Lac Courte Oreilles Lake

Aquatic Plant Management Plan

July 2011

Sawyer County, WI
WIBC: 2390800

Funded by the Courte Oreilles Lake Association and a grant from the Wisconsin Department of Natural Resources

Prepared by: **Daniel D. Tyrolt**
Environmental Engineer

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Introduction

This Aquatic Plant Management Plan for Lac Courte Oreilles Lake presents a strategy for managing aquatic plants by protecting native plant populations, controlling the growth of Curly Leaf Pondweed (CLP) and preventing establishment of additional invasive species. The plan includes data about the plant community, watershed and water quality of the lake. Based on this data and public input, goals and strategies for the sound management of the aquatic plants in the lake are presented. This plan will guide the Courte Oreilles Lake Association (COLA), the Lac Courte Oreilles Band of Lake Superior Chippewa (LCO), Sawyer County, and the Wisconsin Department of Natural Resources in aquatic plant management for the lake over the next five years (2011 through 2015).

Public Input for Development

The Courte Oreilles Lake Association Aquatic Plant Management (APM) Committee provided input for the development of this aquatic plant management plan. The Aquatic Plant Management Committee was comprised of members from the Courte Oreilles Lake Association with representation from the Lac Courte Oreilles Conservation Department, the Wisconsin Department of Natural Resources and the Sawyer County Aquatic Invasive Species Coordinator. The Courte Oreilles Lake Association Aquatic Plant Management Committee members included the following:

- Kris Sivertson
- Gary Pulford
- David Johnston
- Rob Engelstad

The Aquatic Plant Management Committee met once during April and communicated many times through email. At the first meeting the committee reviewed aquatic plant management planning requirements, plant survey results, plant concerns, CLP management efforts to date and a timeline for the completion of the plan. The APM Committee expressed a variety of concerns that are reflected in the goals and objectives for aquatic plant management in this plan.

The Courte Oreilles Lake Property Owners' Association board announced availability of the draft Aquatic Plant Management plan for review to all lake residents at their annual general membership meeting on June 18, 2011. A copy of the plan was also made available to the public through the COLA website. Comments were accepted through June 24, 2011. The COLA board also approved the plan the plan at their general membership meeting on June 18, 2011.

Lake Management Concerns

The aquatic plant management committee had several major concerns which this plan addresses. These concerns include:

- Minimizing CLP growth and spread within the lake
- Preventing the introduction of other non-native aquatic invasive species
- Preserving the lakes diverse native plant communities
- Education of lake users about aquatic invasive species and the importance of native plants

Lake Information

Lac Courte Oreilles Lake located in Sawyer County, Wisconsin, is considered a unique and significant water resource by the Courte Oreilles Lake Association (COLA), the Lac Courte Oreilles Band of Lake Superior Chippewa Indians (LCO), Sawyer County and the Wisconsin Department of Natural Resources (WDNR). Lake maps of Lac Courte Oreilles Lake are shown in Figures 1 and 2. Figure 1 is the west half of the lake and Figure 2 is the east half of the lake. The lake is a soft-water drainage lake located in the Upper Chippewa River Basin. There are several inlets flowing into the lake. These include Osprey Creek (flowing into Barbertown Bay), Ghost Creek, Spring Creek, Whitefish Creek (from Whitefish Lake), Little Grindstone Creek (from Grindstone Lake), and Ring Creek. It has a surface area of approximately 5,039 acres and a volume of approximately 168,840 acre-feet. The maximum depth is 90 feet, which is one of the deepest lakes in Sawyer County. Approximately 68% of the lake is over 20 feet deep and only 3% is less than 3 feet deep. The total shoreline of the lake spans 25.4 miles. The lake has a varied fishery which includes walleye, muskellunge, northern pike, panfish, crappie, and small and largemouth bass. Cisco are also common and provide a high energy forage base for the gamefish. The lakeshore property owners, LCO tribal members and the general public, via the public accesses, utilize the lake for a wide variety of activities, including fishing, boating, skiing, swimming, snorkeling, SCUBA diving and viewing wildlife.

Figure 1: Lac Courte Oreilles Lake: West Half

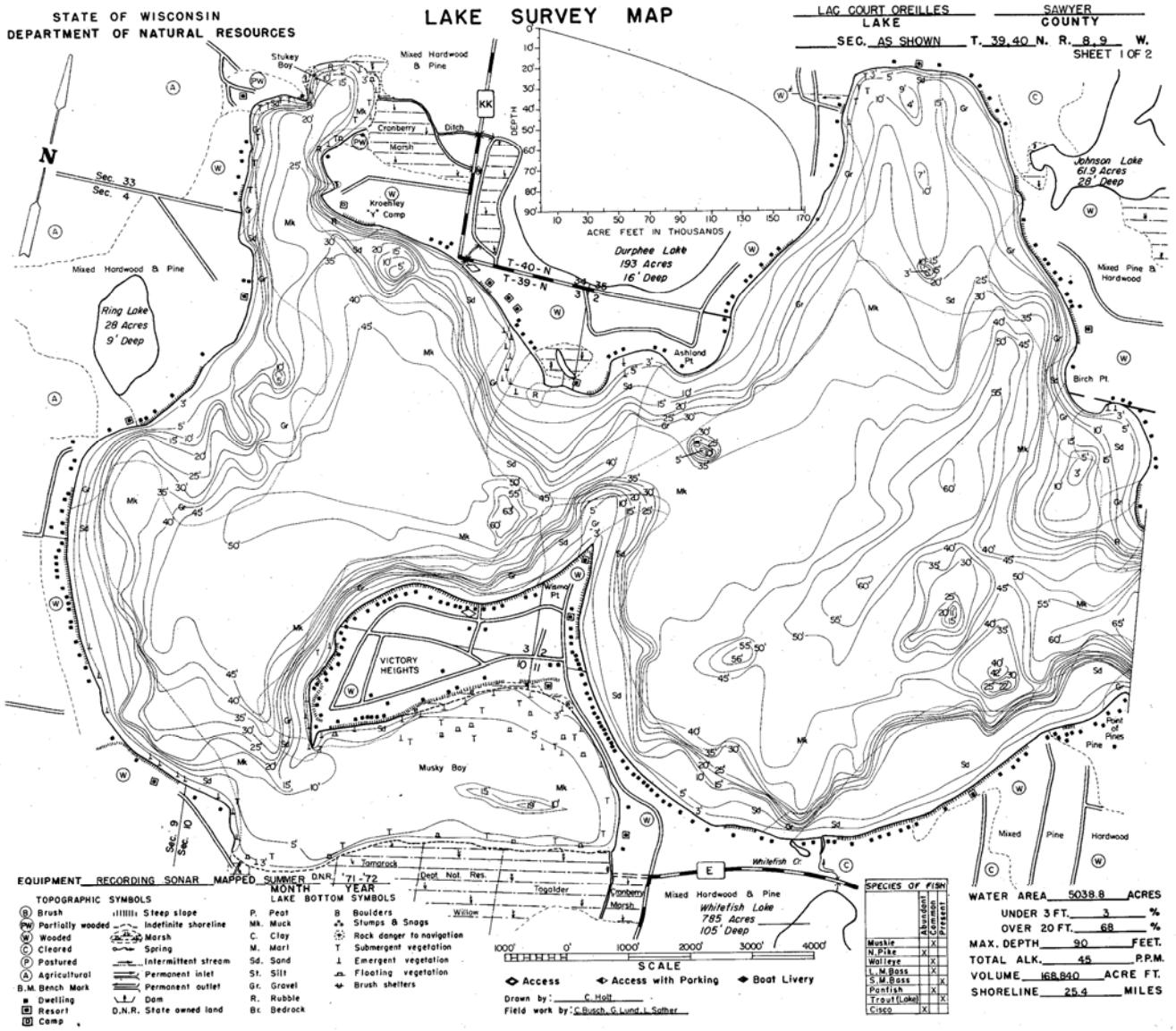
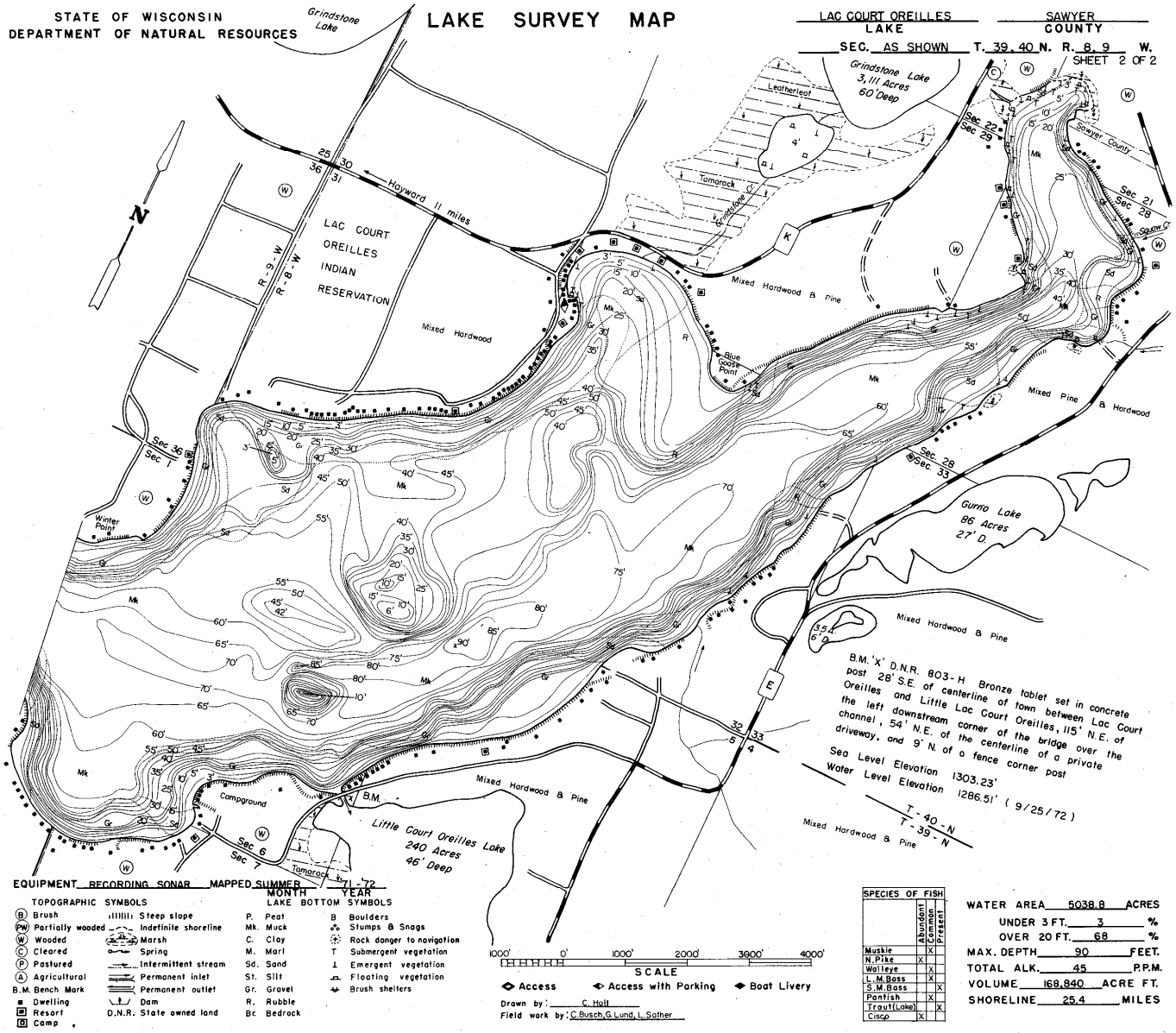


Figure 2: Lac Courte Oreilles Lake: East Half



Water Quality

Not all lakes are in the same stage of eutrophication because of varying nutrient status. Criteria have been established to evaluate the existing nutrient status of a lake. Trophic state indices (TSI's) are calculated for lakes on the basis of total phosphorus, chlorophyll-a concentrations, and Secchi disk transparencies. A TSI value can be obtained from any one of those parameters. TSI values range upward from zero, designating the condition of the lake in terms of its degree of fertility. The trophic status indicates the severity of a lake's algal growth problems and the degree of change needed to meet its recreational goals. Determining the trophic status of a lake is therefore an important step in diagnosing water quality problems. For a general guideline of TSI, Table 1 can be referred to.

