Designation of Sensitive Areas
Squaw Lake, St. Croix County

Wisconsin Department of Natural Resources
Eau Claire, WI

Sensitive Area Designation
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I. INTRODUCTION

Designation of sensitive areas within lakes provide a holistic approach to the protection of those sites within a lake that are most important for preserving the very character and qualities of the lake that initially attracted developments on 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 (Figure 1). The sensitive area designation will provide a framework for management decisions that impact the ecosystem of the lake.

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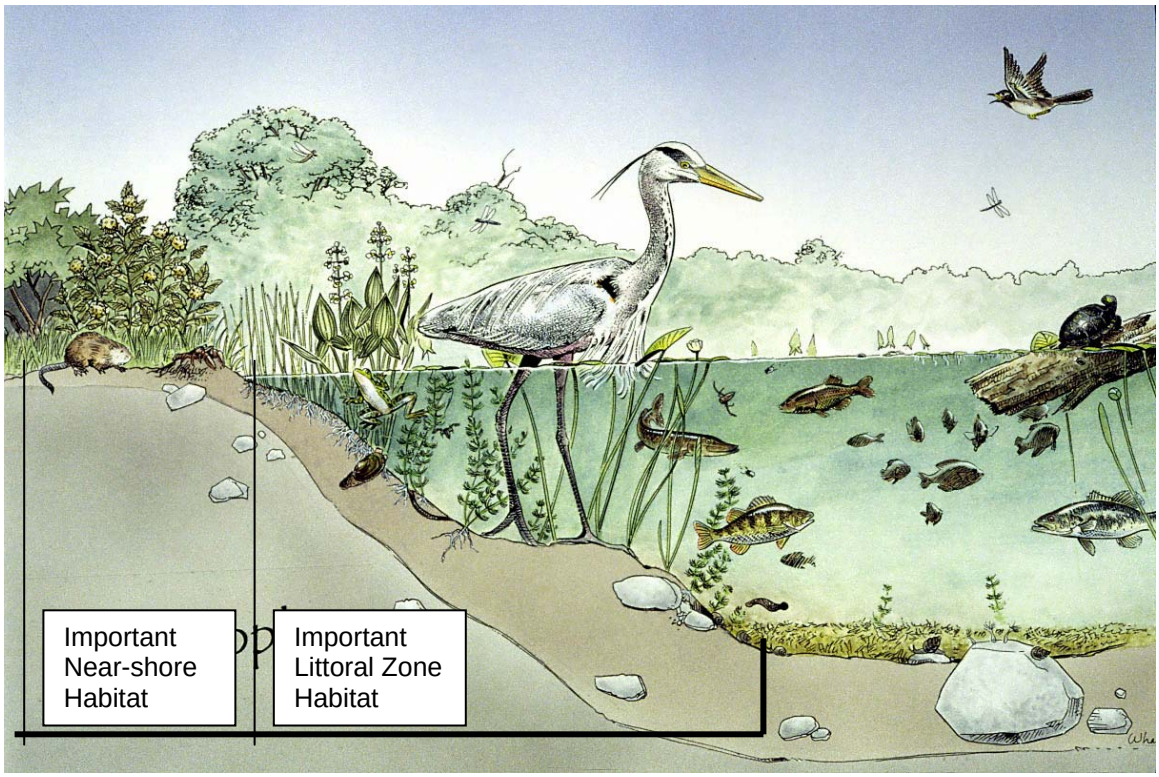

Figure 1. Location of important near-shore and littoral zone habitat.

A Sensitive Area Study was conducted October 11, 2004 on Squaw Lake, St. Croix County. However the study also drew upon multiple fish studies conducted prior to the October 11 and mid-summer aquatic plant studies conducted every three years during 1986-2001.
The study team included:
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Buzz Sorge, DNR Lakes Manager
Kris Belling, DNR Wildlife Biologist
Eunice Post, DNR Water Management Specialist

Squaw Lake is a 129-acre lake with a maximum depth of 32 ft and an average depth of 13 ft. The water level was low during the time of the sensitive area study.

