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UPPER TURTLE LAKE, BARRON COUNTY

2018-2022 APMP
WDNR WBIC: 2079800

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Upper Turtle Lake Association
Turtle Lake, WI 54829

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TABLE OF CONTENTS

Figures

Tables

Appendices

AQUATIC PLANT MANAGEMENT PLAN-UPPER TURTLE LAKE

PREPARED FOR THE UPPER TURTLE LAKE ASSOCIATION

INTRODUCTION

Upper Turtle Lake is a hard water drainage lake located in west-central Barron County, Wisconsin. The health and quality of the native plant community is above average, with a floristic quality that ranks in the upper quartile on a statewide and regional basis. Curly-leaf pondweed (CLP), an aquatic invasive species, is known to be in the lake and reed canary grass and purple loosestrife, both established exotic species, are also present around the lake. Until recently, CLP seldom occurred as monotypic beds and appeared to enhance early season habitat in the lake by providing fish forage and cover areas. In 2017, the CLP population was significantly larger than the fairly benign population that was seen in 2010. While it is possible that CLP has been spreading at a fast but steady pace since the most recent plant survey, in 2010, the ideal winter and spring conditions in 2017 likely exacerbated the issue and potentially caused a massive population increase.

In 2010, UTLA partnered with the Lower Turtle Lake Management District to fund management planning efforts resulting in the first Aquatic Plant Management plan being presented to the UTLA in 2011. There has not been any form of active management on Upper Turtle Lake, but UTLA volunteers have been collecting water clarity data through Citizen Lake Monitoring Network (CLMN) since 1994. In 1999, the UTLA added water chemistry data to measure total phosphorus and chlorophyll-A concentrations. Since 2003, the CLMN water chemistry data has shown a slight increase in total phosphorus concentrations.

With the increase in CLP levels, the Upper Turtle Lake Association has recognized the need for a coordinated strategy to begin actively managing CLP and other aquatic invasive species and to prevent the introduction of new invasive species. This Aquatic Plant Management Plan was developed to fulfill that need by setting forth goals and aquatic plant management activities for the next five year. An outline of the aquatic plant management goals, objectives, and activities can be found in Appendix F. A priority and funding implementation matrix is included in Appendix G, and a five-year timeline for completion of the activities is included in Appendix H. This five-year plan is intended to be a living document which can be modified from time to time to ensure goals are being met. Minor changes and adaptations are expected and may be made annually, but any major change in activities or management philosophy will be presented to the UTLA and the WDNR for approval.

2011 MANAGEMENT GOALS, OBJECTIVES, AND ACTIONS

The following is a review of the management goals, objectives and actions from the 2011 management plan on Upper Turtle Lake:

1. Protect and enhance the native species community
2. Monitor and control the aquatic invasive species in Upper Turtle Lake
3. Prevent the introduction of new aquatic invasive species and prevent the spread of invasive species from Upper Turtle Lake to other lakes.
4. Reduce nutrient and pollutant loading to the lake and monitor water quality.
5. Evaluate aquatic plant management on an annual basis and revise the APM Plan as necessary.

The objectives and actions that were found in the 2011 APM Plan were focused on education, monitoring, and prevention. After this original plan was written and approved in 2011, very few of these goals were met.

Water quality monitoring was conducted by volunteers through the Citizen Lake Monitoring Network, and no new AIS have been found in Upper Turtle Lake. However, the curly-leaf pondweed (CLP) population has expanded greatly and there has been no data collected regarding this expansion since the original plant survey work done in 2010. Because of this, there is a need to collect more data to determine the appropriate scale and method of CLP management. Additionally, there have been minimal education or prevention efforts through Clean Boats Clean Waters or other Lake Association sponsored events.

PUBLIC PARTICIPATION AND STAKEHOLDER INPUT

To be completed after presentation of this plan to UTLA for approval

OVERALL MANAGEMENT GOAL

The overall management goal for Upper Turtle Lake is to maintain or enhance the quality and usability of the lake through AIS management and educational outreach. Aquatic plant management on Upper Turtle Lake will be focused on returning CLP levels to those seen in the 2010 survey. Maintaining or improving the native plant populations will also be a part of this plan. Improving or maintaining water quality is also included as a means to protect and enhance the native plant population.

The following is a list of the goals defined in this update of the 2011 Aquatic Plant Management Plan.

Goal 1 – Support and propagate AIS management efforts that minimize negative impacts to native plant communities.

Goal 2 – Protect and enhance the native species populations within and around Upper Turtle Lake.

Goal 3 – AIS education and prevention.

Goal 4 – Promote and support nearshore, riparian, and watershed best management practices that will improve fish and wildlife habitat, reduce runoff, and minimize nutrient loading into Upper Turtle Lake

Goal 5 – Encourage and engage lake residents and visitors to be active lake stewards.

Goal 6 – Implement the Upper Turtle Lake Management Plan effectively and efficiently with a focus on community and constituent education, information, and involvement

Each of these goals has one or more objectives to meet and actions to be implemented if the goal is to be met. Goals, Objectives, and Management Actions are included as Appendix F. An Implementation Matrix is included as Appendix G, and a Calendar of Events is included in Appendix H.

The waters of Wisconsin belong to all people. Their management becomes a balancing act between the rights and demands of the public and those who own property on the water's edge. This legal tradition called the Public Trust Doctrine dates back hundreds of years in North America and thousands of years in Europe. Its basic philosophy with respect to the ownership of waters was adopted by the American colonies. The US Supreme Court has found that the people of each state hold the right to all their navigable waters for their common use, such as fishing, hunting, boating and the enjoyment of natural scenic beauty.

The Public Trust Doctrine is the driving force behind all management in Wisconsin lakes. Protecting and maintaining that resource for all of Wisconsin's people are at the top of the list in determining what is done and where. In addition to the Public Trust Doctrine, two other forces have converged that reflect Wisconsin's changing attitudes toward aquatic plants. One is a growing realization of the importance of a strong, diverse community of aquatic plants in a healthy lake ecosystem. The other is a growing concern over the spread of AIS, such as EWM. These two forces have been behind more recent changes in Wisconsin's aquatic plant management laws and the evolution of stronger support for the control of invasive plants.

To some, these two issues may seem in opposition, but on closer examination they actually strengthen the case for developing an APMPs as part of a total lake management picture. Planning is a lot of work, but a sound plan can have long-term benefits for a lake and the community living on and using the lake.

The impacts of humans on Wisconsin's waters over the past five decades have caused public resource professionals in Wisconsin to evolve a certain philosophy toward aquatic plant management. This philosophy stems from the recognition that aquatic plants have value in the ecosystem, as well as from the awareness that, sometimes, excessive growth of aquatic plants can lessen our recreational opportunities and our aesthetic enjoyment of lakes. In balancing these, sometimes competing objectives, the Public Trust Doctrine requires that the State's public resource professionals be responsible for the management of fish and wildlife resources and their sustainable use to benefit all Wisconsin citizens. Aquatic plants are recognized as a natural resource to protect, manage, and use wisely.

Aquatic plant protection begins with human beings. We need to work to maintain good water quality and healthy native aquatic plant communities. The first step is to limit the amount of nutrients and sediment that enter the lake. There are other important ways to safeguard a lake's native aquatic plant community. They may include developing motor boat ordinances that prevent the destruction of native plant beds and reduce shoreline erosion and sediment disturbance caused by boat wakes, limiting aquatic plant removal activities, designating certain plant beds as critical habitat sites and preventing the spread of non-native, invasive plants, such as EWM.

If plant management is needed, it is usually in lakes that humans have significantly altered. If we discover how to live on lakes in harmony with natural environments and how to use aquatic plant management techniques that blend with natural processes rather than resist them, the forecast for healthy lake ecosystems looks bright. To assure no harm is done to the lake ecology, it is important that plant management is undertaken as part of a long range and holistic plan.

In many cases, the development of long-term, integrated aquatic plant management strategies to identify important plant communities and manage nuisance aquatic plants in lakes, ponds or rivers is required by the State of Wisconsin. To promote the long-term sustainability of our lakes, the State of Wisconsin endorses the development of APMPs and supports that work through various grant programs.

There are many techniques for the management of aquatic plants in Wisconsin. Often management may mean protecting desirable aquatic plants by selectively hand pulling the undesirable ones. Sometimes more

intensive management may be needed such as using harvesting equipment, herbicides or biological control agents. These methods require permits and extensive planning. Often using and Integrated Pest Management (IPM) strategy that incorporates multiple management actions/alternatives works the best.

While limited management on individual properties is generally permitted, it is widely accepted that a lake will be much better off if plants are considered on a whole lake scale. This is routinely accomplished by lake organizations or units of government charged with the stewardship of individual lakes.

LAKE INVENTORY

In order to make recommendations for aquatic plant and lake management, basic information about the water body of concern is necessary. A basic understanding of physical characteristics including size and depth, critical habitat, water quality, water level, fisheries and wildlife, wetlands and soils is needed to make appropriate recommendations for improvement.

WATERSHED

A watershed is an area of land from which water drains to a common surface water feature, such as a stream, lake, or wetland. The Upper Turtle Lake watershed is 2,117 acres which includes the 427 acre lake area. The Upper Turtle Lake watershed is part of the Hay River (HUC 0705000706) watershed which is a part of the even larger Red Cedar River watershed (HUC 07050007) (Figure 1). The Red Cedar River Watershed currently has an approved TMDL and Management Plan to reduce phosphorus loading to make water quality improvements in Tainter and Menomin Lakes. A TMDL is a plan for restoring impaired waters that identifies the maximum amount of a pollutant, in this case phosphorus, which a body of water can receive while still meeting water quality standards. Within that management plan, it states that "Some lake management techniques have the potential to decrease the amount of available phosphorus in Tainter and Menomin Lakes. These include not only local practices designed specifically to benefit these two lakes but also those benefiting upstream lakes in the watershed if those practices result in reduction of phosphorus leaving the lake and entering the watershed" (Red Cedar River Water Quality Partnership, 2015).

