

**Designation of Sensitive Areas
Axhandle Lake, Chippewa County**

**Wisconsin Department of Natural Resources
Eau Claire, WI**

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Sensitive Area Designation Axhandle Lake, Chippewa County

I. INTRODUCTION

Designations of sensitive areas within lakes provide a holistic approach to ecosystem assessment and the protection of those areas within a lake that are most important for preserving the very character and qualities of the lake. These sites are those sensitive and fragile areas that support the wildlife and fish habitat provide the mechanisms that protect the water quality in the lake, harbor quality plant communities and preserve the places of serenity and aesthetic beauty for the enjoyment of lake residents and visitors. Sensitive areas are dependent on the protection of shoreline and in-lake habitat.

Protecting the terrestrial plant community on shore provides a buffer that absorbs nutrient runoff, prevents erosion, protects water quality, maintains water temperatures and provides important habitat. The habitat is important for species that require habitat on shore and in the water as well as those species that require a corridor in order to move along the shore (Figure 1).

Protecting the littoral zone and littoral zone plant communities is critical for fish, wildlife and the invertebrates that both feed upon (Figure 1).

The sensitive area designation will provide a framework for management decisions that impact the ecosystem of the lake.

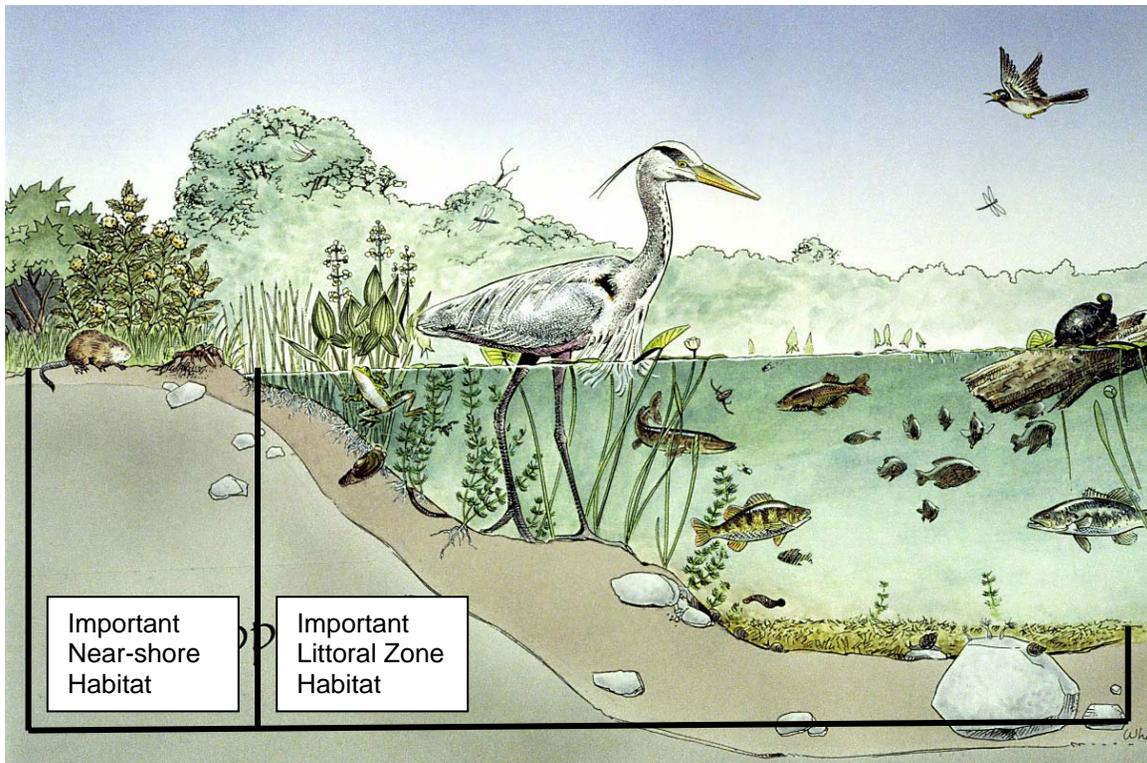


Figure 1. Location of important near-shore and littoral zone habitat.

A Sensitive Area Study was conducted September 7, 2005 on Axhandle Lake, Chippewa County. The designations were based on aquatic plant data collected during July 1996, August 2000 and August 2004; water quality data collected multiple times per year during 2002-2005 and previous fish surveys

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Axhandle Lake is an 84-acre natural seepage lake in northwest Chippewa County, Wisconsin. Axhandle Lake has a maximum depth of 73 feet and a mean depth of 19 feet. The ratio of drainage area to lake surface is 3.2:1 (Pippenger 1994). This indicates a relatively small watershed that would not significantly impact the water quality of the lake through run-off. There are intermittent inflows from Dark Lake and Woodpecker Lake via Ten Mile Creek. Water flows out to Ten-Mile Creek.

