retained shrubs for structure on the uplands, and have maintained a buffer along the shoreline.

The aquatic plant community was not diverse within this area. The following is a list of aquatic plant species found:

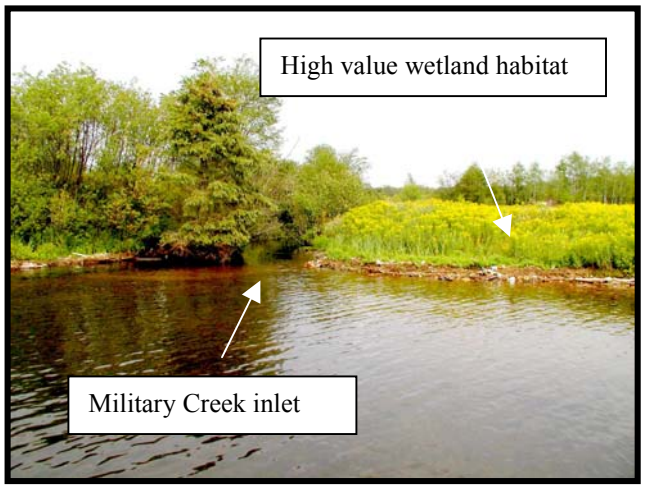
PRESENT	COMMON	ABUNDANT	DOMINANT
Submergents Ranunculus sp. (crowfoot/buttercup) Elodea canadensis (waterweed) Myriophyllum alterniflorum (alternate-flowered water-milfoil) Zosterella dubia (water stargrass) Najas flexilis (bushy pondweed)		**Submergents** Vallisneria americana (wild celery)	
Turf Formers/Rosettes Sagittaria graminea (grass-leaved arrowhead)			
Potamogetons P. gramineus (variable)			

Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.
2. No chemical, physical or mechanical removal of native aquatic plants. Need to prevent the establishment of Eurasian water-milfoil in this area.
3. Pea gravel or sand blankets should not be permitted within this area.
4. Dredging within this area is inappropriate for maintenance of fish and wildlife values.
5. Allow pier construction, but must follow the pier planner guidance. Piers should be minimized to the extent possible, but not exceed pier planner guidance recommendations.
6. If using fertilizers on lawns, limit the amount applied and use phosphorus-free fertilizers.
7. Protect snag trees, large woody cover and live den trees in the upland and near-shore habitat.

Resource Value of Sensitive Area Site 9 - North Twin

Site 9 (refer to Appendix A) is located on the northeast end of the lake where Military Creek enters the lake. Primary reasons for site selection include fisheries and wildlife. Military Creek, a cold water stream, flows into North Twin and provides temperature fluctuations which in turn increases the likelihood of greater biodiversity. Site length is approximately 500 feet. Substrate consists of gravel and rubble near shore, and mostly sand in deeper water. The shoreland area consists of wet meadow/wet prairie habitat. There was not any large woody cover present at this site. The NSB rating was very poor compared to other areas of the lake. The water and shoreland area contains the remnants (concrete slabs, metal, etc.) of an old wood treatment facility that was located near the Military Creek inlet, thus the reason for the low NSB rating.



Fisheries was chosen as one of the primary reasons for site selection. Walleye rely on the gravel and rubble substrate for spawning. Musky rely on this site for feeding. Smallmouth bass rely on this area for rearing and feeding also.

Wildlife was chosen as one of the primary reasons for site selection. This area, especially along Military Creek provides a thick vegetative shrub cover valuable for a variety of wildlife species. Furbearers, upland wildlife, reptiles, amphibians, waterfowl and song

birds all rely on this site for one or more of their functional needs. An osprey nests between North Twin Lake and County Hwy E, and a second osprey nest is approximately ½ mile to the northeast.

The aquatic plant community was quite sparse at this site. The following is a list of aquatic plant species that were found:

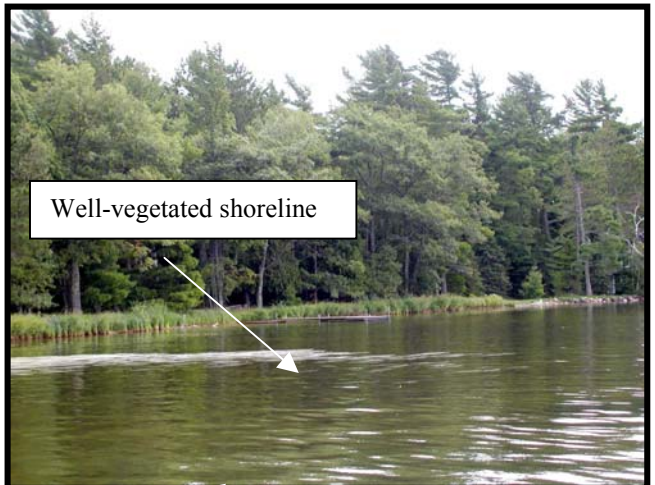
PRESENT	COMMON	ABUNDANT	DOMINANT
Submergents Vallisneria americana (wild celery) Myriophyllum sibiricum (northern water-milfoil)			
Potamogetons P. gramineus (variable)			
Turf Formers/Rosettes Sagittaria graminea (grass-leaf arrowhead)			

Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.
2. No chemical, physical or mechanical removal of native aquatic plants. Need to prevent the establishment of Eurasian water-milfoil in this area.
3. Pea gravel or sand blankets should not be permitted within this area.
4. To the extent possible, restore shoreline to its natural state. Remove any old metal, concrete slabs, etc. located in the water and the shoreland area.
5. Limit any dredging activities to remedial dredging from past contamination.