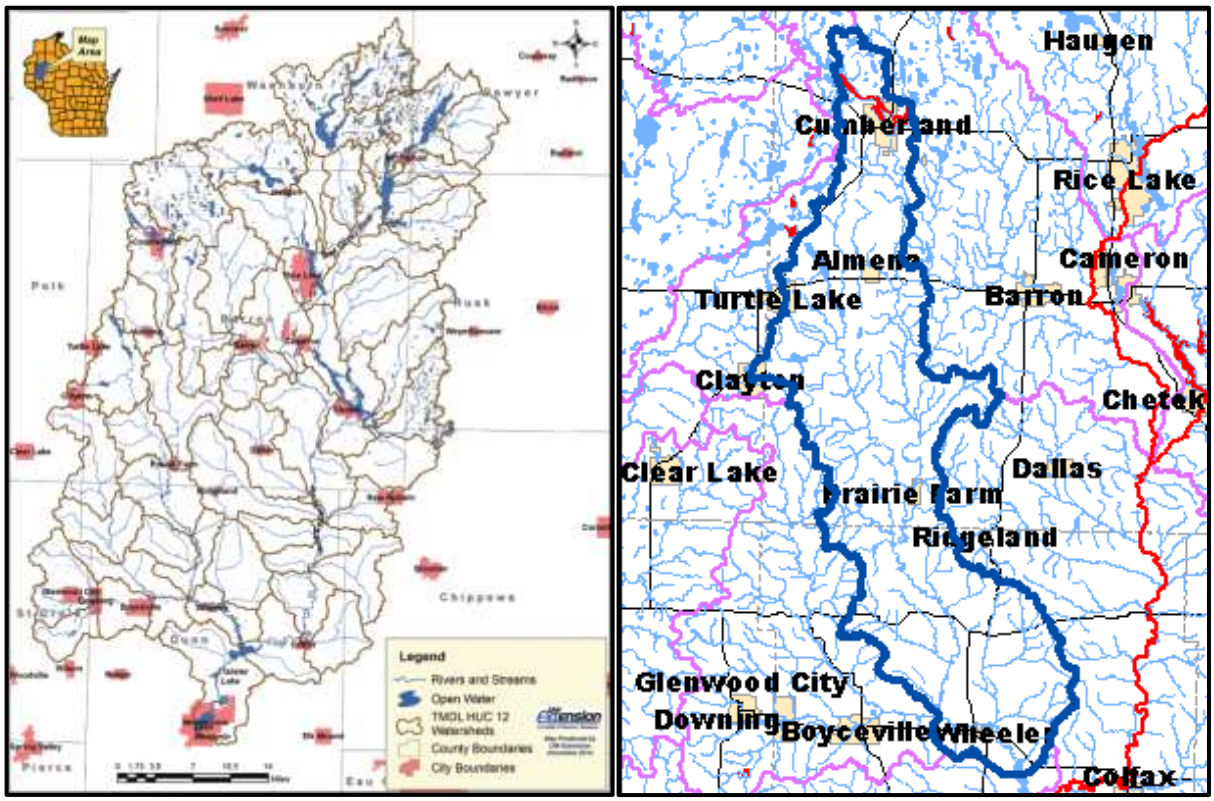


Figure 1: Left- Red Cedar River Watershed *(Red Cedar River Water Quality Partnership, 2015)* **Right- Hay River Sub-watershed** *(WDNR, 1996)*

The land use in the Upper Turtle Lake watershed is primarily classified as agricultural (row crops, pasture, etc.) and a mix of forests, wetlands, and barrens (Figure 2). Agricultural land use covers nearly 50% of the watershed and consists primarily of large-scale row cropping. Residential areas make up a relatively small portion of the land use; however, the majority of residential areas are concentrated around the lakes in the watershed leading to more immediate and likely greater impacts to water quality than areas located further away from the lakes.

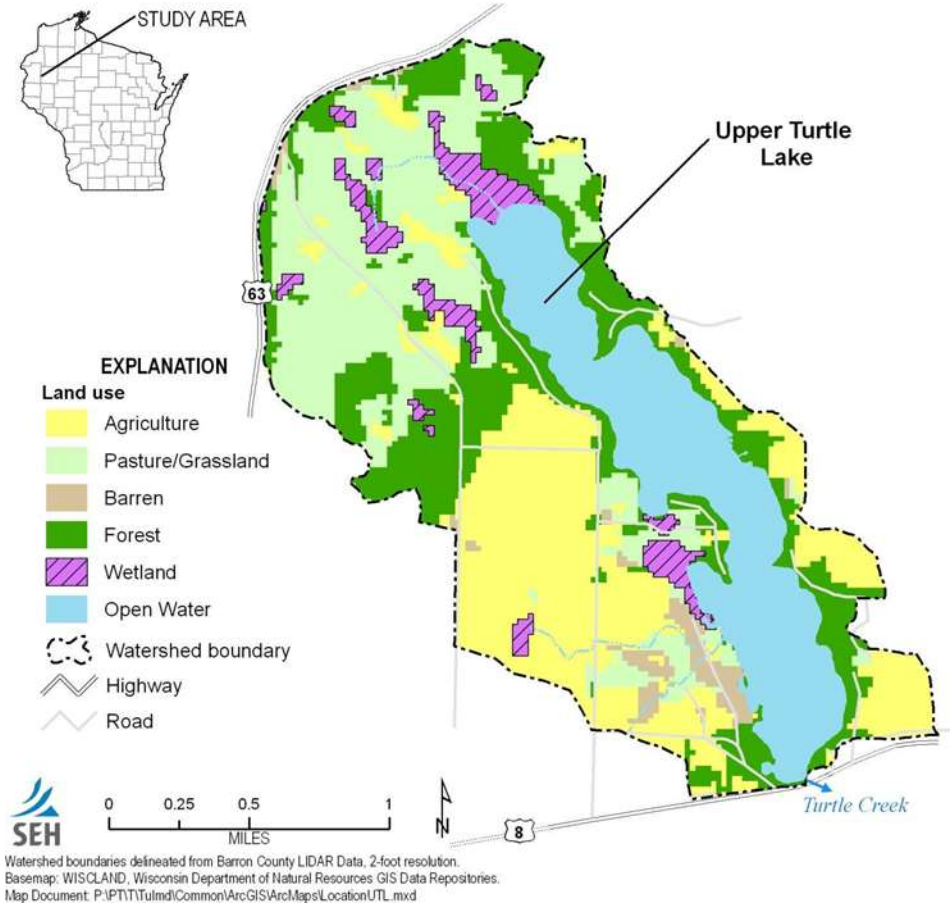


Figure 2: Location and Land Use of Upper Turtle Lake Watershed (SEH, 2011)

Land cover and land use management practices within a watershed have a strong influence on water quality. Increases in impervious surfaces, such as roads, rooftops and compacted soils, associated with residential and agricultural land uses can reduce or prevent the infiltration of runoff. This can lead to an increase in the amount of rainfall runoff that flows directly into Upper Turtle Lake and its tributary streams. The removal of riparian, i.e., nearshore, vegetation causes an increase in the amount of nutrient-rich soil particles transported directly to the lake during rain events.

PHYSICAL CHARACTERISTICS

Upper Turtle Lake is a drainage lake in west-central Barron County, Wisconsin about 2.5 miles east of the Village of Turtle Lake. The lake covers 427 acres, has a maximum depth of 26 feet and an average depth of 14-ft, and 7.37 miles of shoreline. The north basin is relatively shallow while the south and central basins are a fair bit deeper. Because of this, most of the north basin is part of the littoral zone, and there is a thin band around the rest of the lake where plants are able to grow (Figure 3).

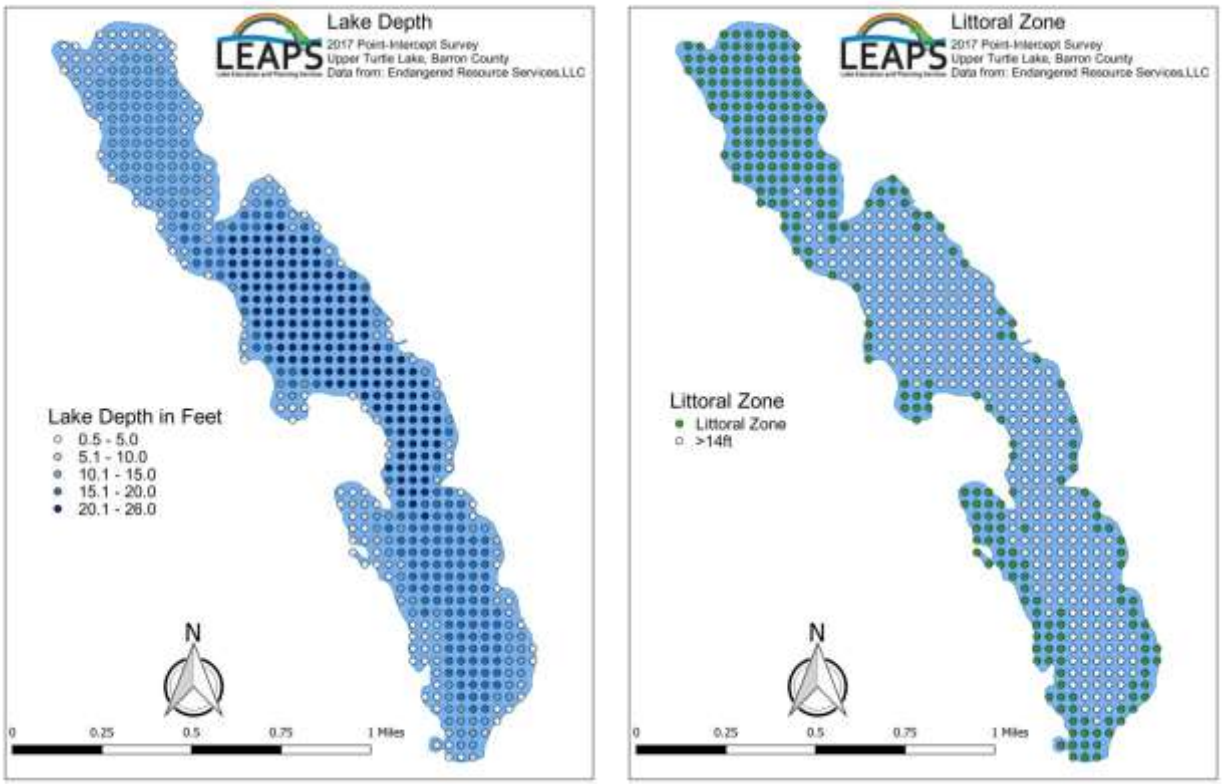


Figure 3: Depth and Littoral Zone of Upper Turtle Lake

Turtle Creek, which flows from Upper Turtle Lake, is the main tributary to Lower Turtle Lake. The lake is fed by intermittent streams and groundwater and is the headwaters of Turtle Creek which begins at the southern end of the lake. Turtle Creek flows through Lower Turtle Lake which drains into the Hay River.

As part of the Clean Water Act, states must produce a list of waters that do not meet water quality standards every two years. This list is known as the 303d Impaired Waters List. Water quality standards include the acceptable levels of total phosphorus, algae growth, and/or any number of miscellaneous pollutants. In 2014, Upper Turtle Lake was listed as 303d impaired water due to excess algae growth. The cause of this excess growth was originally listed as an unknown pollutant, but this is currently under review with a proposed change to excess phosphorus. This excess phosphorus likely comes from some entering the lake from the watershed as well as the phosphorus that is released when curly-leaf pondweed dies off mid-summer. The majority of the lake bottom consists of muck with some rock and sand interspersed throughout (Figure 4). The large amount of organic muck could be another source of additional phosphorus that leads to the excessive algae blooms which impair Upper Turtle Lake.