Table 1: Trophic Status and TSI Ranges

Trophic Status	TSI Range	
Oligotrophic	TSI 37	Clear, low productivity lakes with total phosphorus concentrations less than or equal 10 ug/L
Mesotrophic	38 TSI 50	Intermediate productivity lakes with total phosphorus concentrations greater than 10 ug/L, but less than 25 ug/L
Eutrophic	51 TSI 63	High productivity lakes generally having 25 to 57 ug/L of total phosphorus
Hypereutrophic	64 TSI	Extremely productive lakes that are highly eutrophic, disturbed and unstable (i.e., fluctuating in their water quality on a daily and seasonal scale, producing gases, off-flavor, and toxic substances, experiencing periodic anoxia and fish kills, etc.) With total phosphorus concentrations above 57 ug/L

The LCO Conservation Department has been collecting lake data on a regular basis at several sites throughout the lake since 2000. This data includes total phosphorus, chlorophyll-a and Secchi disk readings. The water quality data show that Lac Courte Oreilles Lake, with the exception of Musky Bay, has excellent water quality that would be consistent with a north temperate oligotrophic lake. Musky Bay, on the other hand, is classified as eutrophic. Table 2

indicates the 2010 Trophic state indices for the sample locations that the LCO Conservation Department has been monitoring within the lake. It is important to note that the water quality values are borderline between the Oligotrophic and Mesotrophic categories, indicating that a slight increase in nutrients to the lake could shift the lake into the Mesotrophic category.

Table 2: 2010 Lac Courte Oreilles Lake Trophic State Indices

Waterbody	Chl a TSI Value	Secchi Disc TSI Value	Total P TSI Value	Chl a Trophic State	Secchi Disc Trophic State	Total P Trophic State
Musky Bay Deep	51	47	57	eutro	meso	eutro
Stucky Bay	38	35	41	meso	oligo	meso
West Basin	38	32	36	meso	oligo	oligo
Center basin	36	32	32	oligo	oligo	oligo
Deep Hole	37	33	37	oligo	oligo	oligo
Grindstone Bay	39	35	42	meso	oligo	meso
Barbertown Bay	39	35	41	meso	oligo	meso

Figure 3 shows the average total phosphorus values from 2000 thru 2010 for the sites the LCO Conservation Department has been monitoring. Phosphorus is the plant nutrient that most often limits the growth of algae. Phosphorus-rich lake water indicates a lake has the potential for abundant algal growth, which can lead to lower water transparency and a decline in hypolimnetic oxygen levels in a lake. While nitrogen can limit algal growth, it can be obtained from the atmosphere by certain algal species. This is termed nitrogen fixation. Thus, phosphorus is the only essential nutrient that can be effectively managed to limit algal growth.

To further understand the phosphorus loading to Musky Bay which is causing it to be eutrophic, a phosphorus budget was calculated for the Bay. The latest phosphorus budget was completed by LCO Conservation Department in 2008 and is depicted in Figure 4. A significant portion of the phosphorus loading to the bay is coming from the cranberry farm which discharges into the bay. The high nutrient loading to the bay is causing severe algae blooms and the prolific growth of aquatic macrophytes. This is of particular concern since curly leaf pondweed appears to be well established in the bay and these excess nutrient help to fuel its growth.

Figure 5 shows the average chlorophyll-a values from 2000 thru 2010 for the sites the LCO Conservation Department has been monitoring. Chlorophyll-a is a measure of algal abundance within a lake. High chlorophyll-a concentrations indicate excessive algal abundance (i.e. algal blooms), which can lead to recreational use impairment.

Figure 3: LCO Average Total Phosphorus Values

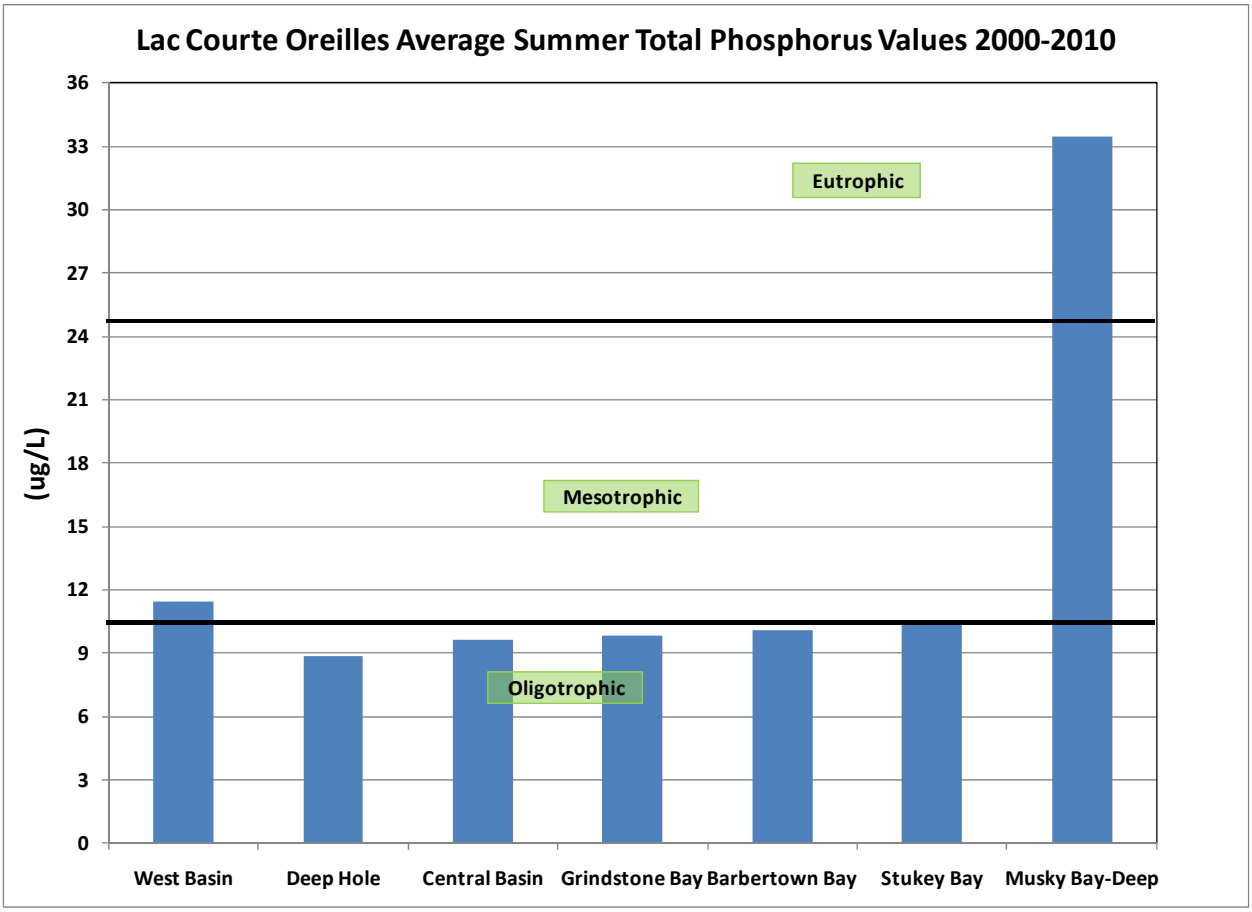


Figure 6 shows the average Secchi disk readings from 2000 thru 2010 for the sites the LCO Conservation Department has been monitoring. Secchi disk transparency is a measure of water clarity. Perceptions and expectations of people using a lake are generally correlated with water clarity. The results of a survey completed by the Metropolitan Council (Osgood, 1989) indicated that the following relationships can generally be perceived between a lake's recreational use impairment and Secchi disk transparencies:

- No impairment occurs at Secchi disk transparencies greater than 4 meters (13 feet).[1]
- Minimal impairment occurs at Secchi disk transparencies of 2 to 4 meters (6.5 - 13 feet).

[1] Osgood, R.A.;1989. Assessment of Lake Use - Impairment in the Twin Cities metropolitan Area. Prepared for the Minnesota Pollution Control Agency. Metropolitan Council Publication 590-89-130. 12 pp.

- Moderate impairment occurs at Secchi disk transparencies of 1 to 2 meters (3.3 - 6.5 feet).
- Moderate to severe use-impairment occurs at Secchi disk transparencies less than 1 meter (3.3 feet).