Axhandle Lake is currently a mesotrophic lake with good water clarity and water quality, but nutrients and algae have increased since 2000. The lake has excellent diversity of aquatic plant species and one of the highest quality plant communities in the state and region. The aquatic plant community in Axhandle Lake is characterized by a high intolerance to disturbance, an extreme closeness to an undisturbed condition and an assemblage of soft water species (Konkel 2005).

Najas gracillima was the dominant aquatic plant species, dominating all depth zones up to 15.5 feet; *Eleocharis acicularis* was the sub-dominant species. The 1.5-5-foot depth zone supports the most plant growth (Konkel 2005).

Protecting the natural areas that still occur in Axhandle Lake is especially important due to the losses that have already occurred at developed sites. A comparison of developed sites in Axhandle Lake and natural areas in the lake (Konkel 2005) showed a lower occurrence of sensitive species and a higher occurrence of tolerant species at the disturbed sites. The species of Special Concern that colonizes Axhandle Lake, *Myriophyllum farwelli*, does not occur at the disturbed shoreline sites. The two most tolerant species in Axhandle Lake occurred at a higher frequency at the disturbed sites. The disturbed sites had a lower coverage of floating-leaf species which are important components of quality habitat. Metrics used to analyze an aquatic plant community indicate that the plant community at the disturbed sites was farther from an undisturbed condition than the plant community at the natural sites (Nichols 1998).

II. THE SENSITIVE AREAS

The reasons for selection of each sensitive area are important, as this is what drives the selection process, their importance to the whole lake community.

All sites were selected because of their: importance for fish habitat, importance for wildlife habitat, importance for protecting water quality, the natural buffer of terrestrial vegetation, the high quality aquatic plant communities they supported and for their outstanding, natural scenic beauty (Figure 2).

All of the sensitive areas that were selected have the potential to be used for educational purposes; they provide visual and sound buffers, buffers against the invasion of non-native species and areas of beauty for lake residents and visitors.

All sensitive areas were geo-referenced.

Attributes Common to All the Sensitive Areas

Water Quality

The vegetation at all of the sites provides important water quality protections. The plants provide a nutrient buffer by absorbing nutrients thus reducing algae growth. The plants provide a physical buffer that protects the shoreline against wave erosion. Aquatic plants provide sediment stabilization, their roots anchoring the sediments and preventing resuspension by boat motors and waves and the resulting turbidity. They provide a biological buffer that reduces the chance of invasion by exotic species.

Wildlife Habitat

All of the sensitive areas provide very important wildlife habitat. The emergent vegetation, floating-leaf vegetation, shoreline shrubs, snag trees, perch trees and fallen logs are the key habitat structure at these sites. Some values are unique to a sensitive area and some habitat values are shared by all the sensitive areas. All of the sites provide shelter and feeding areas for deer; feeding areas for otter; shelter, cover, rearing and feeding areas for beaver and mink; feeding areas for ducks, loon, geese, eagle and osprey; shelter, cover, nesting and feeding for song birds; shelter, cover, nesting and feeding areas for frogs, toads, salamanders, turtles and snakes.

Fish Habitat

The designation of sensitive areas helps to preserve important fish habitat in a lake. The sensitive areas possess various attributes (submergent, floating-leaf, emergent and overhanging vegetation, gravel substrates and large woody cover) that have the potential to provide spawning areas, feeding areas, cover and nursery areas throughout the season.

Recommendations for the entire lake

- 1) Exotic/invasive species informational signs need to be posted and maintained.
- 2) Lake residents involved in Clean Boats Clean Waters Volunteer Inspection Program, especially on busy weekends to education lake users about protecting lakes from exotic invasions.

Sensitive Area Axhandle 1 – Northwest Bay and Shore

This sensitive area includes approximately 4.5-acres and approximately 1750 feet of shoreline including and near the northwest bay, out to the maximum rooting depth of 12 feet (Figure 2). The bay includes deep marsh wetlands and supports important near-shore terrestrial habitat, shoreline habitat and littoral zone habitat composed of mostly herbaceous and forest growth with some shrub cover and developed properties (Figure 3, 4, 5). About 50% of the shoreline is wetland, 40% is wooded and the rest in cottage development. The forest canopy and mid-story layer are excellent at this site.

The sediment is composed of rubble, gravel, sand, silt and detritus. Fallen trees are present at the site for fish and wildlife habitat.

The Plant Community:

This site supports 31 species of aquatic plants.

Emergent vegetation: sedges, three-way sedge, spikerush, soft rush, twig rush, water arum, marsh St. Johnswort arrowhead, pickerelweed and bulrush, protect the shoreline and provide important food sources, cover and fish spawning habitat.

Floating-leaf vegetation: white water lilies, yellow pond lilies, floating-leaf burr-reed and watershield, dampen wave action and provide important fish cover.