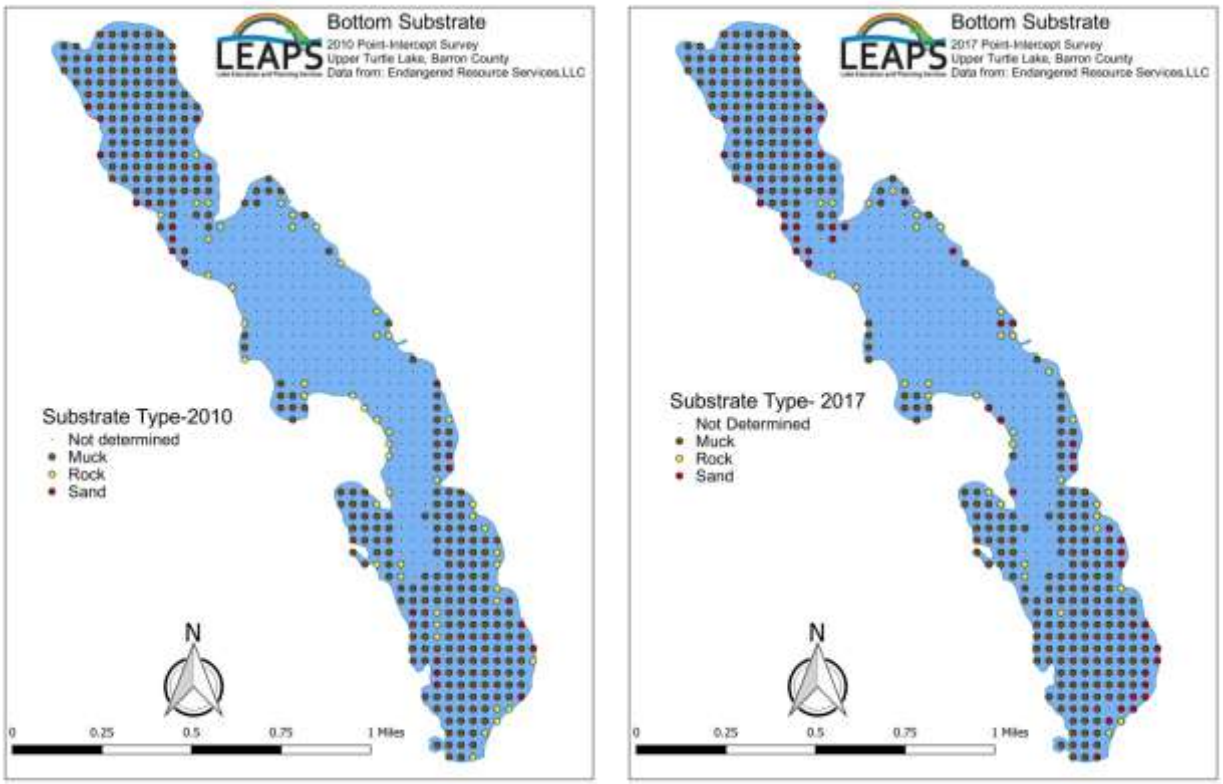


Figure 4: Lake Substrate in 2010 (Left) and 2017 (Right)

CRITICAL HABITAT

Every body of water has areas of aquatic vegetation that offers critical or unique fish and wildlife habitat. Such areas can be identified by the WDNR and identified as Sensitive Areas per Ch. NR 107. Figure 5 shows the sensitive areas identified by the WDNR (2001) in Upper Turtle Lake. Aquatic habitat areas provide the basic needs (e.g. habitat, food, nesting areas) for waterfowl, fish, and wildlife. Disturbance to these areas during mechanical harvesting should be avoided or minimized and chemical treatment is generally not allowed. Areas of rock and cobble substrate with little or no fine sediment are considered high quality walleye spawning habitat. No dredging, structures, or deposits should occur in these sensitive areas. Further details for each sensitive area can be found in the Upper Turtle Lake Sensitive Area Designation (WDNR, 2001) (Appendix A).

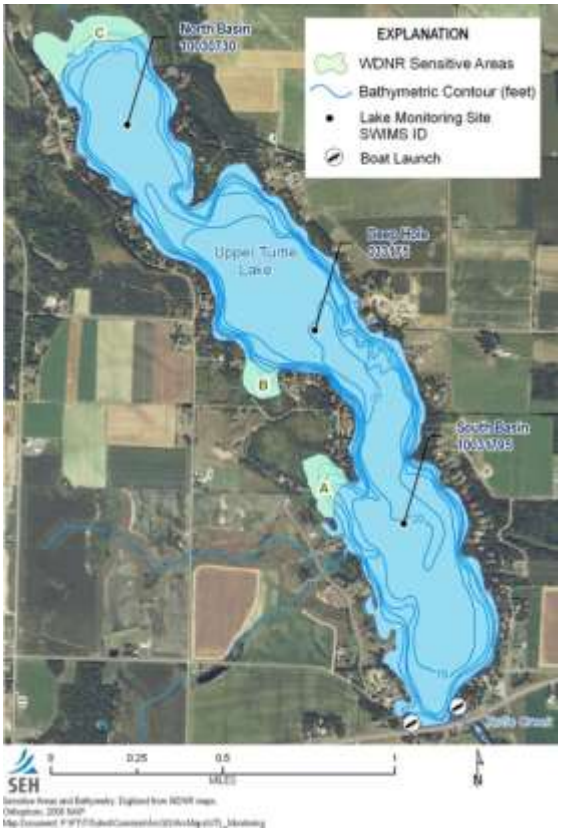


Figure 5: Sensitive Areas and Water Quality Sampling Sites in Upper Turtle Lake (SEH, 2011)

WATER QUALITY

Water quality data has been collected by Citizen Lake Monitoring Network (CLMN) volunteers since 1994 through 2017 with the exception of 2006. All of the data from 1994 through 1998 was Secchi depth data, but water chemistry for total phosphorus and chlorophyll-*a* concentration was added in 1999, with the exception of 2006-2009.

The water quality of a lake influences the aquatic plant community, which in turn can influence the chemistry of a lake. Water clarity, total phosphorus and chlorophyll a are measures of water quality that can be used to determine the productivity or trophic status of a lake. The Carlson trophic state index (TSI) is a frequently used biomass-related index. The trophic state of a lake is defined as the total weight of living biological material (or biomass) in a lake at a specific location and time. Eutrophication is the movement of a lake's trophic state in the direction of more plant biomass. Eutrophic lakes tend to have abundant aquatic plant growth, high nutrient concentrations, and low water clarity due to algae blooms (Figure 6). Oligotrophic lakes, on the other end of the spectrum, are nutrient poor and have little plant and algae growth (Figure 6). Mesotrophic lakes have intermediate nutrient levels and only occasional algae blooms (Figure 6).

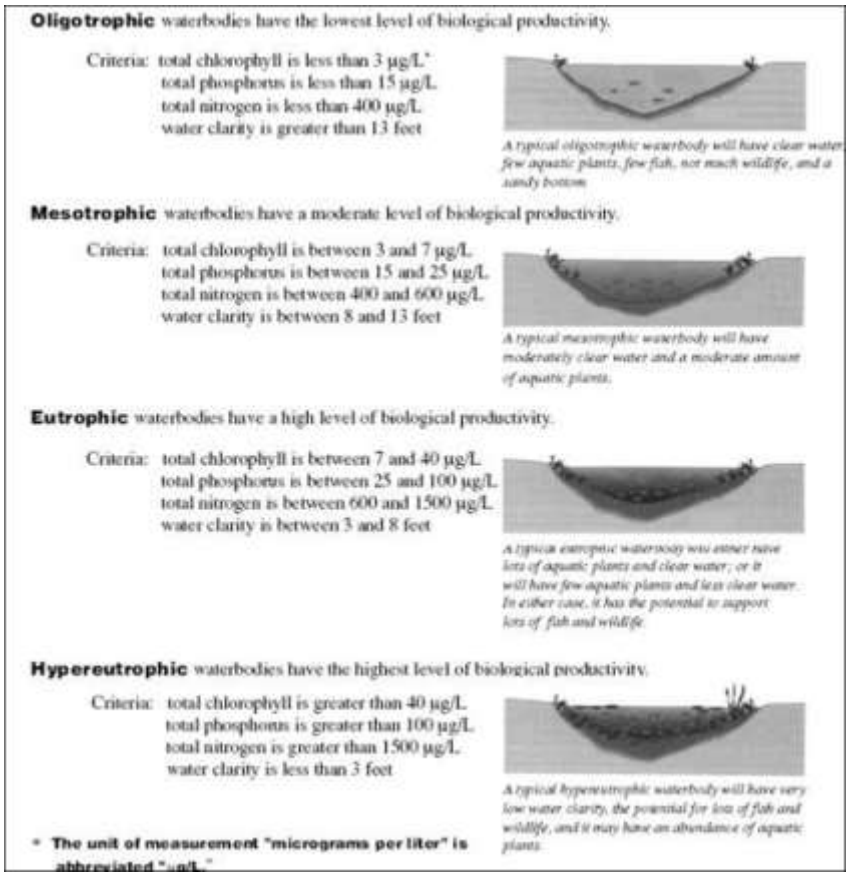


Figure 6: Trophic States in Lakes

Generally, TSI values from 0-30 are considered oligotrophic, 30-50 are mesotrophic, 50-70 are eutrophic, and anything above 70 is considered to be hypereutrophic. In Upper Turtle Lake, the average Secchi TSI value is 52, the average total phosphorus TSI is 57, and the average chlorophyll-*a* TSI is 56 (Figure 7). These values mean that Upper Turtle Lake is a eutrophic lake with a high level of biological productivity. These values have remained fairly steady, usually falling between 50 and 60; however it is worth noting that these values have been on the higher end of that range in recent years than they were the first few years that water chemistry data was collected. With 2017 being the first year that any of the values yearly averages generated TSI values higher than 60. While this could be an anomaly, it is something to pay attention to in the coming years.

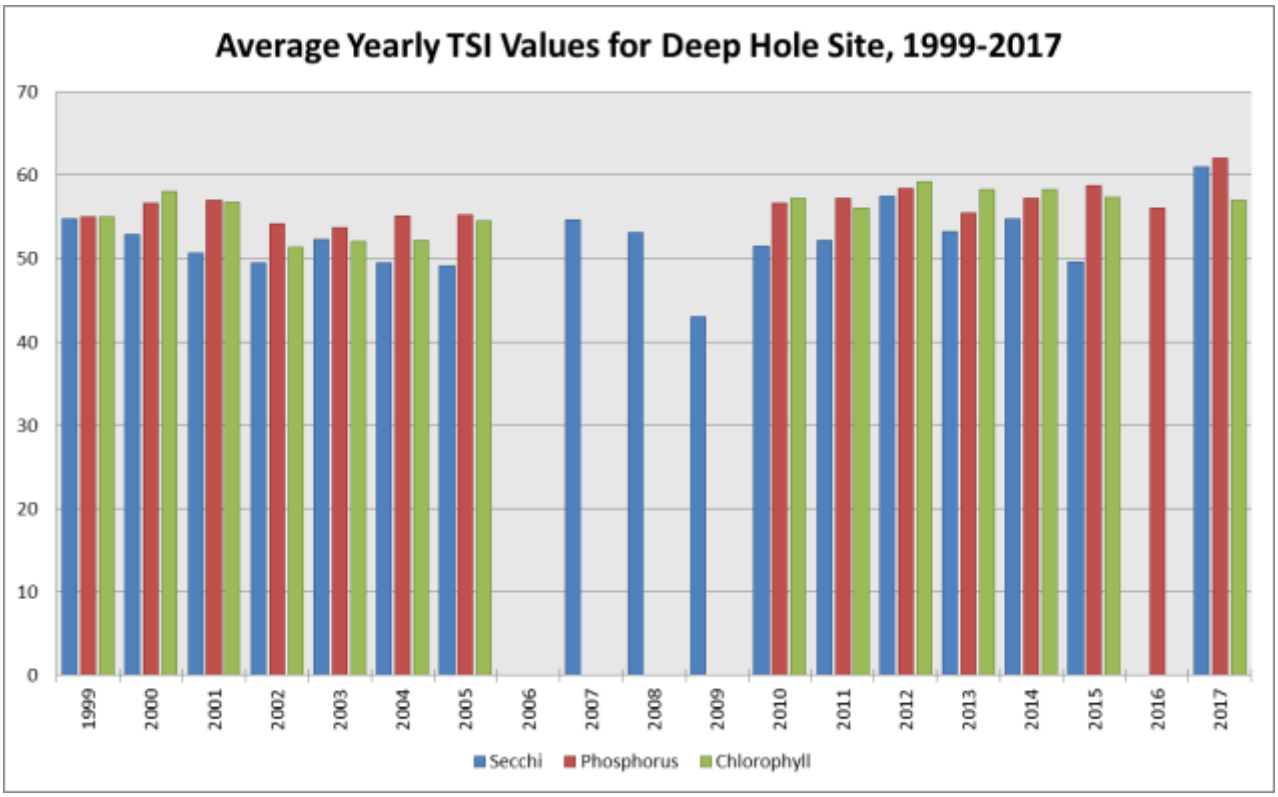


Figure 7: Yearly TSI Values

The actual Secchi values on Upper Turtle Lake show a more noticeable pattern of decreased water quality in recent years. The total yearly averages for the Secchi depths have stayed relatively constant since 1994, hovering just under 7-ft of depth. However there is a noticeable downward trend in the summer averages despite 2009 being the best recorded year for Secchi depth (Figure 8). 2015 and 2017, in particular, show the dramatic drop in water clarity over the summer. While a decrease in clarity from spring to summer is somewhat expected, this decrease is concerning when it is significantly more dramatic than past years.