Figure 4: Musky Bay Total Phosphorus Budget

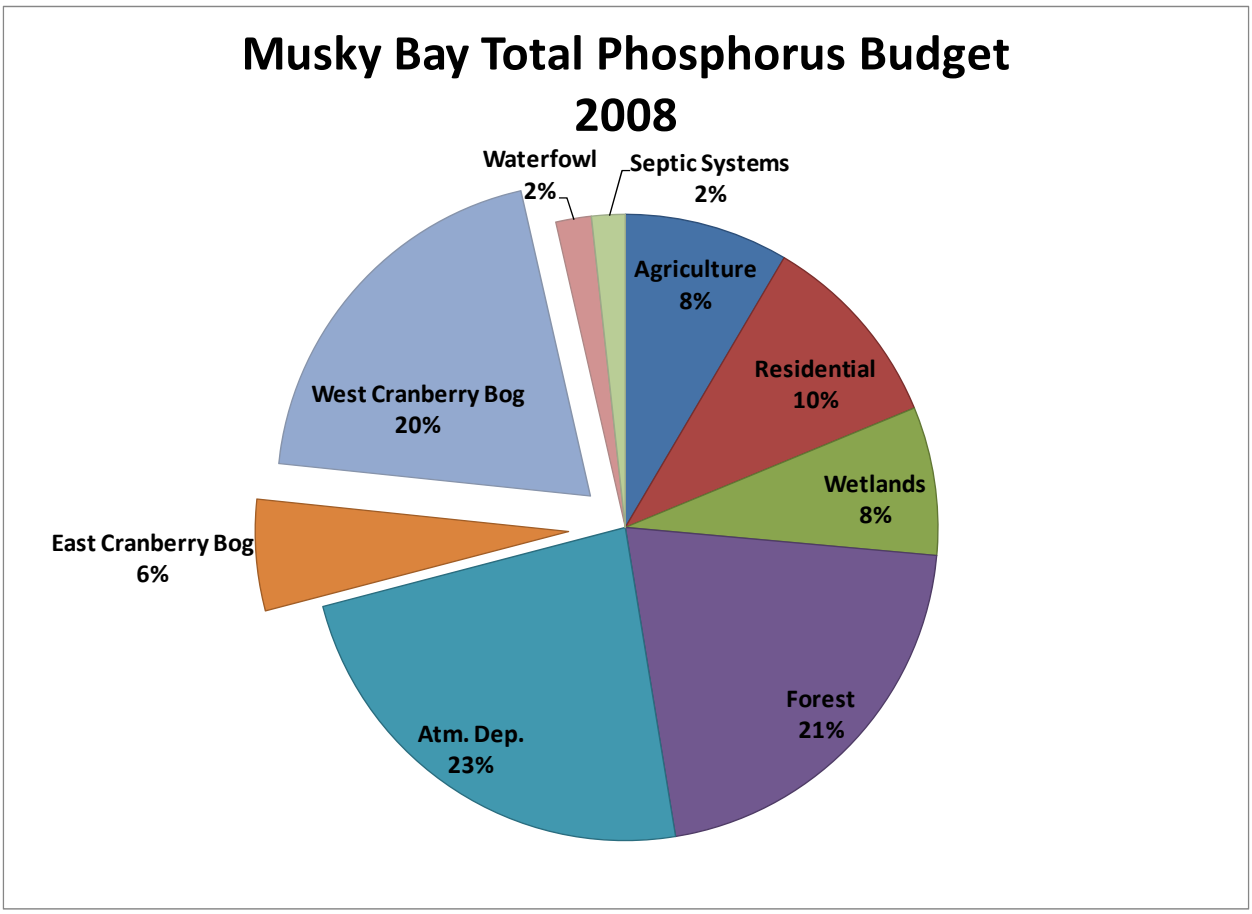
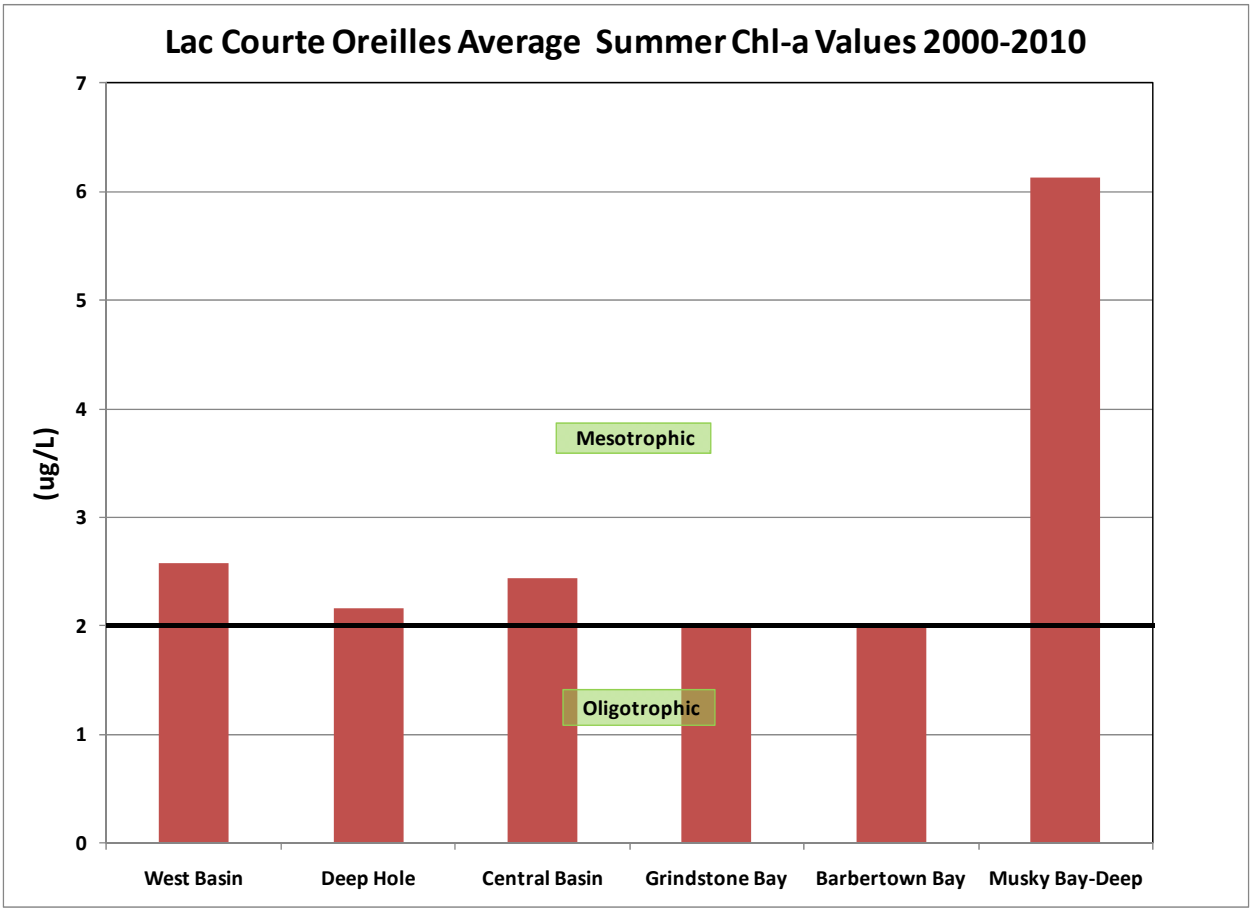
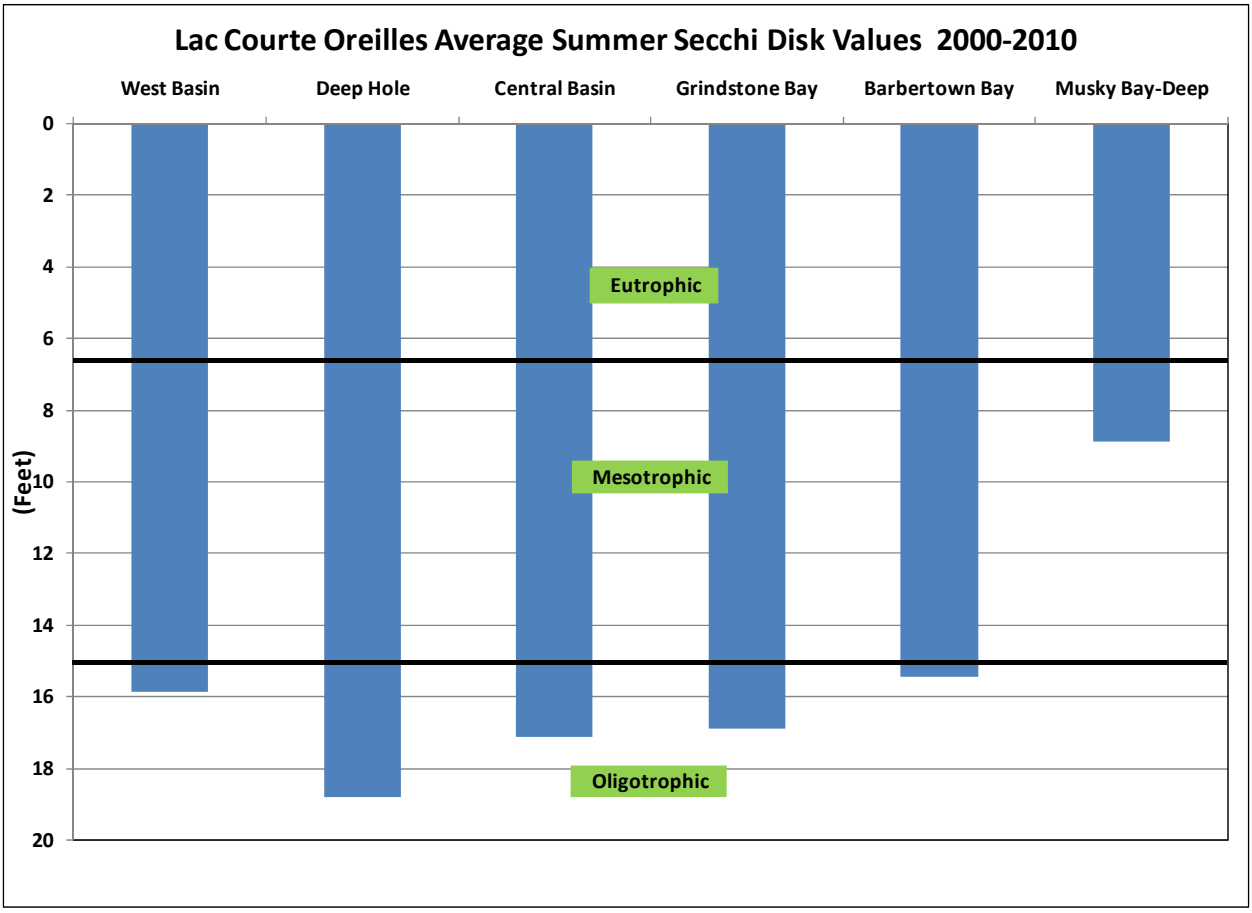


Figure 5: LCO Average Chl-a Values



Alkalinity is associated with the carbon system in the lake. Another term used to indicate a lake's alkalinity is hardness. Hard water lakes (greater than 60 mg/L calcium carbonate) tend to be better producers of aquatic life, including both plants and animals. Soft water lakes (less than 60 mg/L calcium carbonate) are not as productive. Extremely low alkalinities (less than 5 mg/L calcium carbonate) are more likely to be impacted by acidification resulting from acid rain. Alkalinities above 5 mg/L calcium carbonate have enough buffering to counteract the effects of acid rain. Alkalinity Data for Lac Courte Lake indicates that it has an alkalinity of 50 mg/L. Lac Courte Oreilles Lake would therefore be classified as a soft water lake.

Figure 6: LCO Average Secchi Disk Values



Watershed

The area of land that drains to the lake is called the lake's watershed. This area may be small, as is the case of small seepage lakes. Seepage lakes have no stream inlet or outlet and their watersheds include only the land draining directly to the lake. On the other hand, a lake's watershed may be large, as in drainage lakes such as Lac Courte Oreilles Lake. Drainage lakes have at least one stream inlet and an outlet and therefore their watersheds include the land draining to the streams in addition to the land draining directly to the lake. The water draining to a lake may carry pollutants that affect the lake's water quality. Therefore, water quality conditions of the lake are a direct result of the land use practices within the entire watershed. Poor water quality may reflect poor land use practices or pollution problems within the watershed. Good water quality conditions suggest that proper land uses are occurring in the watershed or there is minimal development within the watershed.

All land use practices within a lake's watershed impact the lake and determine its water quality. Impacts result from the export of sediment and nutrients, primarily phosphorus, to a lake from

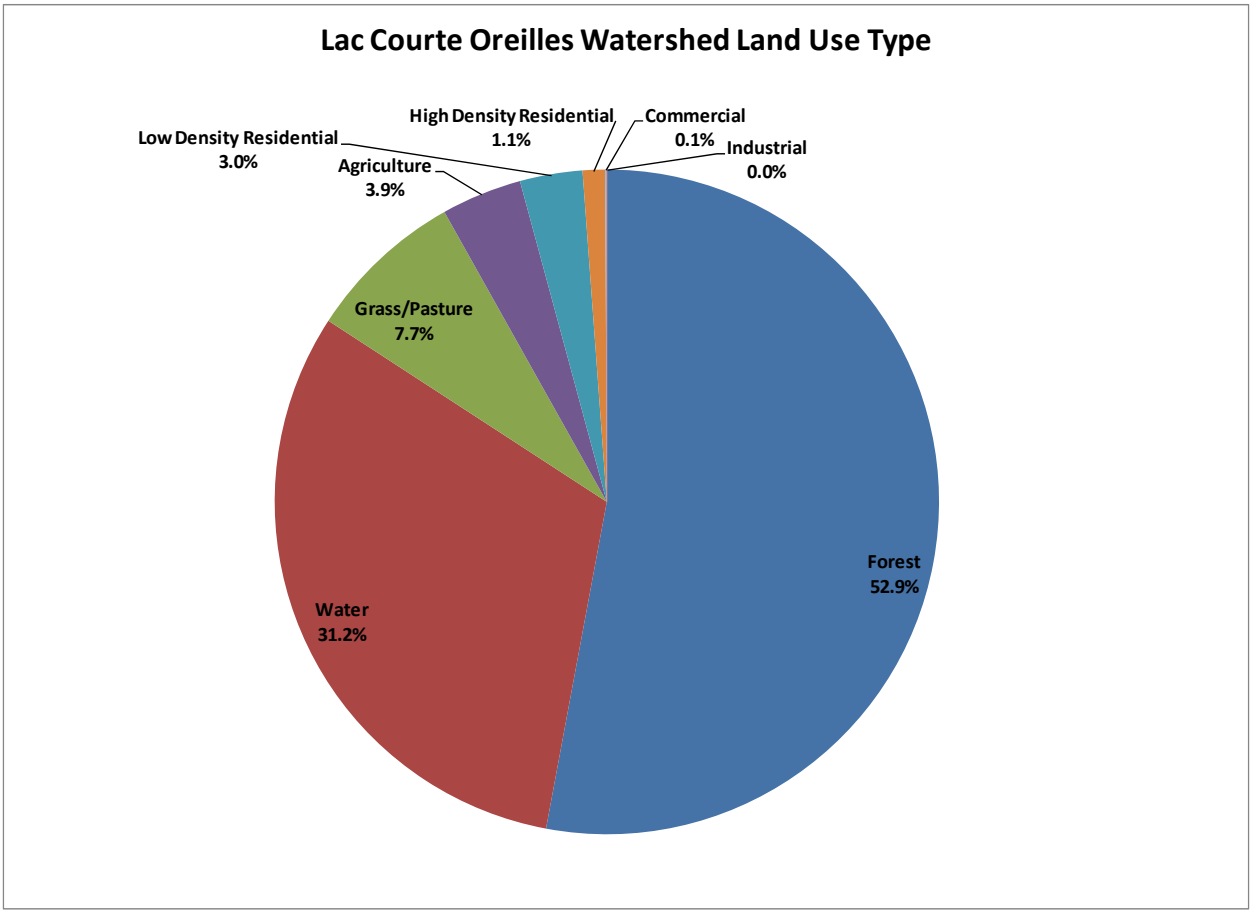
its watershed. Each land use contributes a different quantity of phosphorus to the lake, thereby, affecting the lake's water quality differently. An understanding of a lake's watershed, phosphorus exported from the watershed, and the relationship between the lake's water quality and it's watershed must be understood.

The watershed for Lac Courte Oreilles Lake is part of the Couderay River watershed (Watershed Identification Key UC20) located in the Upper Chippewa River Basin. The watershed is primarily forest with development occurring along the lakeshore. The forested land is a good land cover to have around the lake since it contributes much smaller nutrient and sediment amounts into the lake compared to developed land covers such as residential and agriculture. The entire LCO watershed encompasses 68,990 acres and includes several other lakes. Water quality changes in these lakes would also be reflected in Lac Courte Oreilles Lake. The major lakes within the Lac Courte Oreilles lakes watershed include the following:

- Round Lake (3,054 acres)
- Grindstone Lake (3,116 acres)
- Sand Lake (928 acres)
- Whitefish Lake (786 acres)

Watershed land use acreages were taken from the "Lac Courte Oreilles Lake Management Plan" prepared by C. Bruce Wilson (Wilson, 2011). In total, the watershed covers a surface area of 68,990 with the majority of land cover in forest 36,517 acres (53%) and water covering about 21,557 acres (31%). Grass and pasture were tabulated to cover over 5,300 acres with High Density and Low Density residential covering about 2, 900 acres and agriculture about 2,704 acres. These are represented in Figure 7. Forest plus water categories cover about 84% of the watershed with agriculture, commercial, industrial and residential less than 9%.

Figure 7: Lac Courte Oreilles Watershed Land Use



Aquatic Habitats

Primary Human Use Areas

The lakeshore property owners, LCO tribal members and the general public, via the public accesses, utilize the lake for a wide variety of activities, including fishing, boating, skiing, swimming, snorkeling, SCUBA diving and viewing wildlife. Public access to the lake is via the three public boat launches.