A very diverse submerged plant community provides many important habitat components for the fish and wildlife community (Table 1). Slender naiad, wild celery and small bladderwort are present. Small rosette species colonize the bottom, anchoring the sediments. Pipewort, dwarf watermilfoil, the small brown-fruited rush, waterwort, arrowhead rosettes and creeping spikerush are common; creeping spearwort and quillwort are also present at this site. The pondweed family, which is an important food source for waterfowl and fish, is represented by an abundance of Oake's pondweed, small pondweed is common and leafy pondweed all occur at this site.

Fourteen sensitive species occurred at this site (Table 2). The species sensitivity is measured by its Coefficient of Conservatism. A Coefficient of Conservatism is an assigned value, 0-10, the probability that the species will occur in an undisturbed habitat. A coefficient of 9 or 10 were given to native plants found only in area of high quality, of which many are Endangered, Threatened or Special Concern Species. Coefficients of 6-8 are native plants found in stable climax habitats (Nichols 1998).

Table 2. Sensitive Species Recorded at Sensitive Area 1.

Species		Coefficient of Conservatism
<i>Calla palustris</i>	Water arum	9
<i>Cladium mariscoides</i>	Twig rush	10
<i>Dulichium arundinaceum</i>	Three-way sedge	9
<i>Elatine minima</i>	Waterwort	9
<i>Eriocaulon aquaticum</i>	Pipewort	9
<i>Isoetes echinospora</i>	Spiny-spore quillwort	8
<i>Juncus pelocarpus</i>	Brown-fruited rush	8
<i>Myriophyllum tenellum</i>	Dwarf milfoil	10
<i>Pontederia cordata</i>	Pickerelweed	9
<i>Ranunculus reptans</i>	Creeping spearwort	9
<i>Sagittaria graminea</i>	Grass-leaf arrowhead	9
<i>Sparganium fluctuans</i>	Floating-leaf burreed	10
<i>Triadenum fraserii</i>	Marsh St. Johns-wort	8
<i>Utricularia gibba</i>	Small bladderwort	9

Wildlife Habitat

In addition to the habitat values found at all the sites, this site also provides:

- 1) shelter, cover and feeding areas for beaver
- 2) shelter and cover for otters
- 3) shelter, cover and nesting for ducks, eagle and osprey

Fish Habitat

Boulders, rubble/gravel sediments, large woody cover in the water, emergent vegetation, floating-leaf vegetation, submergent vegetation provide important fish habitat. The high diversity of habitat and cover types provide for all life stages of the fish community.

- 1) feeding areas for walleye
- 2) feeding and cover for northern pike
- 3) spring and summer spawning, year-round nursery areas, feeding areas and cover for large-mouth bass, bluegill, pumpkinseed, warmouth
- 4) spring spawning sites, year-round nursery areas, feeding areas and cover for perch, crappie

Recommendations for Area 1

- 1) Minimize removal of any shoreline. Allow removal of a maximum corridor width of 30 feet.
- 2) Maintain the aquatic vegetation (emergent, floating-leaf and submergent) in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection. Permits required for any vegetation removal.
- 3) Protect emergent vegetation.

- 4) Maintain the current wildlife habitat
- 5) Maintain snag trees on shore for cavity nesting and perch sites.
- 6) Maintain the current buffer width for wildlife corridor.
- 7) Trees near shore have potential for wood duck nesting. Place wood duck box on the point.
- 8) Maintain the current shoreline and aquatic vegetation for fish habitat.
- 9) Do not alter the littoral zone except for improvement of spawning habitat.
- 10) Do not remove fallen trees along the shoreline, leave in water for fish and wildlife habitat.
- 11) Compliance issues may include shoreline properties with excess docks for the property width, insufficient setbacks for structures on the shore and woodpiles and other miscellaneous items stored on the shoreline. Properties need to be brought within compliance.
- 12) Natural vegetation buffers are needed on several shoreline properties.
- 13) Designate slow no-wake in the northwest bay.
- 14) No permitting for shoreline erosion control needed.
- 15) No bank grading.
- 16) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
- 17) No dredging or lake bed removal or modifications.
- 18) Pier placement by permit only to minimize number of piers and their size and disturbance; require light-penetrating pier material such as metal grating.
- 19) No boat ramp placement.
- 20) Permit required for recreational floating devices.

Sensitive Area Axhandle 2 – Island and Narrows

This sensitive area encompasses approximately 1350ft of shoreline around the island and 1700ft of shoreline on the shoreline south of the island, out to the maximum rooting depth of 14 feet (Figure 2). The sediment is rock, sand, and silt.

The site includes near-shore terrestrial, shoreline and shallow water habitats (Figure 6, 7). The shoreline almost entirely wooded with an understory cover of shrub and herbaceous growth.

Large woody cover that is an important structural component of fish and wildlife habitat is present along most of the shore.