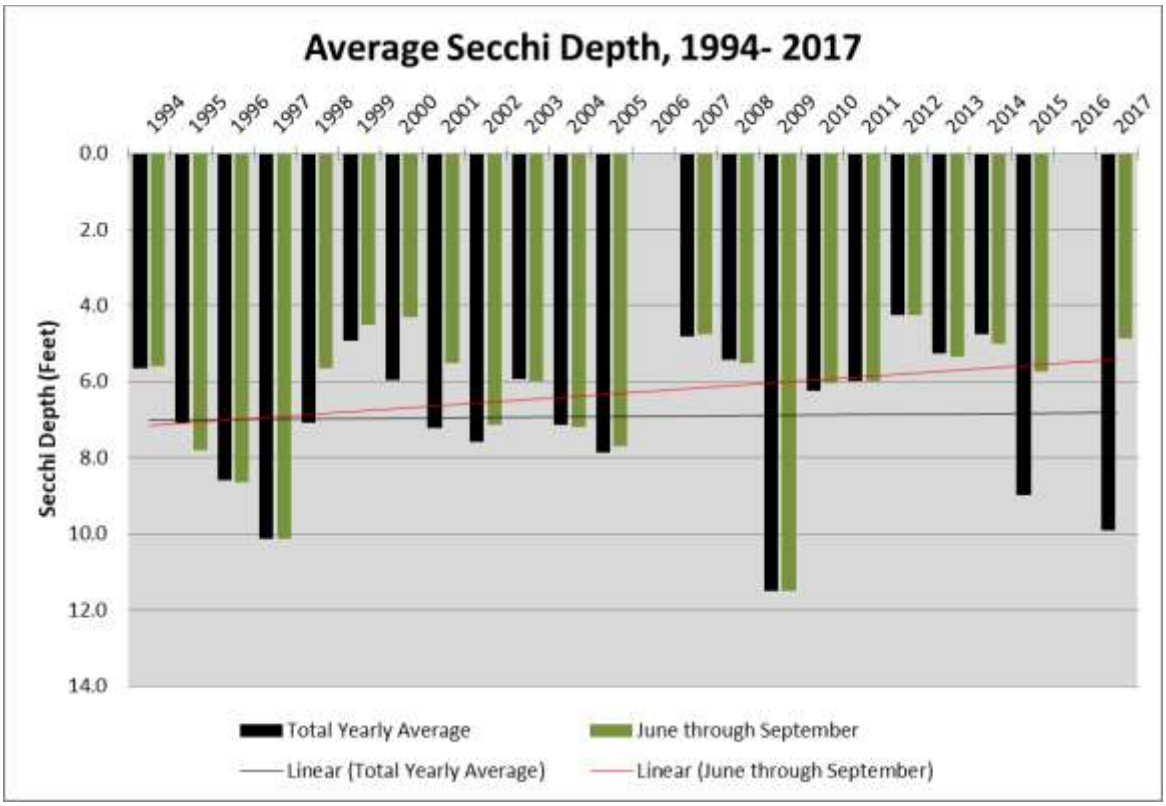


Figure 8: Secchi Depth Averages and Trendlines

The water chemistry data shows the most noticeable decrease in water quality (Figure 9). Since 1999, there has been a steady increase in both total phosphorus and chlorophyll- a concentration throughout the lake. While it appears to drop in 2016, it should be noted that there was only one sample collected for the entire season that year, and this sample was taken in May which is when lower phosphorus concentrations could be expected due to the lack of impacts from either snowmelt or other watershed activities. Aside from the small spike in 2012, the chlorophyll-a concentrations have remained fairly steady since 2010, though they are somewhat higher than the concentrations found in 1999-2005.

Since 2003, total phosphorus levels appear to be increasing. While the spike of almost 80µg/L, shown in 2017, is probably the result of incomplete data, with only one sample being collected during the spring turnover, there is still a noticeable pattern of increased phosphorus levels within the lake. It is interesting that despite the increase in total phosphorus levels, the chlorophyll-a levels have remained relatively constant. This is likely due to a healthy and diverse plant community within Upper Turtle Lake.

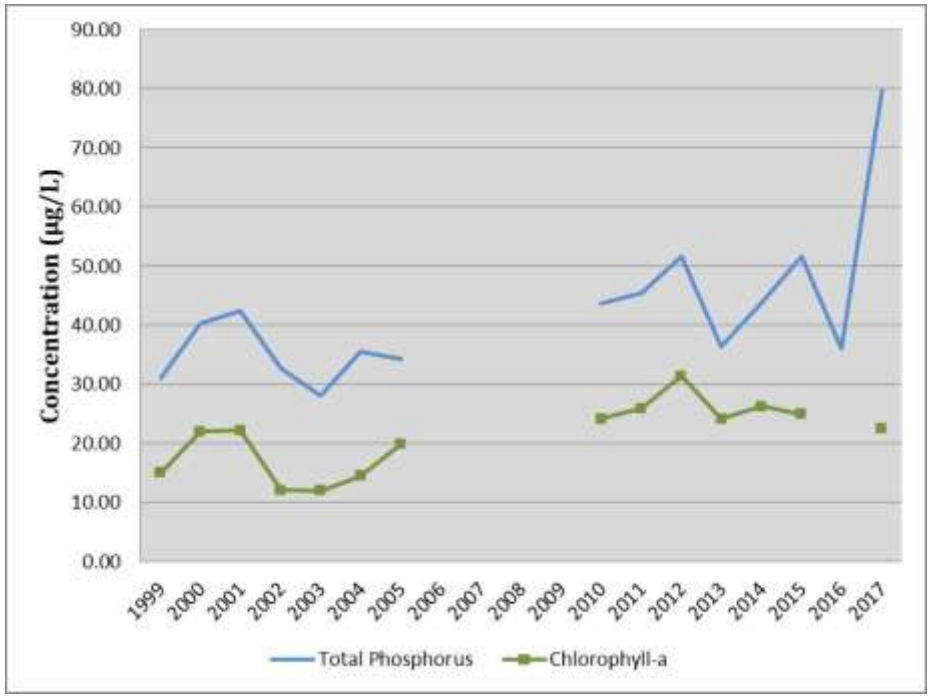


Figure 9: Yearly Average Total Phosphorus and Chlorophyll-a Concentrations

TEMPERATURE AND DISSOLVED OXYGEN

Temperature and dissolved oxygen are important factors that influence aquatic organisms and nutrient availability in lakes. As temperature increases during the summer in deeper lakes, the colder water sinks to the bottom and the lake develops three distinct layers as shown in Figure 10. This process, called stratification, prevents mixing between the layers due to density differences which limits the transport of nutrients and dissolved oxygen between the upper and lower layers. In most lakes in Wisconsin that undergo stratification, the whole lake mixes in the spring and fall when the water temperature is between 53 and 66°F, a process called overturn. Overturn begins when the surface water temperatures become colder and therefore denser causing that water to sink or fall through the water column. Below about 39°F, colder water becomes less dense and begins to rise through the water column. Water at the freezing point is the least dense which is why ice floats and warmer water is near the bottom (called inverse stratification) throughout the winter.

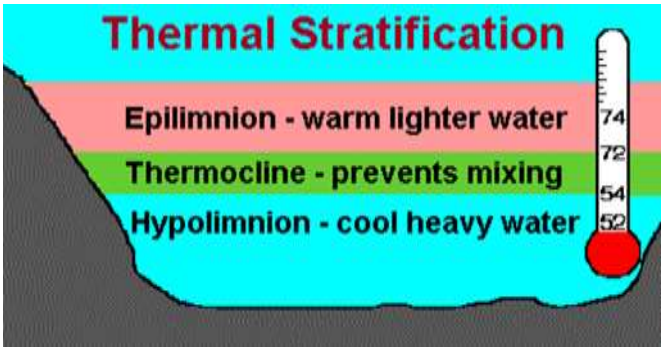


Figure 10: Summer thermal stratification

Upper Turtle Lake does not usually stratify until July which means the lake remains fairly mixed through a good portion of the season. While the stratification allows nutrients that are stirred up by the moving water to settle out into the sediments, it also causes oxygen levels in the lowest parts of the lake to drop dramatically.

This lack of oxygen can release additional nutrients into the water from the sediments which can decrease water quality.

FISHERIES AND WILDLIFE

Overall, there are a wide variety of warm water fisheries that can be found within Upper Turtle Lake. The 2011 late spring fisheries assessment showed bluegills, pumpkinseed, perch, crappies, rock bass, largemouth and smallmouth bass, northern pike, and walleye (Table 1). The largest fisheries within Upper Turtle Lake were the panfish, but there was also a good amount of bass, walleye, and other predatory fish.

Table 1: Summary of 2011 Spring Fisheries Assessment

2011 Spring Fisheries Assessment				
Species	Relative Abundance (catch per mile)	Minimum Length (Inches)	Maximum Length (Inches)	Average Length (Inches)
Walleye	14.58	7.5	25	19.13
Black Crappie	6	7.5	10	9.25
Bluegill	187	2.5	8.5	5.1
Largemouth Bass	39.79	6	17.5	12.45
Northern Pike	0.42	19.5	24	22
Pumpkinseed	7	3	7	5.32
Rock Bass	7	5	8.5	7.61
Smallmouth Bass	0.42	12.5	13	13
Yellow Perch	34	2.5	10	5.53

Upper Turtle Lake is currently involved in a WDNR study with the goal of stabilizing walleye populations that have seen significant decreases in the past 20 years. One of the possible causes for the decrease in walleye numbers is thought to be the increase in bass populations which can reduce walleye populations through direct predation. As a part of this study, yearly surveys are conducted to assess the bass, northern, and walleye populations. The ultimate goal of this study is to find management mechanisms which allow walleye populations to remain at steady numbers through natural reproduction.

Upper Turtle Lake is considered to be a treatment lake for this study which means that large walleye fingerlings are stocked when the young of the year survey results show less than 10 catch per effort (CPE). This is why walleye stocking was resumed in Upper Turtle Lake in 2014. Before this, small walleye fingerling were stocked pretty regularly from 1975-2004. This study will be continuing through 2024, so the final results have not yet been tallied, but initial results show no significant changes in bass populations with increases in the walleye populations which was caused by the stocking efforts of 2014 and 2016 (Figure 11).