Presently, there are 651 single family dwellings on Lac Courte Oreilles. This is up from about 206 residences in the late 1960's. Resorts on the lake have decreased from 18 to 3 during this same time period (Table 3).

Table 3: Lac Courte Residential Shoreline Development (Pratt and Neuswanger 2006)

Year	Residences	Resorts
1967	206	18
1998	542	3
2005	651	3

Fisheries

Lac Courte Oreilles Lake has a varied fishery. It is a stocked walleye lake with approximately 2 adult walleye per acre. The population of walleye also appears to be increasing according to recent fyke net surveys (Krahn, 2010). It is a quality muskellunge fishery and is a good smallmouth fishery. Cisco are also present in the lake and provide a quality food source for good growth rates of the gamefish. The population of Largemouth bass is increasing and may become a management problem. The increasing numbers of largemouth bass may be linked to a shift in the macrophyte community in the lake.[2] A majority of the near shore habit in the lake is sub-optimal habit for largemouth bass (rock cobble or sandy substrate without plants or woody structure); but an increase in survival of young fish facilitated by an increase in aquatic plants could lead to the development of a significant largemouth bass population (Krahn, 2010). Copies of the latest WDNR (2010) early spring and spring fyke net survey and summary results are included in Appendix A. Other fish species present in the lake include, northern pike, bluegill, perch, black crappie, rock bass, pumpkinseed, bullheads, white suckers, redhorse, longnose gar and various minnow species.

Rare and Endangered Species Habitat

Lac Courte Oreilles Lake is located in T39N 40N, R8, 9W. Table 4 lists the species that the Wisconsin Natural heritage Inventory has listed for the Town and Range that Lac Courte Oreilles Lake is located in. The listing does not provide enough detail to know if the species are actually found in Lac Courte Oreilles Lake.

Table 4: Rare and Endangered Species (T39N 40N R8W R9W)

Scientific Name	Common Name	State Status[3]
Canis lupus	Gray Wolf	SC/FL
Eleocharis robbinsii	Robbins' Spikerush	SC

[2] Personal communication, Frank Pratt, WI DNR Fisheries Biologist (retired).

[3] THR = Threatened, SC = Special Concern, SC/FL = Special Concern (federally protected as endangered or threatened), SC/P = Special Concern (federally protected), END = endangered

Scientific Name	Common Name	State Status[3]
Haliaeetus leucocephalus	Bald Eagle	SC/P
Lepomis megalotis	Longear Sunfish	THR
Moxostoma valenciennesi	Greater Redhorse	THR
Potamogeton pulcher	Spotted Pondweed	END
Scirpus torreyi	Torrey's Bulrush	SC
Utricularia purpurea	Purple Bladderwort	SC

PLANT COMMUNITY

Functions and Values of Aquatic Plants

Native aquatic plants play a key role in the ecology of a lake. They can help to maintain water quality, prevent shoreline erosion and provide habit for a wide diversity of species from fish to amphibians to mammals. Table 5 lists the species of plants that were sampled or observed in Lac Courte Oreilles Lake and their ecological significance.

Phragmites Bed-LCO

Table 5: Lac Courte Oreilles Lake Plants and Their Significance

Scientific Name	Common Name	Ecological Significance[4]
filamentous algae	filamentous algae	
Ceratophyllum demersum	Coontail	The stiff whorls of leaves offer prime habitat for a host of critters, particularly during the winter when many other plants are reduced to roots and rhizomes. Both the foliage and fruit are grazed by waterfowl. Bushy stems of coontail harbor many invertebrates and provide important shelter and foraging opportunities for fish.

[4] Summarized from Through the Looking Glass. Borman etal. 1997.

Scientific Name	Common Name	Ecological Significance[4]
Chara	Muskgrasses	A favorite waterfowl food. Algae and invertebrates found on it provide additional grazing. It is also considered valuable fish habitat. Beds of muskgrass offer cover and are excellent producers of food, especially for young trout, largemouth bass and smallmouth bass. The rhizoids slow the movement and suspension of sediments. Therefore, stands of muskgrass can benefit water quality. It is a good bottom stabilizer.
Eleocharis acicularis	Needle Spikerush	Provides food for a wide variety of waterfowl as well as muskrats. Submersed beds offer spawning habitat and shelter for invertebrates.
Elodea canadensis	Common waterweed	The branching stems offer valuable shelter and grazing opportunities for fish, although very dense stands can obstruct fish movement. It also provides food for muskrats and waterfowl.
Eriocaulon aquaticum	Pipewort	Beds of pipewort create shallow water structure for young fish, amphibians and invertebrates. The leaves are sometimes grazed by ducks.
Heteranthera dubia	Water star-grass	A locally important source of food for geese and ducks including northern pintail, blue-winged teal and wood duck. It also offers good cover and foraging opportunities for fish.
Isoetes sp.	Quillwort	Provide habit in low nutrient lakes that may have very limited plant growth. The foliage is sometimes consumed by waterfowl or game birds including sharp-tailed grouse.
Lemna minor	Small duckweed	It is a nutritious food source that can provide up to 90% of the dietary needs for a variety of ducks and geese. It is also consumed by muskrat, beaver and fish. Rafts of duckweed offer shade and cover for fish and invertebrates. Extensive mats of duckweed can also inhibit mosquito breeding.
Lemna trisulca	Forked duckweed	A good food source for waterfowl. Tangled masses of fronds also provide cover for fish and invertebrates.
Lobelia dortmanna	Water lobelia	Beds of water lobelia can help stabilize sandy, eroding shorelines. It also offers shallow water habitat for invertebrates and young fish.
Megalodonta beckii	Water marigold	The submersed foliage offers shade, shelter and foraging opportunities for fish. Waterfowl and shorebirds may consume the fruit when the plant produces it. It is considered an "indicator species." It is sensitive to changes in water quality, and may be one of the first submersed plants to disappear from a lake when water quality declines.

Scientific Name	Common Name	Ecological Significance[4]
Myriophyllum sibiricum	Northern water milfoil	Leaves and fruit are consumed by a variety of waterfowl. The feathery foliage traps detritus and provides invertebrate habitat. Beds offer shade, shelter and foraging opportunities for fish.
Myriophyllum tenellum	Dwarf water milfoil	Provides good spawning habitat for panfish and shelter for small invertebrates. The network of rhizomes helps stabilize sediment.
Najas flexilis	Bushy pondweed	It is one of the most important plants for waterfowl. Stems, leaves and seeds are all consumed by a wide variety of ducks. It is also important to a variety of marsh birds as well as muskrats. It is a good producer of food and shelter for fish.
Nitella sp.	Nitella	It is sometimes grazed by waterfowl. The algae and invertebrates on its surface are attractive to ducks and geese. It also offers foraging opportunities for fish.
Nuphar variegata	Spatterdock	It anchors the shallow water community and provide food for many residents. It provides seeds for waterfowl. The leaves, stems and flowers are grazed by deer. Muskrat, beaver and even porcupine have been reported to eat the rhizomes. The leaves offer shade and shelter for fish as well as habitat for invertebrates.
Nymphaea odorata	White water lily	It provides seeds for waterfowl. The leaves, stems and flowers are grazed by deer. Muskrat, beaver and even porcupine have been reported to eat the rhizomes. The leaves offer shade and shelter for fish.
Phragmites australis	Common Reed	The rhizomes can help stabilize shorelines, but the *dense stands can exclude other beneficial plants*. It provides minimal food for waterfowl but is grazed by muskrats. The standing winter stalks offer some cover for wildlife.
Pontederia cordata	Pickerelweed	The flowering stalk is a haven for many insects - some seeking nectar and others a spot to rest. The seeds are consumed by waterfowl as well as muskrats. Networks of rhizomes and leaves also offer shade and shelter for fish. Beds can be important shoreline stabilizers and help dampen wave action.
Potamogeton amplifolius	Large-leaf pondweed	The broad leaves offer shade, shelter and foraging opportunities for fish. Abundant production of large nutlets makes this a valuable waterfowl food.

Scientific Name	Common Name	Ecological Significance[4]
Potamogeton crispus	Curly-leaf pondweed	**Invasive Species** Provides habitat for fish and invertebrates in the winter and spring when most other aquatic plants are reduced to rhizomes and winter buds. However, the midsummer die-off of curly-leaf pondweed creates a sudden loss of habitat and releases nutrients into the water column that can trigger algal blooms and create turbid water conditions.
Potamogeton gramineus	Variable pondweed	The fruits and tubers are grazed by a variety of waterfowl. The foliage and fruit may also be eaten by muskrat, beaver and deer. The extensive network of leafy branches offers invertebrate habitat and foraging opportunities for fish.
Potamogeton illinoensis	Illinois pondweed	The fruit which are produced are grazed by a variety of waterfowl. The fruit may also be eaten by muskrat, beaver and deer. Offers excellent shade and cover for fish and good surface area for invertebrates.
Potamogeton natans	Floating-leaf pondweed	The fruit is held on the stalk until late in the growing season. This provides valuable grazing opportunities for ducks and geese. Portions of the plant may also be consumed by muskrat, beaver and deer. It is considered good fish habitat because it provides shade and foraging opportunities.
Potamogeton praelongis		The fruit provides valuable grazing opportunities for ducks and geese. Portions of the plant may also be consumed by muskrat, beaver and deer. It is considered a good food producer for trout and valuable habitat for muskellunge.
Potamogeton pusillus	Small pondweed	It can be a locally important food source for a variety of ducks and geese. It may also be grazed by muskrat, deer, beaver and moose. It provides a food source and cover for fish.
Potamogeton richardsonii	Clasping-leaf pondweed	It can be a locally important food source for a variety of ducks and geese. It may also be grazed by muskrat, deer, beaver and moose. It provides a food source and cover for fish.
Potamogeton robbinsii	Fern pondweed	It provides habitat for invertebrates that are grazed by waterfowl. It also offers good cover and foraging opportunities for fish, particularly northern pike.
Potamogeton zosteriformis	Flat-stem pondweed	It can be a locally important food source for a variety of ducks and geese. It may also be grazed by muskrat, deer, beaver and moose. It provides a food source and cover for fish.

Scientific Name	Common Name	Ecological Significance[4]
Ranunculus aquatilis	Stiff water crowfoot	As flowers give way to fruit, the water crowfoot bed becomes a choice spot dabbling ducks. Both fruit and foliage are consumed by variety of waterfowl. When it is growing in shallow zones, it is sometimes consumed by upland game birds including ruffed grouse. Stems and leaves provide valuable invertebrate habitat and it is considered a fair producer of food for trout.
Sagitaria sp.	Arrowhead	It is one of the highest value aquatic plants for wildlife. Waterfowl depend on the high-energy tubers during migration and the seeds are also consumed by a wide variety of ducks, geese, marsh birds and shore birds. Muskrats, beavers and porcupines are known to eat both tubers and leaves. Arrowhead beds offer shade and shelter for young fish.
Schoenoplectus acutus	Hardstem bulrush	It offers habitat for invertebrates and shelter for young fish, especially northern pike. The nutlets are consumed by a wide variety of waterfowl, marsh birds (including bitterns, herons, rails) and upland birds. Stems and rhizomes are eaten by geese and muskrats. Bulrushes also provide nesting material and cover for waterfowl, marsh birds and muskrats.
Sparganium eurycarpum	Common bur-reed	Colonies of bur-reed help anchor sediment and provide nesting sites for waterfowl and shorebirds. The fruit is eaten by a variety of waterfowl including mallards and tundra swans. The whole plant is grazed by muskrat and deer.
Spirodela polyrhiza	Large Duckweed	Good waterfowl food. It is also eaten by muskrat and some fish. Rafts of duckweed offer shade and cover for fish and invertebrates.
Typha latifolia	Broad-leaved cattail	Cattails provide nesting habitat for many marsh birds. Shoots and rhizomes are consumed by muskrats and geese. Submersed stalks provide spawning habitat and shelter for fish. Invertebrates also live on cattails.
Vallisneria americana	Wild celery	It is a premier source of food for waterfowl. All portions of the plant are consumed including foliage, rhizomes, tubers and fruit. Wild celery is a prime destination for canvasback ducks. It is also important to marsh birds and shore birds including rail, plover, sand piper and snipe. Muskrats are also known to graze on it. Beds are considered good fish habitat providing shade, shelter and feeding opportunities.

Aquatic Plant Survey Results

The Wisconsin Department of Natural Resources generated the sampling point grid for Lac Courte Oreilles Lake which consisted of 2254 points. Only points shallower than 25 feet were initially sampled until the maximum depth of plants could be established. This was determined to be 24 feet and is considered the littoral zone. Figure 8 shows all the points that were sampled at depths of 24 feet or less and can be considered a map of the littoral zone. A total of 810 points were at depths of 24 feet or less and out those 810 points, 626 of them contained vegetation. See Table 6 for a summary of the survey statistics. Appendix B contains a more detailed discussion of the aquatic plant survey and also depicts maps of all the species sampled or observed.