The Plant Community:

The aquatic plant community at this site supports 21 species of plants.

Shoreline and emergent vegetation includes pickerelweed and three-way sedge that provide wildlife cover and food sources, protect the shoreline and provide spawning habitat.

Floating leaf-species are white water lily in abundance and commonly occurring watershield, provide cover and food sources.

A very diverse submergent plant community provides a diverse habitat (Table 3). Slender water-nymph is dominant; wild celery and bushy pondweed are present. The pondweed family is likely the most important producer of habitat and is represented here by ribbon-leaf pondweed, spiral-fruited pondweed, small pondweed and leafy pondweed.

Small rosette species protect the lake bottom and anchor the sediment. Quillwort and needle spikerush are abundant; pipewort and arrowhead rosettes are common; dwarf milfoil, the small brown-fruited rush, waterwort and spearwort also colonize the lake bed.

Ten sensitive species occurred at this site (Table 4). The species sensitivity is measured by its Coefficient of Conservatism. A coefficient of 9 or 10 were given to native plants found only in area of high quality, of which many are Endangered, Threatened or Special Concern Species. Coefficients of 6-8 are native plants found in stable climax habitats (Nichols 1998).

Table 4. Sensitive Species Recorded at Sensitive Area 2

Species		Coefficient of Conservatism
<i>Dulichium arundinaceum</i>	Three-way sedge	9
<i>Elatine minima</i>	Waterwort	9
<i>Eriocaulon aquaticum</i>	Pipewort	9
<i>Isoetes echinospora</i>	Spiny-spore quillwort	8
<i>Juncus pelocarpus</i>	Brown-fruited rush	8
<i>Myriophyllum tenellum</i>	Dwarf watermilfoil	10
<i>Pontederia cordata</i>	Pickerelweed	9
<i>Potamogeton spirillus</i>	Snailseed pondweed	8
<i>Ranunculus reptans</i>	Creeping spearwort	9
<i>Sagittaria graminea</i>	Grass-leaf arrowhead	9

Wildlife Habitat

In addition to the habitat values found at all the sites, this site also provides

- 1) Shelter, hibernating areas and feeding areas for bear
- 2) Nursery areas for deer
- 3) Shelter and cover for otter
- 4) Shelter and nesting areas for ducks, eagles and osprey.
- 5) Turtle habitat is especially good at this site.

Fish Habitat

The large boulders, rock and gravel sediments, submerged vegetation and floating-leaf vegetation at this site provide fish habitat.

The site provides feeding areas and protective cover for large-mouth bass, bluegill, pumpkinseed, yellow perch and warmouth.

Recommendations for Area 2

- 1) Minimize removal of any shoreline. Allow removal of a maximum corridor width of 30 feet.
- 2) Maintain the aquatic vegetation (emergent, floating-leaf and submergent) in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection. Permits required for any vegetation removal.
- 3) Protect emergent vegetation.
- 4) Maintain the current wildlife habitat
- 5) Maintain snag trees on shore for cavity nesting and perch sites.
- 6) Maintain the current buffer width for wildlife corridor.
- 7) Protect large oaks and nags on shore for potential wood duck nesting.
- 8) Protect large white pines on island as potential osprey and eagle nesting sites.
- 9) Maintain the current shoreline and aquatic vegetation for fish habitat.
- 10) Do not alter the littoral zone except for improvement of spawning habitat.

- 11) Do not remove fallen trees along the shoreline, leave in water for fish and wildlife habitat.
- 12) No permitting for shoreline erosion control needed such as rip-rap, retaining walls. Site has sufficient natural vegetation buffer.
- 13) No bank grading.
- 14) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
- 15) No dredging or lake bed removal or modifications.
- 16) Pier placement by permit only to minimize number of piers and their size and disturbance; require light-penetrating pier material such as metal grating.
- 17) No boat ramp placement.
- 18) Permit required for recreational floating devices.

Sensitive Area Axhandle 3 – South Bay

This sensitive area encompasses approximately 6 acres of the south bay, encompassing approximately 1900 feet of shoreline (Figure 2). It includes deep marsh and shallow marsh habitats that support important near-shore terrestrial habitat, shoreline habitat and shallow water habitat (Figure 8). The sediment is a mixture of sand, silt, gravel and detritus. The shoreline at this sensitive area is composed of mainly wooded cover with some herbaceous growth with a small area of cottage development. Deep marsh habitat is found along part of the wooded shoreline.

Large woody cover from fallen trees is abundant in the shallow water along most of the shoreline. This woody cover provides important habitat for fish cover and wildlife resting areas.

The Plant Community:

This site supports 26 species of aquatic plants.

This emergent vegetation at this site protects the shoreline and provides important food sources, cover and fish spawning habitat. The emergent community is composed of bluejoint grass, leatherleaf, sedges, spikerushes, three-way sedge and arrowhead.