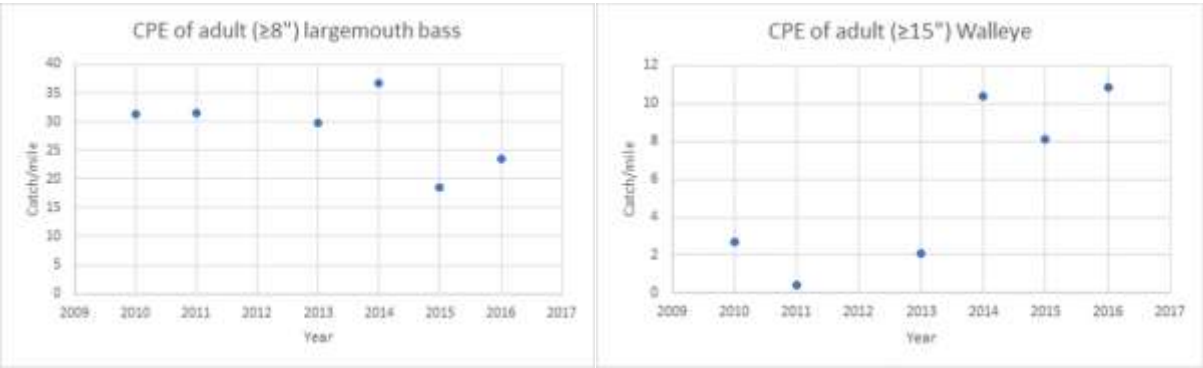


Figure 11: Yearly Catch per Effort of Largemouth Bass and Walleye

The Natural Heritage Inventory (NHI) database contains recent and historic observations of rare species and plant communities. Each species has a state status including Special Concern (SC), Threatened (THR) or Endangered (END). There are seven plant species found within the same township and range (T34N, R14W) as Upper Turtle Lake. One of these species, spotted pondweed, is endangered (WDNR, 2017).

The only invasive animal species that has been verified within Upper Turtle Lake is the Chinese mystery snail. There is not a lot known about the direct impacts that these snails have on the natural systems they invade, but there is some evidence that they cause some decline in native snail populations. Chinese mystery snails also occasionally experience mass die off which result in aesthetic issues with large amounts washing up on shore and subsequently decomposing along the shoreline.

WETLANDS

A wetland is an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions. Wetlands have many functions which benefit the ecosystem surrounding Upper Turtle Lake. Wetlands with a higher floral diversity of native species support a greater variety of native plants and are more likely to support regionally scarce plants and plant communities. Wetlands provide fish and wildlife habitat for feeding, breeding, resting, nesting, escape cover, travel corridors, spawning grounds for fish, and nurseries for mammals and waterfowl.

Wetlands also provide flood protection within the landscape. Due to the dense vegetation and location within the landscape, wetlands are important for retaining stormwater from rain and melting snow moving towards surface waters and retaining floodwater from rising streams. This flood protection minimizes impacts to downstream areas. Wetlands provide water quality protection because wetland plants and soils have the capacity to store and filter pollutants ranging from pesticides to animal wastes.

Wetlands also provide shoreline protection to Upper Turtle Lake because shoreline wetlands act as buffers between land and water. They protect against erosion by absorbing the force of waves and currents and by anchoring sediments. This shoreline protection is important in waterways where boat traffic, water current, and wave action cause substantial damage to the shore. Wetlands also provide groundwater recharge and discharge by allowing the surface water to move into and out of the groundwater system. The filtering capacity of wetland plants and substrates help protect groundwater quality. Wetlands can also stabilize and maintain stream flows, especially during dry months. Aesthetics, recreation, education and science are also all services wetlands provide. Wetlands contain a unique combination of terrestrial and aquatic life and physical and chemical processes.

There are not a lot of wetlands in the Upper Turtle Lake watershed (Figure 12). There appears to be a good sized wetland along the southwest shore however, this area has been heavily developed into residential areas which are no longer capable of acting as natural wetlands. Along the northern shore there is a large wetland complex, which has been left natural. This area is bordered by two farm fields, so it is likely acting as a buffer to between the fields and the lake in addition to helping absorb many of the excess nutrients that would otherwise run from the farm into Upper Turtle Lake.

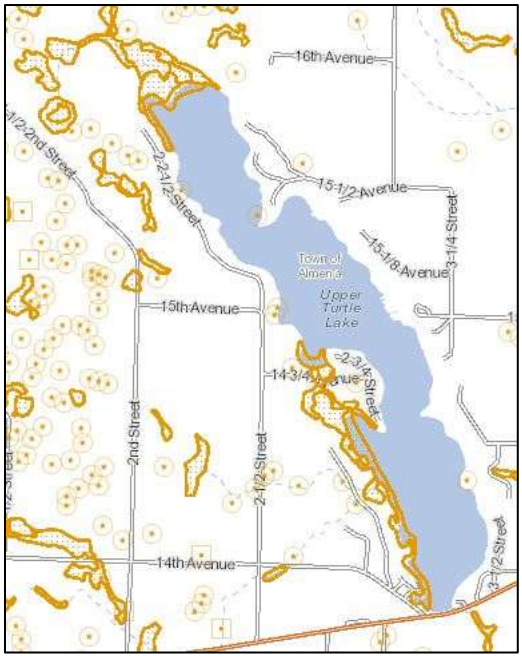


Figure 12: Upper Turtle Lake Wetlands (Wisc. Wetlands Inventory August 23, 2017)

SOILS

Soils are classified into four main hydrologic soil groups (A, B, C, and D) to indicate their potential for producing runoff based off of the rate of infiltration. Group A soils have a high infiltration rate which makes the potential amount of runoff very low. These soils are, generally very sandy and allow water to pass through unimpeded. Conversely, group D soils have a very low infiltration rate making their runoff potential fairly high. Group D soils are generally very dense with high amounts of organic material. This causes water to move slowly through group D soils often resulting in standing water on flat surfaces and flowing water over sloped surfaces. Group D soils are generally found within wetland areas, but they can be problematic in areas that lack the hydrophitic vegetation found within those areas.

There are also three sub groups (A/D, B/D, and C/D) these indicated the infiltration rate of the soils with respect to the water table. If the water table is high and blocking infiltration, these soils are considered to have a high runoff potential and placed into group D, but when the water table is lower, these soils are similar to the first grouping (A, B, or C). Most of the soils, 69.5%, within the Upper Turtle Lake watershed fall into groups B, B/D, or C (Table 2) (NRCSa, 2017). These soils have moderate to slow infiltration rates, so if these areas are not properly managed, there is relatively high runoff potential. The area directly surrounding Upper Turtle Lake are comprised primarily of group B soils reducing the runoff potential in that area, but the majority of the northern half of the watershed are group C which could result in runoff coming in from these areas (Figure 13).

Table 2: Hydrologic soil profile of Upper Turtle Lake watershed

Soil Group	Percentage of Watershed	Infiltration Rate
A	0	High
B	22.5	Moderate
C	28.6	Slow
D	0	Very Slow
A/D	3.3	High when drained, very slow when undrained
B/D	18.4	Moderate when drained, very slow when undrained
C/D	6.3	Slow when drained, very slow when undrained
Water	20.9	N/A

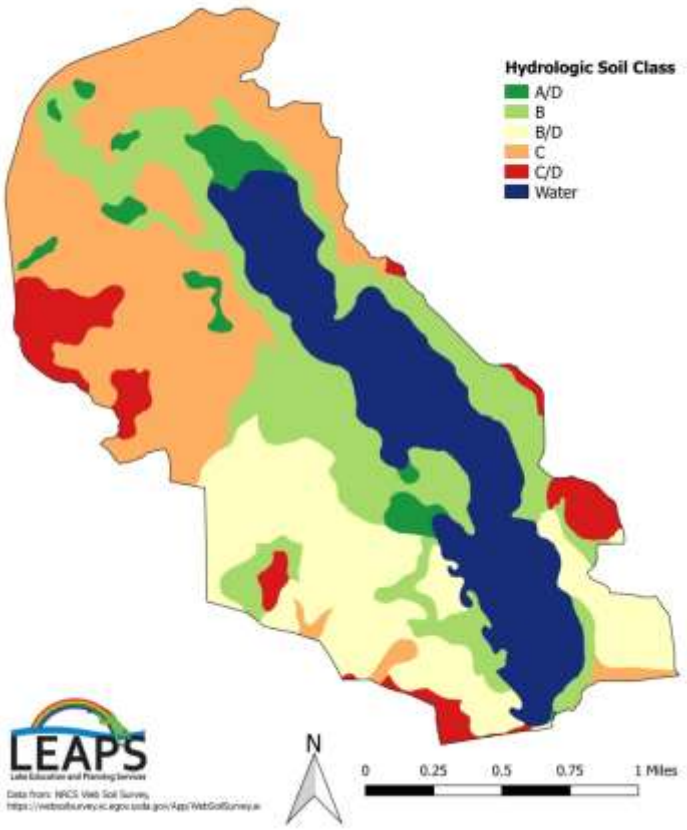


Figure 13: Soil Type and Locations within the Upper Turtle Lake watershed

COARSE WOODY HABITAT (WOLTER, 2012)

Coarse woody habitat (CWH) in lakes is classified as trees, limbs, branches, roots, and wood fragments at least 4 inches in diameter that enter a lake by natural (beaver activity, toppling from ice, wind, or wave scouring) or human means (logging, intentional habitat improvement, flooding following dam construction). CWH in the littoral or near-shore zone serves many functions within a lake ecosystem including erosion control, as a carbon source, and as a surface for algal growth which is an important food base for aquatic macro invertebrates. Presence of CWH has also been shown to prevent suspension of sediments, thereby improving water clarity. CWH serves as important refuge, foraging, and spawning habitat for fish, aquatic invertebrates, turtles, birds, and other animals. The amount of littoral CWH occurring naturally in lakes is related to characteristics of riparian forests and likelihood of toppling. However, humans have also had a large impact on amounts of littoral CWH present in lakes through time. During the 1800's the amount of CWH in northern lakes was increased beyond natural levels as a result of logging practices. But time changes in the logging industry and forest composition along with increasing shoreline development have led to reductions in CWH present in many northern Wisconsin lakes.

CWH is often removed by shoreline residents to improve aesthetics or select recreational opportunities (swimming and boating). Jennings, et al. (2003) found a negative relationship between lakeshore development and the amount of CWH in northern Wisconsin lakes. Similarly, Christensen, et al. (1996) found a negative correlation between density of cabins and CWH present in Wisconsin and Michigan lakes. While it is difficult to make precise determinations of natural densities of CWH in lakes it is believed that the value is likely on the scale of hundreds of logs per mile. The positive impact of CWH on fish communities have been well documented by researchers, making the loss of these habitats a critical concern. One study determined that black crappie selected nesting sites that were usually associated with woody debris, silty substrate, warmer water, and protected from wind and waves (Pope & Willis, 1997).

The amount of CWH within Upper Turtle Lake has not been quantified.

SHORELANDS

How the shoreline of a lake is managed can have big impacts on the water quality and health of that lake. Natural shorelines prevent polluted runoff from entering lakes, help control flooding and erosion, provide fish and wildlife habitat, may make it harder for AIS to establish themselves, muffle noise from watercraft, and preserve privacy and natural scenic beauty. Many of the values lake front property owners appreciate and enjoy about their properties - natural scenic beauty, tranquility, privacy, relaxation - are enhanced and preserved with good shoreland management. And healthy lakes with good water quality translate into healthy lake front property values.

Shorelands may look peaceful, but they are actually the hotbed of activity on a lake. 90% of all living things found in lakes - from fish, to frogs, turtles, insects, birds, and other wildlife - are found along the shallow margins and shores. Many species rely on shorelands for all or part of their life cycles as a source for food, a place to sleep, cover from predators, and to raise their young. Shorelands and shallows are the spawning grounds for fish, nesting sites for birds, and where turtles lay their eggs. There can be as much as 500% more species diversity at the water's edge compared to adjoining uplands.