Squaw Lake has been a hypereutrophic lake with very poor water quality and water clarity. High nutrient levels support the growth of abundant planktonic and filamentous algae. Aquatic plant growth in Squaw Lake is limited by the soft water, steep littoral zone in some portions of the lake, fluctuating water levels, less favorable sediments for plant growth in the shallow zones and poor water clarity.

The aquatic plant community has changed from sparse plant growth, fair diversity and below average quality in 1986, to more abundant plant growth, average diversity and nearly average quality in 1989-1995, and finally to sparse plant growth, good diversity and below average quality in 1998-2001.

Squaw Lake is among the group of lakes in Wisconsin and the North Central Hardwood Region most impacted by disturbance. Fluctuating water levels and poor water clarity caused by abundant algae growth are likely the major disturbance factors and are determining the quality and composition of the aquatic plant community in Squaw Lake.

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 (Figure 1). All of the sensitive areas include the important near-shore terrestrial habitat and shoreline habitat
All of the sensitive areas that were selected have the potential to be used for educational purposes; they all provide visual and sound buffers from shoreline disturbance, they all serve as buffers against the invasion of non-native species and areas of beauty for lake residents and visitors.

Common Attributes for 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. They provide a physical buffer that protect the shoreline against wave erosion. They provide a biological buffer that reduces the chance of invasion by exotic species.

Fish Habitat

The entire littoral zone of the lake is important habitat for bass, northern pike and panfish.

1) The submergent plant growth, the emergent plant growth and fallen trees provide important fish habitat in the lake. This is especially true during summer months when deep areas of the lake are depleted of oxygen.
2) These near shore areas are the spawning sites, the feeding areas, the protective cover for the fish resource. The challenge is to protect, maintain and enhance near shore habitat to support quality fisheries. Continuous loss of near shore habitat will eventually lead to degraded fisheries.

Wildlife Habitat

All of the sensitive areas provide wildlife habitat. The emergent vegetation, floating-leaf vegetation, shoreline shrubs, snag 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 habitat for upland wildlife, frogs, toads and turtles; shelter/cover/nesting and feeding areas for songbirds.

Recommendations for entire lake.

Because the entire littoral zone is important for fish habitat

1) All naturally vegetated shorelines should be maintained as such.
2) All fallen woody cover that falls in the water should be left
3) Add large woody cover
4) All mowed shorelines should be restored with a buffer of natural vegetation between the lawn and lakeshore to not only provide habitat, but also to improve water quality. A 30-foot corridor could be mowed within this buffer as an access point to the lakeshore.
5) Actively work on projects that improve water quality.

Sensitive Area Squaw 1 – Northeast Wetlands

This sensitive area is the approximately 23-acre area that includes wetlands and islands in the northeast area of the lake (Figure 2).

Additional reasons for selecting this site is the natural scenic beauty of the site and the importance of protecting springs. Due to groundwater flows in the area of Squaw Lake, portions of these bays are likely groundwater sources, providing cold spring water to the lake. It is important to protect this water source to Squaw Lake.

The site supports important near-shore terrestrial habitat and shoreline habitat. About 40% of the shoreline is deep marsh wetland and 60% is wooded and some shrub growth. The sediment is composed of sand and gravel. Large woody cover is present along the shore and provides important fish and wildlife habitat structure.

The Plant Community:

A diverse community of emergent vegetation, arrowhead, mannagrass, reed-canary grass, bulrush, sedge, spikerush, water smartweed, tick-seed sunflower, hedge nettle and cattail, protect the shoreline and provide important food sources, cover and fish spawning habitat.

Floating-leaf vegetation, duckweed, provides waterfowl food.

The submerged plant community provides important habitat components for the fish and wildlife community (Table 1). Common waterweed and coontail are present. The pondweed family, which is an important food source, is represented by a small pondweed (*Potamogeton pusillus*). Turf-forming creeping spikerush colonizes the bottom, anchoring the sediments to prevent turbidity from resuspension.

Fish Habitat

The north bay at this site provides good spring and fall habitat for gamefish and panfish during times of high water. In low water times it can become a trap and subject fish to winter fish kill. The gravel sediments provide for bass and panfish spawning. The emergent vegetation provides underwater cover.

This site as a whole provides spring spawning, spring and summer nursery areas, feeding areas and protective cover for large-mouth bass, bluegill and crappie.