Floating-leaf vegetation, abundant white water lilies and commonly occurring watershield dampen wave action and provide important fish habitat.

A diverse submergent plant community provides many fish and wildlife benefits (Table 5). Slender water-nymph is dominant at this site. Wild celery and Farwell's watermilfoil are all common at this site.

Small rosette species colonize the lake bottom, anchoring the substrate. These submerged rosette species include commonly occurring quillwort, pipewort, needle spikerush and rosettes of arrowhead. Other rosette species present are dwarf milfoil, brown-fruited rush, waterwort and spearwort.

The pondweed family is an important food source for fish and waterfowl and is represented at this site by variable-leaf pondweed, ribbon-leaf pondweed and small pondweed. Spiral-fruited pondweed and Oake's pondweed are commonly occurring at this site.

Ten sensitive species occurred at this site (Table 6). The species sensitivity is measured by its Coefficient of Conservatism. A coefficient of 9 or 10 were given to native plants found only in area of high quality, of which many are Endangered, Threatened or Special Concern Species. Coefficients of 6-8 are native plants found in stable climax habitats (Nichols 1998). One of the aquatic plant species at this site is a listed Special Concern species because of its rarity statewide and its sensitivity to disturbance: *Myriophyllum farwellii* (Farwell's watermilfoil).

Table 6. Sensitive Species Recorded at Sensitive Area 3

Species		Coefficient of Conservatism
<i>Dulichium arundinaceum</i>	Three-way sedge	9
<i>Elatine minima</i>	Waterwort	9
<i>Eriocaulon aquaticum</i>	Pipewort	9
<i>Isoetes echinospora</i>	Spiny-spore quillwort	8
<i>Juncus pelocarpus</i>	Brown-fruited rush	8
<i>Myriophyllum farwelli</i>	Farwell's watermilfoil	9
<i>Myriophyllum tenellum</i>	Dwarf watermilfoil	10
<i>Potamogeton spirillus</i>	Snail seed pondweed	8
<i>Ranunculus reptans</i>	Creeping spearwort	9
<i>Sagittaria graminea</i>	Grass-leaf arrowhead	9

Wildlife Habitat

In addition to the habitat values found at all the sites, this site also provides

- 1) shelter, hibernating and feeding areas for bear
- 2) nursery areas for deer
- 3) shelter and cover for otter
- 4) shelter, cover and nesting for ducks, eagles, osprey
- 5) Turtle habitat is especially good at this site.

Fish Habitat

The high degree of large woody cover of fallen trees in the water, the submergent vegetation and floating-leaf vegetation provide habitat for the fish community

- 1) feeding areas and protective cover for walleye, northern pike
- 2) spring and summer spawning sites, year-round nursery areas, feeding areas and protective cover for large-mouth bass, bluegill, pumpkinseed, crappie, warmouth
- 3) spring spawning sites, year-round nursery areas, feeding areas and protective cover for yellow perch

Recommendations for Site 3

- 1) Minimize removal of any shoreline. Allow removal of a maximum corridor width of 30 feet.
- 2) Maintain the aquatic vegetation (emergent, floating-leaf and submergent) in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection. Permits required for any vegetation removal.
- 3) Protect emergent vegetation.
- 4) Maintain the current wildlife habitat
- 5) Maintain snag trees on shore for cavity nesting and perch sites.
- 6) Maintain the current buffer width for wildlife corridor.
- 7) Protect large oaks and nags on shore for potential wood duck nesting.

- 8) Protect large white pines on peninsula as potential osprey and eagle nesting sites.
- 9) Maintain the current shoreline and aquatic vegetation for fish habitat.
- 10) Do not alter the littoral zone except for improvement of spawning habitat.
- 11) Do not remove fallen trees along the shoreline, leave in water for fish and wildlife habitat.
- 12) Maintain current natural vegetation buffer for water quality protection
- 13) Place conservation easement on undeveloped shoreline to protect habitat, water quality and natural beauty
- 14) Do not use lawn chemicals or fertilizers
- 15) No permitting for shoreline erosion control needed such as rip-rap, retaining walls. Site has sufficient natural vegetation buffer that needs to be protected.
- 16) No bank grading.
- 17) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
- 18) No dredging or lake bed removal or modifications.
- 19) Pier placement by permit only to minimize number of piers and their size and disturbance; require light-penetrating pier material such as metal grating.
- 20) No boat ramp placement.
- 21) Permit required for recreational floating devices.

Sensitive Area Axhandle 4 – Southwest Bay

This sensitive area encompasses approximately 1000 feet along the southern shore of the southwest bay to a maximum rooting depth of 13 feet (Figure 2). It includes deep marsh and shallow marsh habitats that support important near-shore terrestrial habitat, shoreline habitat and shallow water habitat (Figure 9). The sediment is sand, silt and gravel. The shoreline at this sensitive area is composed mostly of wooded cover with a small area of developed lawn. Large woody cover from fallen trees is common in the shallow water. This woody cover provides important habitat for fish cover and wildlife resting areas.