Lakes are buffered by shorelands that extend into and away from the lake. These shoreland buffers include shallow waters with submerged plants (like coontail and pondweeds), the water's edge where fallen trees and emergent plants like rushes might be found, and upward onto the land where different layers of plants (low ground cover, shrubs, trees) may lead to the lake. A lake's littoral zone is a term used to describe the shallow water area where aquatic plants can grow because sunlight can penetrate to the lake bottom. Shallow lakes might be composed entirely of a littoral zone. In deeper lakes, plants are limited where they can grow by how deeply light can penetrate the water.

Shorelands are critical to a lake's health. Activities such replacing natural vegetation with lawns, clearing brush and trees, importing sand to make artificial beaches, and installing structures such as piers, can cause water quality decline and change what species can survive in the lake. Because the majority of the shoreland surrounding Upper Turtle Lake has been developed into residential property, some amount of nutrients entering the lake will come from individual property owners. This impact can be minimized by increasing native plant buffers and making a conscious effort to reduce development of the riparian zone.

PROTECTING WATER QUALITY

Shoreland buffers slow down rain and snow melt (runoff). Runoff can add nutrients, sediments, and other pollutants into lakes, causing water quality declines. Slowing down runoff will help water soak (infiltrate) into the ground. Water that soaks into the ground is less likely to damage lake quality and recharges groundwater that supplies water to many of Wisconsin's lakes. Slowing down runoff water also reduces flooding, and stabilizes stream flows and lake levels.

Shoreland wetlands act like natural sponges trapping nutrients where nutrient-rich wetland sediments and soils support insects, frogs, and other small animals eaten by fish and wildlife.

Shoreland forests act as filters, retainers, and suppliers of nutrients and organic material to lakes. The tree canopy, young trees, shrubs, and forest understory all intercept precipitation, slowing runoff, and contributing to water infiltration by keeping the soil's organic surface layer well-aerated and moist. Forests also slow down water flowing overland, often capturing its sediment load before it can enter a lake or stream. In watersheds with a significant proportion of forest cover, the erosive force of spring snow melts is reduced as snow in forests melts later than snow on open land, and melt water flowing into streams is more evenly distributed. Shoreland trees grow, mature, and eventually fall into lakes where they protect shorelines from erosion, and are an important source of nutrients, minerals and wildlife habitat.

NATURAL SHORELANDS ROLE IN PREVENTING AIS

In addition to removing essential habitat for fish and wildlife, clearing native plants from shorelines and shallow waters can open up opportunities for invasive species to take over. Like tilling a home garden to prepare it for seeding, clearing shoreland plants exposes bare earth and removes the existing competition (the cleared shoreland plants) from the area. Nature fills a vacuum. While the same native shoreland plants may recover and reclaim their old space, many invasive species possess "weedy" traits that enable them to quickly take advantage of new territory and out-compete natives.

The act of weeding creates continual disturbance, which in turn benefits plants that behave like weeds. The modern day practice of mowing lawns is an example of keeping an ecosystem in a constant state of disturbance to the benefit of invasive species like turf grass, dandelions, and clover, all native to Europe. Keeping shoreline intact is a good way to minimize disturbance and minimize opportunities for invasive species to gain a foothold.

THREATS TO SHORELANDS

When a landowner develops a waterfront lot, many changes may take place including the addition of driveways, houses, decks, garages, sheds, piers, rafts and other structures, wells, septic systems, lawns, sandy beaches and more. Many of these changes result in the compaction of soil and the removal of trees and native plants, as well as the addition of impervious (hard) surfaces, all of which alter the path that precipitation takes to the water.

Building too close to the water, removing shoreland plants, and covering too much of a lake shore lot with hard surfaces (such as roofs and driveways) can harm important habitat for fish and wildlife, send more nutrient and sediment runoff into the lake, and cause water quality decline.

Changing one waterfront lot in this fashion may not result in a measurable change in the quality of the lake or stream. But cumulative effects when several or many lots are developed in a similar way can be enormous. A lake's response to stress depends on what condition the system is in to begin with, but bit by bit, the cumulative effects of tens of thousands of waterfront property owners "cleaning up" their shorelines, are destroying the shorelands that protect their lakes. Increasing shoreline development and development throughout the lake's watershed can have undesired cumulative effects.

SHORELAND PRESERVATION AND RESTORATION

If a native buffer of shoreland plants exists on a given property, it can be preserved and care taken to minimize impacts when future lake property projects are contemplated. If a shoreline has been altered, it can be restored. Shoreline restoration involves recreating buffer zones of natural plants and trees. Not only do quality wild shorelines create higher property values, but they bring many other values too. Some of these are aesthetic in nature, while others are essential to a healthy ecosystem. Healthy shorelines mean healthy fish populations, varied plant life, and the existence of the insects, invertebrates and amphibians which feed fish, birds and other creatures. Figure 14 shows the difference between a natural and unnatural shoreline adjacent to a lake home. More information about healthy shorelines can be found at the following website: http://wisconsinlakes.org/index.php/shorelands-a-shallows (last accessed 8-24-2017).

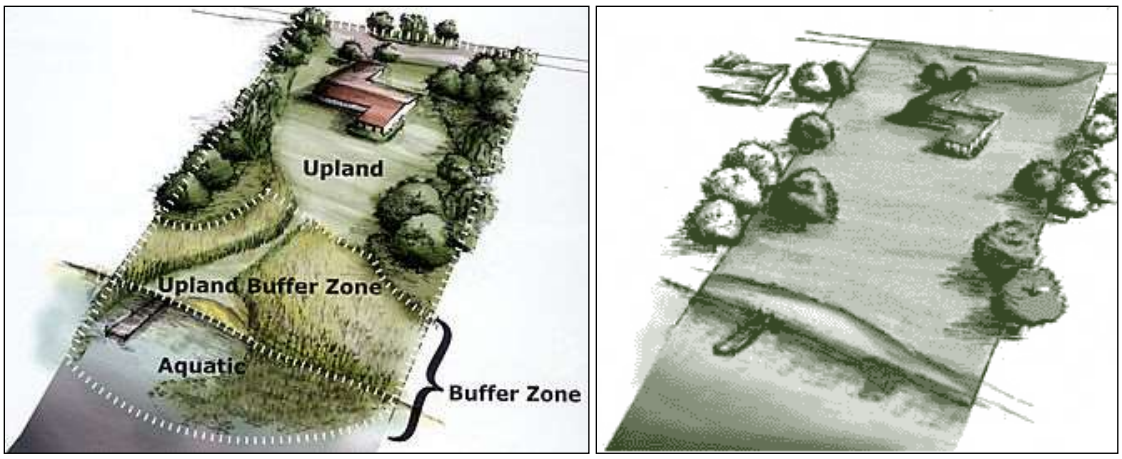


Figure 14: Healthy, AIS Resistant Shoreland (left) vs. Shoreland in Poor Condition

Most of the shoreland surrounding Upper Turtle Lake is covered by residential development. While it is likely that many properties are not entirely developed to the shore, many properties are. Turf grass, mowed lawns to the edge of the lake, exposed earth, and rip rap increase the amount of runoff from roof tops, driveways, lawns and pathways to the lake. The WDNR encourages the installation of relatively simple best management practices including rain gardens, native plantings, and runoff diversion projects through its Healthy Lakes Initiative. Several property owners around Upper Turtle Lake have put in best management practices as a part of the 2010-2016 lake protection project. UTLA could sponsor some more of these projects for individual property owners who are interested in improving their shorelines.

2009 AND 2016 WHOLE LAKE POINT INTERCEPT AQUATIC PLANT SURVEYS

An initial Aquatic Plant Management Plan was developed in 2011 using data from the first whole lake point-intercept survey completed in 2010. As a prerequisite to updating the 2011 plan in 2017, another point-intercept survey using the same points and procedure from the 2010 survey was completed. Results from the 2017 survey were compared to the 2010 survey to determine how the lake's vegetation may have changed since the last point-intercept survey. The 2017 survey included an early-season CLP bed mapping survey and a full point-intercept survey for all aquatic plants on in mid-summer.

WARM-WATER FULL POINT-INTERCEPT AQUATIC PLANT SURVEY

During the 2017 warm-water point-intercept survey, plants were found plants growing to 14-ft (up, slightly from 13.5-ft in 2010) The 163 points with vegetation (approximately 27.4% of the entire lake bottom and 59.7% of the littoral zone) was a 0.4% decline from 2010 when plants were found growing at 166 points (27.8% of the bottom and 62.4% of the littoral zone). Growth in 2017 was slightly skewed to deep water as the mean plant depth of 4.5-ft was more than the median depth of 4.0ft. These values were essentially identical to 2011 values.

Plant diversity was fairly high in 2017 with a Simpson Index value of 0.88 – but down slightly from 0.89 in 2010. Species richness was moderate with 28 species found in the rake (down from 31 in 2010) although this total increased to 38 species when including visuals and plants seen during the boat survey. This number was also slightly down from the 40 total species documented in 2010. Similar to the overall species richness, there was a slight decrease in mean native species per site from 3.01 in 2010 to 2.97 in 2016 (Figure 15). A comparison of statistical values from 2010 and 2017 is given in Table 3.

Lower species richness in all three categories: rake, rake including visuals, and rake including visuals and boat survey could be the result of an over-abundance of CLP growth in the spring of the year.

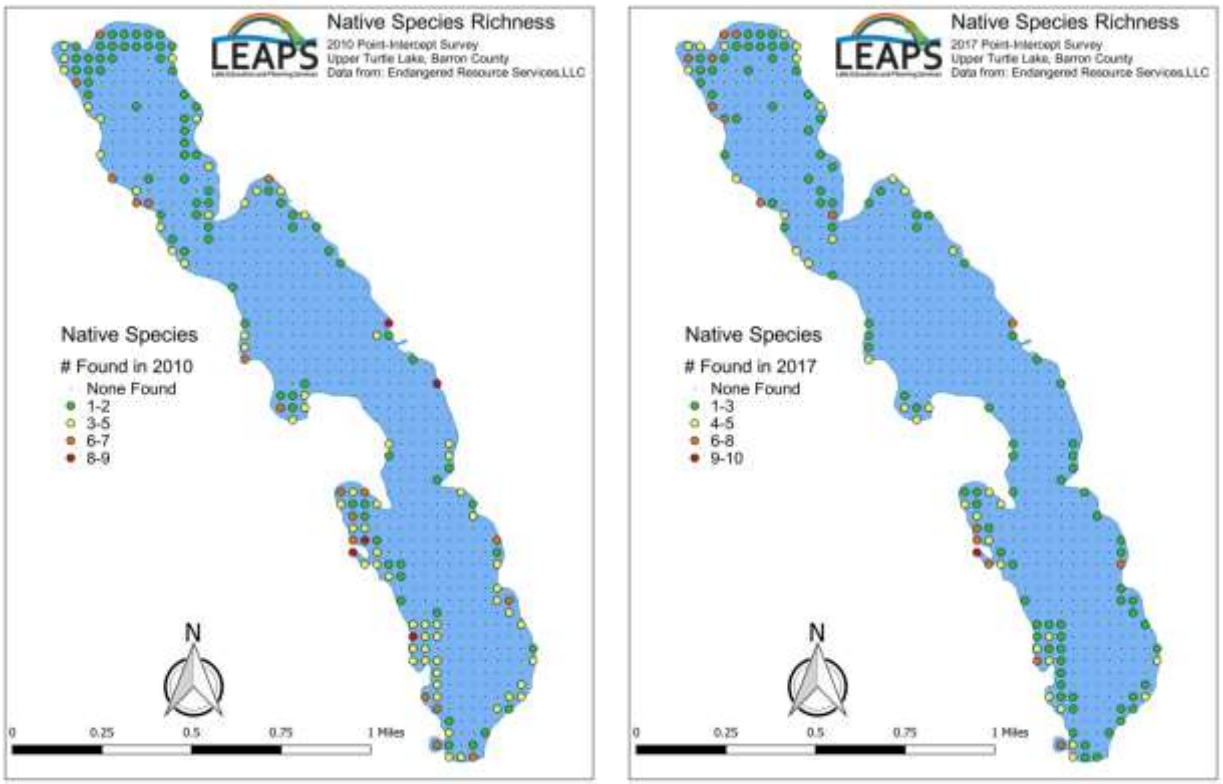


Figure 15: 2010 and 2017 Native Species Richness

Table 3: Aquatic Macrophyte P/I Survey Summary Statistics 2010 and 2017

SUMMARY STATS	2010	2017
Total number of sites visited	595	595
Total number of sites with vegetation	166	163
Total number of sites shallower than maximum depth of plants	265	273
Frequency of occurrence at sites shallower than maximum depth of plants	62.64	59.71
Simpson Diversity Index	0.89	0.88
Maximum depth of plants (ft)**	13.50	14.00
Number of sites sampled using rake on Rope (R)	0	182
Number of sites sampled using rake on Pole (P)	297	413
Average number of all species per site (shallower than max depth)	1.92	1.70
Average number of all species per site (veg. sites only)	3.07	2.84
Average number of native species per site (shallower than max depth)	1.87	1.59
Average number of native species per site (veg. sites only)	3.01	2.97
Species Richness	31	28
Species Richness (including visuals)	35	29
Species Richness (including visuals and boat survey)	40	38
Mean depth of plants (ft)	5.24	5.55
Median depth of plants (ft)	4.00	4.50