Figure 8: Lac Courte Oreilles Lake Littoral Zone and Substrate Type

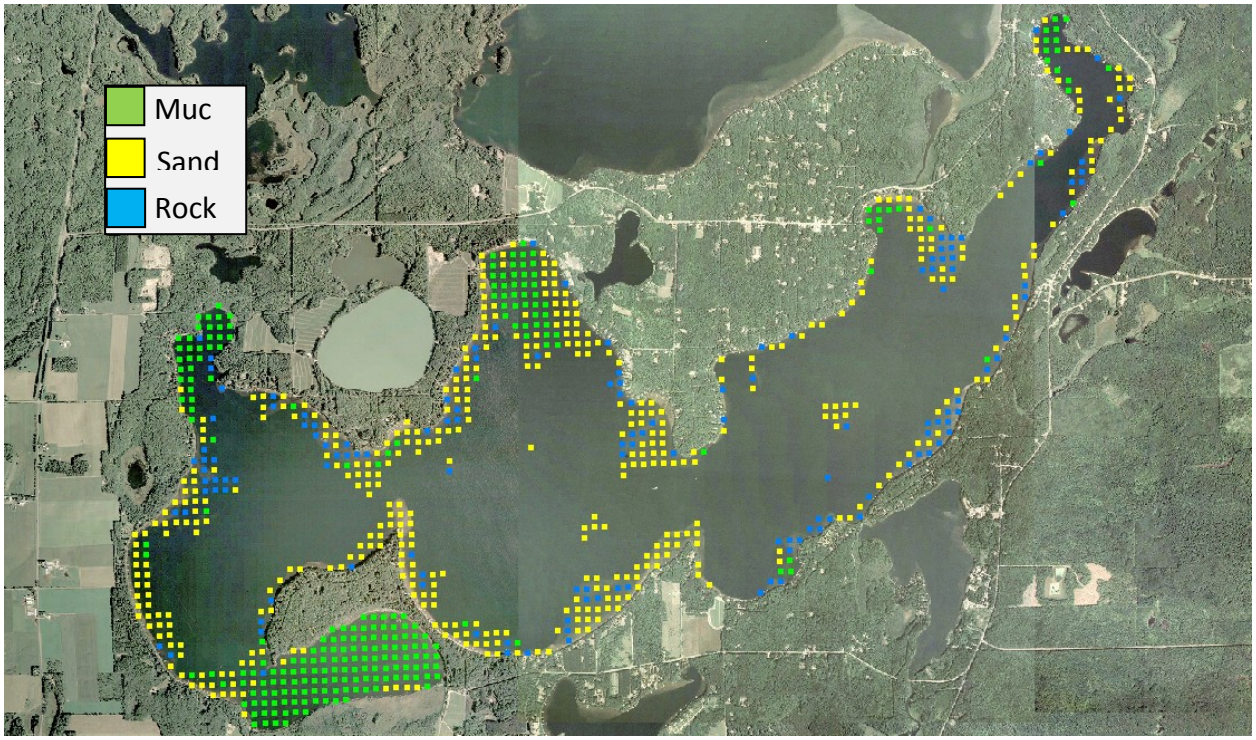


Figure 8 also indicates the type of substrate that was present at each of the littoral zone sampling points. Sand was the most dominant substrate type (53%) followed by muck (30%) and then rock (17%).

Table 6: Lac Courte Oreilles Lake Aquatic Plant Survey Statistics

SUMMARY STATS:	
Total number of points sampled	820
Total number of sites with vegetation	626
Total number of sites shallower than maximum depth of plants	810
Frequency of occurrence at sites shallower than maximum depth of plants	77.28
Simpson Diversity Index	0.94
Maximum depth of plants (ft)	24.00
Number of sites sampled using rake on Rope (R)	382
Number of sites sampled using rake on Pole (P)	438
Average number of all species per site (shallower than max depth)	2.26
Average number of all species per site (veg. sites only)	2.93
Average number of native species per site (shallower than max depth)	2.10
Average number of native species per site (veg. sites only)	2.88
Species Richness	29
Species Richness (including visuals)	36

Species Richness

Twenty-nine species of aquatic macrophytes were directly sampled in Lac Courte Oreilles Lake during the August whole lake survey and three additional ones were viewed from the boat. There were also four more additional species observed in a special point-intercept survey conducted specifically in Musky Bay during June. This brings the total species richness to 36 species. One of the species observed was the exotic invasive species *Potamogeton crispus* (Curly-leaf pondweed).

Plant Diversity

Lac Courte Oreilles Lake has a very diverse plant community consisting of 35 native species and

one exotic species for a total count of 36 species. The Simpson's diversity index is also very high at 0.94 indicating a healthy ecosystem and a high degree of diversity. No single plant dominates within the lake. The plant species abundance is very balanced between many different types.

Hardstem Bullrush Stand-LCO

Floristic Quality Index

Lac Courte Oreilles Lake has a very high FQI (36.0). There were 33 species used to calculate the FQI. The mean conservatism value was 6.27. The number of species and FQI are greater than the median values for lakes in the same eco-region (Northern Lakes and Forests). The mean conservatism value is slightly lower however. Figure 9 compares these values. The high FQI is indicative of a plant community that is intolerant to development and other human disturbances in the watershed. It indicates that the plant community is healthy and has changed little in response to human impact on water quality and habit (sediment) changes. It also indicates a high degree of water quality.

Musky Bay Floristic Quality Index

Musky Bay has a robust and diverse plant community. The bay has also recently become severely infested with CLP. Using the point-intercept surveys and calculating the FFQI for the bay can be one way to track how CLP may be affecting the aquatic community in Musky Bay. It is also evident that there are excess nutrients being contributed to the bay from cranberry marsh discharges. Changes in the FQI can also be used to indicate the plant communities response to adverse changes in water quality and /or sediment composition related to human disturbances. Both of these factors (CLP and nutrients) are likely having an impact on Musky Bay.

A point-intercept survey following DNR protocols was completed for Musky Bay in August of 2007 (Harmony 2007). The results from this survey can be compared to the survey completed in 2010 and be used as a baseline for future surveys. Figure 10 compares the results of these two surveys.

It can be seen in the comparison that the total number of species viewed, Mean C and the FQI value have all decreased from 2007. This is an indication that the plant community in Musky Bay is being negatively impacted. The nutrient levels in the bay, even though they are high, have remained relatively constant. The amount of CLP in the bay has increased significantly since 2007 and this increase in CLP is likely the cause for the adverse change in the overall plant community.

The most dominant plant in the 2007 survey was *Potamogeton robbinsii* (fern pondweed) which has a relatively high conservatism value (8). Currently the most dominant plant in Musky Bay is *Elodea canadensis* (common waterweed) which has a lower conservatism value (3).

Figure 9: FQI Comparison to Ecoregion Median

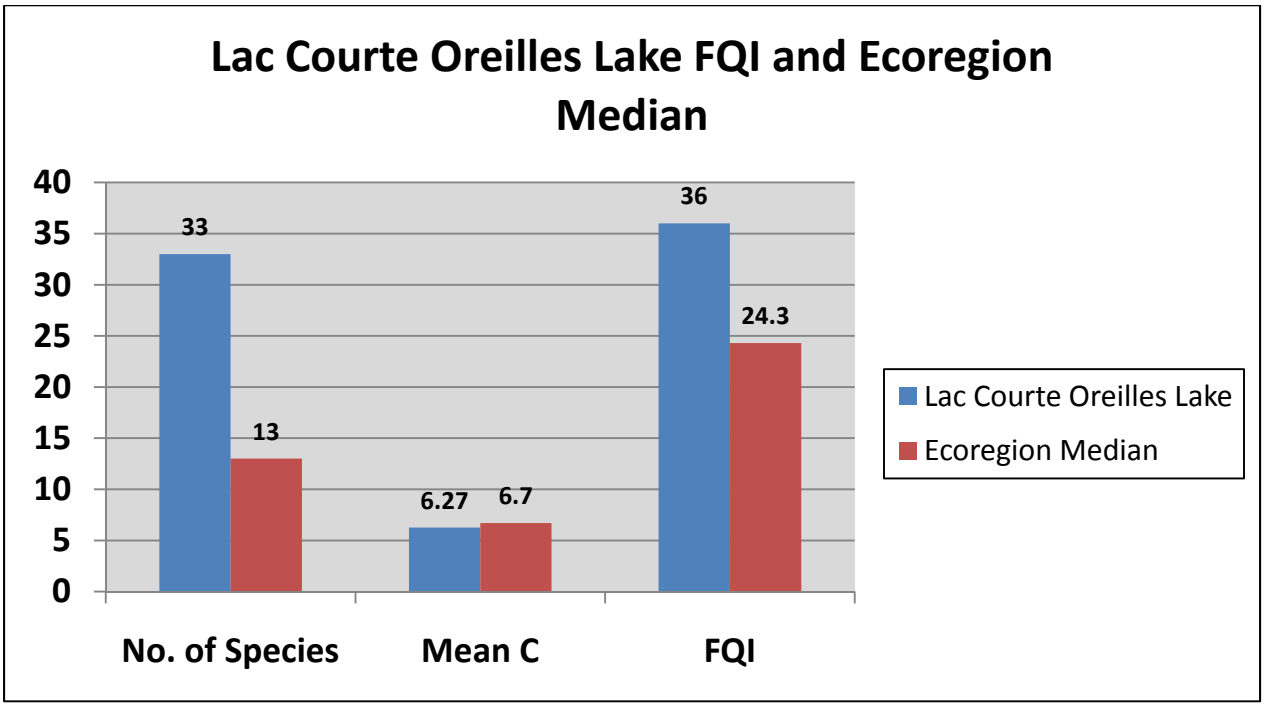
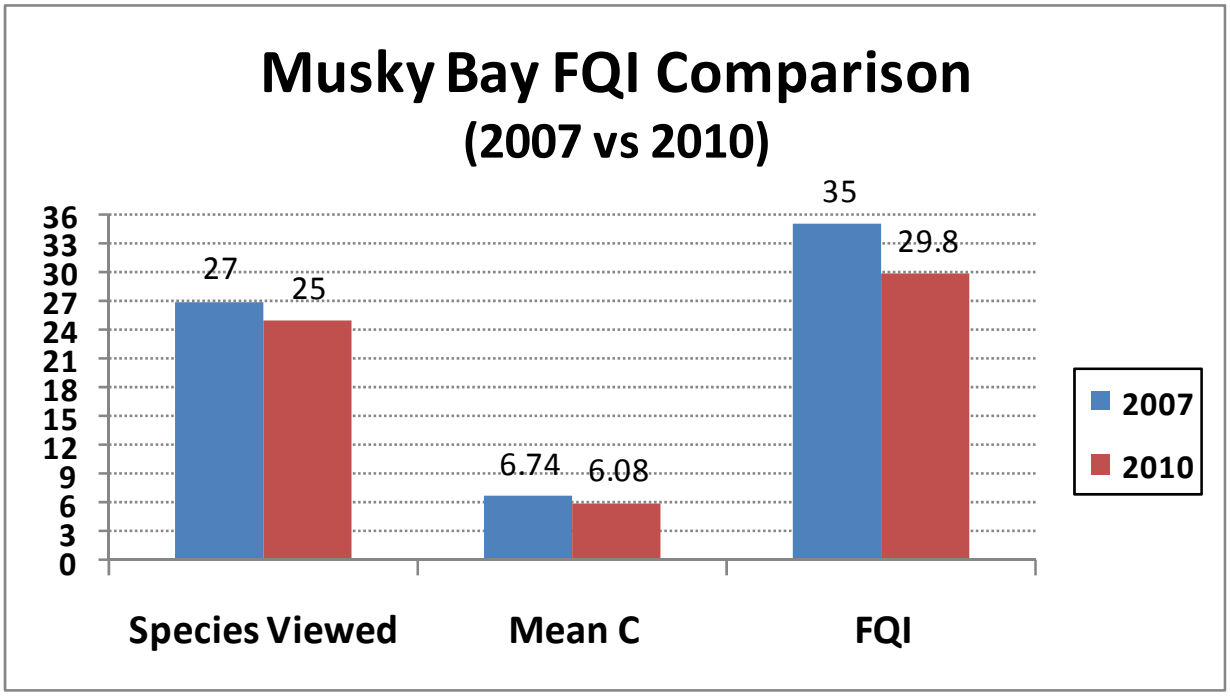


Figure 10: Musky Bay Annual FQI comparison



Invasive Species

In late June of 2010, the entire littoral zone of Lac Courte Oreilles lake was visually surveyed. The primary reason for this survey was to locate any curly leaf pondweed (CLP) (*Potamogeton crispus*) since it is most robust during spring and early summer. A new area of approximately 1.5 – 2 acres of CLP was found in Barbertown Bay (the NE Bay) during this early survey. This new infestation is indicated in Figure 11. Maps of the other known locations of CLP which were surveyed during 2010 are indicated in Figures 12 and 13. No other non-native invasive plants, i.e. Eurasian water milfoil or purple loosestrife, were discovered during the early season visual littoral survey or during the entire lake point-intercept survey.