The Plant Community:

The aquatic plant community is composed of 14 species at this site.

The emergent vegetation at this site protects the shoreline and provides important food sources, cover and fish spawning habitat. The emergent community is composed of pickerelweed.

Floating-leaf vegetation, white water lilies and the commonly occurring watershield dampen wave action and provide important fish habitat.

A diverse submergent plant community provides many fish and wildlife benefits (Table 7). Slender naiad is dominant in at this site and wild celery also occurs.

Small rosette species colonize the lake bottom, anchoring the substrate. These submerged rosette species include quillwort and brown-fruited rush. Rosettes of arrowhead and needle spikerush are common.

The pondweed family is an important food source for fish and waterfowl and is represented at this site by small pondweed, leafy pondweed and spiral-fruited pondweed.

Five sensitive species occurred at this site (Table 8). The species sensitivity is measured by its Coefficient of Conservatism (Nichols 1998).

Table 8. Sensitive Species Recorded at Sensitive Area 4

Species		Coefficient of conservatism
<i>Isoetes echinospora</i>	Spiny spore quillwort	8
<i>Juncus pelocarpus</i>	Brown-fruited rush	8
<i>Pontederia cordata</i>	Pickerelweed	9
<i>Potamogeton spirillus</i>	Snail-seed pondweed	8
<i>Sagittaria graminea</i>	Grass-leaf arrowhead	9

Wildlife Habitat

In addition to the habitat values found at all the sites, this site also provides

- 1) nursery areas for deer
- 2) shelter and cover for otter
- 3) shelter, cover, rearing areas and feeding areas for raccoon
- 4) shelter, cover and nesting for ducks

Fish Habitat

Large boulders, fallen woody debris in the water, emergent vegetation, submergent vegetation and floating-leaf vegetation provide fish habitat at this site.

- 1) feeding areas and protective cover for walleye
- 2) year-round nursery areas, feeding areas and protective cover for northern pike, large-mouth bass, bluegill, pumpkinseed, yellow perch, crappie and warmouth

Recommendations for Area 4

- 1) Minimize removal of any shoreline. Allow removal of a maximum corridor width of 30 feet.
- 2) Maintain the aquatic vegetation (emergent, floating-leaf and submergent) in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection. Permits required for any vegetation removal.
- 3) Protect emergent vegetation.
- 4) Maintain the current wildlife habitat
- 5) Maintain snag and cavity trees on shore.
- 6) Maintain the current shoreline and aquatic vegetation for fish habitat.
- 7) Do not alter the littoral zone except for improvement of spawning habitat.
- 8) Do not remove fallen trees along the shoreline, leave in water for fish and wildlife habitat.
- 9) No permitting for shoreline erosion control needed such as rip-rap, retaining walls.
- 10) No bank grading.
- 11) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
- 12) No dredging or lake bed removal or modifications.
- 13) Pier placement by permit only to minimize number of piers and their size and disturbance; require light-penetrating pier material such as metal grating.
- 14) No boat ramp placement.
- 15) Permit required for recreational floating devices.

Sensitive Area Axhandle 5 – West Bay Shoreline

This sensitive area encompasses approximately 200 feet of shoreline on the north shore of the west bay to the maximum rooting depth of 13.5 feet (Figure 2). It includes deep marsh and shallow marsh habitats that support important near-shore terrestrial habitat, shoreline habitat and shallow water habitat (Figure 10). The sediment is sand, silt and gravel. The shoreline at this sensitive area is composed mostly of wooded with a small area cottage development on each side. Large woody cover from fallen trees is present in the shallow water. This woody cover provides important habitat for fish cover and wildlife resting areas.

The Plant Community:

The aquatic plant community consists of 17 species at this sensitive area. The emergent vegetation at this site protects the shoreline and provides important food sources, cover and fish spawning habitat. The emergent community is composed of spikerush, soft rush, pickerelweed, three-way sedge and arrowhead. Pickerelweed is abundant and arrowheads are common.

Floating-leaf vegetation, white water lilies and the commonly occurring watershield, dampen wave action and provide important fish habitat.

A diverse submergent plant community provides many fish and wildlife benefits. Slender water-nymph is dominant at this site and wild celery is also present (Table 9).

Small rosette species colonize the lake bottom, anchoring the substrate. Rosettes of arrowhead are abundant; quillwort is common; pipewort, dwarf watermilfoil and needle spikerush are present.

The pondweed family is an important food source for fish and waterfowl and is represented at this site by ribbon-leaf pondweed and the commonly occurring Oake's pondweed and spiral-fruited pondweed.

Seven sensitive species occurred at this site (Table 10) (Nichols 1998).