CLP 2010-2017

When the initial management plan for Upper Turtle Lake was written in 2010, CLP was not a significant issue within the lake. While present, the beds were limited in size, interspersed with native species, and they helped provide early season habitat for fish and other aquatic animals. Since then, the CLP has expanded to a point of dominating the majority of the littoral zone, impeding navigation, and negatively impacting native plants. The survey conducted in May 2010 yielded a total of 7.83 acres of CLP spread throughout the lake in 33 different beds with a mean bed size of 0.24 acres.

In June 2017, another survey was completed to see how the plant population within Upper Turtle Lake had changed. The 2017 survey showed that the CLP population had exploded to cover 132.35 acres of Upper Turtle Lake with 81.25 acres of that considered to be a severe impairment to navigation lanes. The 33 beds from the 2010 survey appeared to have consolidated and expanded down to 11 beds with a mean bed size of 12.03 acres (Figure 16). While this large increase may not be a yearly occurrence, it still suggests that the CLP population is much larger than it was when the 2010 survey was conducted.

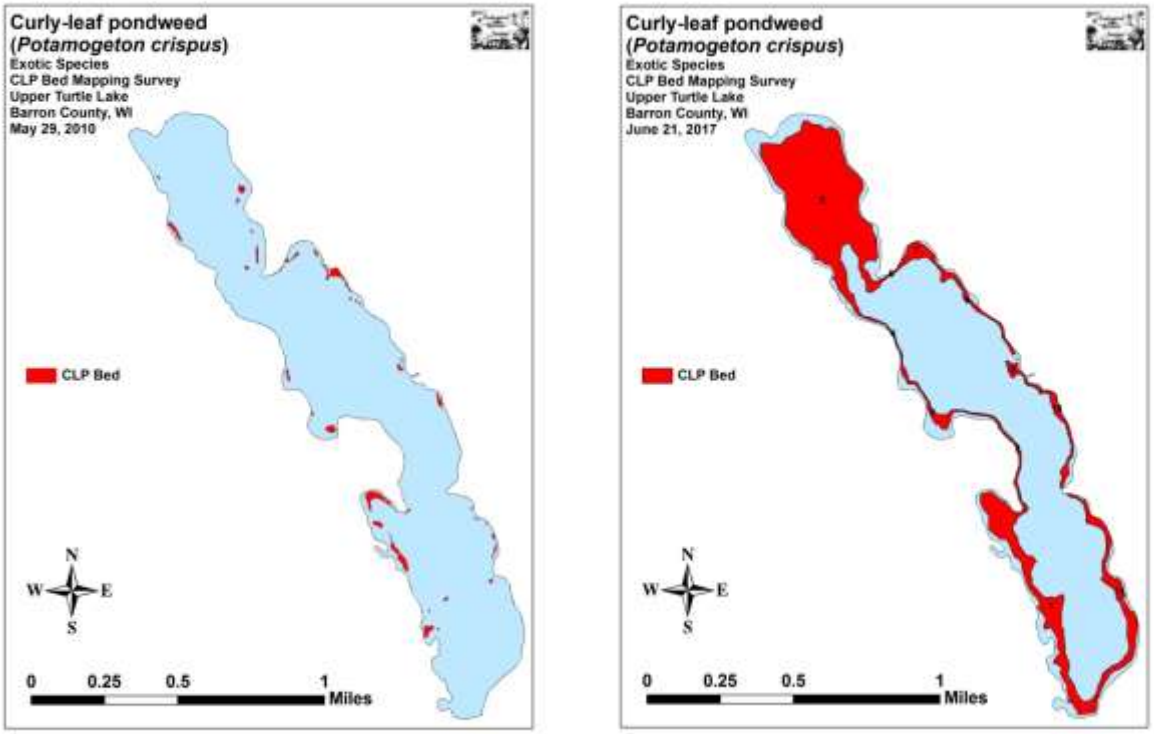


Figure 16: CLP Bed Maps 2010 (left) and 2017(right)

The large increase in CLP documented in 2017 was likely greatly assisted by the unusual winter and spring of 2017. While it is unknown if the incredibly large CLP beds are the new norm in the lake, anecdotal evidence (comments from property owners) suggests the CLP population has been expanding for several years. Dense growth CLP is likely to continue expanding, negatively impacting the native aquatic plant community, water quality, and lake use unless there is some active management undertaken.

WILD RICE

Wild rice is an aquatic grass which grows in shallow water in lakes and slow flowing streams. This grass produces a seed which is a nutritious source of food for wildlife and people. The seed matures in August and September with the ripe seed dropping into the sediment, unless harvested by wildlife or people. It is a highly

protected and valued natural resource in Wisconsin. Only Wisconsin residents may harvest wild rice in the state. According to the WDNR Surface Water Data Viewer, Upper Turtle Lake is not wild rice water.

NON-NATIVE, AQUATIC INVASIVE PLANT SPECIES

CLP is the most problematic non-native, AIS in the lake. Purple loosestrife and reed canary grass are invasive wetland plants that are found within the wetlands around Upper Turtle Lake. There are also several non-native invasive species that are not currently found within or around the lake, but could be introduced if preventative measures are not taken. More information is given for each non-native species in the following sections.

CURLY-LEAF PONDWEED

Curly-leaf Pondweed is found throughout the entire littoral zone of Upper Turtle Lake, and it has become one of the most prevalent AIS found throughout Wisconsin. There are over 15 lakes within Barron County that have CLP present including Lower Vermillion, Poskin Lake, and Beaver Dam Lake.

Curly-leaf pondweed (CLP) is an invasive aquatic perennial that is native to Eurasia, Africa, and Australia (Figure 17). It was accidentally introduced to United States waters in the mid-1880s by hobbyists who used it as an aquarium plant. The leaves are reddish-green, oblong, and about 3 inches long, with distinct wavy edges that are finely toothed. The stem of the plant is flat, reddish-brown and grows from 1 to 3 feet long. CLP is commonly found in alkaline and high nutrient waters, preferring soft substrate and shallow water depths. It tolerates low light and low water temperatures. It has been reported in all of Lower 48 States and most of Canada.

CLP spreads through burr-like winter buds (turions) (Figure 17), which are moved among waterways. These plants can also reproduce by seed, but this plays a relatively small role compared to the vegetative reproduction through turions. New plants form under the ice in winter, making curly-leaf pondweed one of the first nuisance aquatic plants to emerge in the spring. It becomes invasive in some areas because of its tolerance for low light and low water temperatures. These tolerances allow it to get a head start on and out-compete native plants in the spring. In mid-summer, when most aquatic plants are growing, CLP plants are dying off. Plant die-offs may result in a critical loss of dissolved oxygen. Furthermore, the decaying plants can increase nutrients which contribute to algal blooms, as well as create unpleasant stinking messes on beaches. CLP forms surface mats that interfere with aquatic recreation.

Figure 17: CLP Plants and Turions

EWM

EWM is a submersed aquatic plant native to Europe, Asia, and northern Africa (Figure 18). It is the only non-native milfoil in Wisconsin. Like the native milfoils, the Eurasian variety has slender stems whorled by submersed feathery leaves and tiny flowers produced above the water surface. The flowers are located in the axils of the floral bracts, and are either four-petaled or without petals. The leaves are threadlike, typically uniform in diameter, and aggregated into a submersed terminal spike. The stem thickens below the inflorescence and doubles its width further down, often curving to lie parallel with the water surface. The fruits are four-jointed nut-like bodies. Without flowers or fruits, EWM is difficult to distinguish from Northern water milfoil. EWM has 9-21 pairs of leaflets per leaf, while Northern milfoil typically has 7-11 pairs of leaflets. Coontail is often mistaken for the milfoils, but does not have individual leaflets.

EWM grows best in fertile, fine-textured, inorganic sediments. In less productive lakes, it is restricted to areas of nutrient-rich sediments. It has a history of becoming dominant in eutrophic, nutrient-rich lakes, although this pattern is not universal. It is an opportunistic species that prefers highly disturbed lake beds, lakes receiving nitrogen and phosphorous-laden runoff, and heavily used lakes. Optimal growth occurs in alkaline systems with a high concentration of dissolved inorganic carbon. High water temperatures promote multiple periods of flowering and fragmentation.

Unlike many other plants, EWM does not rely on seed for reproduction. Its seeds germinate poorly under natural conditions. It reproduces by fragmentation, allowing it to disperse over long distances. The plant produces fragments after fruiting once or twice during the summer. These shoots may then be carried downstream by water currents or inadvertently picked up by boaters. EWM is readily dispersed by boats, motors, trailers, bilges, live wells, and bait buckets; and can stay alive for weeks if kept moist.

Once established in an aquatic community, milfoil reproduces from shoot fragments and stolons (runners that creep along the lake bed). As an opportunistic species, EWM is adapted for rapid growth early in spring. Stolons, lower stems, and roots persist over winter and store the carbohydrates that help milfoil claim the water column early in spring, photosynthesize, divide, and form a dense leaf canopy that shades out native aquatic plants. Its ability to spread rapidly by fragmentation and effectively block out sunlight needed for native plant growth often results in monotypic stands. Monotypic stands of EWM provide only a single habitat, and threaten the integrity of aquatic communities in a number of ways; for example, dense stands disrupt predator-prey relationships by fencing out larger fish, and reducing the number of nutrient-rich native plants available for waterfowl.

Dense stands of EWM also inhibit recreational uses like swimming, boating, and fishing. Some stands have been dense enough to obstruct industrial and power generation water intakes. The visual impact that greets the lake user on milfoil-dominated lakes is the flat yellow-green of matted vegetation, often prompting the perception that the lake is "infested" or "dead". Cycling of nutrients from sediments to the water column by EWM may lead to deteriorating water quality and algae blooms in infested lakes.