Wildlife Habitat

Shrubs and brush along the shoreline are the most important habitat components at this site. In addition to the habitat values found at all the sites, this site also provides

1) habitat for deer
2) resting and roost areas for ducks
3) shelter/cover/nesting and feeding areas for upland amphibians (frogs, toads, salamanders) and upland turtles.
4) During periods of higher water levels, the water would inundate the rooting zone of the emergent vegetation and could also provide feeding areas and shelter for ducks.

Recommendations

1) Maintain emergent vegetation, shrubs and brush along the shore for wildlife habitat and as a nutrient buffer.
2) Protect emergent vegetation for water quality and protection against erosion.
3) Maintain the aquatic vegetation in an undisturbed condition for fish habitat.
4) Create fish cover and protection areas via addition of large woody debris, tree drops, etc.
5) Protect spawning habitat and reduce disturbance during spring spawning
6) No removal of any shoreline or aquatic vegetation. Allow removal of minimum necessary for lake access.
7) No lawn chemicals and fertilizers to be used on shore
8) No permitting for shoreline erosion control needed; retain existing natural shoreline protection
9) No bank grading
10) Dredging or lake bed removal only to provide a channel between the lake and north pond to provide access and prevent winter fishkills.
11) No pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects
12) Minimize pier dimensions and placement, permit required for placement
13) No boat ramp placement
14) No recreational floating devices

Sensitive Area Squaw 2 – Northwest Channeled Bay

This sensitive area encompasses approximately 8 acres, the narrow channel on the northwest corner of the lake (Figure 2). The sediment is sand, silt and gravel.

Additional reasons for selecting this site is natural scenic beauty and the importance of protecting the springs. Due to groundwater flows in the area of Squaw Lake, this bay is a groundwater source, providing cold spring water to the lake. It is important to protect this water source to Squaw Lake.

The bay supports important near-shore terrestrial habitat and shoreline habitat. About 30% of the shoreline is deep marsh and shallow marsh wetland and 70% is wooded. The gravel and rock substrate provides additional benefits for fish spawning.

The Plant Community:

Shoreline and emergent vegetation that includes mannagrass, reed-canary grass, spikerush, tick-seed sunflower, water smartweed and arrowhead, provide wildlife cover and food sources, protect the shoreline and provide spawning habitat.

Floating–leaf species, duckweed, is dominant and provides food sources.

The submergent plant community provides habitat structure, cover and food sources (see Table 2). Coontail and common waterweed is present. Turf-forming creeping spikerush protects the lake bottom, anchoring the sediment.

Fish Habitat

This site provides unique habitat for fish during periods of high water levels. This channel on the north end of the lake stays warmer in the fall and warms up earlier the spring, so it provides important congregation areas for fish in the spring and fall. Unlike the north bay in site 1, run off from wetlands provide a fresh water source and reduces chances for winter fish kill.

1) a very important area for spring spawning and nursery areas for northern pike
2) an area for gamefish concentration in spring and fall

Wildlife Habitat

Shrubs and brush along the shoreline are the most important habitat components at this site. In addition to the habitat values found at all the sites, this site also provides habitat for deer, nesting and roost areas for ducks, shelter/cover/nesting and feeding areas for amphibians (frogs, toads, salamanders) and turtles. During periods of higher water levels, this site could also provide feeding areas and shelter for ducks.

Recommendations

1) Maintain current vegetation and shrubs and brush along the shore for wildlife habitat and as a nutrient buffer
2) Maintain the current buffer width for wildlife corridor.
3) Protect emergent vegetation for water quality and protection from erosion
4) Maintain the aquatic vegetation in an undisturbed condition for fish habitat.
5) Do not remove fallen trees from the shoreline
6) Do not alter the littoral zone except for improvement of spawning habitat
7) No removal of any shoreline or aquatic vegetation. Allow removal of minimum necessary for lake access.
8) No lawn chemicals and fertilizers to be used on shore
9) No permitting for shoreline erosion control needed; retain existing natural shoreline protection
10) No bank grading
11) No dredging or lake bed removal or modifications
12) No pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects
13) Minimize pier dimensions and placement, permit required for placement
14) No boat ramp placement
15) No recreational floating devices
16) Revegetate and restore shoreline buffer of native vegetation at developed sites for habitat and water quality protection. A 30-foot mowed lake access could be maintained through this buffer. The white house at the opening to channel is not in compliance with shoreline zoning. Shoreline has been clear-cut and needs to be restored with a native vegetation buffer.