Table 10. Sensitive Species Recorded at Sensitive Area 5

Species		Coefficient of Conservatism
<i>Dulichium arundinaceum</i>	Three-way sedge	9
<i>Eriocaulon aquaticum</i>	Pipewort	9
<i>Isoetes echinospora</i>	Spiny-spore quillwort	8
<i>Myriophyllum tenellum</i>	Dwarf watermilfoil	10
<i>Pontederia cordata</i>	Pickerelweed	9
<i>Potamogeton spirillus</i>	Snail-seed pondweed	8
<i>Sagittaria graminea</i>	Grass-leaf arrowhead	9

Wildlife Habitat

In addition to the habitat values found at all the sites, this site also provides

- 1) shelter, cover, nursery areas and feeding areas for raccoon.

Fish Habitat

The large woody cover provided by fallen trees, the emergent vegetation, the submerged vegetation and floating-leaf vegetation provide

- 1) feeding areas and protective cover for walleye
- 2) Year-round nursery areas, feeding areas and protective cover for northern pike, large-mouth bass, bluegill, pumpkinseed, yellow perch, crappie and warmouth.

Recommendations for Area 5

- 1) Minimize removal of any shoreline. Allow removal of a maximum corridor width of 30 feet.
- 2) Maintain the aquatic vegetation (emergent, floating-leaf and submergent) in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection. Permits required for any vegetation removal.
- 3) Protect emergent vegetation.
- 4) Maintain the current wildlife habitat
- 5) Maintain snag and cavity trees on shore.
- 6) Maintain the shoreline vegetation that provides a wildlife corridor.
- 7) Maintain the current shoreline and aquatic vegetation for fish habitat.
- 8) Do not alter the littoral zone except for improvement of spawning habitat.
- 9) Do not remove fallen trees along the shoreline, leave in water for fish and wildlife habitat.
- 10) Do not use lawn chemicals or fertilizers.
- 11) No permitting for shoreline erosion control needed such as rip-rap, retaining walls.
- 12) No bank grading.
- 13) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
- 14) No dredging or lake bed removal or modifications.
- 15) Pier placement by permit only to minimize number of piers and their size and disturbance; require light-penetrating pier material such as metal grating.
- 16) No boat ramp placement.
- 17) No recreational floating devices to be permitted.

Sensitive Area Axhandle 6 – West Bay Wetland

This sensitive area encompasses almost one-acre and 425 feet of shoreline of the small bay to the maximum rooting depth of 12.4 feet (Figure 2). It includes deep marsh and shallow marsh habitats that support important near-shore terrestrial habitat, shoreline habitat and shallow water habitat (Figure 11, 12). The sediment is sand, silt and peat. The shoreline at this sensitive area is dominated by wooded cover with a small wetland and some cottage development.

Large woody cover from fallen trees is common in the shallow water. This woody cover provides important habitat for fish cover and wildlife resting areas.

The Plant Community:

21 species of aquatic plants occur at this site.

The emergent marsh community is composed of bluejoint grass, sedges, spikerushes, soft rush and bulrushes. Arrowhead and pickerelweed are common at this site.

Floating-leaf vegetation is abundant with white water lilies and watershield and dampens wave action and provide important fish habitat.

A diverse submergent plant community provides many fish and wildlife benefits (Table 11). Slender water-nymph is dominant at this site and small bladderwort, stonewort and wild celery also occur.

Small rosette species colonize the lake bottom, anchoring the substrate. These submerged rosette species include pipewort, dwarf watermilfoil, and quillwort. Needle spikerush and brown-fruited rush commonly occur at this site and rosettes of arrowhead are abundant.

The pondweed family is an important food source for fish and waterfowl and is represented at this site by small pondweed and spiral-fruited pondweed.

Six sensitive species occurred at this site (Table 12) (Nichols 1998).

Table 12. Sensitive Species Recorded at Sensitive Area 6

Species		Coefficient of Conservatism
<i>Eriocaulon aquaticum</i>	Pipewort	9
<i>Isoetes echinospora</i>	Spiny-spore quillwort	8
<i>Juncus pelocarpus</i>	Brown-fruited rush	8
<i>Myriophyllum tenellum</i>	Dwarf watermilfoil	10
<i>Potamogeton spirillus</i>	Snail-seed pondweed	8
<i>Sagittaria graminea</i>	Grass-leaf arrowhead	9

Wildlife Habitat

In addition to the habitat values found at all the sites, this site also provides

- 1) rearing areas for deer
- 2) shelter, cover, den areas and feeding areas for bear
- 3) nesting, cover and nesting areas for ducks
- 4) wood duck nesting in shoreline trees
- 5) Shelter and cover for otters and eagles.

Fish Habitat

The boulders, large woody cover from fallen trees, the emergent vegetation, the submerged vegetation and the floating-leaf vegetation provide:

- 1) feeding areas and protective cover for walleye
- 2) Year-round nursery areas, feeding areas and protective cover for northern pike, large-mouth bass, bluegill, pumpkinseed, yellow perch, crappie and warmouth.