To help control the spread of CLP in Stucky Bay and Barbertown Bay, increased monitoring should take place in these bays to locate any new plants so that they can be promptly removed before they form beds in other parts of the bay. By locating any isolated plants or small beds right away, they should be able to be hand pulled or removed by SCUBA divers relatively easily and inexpensively.

Another area that should be watched very closely is Grindstone Bay (also referred to as Anchor Bay). This area needs to be watched closely since CLP has been found in Little Grindstone Lake which flows into this bay. Figure 14 indicates the CLP beds in Little Grindstone Lake. Anchor bay can be seen in the lower left hand side of Figure 14. No CLP is currently found in Grindstone Bay so by closely monitoring it any CLP that is found should either be isolated plants or small beds which once again could be easily removed by hand pulling or SCUBA divers.

Additional information about EWM, CLP, purple loosestrife and other aquatic invasive species of concern can found in Appendix C.

Figure 11: New CLP beds discovered in Barbertown Bay

FIGURE 3

COLA 2010 LAC COURT OREILLES
CLP TREATMENT

BARBERTOWN BAY PI SURVEY
COURT OREILLES LAKE ASSOCIATION, INC.
SAWYER COUNTY, WISCONSIN

Bonestroo

Figure 12: Stucky Bay CLP Bed Location

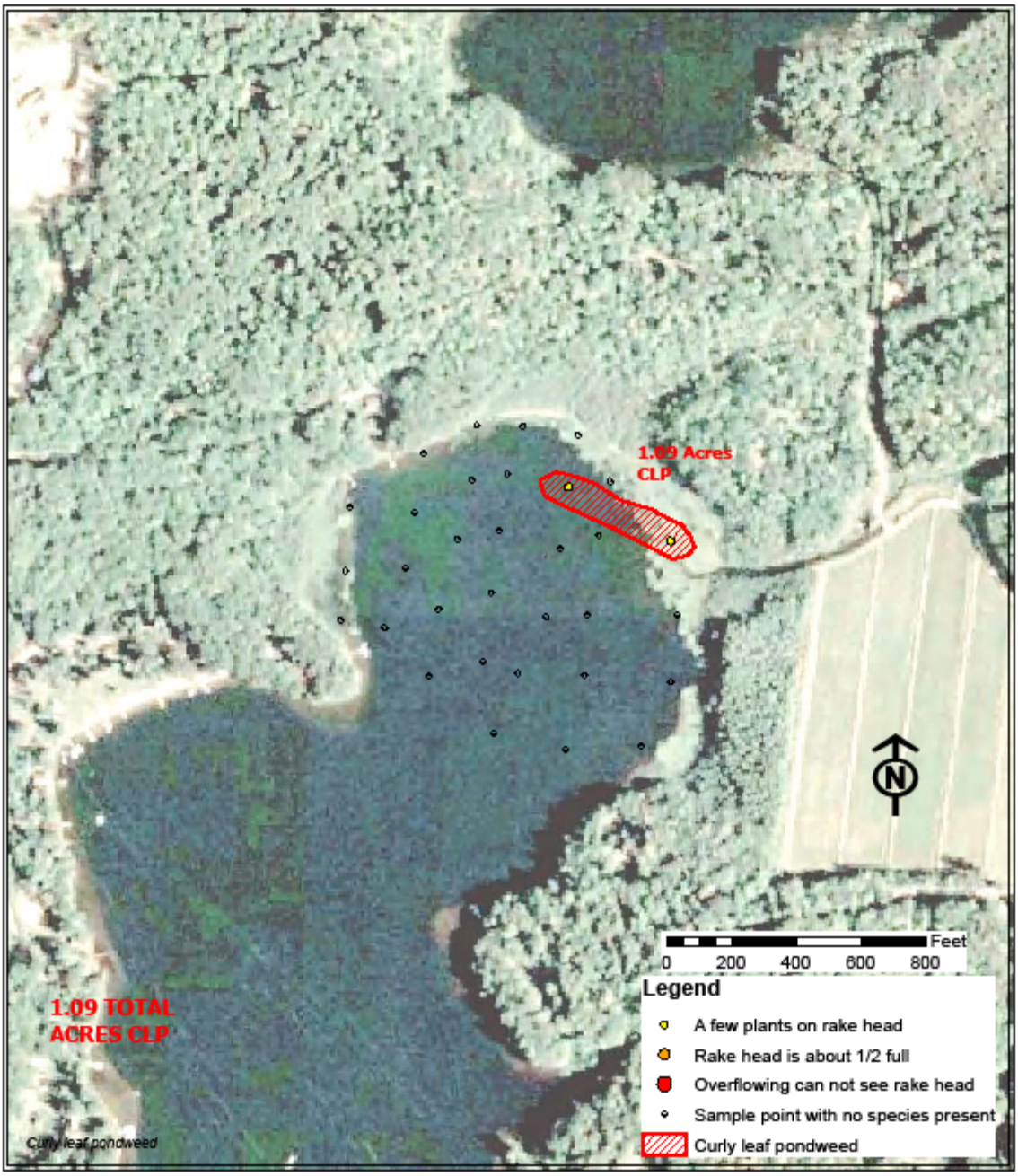


FIGURE 2

COLA 2010 LAC COURT OREILLES
CLP TREATMENT

STUCKY BAY PI SURVEY
COURT OREILLES LAKE ASSOCIATION, INC.
SAWYER COUNTY, WISCONSIN

Bonestroo

Figure 13: Musky Bay CLP Bed Locations

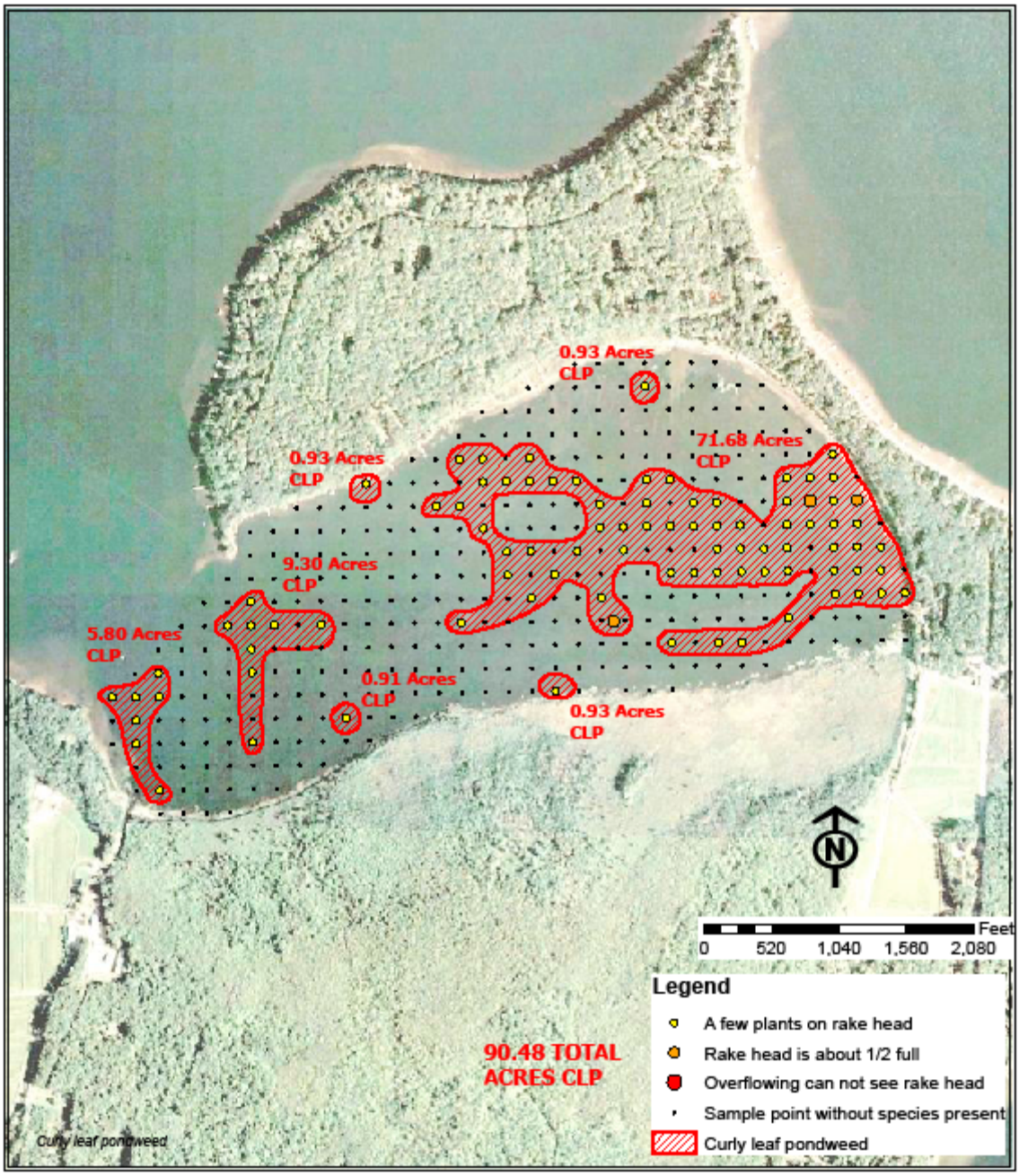


FIGURE 1

COLA 2010 LAC COURT OREILLES
CLP TREATMENT

MUSKY BAY PI SURVEY
COURT OREILLES LAKE ASSOCIATION, INC.
SAWYER COUNTY, WISCONSIN

Bonestroo

Figure 14: Little Grindstone Lake CLP Bed Locations*

**Note: Anchor Bay located in lower left hand corner*

COLA 2011 LITTLE GRINSTONE CLP TREATMENT
COURT OREILLES LAKE ASSOCIATION, INC.
SAWYER COUNTY, WISCONSIN

Bonestroo

Current and Past EWM Management Methods

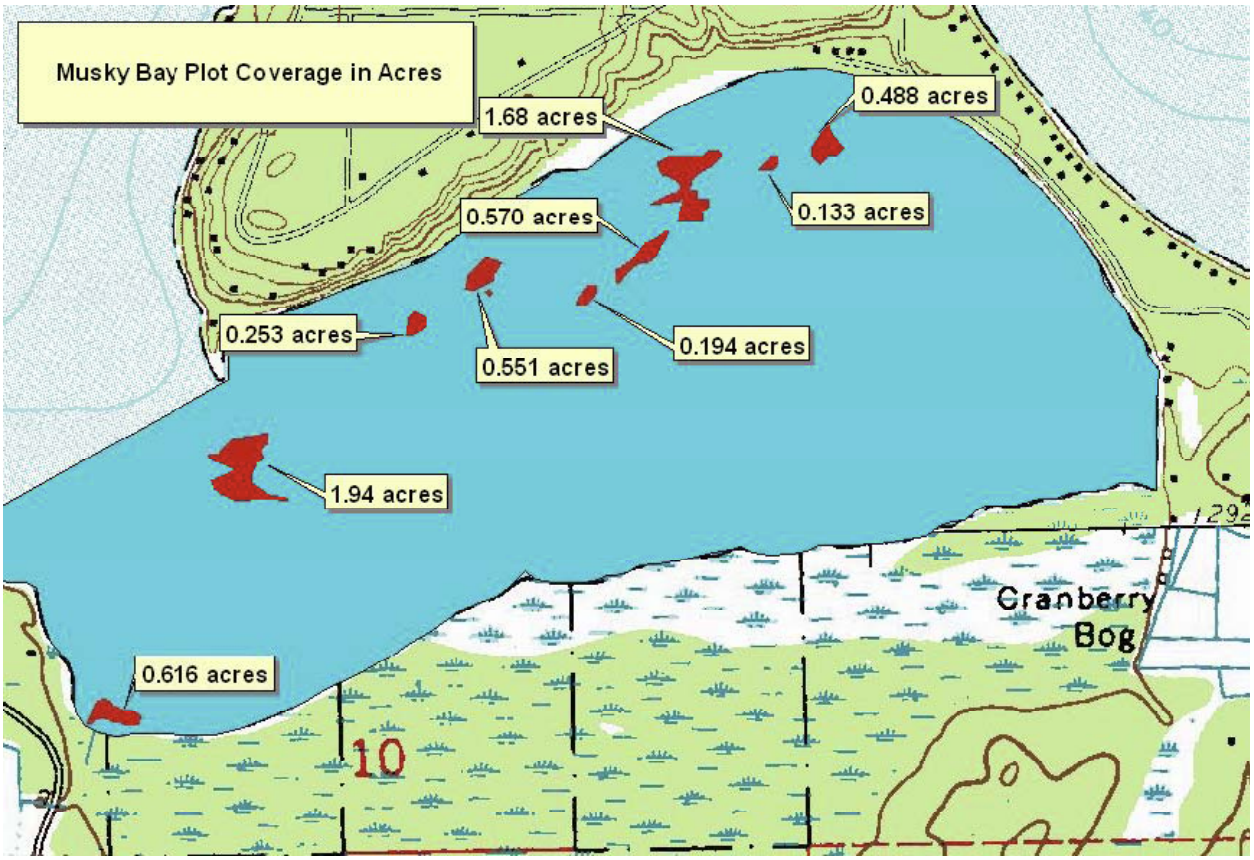
A small CLP infestation was first discovered in Lac Courte Oreilles Lake in July 2006. The infestation was located near the entrance of Musky Bay and encompassed a dense patch that was approximately 0.20 acre. There were also approximately 30 scattered small patches (1 – 10 plants/patch) scattered around the southwest portion of Musky Bay out from the cranberry marsh discharge channel.