Resource Value of Twin

Site 1 on South Twin (refer to
side of the lake, before entrance into
selection include aquatic vegetation
zone where existing vegetation
erosion. The plant beds also work to
reduces nutrient recycling and the



Sensitive Area Site 1 - South

Appendix A) is located on the northeast
North Twin Lake. Primary reasons for site
and wildlife. Site offers a physical buffer
provides protection against shoreline
stabilize the sediments which in turn
likelihood of nuisance algae blooms. Site

length is approximately 1,250 feet. Substrate is comprised mostly of sand. The shoreland area is approximately 90% wooded and 10% sedge meadow wetland habitat. Large woody cover was not present at this site. With minimal human influence at this site the NSB rating was outstanding compared to other areas of the lake.

Fisheries was not a primary reason for site selection, however emergent and submergent vegetation still provides valuable fish habitat. Musky, largemouth bass, bluegill and pumpkinseed rely on this site for spawning, rearing, feeding and protection. Walleye also rely on this area for rearing in the fall.

Wildlife was chosen as a primary reason for site selection. Shoreland vegetation and existing aquatic vegetation provides valuable habitat for a variety of wildlife. Upland wildlife, furbearers, song birds, amphibians and reptiles all rely on this area for one or more of their functional needs.

The aquatic plant community was somewhat diverse at this site. Aquatic plants stabilize the substrate, protect the shoreline, and provide fish and wildlife habitat. The following is a list of aquatic plant species that were found:

PRESENT	COMMON	ABUNDANT	DOMINANT
Emergents Sagittaria cuneata (arum-leaf arrowhead) Sagittaria graminea (grass-leaved arrowhead) Typha latifolia (cattail)	**Potamogetons** P. gramineus (variable)	**Emergents** Sparganium angustifolium (narrow-leaf bur-reed)	
Algae Chara (muskgrass)		**Submergents** Vallisneria americana (water celery)	
Submergents Myriophyllum alterniflorum (alternate-flowered water-milfoil) Najas flexilis (bushy pondweed)			
Potamogetons P. richardsonii (clasping-leaf) P. zosteriformis (flat-stem)			

Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.

2. No chemical, physical or mechanical removal of native aquatic plants. Need to prevent the establishment of Eurasian water-milfoil in this area.
3. Pea gravel or sand blankets should not be permitted within this area.
4. Addition of plants within shrub layer would benefit wildlife.
5. Dredging within this area is inappropriate for maintenance of fish and wildlife values.

Resource Value of Sensitive Area Site 2 - South Twin

Site 2 (refer to Appendix A) includes nearly the entire southern half of South Twin Lake. The primary reason for site selection is fisheries. Site length is approximately 5,850 feet. Substrate is primarily comprised of gravel with sand present. The shoreland area is approximately 75% wooded and 25% developed. Large woody cover is present with less than 1-2 pieces per 100 feet of shoreline. The NSB rating was average due to shoreline development and human disturbances.

Clean (free of silt) gravel/rubble spawning substrate

Fisheries was the primary reason this site was selected as a sensitive area. Substrate at this site is primarily comprised of sand and gravel which is valuable for largemouth and smallmouth bass spawning and panfish spawning. Bass will also rely on this area for rearing and feeding, and walleye for rearing in the fall. Musky will spawn within this area also.

Wildlife was not chosen as a primary reason for site selection, however the site still provides valuable wildlife habitat. The areas that are lightly developed and undeveloped provide the best wildlife habitat. The uplands in these areas generally have a greater diversity of tree species and structure, including ground cover, shrubs, and some snag and den trees. The best of the developed habitat is where landowners have maintained a narrow corridor to the lake, have retained shrubs for structure on the uplands, and have maintained a buffer along the shoreline.