Sensitive Area Squaw 3 – Northwest Shore

This sensitive area encompasses approximately 1100 feet of shoreline on the west side of the lake, on the north part of the lake (Figure 2). There is some development at this site, but it is mostly natural shoreline.

Additional reasons for selecting this site is the importance of protecting the springs in this area. Due to groundwater flows in the area of Squaw Lake, this shoreline is a groundwater source, providing cold spring water to the lake. It is important to protect this water source to Squaw Lake.

It supports important near-shore terrestrial habitat and shoreline habitat. The sediment is sand, gravel and rock. About 10% of the shoreline is deep marsh and shallow marsh wetland and 90% is wooded.

The Plant Community:

Shoreline and emergent vegetation that includes mannagrass, reed-canary grass, sedges, cattails, water smartweed, bulrushes, bur-reed and arrowhead, provide wildlife cover and food sources, protect the shoreline and provide spawning habitat.

Floating-leaf vegetation, duckweed, provides a food source.

Submergent vegetation provides fish and wildlife benefits (Table 3). Common waterweed is present. Turf-forming creeping spikerush colonizes the lake bottom, anchoring the substrate. The pondweed family, an important food source for fish and waterfowl, is represented at this site by small pondweed.

Water Quality

Maintaining the integrity of this sensitive area is especially important for protecting the water quality of Squaw Lake as this site contains springs that provide water flow to the lake.

Fish Habitat

The emergent vegetation is especially important at this site.

1) This site provides spring spawning, spring and summer nursery areas, feeding areas and protective cover for large-mouth bass, bluegill and crappie.
2) Points provide important lofting areas for crappie.

Wildlife Habitat

Shrubs and brush along the shoreline are the most important habitat components at this site. The cover of the shrubs and brush provide a corridor between larger upland habitat areas. In addition to the habitat values found at all the sites, this site also provides corridor for deer and amphibians (frogs, toads, salamanders) and turtle movement, nesting areas for.

Recommendations

1) Maintain the aquatic vegetation in an undisturbed condition for fish habitat.
2) No removal of emergent vegetation.
3) Do not remove fallen trees from the shoreline
4) Do not alter the littoral zone except for improvement of spawning habitat
5) Create fish cover via addition of large woody debris, tree drops, etc.
6) Protect spawning habitat and reduce disturbance during spring spawning
7) No removal of any shoreline or aquatic vegetation. Allow removal of minimum necessary for lake access.
8) No lawn chemicals and fertilizers to be used on shore
9) No permitting for shoreline erosion control needed; retain existing natural shoreline protection
10) No bank grading
11) No dredging or lake bed removal or modifications
12) No pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects
13) Minimize pier dimensions and placement, permit required for placement
14) No boat ramp placement
15) No recreational floating devices
16) Revegetate and restore shoreline buffer of native vegetation at developed sites for habitat and water quality protection. A 30-foot mowed lake access could be maintained through this buffer.

Sensitive Area Squaw 4 – West Shore

This sensitive area a site of outstanding natural beauty, an approximately 4400 feet of shore on the west shore of the lake, mid-lake to the south and includes a bay on the west shore (Figure 2).

The shore supports important near-shore terrestrial habitat and shoreline habitat. About 40% of the shoreline is deep marsh and shallow marsh wetland and 60 % is wooded. The sediment is composed of sand, silt, organic muck and rock. Large woody cover is present along the shore and provides important fish and wildlife habitat structure.

The Plant Community:

Emergent vegetation and shoreline vegetation, mannagrass, reed-canary grass, sedge, spikerush, water smartweed, arrowhead, cattail and two species of bulrush softstem and river), protect the shoreline and provide important food sources, cover and fish spawning habitat.

Floating-leaf vegetation, duckweed, provides a food source.

The submerged plant community provides habitat components for the fish and wildlife community (Table 4). Common waterweed and coontail are present. The pondweed family, which is an important food source, is represented by a small pondweed. Turf-forming creeping spikerush colonizes the lake bottom, anchoring the substrate.