In August 2007, a point intercept survey following WDNR protocol was conducted in Musky Bay to establish a baseline for long-term monitoring of the aquatic plant populations and to help document any changes that occur long-term (Harmony 2007). Two points during this survey contained CLP, but since this survey was conducted in August, most of the CLP had likely died back for the year and was likely undetected.

To more completely assess the extent of CLP in Musky Bay, a CLP survey of the bay was completed on June 24, 2008 (Schieffer 2008). The full report of this survey is included in Appendix D. In this survey, an extensive amount of CLP was sampled. The first portion of the survey involved sampling for CLP at 134 pre-determined grid points. These were the grid points established by the WDNR. Of these grid points, 48 of the points had CLP or 35.8%. In addition, plants and/or clumps of plants viewed between these points were mapped which added 84 points of CLP between the grid points. The density of these points ranged from 1 (low) to 3 (very dense). For areas that were defined as beds (density 2 or greater with plants near or at the surface) the perimeter of the bed was mapped. There were 9 different beds mapped totaling approximately 6.5 acres. These beds are indicated in Figure 15. All of these beds were very dense stands of CLP that could impede navigation and may be viewed as a nuisance level of plant growth.

In the spring of 2009, the beds mapped in Figure 15 were used as basis for treatment. A total of seven acres were chemically treated using granular Aquathol-K. Another new infestation of CLP was also discovered in Stucky Bay that year. This patch was approximately 0.5 acre in size but was not treated that year since it was discovered later in the summer after Musky Bay had been treated.

Figure 15: CLP Beds Mapped in 2008



In 2010, a total of 9.9 acres of CLP was chemically treated with granular Aquathol-K (9.2 acres in Musky Bay and 0.7 acres in Stucky Bay). During the treatment in Musky Bay it was observed that there was substantially more CLP present in the bay than what was allowed to be chemically treated under the permit. To map the additional acreage that was observed the Courte Oreilles Lake Association hired a consulting firm to conduct another point-intercept survey in Musky Bay. This survey conducted in July revealed that over 90 acres of CLP was present in Musky Bay (Figure 13). A substantial increase from the approximately nine acres that was present in 2009. An additional infestation of CLP was also discovered in another part of the Lake. This new infestation encompassed approximately 1.75 acres and was located in Barbertown Bay on the Northeast end of the lake (Figure 11).

In 2011, a total of 96 acres of CLP was treated. Ninety acres were treated in Musky Bay, three acres in Stucky Bay and three acres in Barbertown Bay. The treatment that took place in Musky Bay was a whole bay treatment using liquid Aquathol-K.

A discussion of potential management methods to control the growth and distribution of aquatic plants, including Eurasian Water Milfoil, is discussed in Appendix E.

Musky Bay Survey Recommendations

Musky Bay should continue to be surveyed using the point-intercept protocol. Optimum timing for the survey would be late June to early July. This time frame will allow the survey to be used as the post-treatment survey and subsequent starting point for the following year's treatment locations and acreages if needed. This time frame should also be late enough in the year to ensure that the native plants are growing and be detected in the survey. Conducting this survey annually will allow for the evaluation of changes that may be reflected in the plant community. The diversity, FQI and various other parameters could then be compared to past surveys to assess changes in the plant community.

Plan Goals and Strategies

The Lac Courte Oreilles Lake aquatic plant committee came up with several goals for aquatic plant management for the lake and developed a strategy of actions to effectively and efficiently reach the Goals. The goals include the following:

Goal 1) Curly leaf pondweed growth is kept at a minimum level.

Goal 2) Prevent the introduction and spread of other aquatic invasive species.

Goal 3) Preserve the lakes' diverse native plant communities.

Goal 4) Lake residents and users are made aware of the importance of native aquatic plants, the means to protect them, and the threat of aquatic invasive species.

Goal 5) Restore native shoreline vegetation

Goal 6) Waterfront residents will protect lake water quality and plant communities by minimizing runoff of pollutants from their lake property.

Goal 1) Curly leaf pondweed (CLP) growth is kept at a minimum level.

Objective 1: Control existing curly-leaf pondweed infestations using established treatment methods

Objective 2: Identify locations of curly-leaf pondweed plants and beds, and monitor the effectiveness of control methods

Objective 3: Obtain effective control while minimizing negative effects on native plants

Objective 4: Prevent the spread of curly-leaf pondweed to other parts of the lake

Objective 5: Prevent any new introductions of curly-leaf pondweed into the lake

Action Items

- Improve and update signage at the boat landings to inform users of the landings regarding aquatic invasive species.
- Post maps of current CLP bed locations at all boat landings and instruct users of the lake to try to avoid boating in these areas to help minimize the potential to spread it
- Designate Musky Bay as a no-wake zone to help prevent boat wakes from breaking apart curly leaf pondweed plants and thereby furthering its spread
- Control Curly leaf pondweed growth using the following standards for treatment:

TREATMENT STANDARDS FOR AREAS OTHER THAN MUSKY BAY

Standard	Method
Bed of CLP >0.25 acre with average rake density of 1.5 or greater	Herbicide treatment of bed according to established protocols for CLP
Bed of CLP >0.25 acre with average rake density <1.5 Bed of CLP <0.25 acre Sporadic CLP growth	Hand pull (residents) Diver pulling Monitor by mapping density and size in Spring

TREATMENT STANDARDS FOR MUSKY BAY *WHEN TOTAL ACREAGE OF CLP IN THE BAY IS 54 ACRES OR LESS (up to 20% coverage in bay)*

Standard	Method
Bed of CLP >0.25 acre with average rake density of 1.5 or greater	Herbicide treatment of bed according to established protocols for CLP
Bed of CLP >0.25 acre with average rake density <1.5 Bed of CLP <0.25 acre Sporadic CLP growth	Monitor beds by mapping density and size in Spring

TREATMENT STANDARDS FOR MUSKY BAY *WHEN TOTAL ACREAGE OF CLP IN THE BAY IS GREATER THAN 54 ACRES (greater than 20% coverage in bay)*

Standard	Method
Total acreage of all CLP beds in the Bay is greater than 54 acres (over 20% coverage in the Bay)	Whole bay chemical treatment by a professional herbicide applicator. Herbicide type and dosing rates to be determined in consultation with WDNR and herbicide applicator/consultant

General procedure for CLP control

Volunteer monitoring

- Volunteers are assigned to monitor specific stretches of the shoreline by an Adopt-A-Shoreline Coordinator. Shorelines and bays with known CLP beds will be key areas to focus on. Another key area will be Grindstone Bay, since CLP is known to be present in the stream flowing into this bay. The public boat landings are also key areas that will need close monitoring since other lakes in the area have CLP and boaters and fishermen frequently visit multiple lakes.
- The stretches of shoreline will be monitored on at least a monthly basis from May – July. More frequent monitoring can take place if the volunteer has the time available. Monitoring should take place during the first week of each month and the volunteers will report their observations (CLP or other invasives present or not present) to the Adopt-A-Shoreline Coordinator. The Adopt-A-Shoreline Coordinator will send out monthly (May, June, July,) post-card or email reminder notices to the volunteer monitors.
- Sawyer County AIS Coordinator or APM consultant confirms any areas of suspected CLP.
- APM consultant maps confirmed locations of CLP as they are found. The APM consultant records the size and density of the CLP beds.
- Annual maps will be prepared by the APM consultant to gauge success in controlling the CLP infestations. Maps will include acreage and density of CLP beds.

Herbicide Treatment Procedure

- The COLA board appoints a lead person to coordinate herbicide treatment activities.

- Herbicide Treatment Coordinator hires an aquatic plant management plan (APM) consultant to complete the pre and post treatment monitoring according to the DNR protocol or other agreed upon protocol approved by the WDNR. (See Appendix F for the DNR pre and post monitoring protocol). Pre and post monitoring will result in maps of CLP locations, including size of bed and rake density.
- APM consultant provides recommended treatment areas from the maps of confirmed locations of CLP. Post-monitoring treatment maps can be used as a basis for following springs treatment and permit application.
- Herbicide Treatment Coordinator ensures that DNR permit applications are completed in a timely manner in consultation with APM consultant (Recommend permit application process begin no later than February).
- If treatment is to take place in an area where cranberry growers use the water, the Herbicide Treatment Coordinator will inform the cranberry grower of the area to be treated and keep them apprised of planned dates for treatment.
- Herbicide Treatment Coordinator contracts for the treatment of areas that meet plan standards.
- Contractor/consultant treats Curly leaf pondweed beds early in the season (water temperature will be 50 degrees Fahrenheit or less) to minimize impact on native plants

Diver Procedure

- The COLA board appoints or hires a Diver Coordinator to coordinate CLP diver activities.
- CLP Diver Coordinator obtains a list of potential divers.
- CLP Diver Coordinator contacts divers to assess interest.
- CLP Diver Coordinator arranges training for CLP Divers if there is enough interest around the lake.
- If there is not enough interest among volunteer divers, CLP Diver Coordinator investigates and pursues options for hiring divers to pull CLP.
- CLP Diver Coordinator receives low density and sporadic CLP area list/map each spring in late May (following pre-treatment survey). If additional CLP areas are discovered by the volunteer monitors these additional areas will also be provided as they are discovered.

- CLP Diver Coordinator informs volunteer divers of CLP locations to pull or contracts with diver service in cooperation with COLA board.
- Treatment locations and results are recorded by divers and reported to the CLP Diver Coordinator and COLA board.

Hand-pulling

COLA board instructs residents in proper hand-pulling techniques. This would include:

- pull complete CLP plant and root;
- Either net or have a second person assisting to collect;
- Remove all plant fragments away from the water (composting is fine).

Instruction may occur at annual meetings or workshops or be distributed in newsletter or special mailings.

Adaptive Management Approach

The CLP treatment areas, standards, and methods will be reviewed each year to see if they are effective and cost efficient. Changes may be made to the treatment approach based upon project results. Significant changes will be documented as brief addendums to the aquatic plant management plan to be reviewed by the COLA Board and the Department of Natural Resources. One of the main factors to evaluate is at what acreage of CLP it becomes more financially feasible to do a whole bay treatment for Musky Bay. The acreages indicated above are a starting point and should be adjusted as costs and new information dictate.

Goal 2) Prevent the introduction and spread of other aquatic invasive species.

Lac Courte Oreilles Lake is used heavily by anglers and other recreational users. This significantly increases the risk of invasive plant introduction. It is very important that lake residents become educated about the identification of the various invasive plant species that are or could become established in the Lake. This will provide a greater awareness about these species and if one is discovered it is more likely that it would be found before it has spread to a large area and thus be easier to manage. In order to catch a new invasive species while it is still small and therefore easier to manage, it is

especially crucial that the Adopt-a-Shoreline volunteers become familiar with the various aquatic invasive species that are of concern to Lac Courte Oreilles Lake (refer to Appendix C for discussions of the various invasive species of concern).

It is also important for the Courte Oreilles Lake Association to continue its Clean Boats/Clean Waters Program. This program is provided through the University of Wisconsin Extension in cooperation with the Wisconsin DNR. The Association should continue the public landing inspections either through volunteer or hire.

Objective 1: Lake residents can identify potential invasive species and/or know who to contact for identification.

Objective 2: Monitor for the presence of other aquatic invasive species.

Objective 3: Control aquatic invasive species if identified on the lake.

Action Items

Gather and distribute information regarding common invasive species and who to contact if these species are suspected. Provide this information to the Adopt-A-Shoreline Volunteers so they can be on the watch for these during their scheduled CLP shoreline surveys. Information will also be provided to the lake residents at the annual meetings or through special mailings.

Continue the clean Boats/Clean Waters program.

Ensure that adequate and updated information is available at all the boat landings (private and public) educating users about AIS.

Goal 3) Preserve the lakes' diverse native plant communities.