Recommendations for Area 6

- 1) Minimize removal of any shoreline. Allow removal of a maximum corridor width of 30 feet.
- 2) Maintain the aquatic vegetation (emergent, floating-leaf and submergent) in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection. Permits required for any vegetation removal.
- 3) Protect emergent vegetation.
- 4) Maintain the current wildlife habitat
- 5) Maintain snag and cavity trees on shore.
- 6) Maintain the shoreline vegetation that provides a wildlife corridor.
- 7) Maintain shoreline trees for potential wood duck nesting
- 8) Maintain the current shoreline and aquatic vegetation for fish habitat.
- 9) Do not alter the littoral zone except for improvement of spawning habitat.
- 10) Do not remove fallen trees along the shoreline, leave in water for fish and wildlife habitat.
- 11) Do not use lawn chemicals or fertilizers.
- 12) Structures within the 35 buffer zone need storm water management, preferably rain gardens
- 13) Shoreline and bank vegetation needs to be restored through revegetation of the native vegetation
- 14) No bank grading
- 15) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
- 16) No dredging or lake bed removal or modifications.
- 17) Pier placement by permit only to minimize number of piers and their size and disturbance; require light-penetrating pier material such as metal grating.
- 18) No boat ramp placement.
- 19) No recreational floating devices to be permitted.

Sensitive Area Axhandle 7 – East Shore

This sensitive area encompasses approximately 500 feet of shoreline along a portion of the east shore to the maximum rooting depth of 15.5 feet (Figure 2). It includes deep marsh habitat that support important shoreline habitat and shallow water habitat (Figure 13, 14). The sediment is sand, silt, gravel and rock. The shoreline at this sensitive area is composed of some native herbaceous growth with abundant wooded cover and cottage development and a minimally developed boat landing on either end. Large woody cover from fallen trees is present in the shallow water. This woody cover provides important habitat for fish cover and wildlife resting areas.

The Plant Community:

The plant community at this site includes 16 species of aquatic plants.

Floating-leaf vegetation, white water lilies and watershield dampen wave action and provide important fish habitat.

A diverse submergent plant community provides many fish and wildlife benefits (Table 13). Slender water-nymph, bushy pondweed and wild celery occur at this site.

Small rosette species colonize the lake bottom, anchoring the substrate. The turf-like needle spikerush is abundant; Rosettes of arrowhead, spearwort, and brown-fruited rush are common at this site; pipewort, quillwort, and waterwort are present also.

The pondweed family is an important food source for fish and waterfowl and is represented at this site by small pondweed and spiral-fruited pondweed.

Seven sensitive species occurred at this site (Table 14) (Nichols 1998).

Table 14. Sensitive Species Recorded at Sensitive Area 7

Species		Coefficient of Conservatism
<i>Elatine minima</i>	Waterwort	9
<i>Eriocaulon aquaticum</i>	Pipewort	9
<i>Isoetes echinospora</i>	Spiny-spore quillwort	8
<i>Juncus pelocarpus</i>	Brown-fruited rush	8
<i>Potamogeton spirillus</i>	Snail seed pondweed	8
<i>Ranunculus reptans</i>	Creeping spearwort	9
<i>Sagittaria graminea</i>	Grass-leaf arrowhead	9

Wildlife Habitat

In addition to the habitat values found at all the sites, this site also provides

- 1) shelter, cover, rearing areas and feeding areas for raccoon
- 2) shelter, cover and nesting areas for ducks
- 3) Shelter, cover and feeding areas for bear.

Fish Habitat

The rock and gravel at this site provide spawning for fish

Recommendations for Area 7

- 1) Minimize removal of any shoreline. Allow removal of a maximum corridor width of 30 feet.
- 2) Maintain the aquatic vegetation (emergent, floating-leaf and submergent) in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection. Permits required for any vegetation removal.
- 3) Protect emergent vegetation.
- 4) Maintain the current wildlife habitat
- 5) Maintain snag and cavity trees on shore.
- 6) Maintain the shoreline vegetation that provides a wildlife corridor.
- 7) Maintain the current shoreline and aquatic vegetation for fish habitat.
- 8) Do not alter the littoral zone except for improvement of spawning habitat.
- 9) Do not remove fallen trees along the shoreline, leave in water for fish and wildlife habitat.
- 10) New development on the site must implement a program for natural buffer preservation and storm water management.
- 11) Conservation easements should be considered.
- 12) Shoreline and bank vegetation needs to be restored through revegetation of the native vegetation
- 13) No bank grading
- 14) No permit approval for pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects.
- 15) No dredging or lake bed removal or modifications.
- 16) Pier placement by permit only to minimize number of piers and their size and disturbance; require light-penetrating pier material such as metal grating.
- 17) No boat ramp placement.
- 20) Recreational floating devices sited by permit only.