The aquatic plant community was somewhat diverse at this site. Eurasian water-milfoil, an exotic species, was found at this site. The following is a list of aquatic plant species that were found:

PRESENT	COMMON	ABUNDANT	DOMINANT

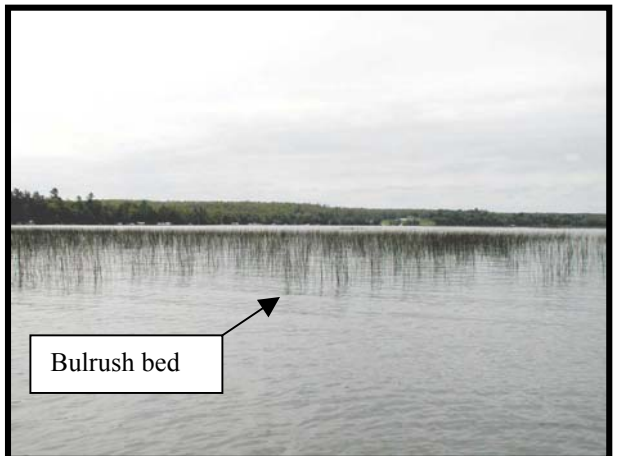
Submergents Bidens beckii (water marigold) Elodea canadensis (waterweed) Myriophyllum sibericum (northern water-milfoil) Myriophyllum alterniflorum (alternate-flowered water-milfoil) Zosterella dubia (water stargrass) Najas flexilis (bushy pondweed)	**Submergents** Vallisneria (wild celery)		
Potamogetons P. zosteriformis (flat stem) P. pusillus (small pondweed)	**Potamogetons** P. gramineus (variable)		
	Exotics Myriophyllum spicatum (Eurasian water-milfoil)		

Management Recommendations:

1. Minimize shoreline disturbance (grading, cutting, mowing, placement of structures, etc.) below the OHWM, 35-foot shoreland buffer and within the shoreland zone.
2. No chemical, physical or mechanical removal of native aquatic plants.
3. Control of Eurasian water-milfoil through use of selective control chemicals or mechanical control is recommended.
4. Pea gravel or sand blankets should not be permitted within this area.
5. Dredging within this area is inappropriate for maintenance of fish and wildlife values.
6. If using fertilizers on lawns, limit the amount applied and use phosphorus-free fertilizers.
7. Addition of large woody cover (half logs, tree drops) would create more habitat for fish. You must talk to a local DNR fish biologist before doing this.

Resource Value of Sensitive Area Site 3 - South Twin

Site 3 on South Twin Lake (refer to Appendix A) consists of the bulrush bed located in the northeastern part of the lake. Primary reasons for site selection include fisheries, wildlife and aquatic vegetation. This site offers a nutrient buffer zone where the existing aquatic vegetation provides a sink for nutrients, thus reducing nuisance algae blooms. The average water depth within the bulrush bed is over 6 feet. Large woody cover was not present at this site. With no human influences, the NSB rating was outstanding compared to other areas of the lake.



Fisheries was chosen as one of the primary reasons for site selection. This is the only major bulrush bed in South Twin Lake. The bulrush bed provides spawning, rearing, feeding and protection for largemouth bass, bluegill, pumpkinseed and black crappie. Musky also rely on this area for rearing, feeding and protective cover.

Aquatic vegetation was a primary reason for site selection. The bulrush beds extend into the lake to where the bed is in over 6 feet of water. In some of these areas, the plants rose out of the water more than 5 feet. This means that the actual plants were over 11 feet tall. The bulrush beds provide wildlife benefits for a variety of species. It provides cover, food and nesting areas for furbearers, waterfowl, reptiles and amphibians.

The aquatic plant community was not very diverse at this site. Eurasian water-milfoil, an exotic plant species, was found at this site. The following is a list of aquatic plant species that were found:

PRESENT	COMMON	ABUNDANT	DOMINANT
Algae Chara (muskgrass)		**Exotics** Myriophyllum spicatum (Eurasian water-milfoil)	**Emergents** Scirpus validus (softem bulrush)
Submergents Bidens beckii (water marigold) Vallisneria americana (wild celery) Myriophyllum sibericum (northern water-milfoil) Najas flexilis (bushy pondweed)			
Potamogetons P. gramineus (variable) P. zosteriformis (flat stem)			

Management Recommendations:

1. No chemical, physical or mechanical removal of native aquatic plants.
2. Control of Eurasian water-milfoil through use of selective control chemicals or mechanical control is recommended.
3. Pea gravel or sand blankets should not be permitted within this area.
4. Dredging within this area is inappropriate for maintenance of fish and wildlife values.
5. Reduce boat traffic in and around the bulrush bed. Possibly establish a slow-no-wake.
6. Do not allow placement of structures within the bulrush bed.

Conclusion:

In conclusion, nine sensitive areas were designated on North Twin Lake and three on South Twin Lake. This report identified important areas of habitat and management recommendations for each site. Lakes are one of the state's most valuable resources and without proper protection the water quality of our lakes will quickly deteriorate, thus decrease the quality of fish and wildlife habitat and recreational opportunities. Shoreline development has increased over 200% in the last 35 years on Northern Wisconsin lakes (Northern Initiatives Lakes and Shorelands-1999). As development increases there is an increase in pressure on water resources. All lake ecosystems are sensitive to change and man's impact. It is critical that we protect and restore these valuable resources.

All the data that was used to complete this report can be obtained at the Rhinelander DNR Service Center.