The plant community in Lac Courte Oreilles Lake is very diverse. It is important to preserve the diversity and quantity of the native plants that are present. This diverse plant community provides key habitat for a diverse fish population, helps to prevent the spread of invasive plants and it also helps to provide protection from shoreline erosion. It is important to understand that these plants play a very important role in the ecosystem of Lac Courte Oreilles Lake.

Objective 1: Minimize removal of native plants from waterfront corridors.

Objective 2: Control methods selectively target invasive species avoiding impacts to native plants.

Action Items

Allow hand removal only of native plants (no herbicides) if needed to maintain access for swimming and navigation. Limit this hand clearing to a thirty foot access corridor or less. Note that invasive species may be removed along the entire shoreline by hand. It will be stressed to homeowners that removing native vegetation opens up new areas for colonization by invasive plants. This is especially noteworthy for properties on the lake adjacent to where Curly leaf pondweed has been found.

Selectively control CLP by using herbicide early in the season before native plants are actively growing.

Provide residents with educational materials and present information regarding aquatic plant values and methods at annual meetings and in newsletters to limit impacts to native aquatic plants.

Assess the need of establishing no-wake zones in areas where plants may be negatively affected by wave action.

Goal 4) Lake residents and users are made aware of the importance of native aquatic plants, the means to protect them, and the threat of aquatic invasive species.

Objective 1: The Courte Oreilles Lake Association will implement an aggressive education effort.

Action Items

Implement the education plan detailed below.

<u>Target audience</u>
Lake residents
Boat landing visitors

<u>Messages</u>

- Explain the plan activities to increase support for APM plan implementation (volunteer and monetary resources). This will include explaining the CLP treatment strategy and importance of timing.
- It is likely not possible to eradicate Curly leaf pondweed once it is established in the lake. The plan is geared to minimize the growth and spread of this invasive plant. All efforts will be employed to try and eradicate it however.
- Describe the importance of native plants to the lakes.
- Describe how lake residents and users can best preserve native plants – no wake near shore, effects of activity and parking boats on shallow reefs/sandbars, only limited clearing/raking for dock access and swimming, preventing introduction of invasive species, etc.
- Plant identification information
- How to protect natives while controlling invasive species
- Provide maps of CLP locations and areas of native plants of special concern to residents to avoid boating through these areas
- DNR permits are required for any aquatic herbicide application – including herbicides available on-line and shown in magazine advertisements. Fines may result if herbicides are applied without the appropriate permit.
- It is ok to hand pull Curly leaf pondweed as well as other invasive species along your entire shoreline. You must be confident in your identification of invasive plant species. And, you must be very careful to remove any plant fragments from the water.
- It is ok to compost Curly leaf pondweed well away from the water and use the compost in your garden.
- Describe suitable habitat for invasive species.
- Identify who to contact for suspected Curly leaf pondweed (and other aquatic invasive species) locations.
- Property owners can hand pull or rake aquatic plants (or hire someone else to do this) in an area up to 30 feet wide along the shoreline that they own. This activity should be minimized to prevent the introduction and spread of invasive (weedy) aquatic plants in the cleared areas.

<u>Methods</u>
Website

Newsletter
Annual meetings
Special mailings (including packets of info to new property owners)
Workshops and training
UWEX/DNR informational materials and staff resources will be used whenever possible.
Sawyer County AIS Coordinator can provide training on plant identification.

Goal 5) Restoration and preservation of native shoreline vegetation

Shoreline vegetation is very important to the ecosystem of Lac Courte Oreilles Lake. It provides key habitat for amphibians, reptiles, insects, birds and aquatic mammals. Furthermore, it buffers the lake from non-point source pollution and reduces erosion into the lake. As development occurs, the native vegetation that was present around the lake shore gets replaced by lawns and/or non-native, ornamental plants. Many times the tree and shrub layers are reduced or eliminated resulting in heavier runoff containing more sediment and nutrients. It is vital that the shoreline buffer be preserved and areas that have been adversely affected are restored. Due to the importance of the shoreline buffers and vegetation, lakeshore property owners should be highly encouraged to consider shoreline restoration projects. Sawyer County does have a program in place for helping with buffer restoration project.

> **Objective 1**: The Courte Oreilles Lake Association will implement an aggressive, effective education effort about the importance of native shoreline vegetation
>
> **Objective 2**: Designate several successful buffer zone restoration projects so lake residents can better understand what a buffer restoration looks like and track its progression.

Action Items

Organize and provide education about the importance of native shoreline vegetation and encourage restoration.

Encourage shoreline restoration projects and facilitate shoreline restoration projects through incentives and/or cost share programs with Sawyer County or other grants.

Conduct a shoreline assessment to document the current status of the shoreline of Lac Courte Oreilles Lake. This assessment will include photographing from the lake each

individual parcel of property and determining the characteristics of the shoreline. A similar survey was conducted on a nearby lake (Grindstone Lake)[5]. An assessment protocol adapted from the Grindstone Lake shoreline survey can be used to guide the assessment for Lac Courte Oreilles Lake. (See Appendix G)

Goal 6) Protect lake water quality and plant communities by minimizing runoff of pollutants from waterfront property.

The Courte Oreilles Lake Association is encouraged to work with property owners, the Lac Courte Oreilles Tribe, the Sawyer County Zoning and Conservation Department, the Department of Natural Resources, and other partners to further assess pollutant loading concerns and options for management.

Watershed protection measures should concentrate on areas where phosphorus loading potential is the highest and runoff to the lake is most direct. Residential and agricultural areas along the lakeshore provide the highest potential for phosphorus loading to the lake.

The Property Owners Association should encourage residents to protect water quality by installing infiltration practices such as rain gardens and rain barrels. These practices capture water from roofs and paved areas allowing water to soak into the ground rather than flowing to the lake.

Buffers of natural vegetation along the shoreline also help to slow runoff water and allow infiltration and should be encouraged. Lac Courte Oreilles Lake still appears to have a well-preserved shoreline buffer zone for much it's shoreline. However, runoff may still channelize to the lake from homes, driveways and other impervious surfaces through cleared areas to the lake. Therefore, limiting cutting in a pathway even more narrower than the allowed 30 foot view corridor is highly recommended in order to preserve lake water quality and habitat.

The use of any fertilizers should also be discouraged. Phosphorus free fertilizer still contains nitrogen which will accelerate plant growth in the lake if there is any runoff. This could encourage the spread and increase the density of adjacent CLP stands. Property owners should be encouraged to follow the practices mentioned below through education and incentive programs.

[5] Personal communication with Bruce Paulsen, Grindstone Lake Homeowners Association. September 2009.

Objective 1: Establish an effective education program to help reduce runoff from waterfront property.

Action Items

Implement the education plan detailed below.

Target audience
Lake residents

Messages

- Waterfront development impacts lake water quality and aquatic plant growth
- Provide information on lawn care practices that can help a lake and why they help the lake
- Provide information regarding waterfront practices to protect the lakes
- Natural wetlands provide critical pollutant filters
- Use zero phosphorus fertilizer, or better yet, don't use any fertilizer (nitrogen affects growth of plants in the water)
- Encourage property owners to establish rain gardens to collect and filter runoff from impervious surfaces on their property
- How buffer installations can help the lake and how to install them

Methods

COLA Website
Demonstration sites
Newsletter
Annual meetings
Special mailings (including packets of info to new property owners)
Workshops and training
On-on-one technical assistance visits
Use UWEX/DNR informational materials and staff resources whenever possible

Implementation Plan[6]

Action Items[7]	Timeline	Cost 2012	Cost 2013	Cost 2014	Responsible Parties
CLP Control					
Improve and update signage at boat landings	May	$1000			COLA Board
Shoreline monitoring	May – Aug.	50 hours	50 hours	50 hours	Adopt-a-Shoreline volunteers
Adopt-a-Shoreline coordination	May – Aug.	10 hours	10 hours	10 hours	COLA (Adopt-a-Shoreline coordinator)
Confirm and map CLP locations submitted by Adopt-a-shoreline coordinator	May – Aug.	10 hours	10 hours	10 hours	APM Consultant
Prepare & apply for herbicide treatment permit	February (Each year treatment is needed)	$200	$200	$200	APM Consultant
Conduct pre and post treatment monitoring	May (pre) visually confirm presence & determine optimal treatment date Late June (post)	8 hours (Pre) $3500 (Post)	8 hours (Pre) $3500 (Post)	8 hours (Pre) $3500 (Post)	COLA (Pre) APM Consultant (Post)
Treat CLP per plan protocol	Early May	Liquid ($420/acre) Granular ($830/acre)	Liquid ($420/acre) Granular ($830/acre)	Liquid ($420/acre) Granular ($830/acre)	Certified Herbicide Applicator
COLA appoints or hires Diver Coordinator	May				COLA Board

[6] Costs are an estimate and may vary considerably depending on consultant
[7] Refer to action items under plan goals

Action Items[7]	Timeline	Cost 2012	Cost 2013	Cost 2014	Responsible Parties
Obtain list of Divers and coordinate diver activities	May - August	30 hours	30 hours	30 hours	Diver Coordinator
AIS Prevention					
Gather and distribute AIS info	Ongoing	15 hours	15 hours	15 hours	APM Consultant COLA Board
Clean Boats/Clean Waters	June - August	$4000	$4000	$4000	CBCW Staff
Preserve plant communities					
Provide educational materials and info at meetings and for newsletter	Ongoing	6 hours	6 hours	6 hours	APM Consultant COLA Board
Assess establishment of no-wake zones	Summer	8 hours			COLA Board
Plant Education					
Provide updates on website	Ongoing	10 hours	10 hours	10 hours	COLA Board
Newsletter articles, presentations, meetings, workshops	Ongoing	20 hours	20 hours	20 hours	COLA Board APM Consultant
Restoration and Preservation of Shoreline					
Organize and distribute educational material	Ongoing	8 hours	8 hours	8 hours	COLA Board APM Consultant
Shoreline Assessment	Summer	50 hours			APM Consultant COLA volunteers
Water Quality Protection					
Implement education program	Ongoing	20 hours	20 hours	20 hours	COLA Board APM Consultant
Hydrologic & Phosphorus Budget Study	2014			$20,000	Consultant

Monitoring and Assessment

Aquatic Plants

Aquatic plant surveys are the primary means to track achievement towards the goals stated in this plan. Every five years whole lake point-intercept plant surveys should be done to update the knowledge of the aquatic plant ecosystem and to further determine if management strategies were effective. Additionally, this will lead to a further understanding of how aquatic plant communities change over time. The plant surveys should be conducted in accordance with the guidelines established by the WI DNR. A copy of these guidelines are included in Appendix H.

To better track the effectiveness of the treatment of CLP in Musky Bay, Stucky Bay and Barbertown Bay annual point-intercept surveys should be completed in these bays. It is also recommended that the surveys use a finer grid than the WDNR generated grid used for the whole lake. Doubling the number of points for the grid, as was done in 2010 for these bays, would allow for more detailed coverage in these bays.

Education

To evaluate the effectiveness of the education and prevention actions identified in this plan a survey of boaters and property owners should be done by 2014. The Clean Boats, Clean Waters Volunteer Boat Landing Monitoring Program includes a questionnaire for boaters using the landing that the volunteer asks and records. This would be one simple way to evaluate the effectiveness of education and prevention actions taken. Also, additional surveys can be utilized to gauge target areas for future education.

Water Quality

The Lac Courte Oreilles Conservation Department annually monitors the lake during the summer months for total phosphorus, Chl-a and records Secchi disk values. Profiling with a multi-parameter water quality meter also is conducted. If for some reason the LCO Conservation Department was not able to continue their monitoring of the lake, COLA should be prepared to continue volunteer monitoring of water quality through the WI DNR self-help monitoring program to help with water quality trend evaluations.

It is recommended that an updated hydrologic and phosphorus budget survey be completed every ten to fifteen years in order to examine the changing relationships between watershed land use activities and lake water quality. The last detailed water quality study of this nature was completed in 1996, which would call for an updated study to be completed as soon as funding allows.

Contingency Plan for Newly-found Populations of an AIS

A contingency fund should be set aside to deal specifically with a new AIS infestation. COLA should expect to pay all the cost for control up-front since the AIS rapid response grant operates on a reimbursement basis. If a new non-native, invasive species introduction should occur, the following plan should be followed once a potential identification has occurred.

1. For positive identification of the invasive species contact a designated local plant identification expert, (i.e. Sawyer County AIS coordinator, LCO Conservation Department) and the WI DNR.

2. Notify WI DNR aquatic plant management specialists of positive identification. Collect plant for a voucher specimen.

3. Carry out response plan using one or more of the following methods:

    a) Hand pulling
    b) Herbicide use (permits required)
    c) Mapping spatial coverage and density

4. If warranted, apply for an invasive species rapid response grant from the WI Department of Natural Resources. It is recommended to check the WI DNR website to be sure that the latest version is being used.

5. Notify residents of positive invasive species identification and location.

6. Carefully monitor infested area and nearby areas for effectiveness of control methods.

7. Repeat controls as needed.

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Appendices