Fish Habitat

The small bay at this site is premier spring and fall fish habitat, the best bay on the lake for habitat. The bay has warmer water in spring and fall for fish congregation, but its deep water connection to the main lake prevents fish entrapment and winter fish kill. The lakeshore is undeveloped and provides a variety of fish habitat in the form of large woody debris, submergent and emergent vegetation.

1) spring spawning, spring and summer nursery areas, feeding areas and protective cover for large-mouth bass, bluegill and crappie
2) spring spawning and nursery areas for northern pike in the bay
3) an especially important area in the bay for bass and panfish to congregate in the spring and fall.

Wildlife Habitat

Shrubs and brush along the shoreline are the most important habitat components at this site. The cover of the shrubs and brush provide a corridor between larger upland habitat areas. In addition to the habitat values found at all the sites, this site also provides a corridor for upland wildlife, turtles and amphibians (frogs, toads, salamanders).

Recommendations

1) Maintain the aquatic vegetation in an undisturbed condition for fish habitat.
2) Do not remove fallen trees from the shoreline
3) Do not alter the littoral zone except for improvement of spawning habitat
4) Create fish cover via installation of large woody debris, tree drops, etc.
5) Protect spawning habitat and reduce disturbance during spring spawning
6) Maintain the current buffer width for wildlife corridor.
7) Protect shoreline vegetation, shrub and brush, for wildlife habitat.
8) Maintain the aquatic vegetation in an undisturbed condition for water quality protection.
9) No removal of any shoreline or aquatic vegetation. Allow removal of minimum necessary for lake access.
10) No lawn chemicals and fertilizers to be used on shore
11) No permitting for shoreline erosion control needed; retain existing natural shoreline protection
12) No bank grading
13) No dredging or lake bed removal or modifications
14) No pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects
15) Minimize pier dimensions and placement, permit required for placement
17) Boat ramp at site to be maintained but not enlarged
18) No recreational floating devices
19) Future development platted to maintain existing buffer

Sensitive Area Squaw 5 – Southwest Bay and Shore

This sensitive area encompasses approximately 1500 feet of the south shore of the bay and the shore east and south of the bay (Figure 2). The sediment is sand, silt and gravel.

The bay supports important near-shore terrestrial habitat and shoreline habitat. About 40% of the shoreline is deep marsh and shallow marsh wetland and 60% is wooded. Large woody cover that is an important structural component of fish and wildlife habitat is present along portions of the shore. The gravel and sand substrate provide additional benefits for fish spawning.

The Plant Community:

Shoreline and emergent vegetation that includes mannagrass, spikerush, reed-canary grass, water smartweed, tick-seed sunflower, cattail, bul-rush and water plantain, provide wildlife cover and food sources, protect the shoreline and provide spawning habitat.

Floating leaf-species, duckweed, provides food sources.

The submergent plant community provides habitat (see Table 5). Common waterweed is present. The pondweed family is an important food producer and is represented here by small pondweed. Turf-forming creeping spikerush is abundant and protects the lake bottom and anchors the sediment.

Fish Habitat

The bay at this site is important for habitat for fish. The bay has warmer water in spring and fall for fish congregation, but its deep water connection to the main lake prevents fish entrapment and winter fish kill.

This site provides spring spawning, spring and summer nursery areas, feeding areas and protective cover for large-mouth bass, bluegill and crappie.

Wildlife Habitat

Emergent vegetation and shrubs and brush along the shoreline are the most important habitat components at this site. In addition to the habitat values found at all the sites, this site also provides habitat for deer, shelter and feeding areas for ducks and turtles and corridor for amphibians (frogs, toads, salamanders).

Recommendations

1) Maintain the aquatic vegetation in an undisturbed condition for fish habitat.
2) Do not remove fallen trees from the shoreline
3) Do not alter the littoral zone except for improvement of spawning habitat
4) Create fish cover via installation of large woody debris, tree drops, etc.
5) Protect spawning habitat and reduce disturbance during spring spawning
6) Protect shoreline vegetation, shrub and brush, for wildlife habitat.
7) Maintain the aquatic vegetation in an undisturbed condition for water quality protection.
8) No removal of any shoreline or aquatic vegetation. Allow removal of minimum necessary for lake access.
9) No lawn chemicals and fertilizers to be used on shore
10) Development in bay not in compliance with shoreline zoning. Terraced to lakeshore, creating excess hard surface, possible grading violation and sand blanket violation.
11) Revegetate and restore shoreline buffer of native vegetation at developed sites for habitat and water quality protection. A 30-foot mowed lake access could be maintained through this buffer.
12) Remove concrete wall
13) No bank grading
14) No dredging or lake bed removal or modifications
15) No pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects
16) Minimize pier dimensions and placement, permit required for placement
17) No boat ramp placement
18) No recreational floating devices

Sensitive Area #5a - Spring and Fall Fish Protection Area (Small backwater between Site #5 and Site #6)

This small area provides springs and an important area of fish to congregate in the spring.

Recommendations

1) No alteration of the shoreline; preserve all natural vegetation to protect water temperature and quality
2) No alteration of the sediments to protect this spring and fall fish habitat
3) No placement of piers, docks
4) No grading, dredging, filling.

Sensitive Area Squaw 6 – Southeast Peninsula

This sensitive area encompasses approximately 3100 feet of shore around the peninsula and adjacent shoreline north of this peninsula in the southeast corner of the lake (Figure 2). It supports important near-shore terrestrial habitat, shoreline habitat and shallow water habitat. The sediment is sand and rock. About 30% of the shoreline is wetland and 70% is wooded. Areas of large rock and gravel are important for fish spawning.

The Plant Community:

Shoreline and emergent vegetation that includes spikerush, reed-canary grass, sedge, three-way sedge, spikerush, water smartweed, bulrush and arrowhead, provide wildlife cover and food sources, protect the shoreline and provide spawning habitat.

Floating-leaf vegetation, duckweed, provides food source.

The submergent plant community provides fish and wildlife benefits (Table 6). Common waterweed and coontail occur at this site. Turf-forming creeping spikerush is abundant, anchoring the substrate to reduce turbidity. The pondweed family is an important food source for fish and waterfowl and is represented at this site by small pondweed.

Water Quality

Maintaining the integrity of this sensitive area is especially important for protecting the water quality of Squaw Lake as this site contains springs that provide water flow to the lake.

Fish Habitat

This site provides spring and fall habitat during high water conditions.

1) spring and summer spawning feeding areas and protective cover for large-mouth bass, bluegill and crappie
2) an important area for gamefish concentration in the spring and fall

Wildlife Habitat

Emergent vegetation and shrubs and brush along the shoreline are the most important habitat components at this site. In addition to the habitat values found at all the sites, this site also provides shelter/cover/nesting and feeding areas for amphibians (frogs, toads, salamanders) and turtles. During periods of higher water, this site could provide cover and feeding areas for ducks.

Recommendations

1) Maintain the aquatic vegetation in an undisturbed condition for fish habitat.
2) Do not remove fallen trees from the shoreline
3) Do not alter the littoral zone except for improvement of spawning habitat
4) Create fish cover via large woody debris, tree drops, etc.
5) Protect spawning habitat and reduce disturbance during spring spawning
6) Protect shoreline vegetation, shrubs and brush, for wildlife habitat
7) Maintain the aquatic vegetation in an undisturbed condition as a buffer for water quality protection
8) No permitting for shoreline erosion control needed; maintain current buffer
9) No lawn chemicals and fertilizers to be used on shore
10) No bank grading
11) No dredging or lake bed removal or modifications
12) No pea gravel beds or sand blankets, except for DNR fishery or wildlife approved projects
13) Minimize pier dimensions and placement, permit required for placement
14) No boat ramp placement
15) No recreational floating devices

Sensitive Area #6a - Spawning Protection Area (North of Boat Landing and south of Site #1)

In the past the gravel bar and emergent bulrush beds provided important cover and spawning sites. In past fish surveys, this site harbored the largest fish. In recent years, these bulrush beds have been removed and the nearshore area has become degraded.

Recommendations

1) Do not alter sediments that are used for fish spawning.
2) Restore emergent vegetation (bulrushes) for fish habitat.