Figure 18: EWM

EWM is not currently found on Upper Turtle Lake, but it can be found nearby in Echo, Beaver Dam and Lower Vermillion Lakes less than ten miles from Upper Turtle Lake. Because there is a large population of Northern watermilfoil, there is the potential for EWM and NWM to hybridize if EWM were to be introduced to Upper Turtle Lake. This hybrid milfoil is believed to be less sensitive to chemical management than the parental strands which make management much more difficult (LaRue, Zuelling, & Thum, 2012). This hybrid milfoil can be found in nearby Horseshoe Lake. Because there are several established populations of EWM and its hybridized counterpart so close to Upper Turtle Lake, prevention and monitoring for this AIS should be a large part of future management.

PURPLE LOOSESTRIFE

Purple loosestrife (Figure 19) is a perennial herb 3-7 feet tall with a dense bushy growth of 1-50 stems. The stems, which range from green to purple, die back each year. Showy flowers that vary from purple to magenta possess 5-6 petals aggregated into numerous long spikes, and bloom from August to September. Leaves are opposite, nearly linear, and attached to four-sided stems without stalks. It has a large, woody taproot with fibrous rhizomes that form a dense mat. By law, purple loosestrife is a nuisance species in Wisconsin. It is illegal to sell, distribute, or cultivate the plants or seeds, including any of its cultivars.

Purple loosestrife is a wetland herb that was introduced as a garden perennial from Europe during the 1800's. It is still promoted by some horticulturists for its beauty as a landscape plant, and by beekeepers for its nectar-producing capability. Currently, more than 20 states, including Wisconsin have laws prohibiting its importation or distribution because of its aggressively invasive characteristics. It has since extended its range to include most temperate parts of the United States and Canada. The plant's reproductive success across North America can be attributed to its wide tolerance of physical and chemical conditions characteristic of disturbed habitats, and its ability to reproduce prolifically by both seed dispersal and vegetative propagation. The absence of natural predators, like European species of herbivorous beetles that feed on the plant's roots and leaves, also contributes to its proliferation in North America.

Purple loosestrife was first detected in Wisconsin in the early 1930's, but remained uncommon until the 1970's. It is now widely dispersed in the state, and has been recorded in 70 of Wisconsin's 72 counties. Low densities in most areas of the state suggest that the plant is still in the pioneering stage of establishment. Areas of heaviest infestation are sections of the Wisconsin River, the extreme southeastern part of the state, and the Wolf and Fox River drainage systems.

This plant's optimal habitat includes marshes, stream margins, alluvial flood plains, sedge meadows, and wet prairies. It is tolerant of moist soil and shallow water sites such as pastures and meadows, although established plants can tolerate drier conditions. Purple loosestrife has also been planted in lawns and gardens, which is often how it has been introduced to many of our wetlands, lakes, and rivers.

Purple loosestrife can germinate successfully on substrates with a wide range of pH. Optimum substrates for growth are moist soils of neutral to slightly acidic pH, but it can exist in a wide range of soil types. Most seedling establishment occurs in late spring and early summer when temperatures are high.

Purple loosestrife spreads mainly by seed, but it can also spread vegetatively from root or stem segments. A single stalk can produce from 100,000 to 300,000 seeds per year. Seed survival is up to 60-70%, resulting in an extensive seed bank. Mature plants with up to 50 shoots grow over 2 meters high and produce more than two million seeds a year. Germination is restricted to open, wet soils and requires high temperatures, but seeds remain viable in the soil for many years. Even seeds submerged in water can live for approximately 20 months. Most of the seeds fall near the parent plant, but water, animals, boats, and humans can transport the seeds long distances. Vegetative spread through local perturbation is also characteristic of loosestrife; clipped, trampled, or buried stems of established plants may produce shoots and roots. Plants may be quite large and several years old before they begin flowering. It is often very difficult to locate non-flowering plants, so monitoring for new invasions should be done at the beginning of the flowering period in mid-summer.

Any sunny or partly shaded wetland is susceptible to purple loosestrife invasion. Vegetative disturbances such as water drawdown or exposed soil accelerate the process by providing ideal conditions for seed germination. Invasion usually begins with a few pioneering plants that build up a large seed bank in the soil for several years. When the right disturbance occurs, loosestrife can spread rapidly, eventually taking over the entire wetland. The plant can also make morphological adjustments to accommodate changes in the immediate environment; for example, a decrease in light level will trigger a change in leaf morphology. The plant's ability to adjust to a wide range of environmental conditions gives it a competitive advantage; coupled with its reproductive strategy, purple loosestrife tends to create monotypic stands that reduce biotic diversity.
Purple loosestrife displaces native wetland vegetation and degrades wildlife habitat. As native vegetation is displaced, rare plants are often the first species to disappear. Eventually, purple loosestrife can overrun wetlands thousands of acres in size, and almost entirely eliminate the open water habitat. The plant can also be detrimental to recreation by choking waterways.

Purple loosestrife has been identified in the wetlands surrounding Upper Turtle Lake, but it has not developed into the monotypic beds that can damage wetlands. While this should be monitored for any change, active management of purple loosestrife is not required.

Figure 19: Purple Loosestrife

JAPANESE KNOTWEED

Knotweeds are robust, bamboo-like perennials introduced from Asia that are spreading throughout the Great Lakes states. The main species is Japanese Knotweed. Knotweed grows in dense stands 6-12-ft tall (Figure 20). Its stems are hollow, green to reddish in color and bamboo-like. Its leaves are bright green, broad, egg or heart shaped, with a pointed tip. Small white flowers in branched spray appear July through August. Dormant in winter, the dead reddish brown stems often remain standing. It emerges from root crowns in April and reaches full height in June. The heaviest concentrations of knotweed are usually along rivers and roads, but are also found in parks, backyards, along lake shore, in forests and on farms. Japanese knotweed reproduces occasionally by seed, but spreads primarily by extensive networks of underground rhizomes, which can reach 6 feet deep, 60 feet long, and become strong enough to damage pavement and penetrate building foundations. There is evidence which suggests that this plant has allelopathic properties which means it is able to excrete chemicals that inhibit the growth of some surrounding plants (Parepa, Schaffner, & Bossdorf, 2012). This helps the plant spread very quickly once established. Controlling Japanese knotweed is difficult and requires persistence and diligence. It can be dug, cut, covered, chemically sprayed, or have herbicide injected into individual stems. Japanese knotweed has not been found around Upper Turtle Lake. There are several lakes, including Rice Lake and Sand Lake, northwest of Cumberland, where knotweed has been observed, but these populations have not been verified by the WDNR.

Figure 20: Japanese Knotweed

REED CANARY GRASS

Reed canary grass (Figure 21) is a large, coarse grass that reaches 2 to 9 feet in height. It has an erect, hairless stem with gradually tapering leaf blades 3 1/2 to 10 inches long and 1/4 to 3/4 inch in width. Blades are flat and have a rough texture on both surfaces. The lead ligule is membranous and long. The compact panicles are erect or slightly spreading (depending on the plant's reproductive stage), and range from 3 to 16 inches long with branches 2 to 12 inches in length. Single flowers occur in dense clusters in May to mid-June. They are green to purple at first and change to beige over time. This grass is one of the first to sprout in spring, and forms a thick rhizome system that dominates the subsurface soil. Seeds are shiny brown in color.

Both Eurasian and native ecotypes of reed canary grass are thought to exist in the U.S. The Eurasian variety is considered more aggressive, but no reliable method exists to tell the ecotypes apart. It is believed that the vast majority of our reed canary grass is derived from the Eurasian ecotype. Agricultural cultivars of the grass are widely planted.

Reed canary grass is a cool-season, sod-forming, perennial wetland grass native to temperate regions of Europe, Asia, and North America. The Eurasian ecotype has been selected for its vigor and has been planted throughout the U.S. since the 1800's for forage and erosion control. It has become naturalized in much of the northern half of the U.S., and is still being planted on steep slopes and banks of ponds and created wetlands.

Reed canary grass can grow on dry soils in upland habitats and in the partial shade of oak woodlands, but does best on fertile, moist organic soils in full sun. This species can invade most types of wetlands, including marshes, wet prairies, sedge meadows, fens, stream banks, and seasonally wet areas; it also grows in disturbed areas such as bergs and spoil piles.

Reed canary grass reproduces by seed or creeping rhizomes. It spreads aggressively. The plant produces leaves and flower stalks for 5 to 7 weeks after germination in early spring and then spreads laterally. Growth peaks in mid-June and declines in mid-August. A second growth spurt occurs in the fall. The shoots collapse in mid to late summer, forming a dense, impenetrable mat of stems and leaves. The seeds ripen in late June and shatter when ripe. Seeds may be dispersed from one wetland to another by waterways, animals, humans, or machines.

This species prefers disturbed areas, but can easily move into native wetlands. Reed canary grass can invade a disturbed wetland in just a few years. Invasion is associated with disturbances including ditching of wetlands, stream channelization, and deforestation of swamp forests, sedimentation, and intentional planting. The difficulty of selective control makes reed canary grass invasion of particular concern. Over time, it forms large, monotypic stands that harbor few other plant species and are subsequently of little use to wildlife. Once established, reed canary grass dominates an area by building up a tremendous seed bank that can eventually erupt, germinate, and recolonize treated sites.

Reed canary grass is located in many locations along the shoreland of Upper Turtle Lake, but the wetlands around the lake have not been overrun by this plant. Currently there is no need for active management of the reed canary grass around Upper Turtle Lake, but AIS monitoring volunteers should be aware and note if it begins to overrun the wetlands.

Figure 21: Reed Canary Grass

NON-NATIVE AQUATIC INVASIVE ANIMAL SPECIES

Several non-vegetative, aquatic, invasive species are in nearby lakes, but have not been identified in Upper Turtle Lake. One species, Chinese mystery snails have been verified while rusty crayfish have been observed. It is important for lake property owners and users to be knowledgeable of these species in order to identify them if and when they show up in Upper Turtle Lake.

CHINESE MYSTERY SNAILS

Chinese mystery snails have been identified within Upper Turtle Lake. The population within Upper Turtle Lake has been verified by the WDNR, but the actual extent is somewhat unknown.

The Chinese mystery snails and the banded mystery snails (Figure 22) are non-native snails that have been found in a number of Wisconsin lakes. There is not a lot yet known about these species, however, it appears that they have a negative effect on native snail populations. The mystery snail's large size and hard operculum (a trap door cover which protects the soft flesh inside), and their thick hard shell make them less edible by predators.

The female mystery snail gives birth to live crawling young. This may be an important factor in their spread as it only takes one impregnated snail to start a new population. Mystery snails thrive in silt and mud areas although they can be found in lesser numbers in areas with sand or rock substrates. They are found in lakes, ponds, irrigation ditches, and slower portions of streams and rivers. They are tolerant of pollution and often thrive in stagnant water areas. Mystery snails can be found in water depths of 0.5 to 5 meters (1.5 to 15 feet). They tend to reach their maximum population densities around 1-2 meters (3-6 feet) of water depth. Mystery snails do not eat plants. Instead, they feed on detritus and in lesser amounts on algae and phytoplankton. Thus removal of plants along the shoreline area will not reduce the abundance of mystery snails.

Lakes with high densities of mystery snails often see large die-offs of the snails. These die-offs are related to the lake's warming coupled with low oxygen (related to algal blooms). Mystery snails cannot tolerate low oxygen levels. High temperatures by themselves seem insufficient to kill the snails as the snails could move into deeper water.

Many lake residents are worried about mystery snails being carriers of the swimmer's itch parasite. In theory they are potential carriers, however, because they are an introduced species and did not evolve as part of the lake ecosystem, they are less likely to harbor the swimmer's itch parasites.

Figure 22: Chinese Mystery Snails (not from Upper Turtle Lake)

RUSTY CRAYFISH

Rusty crayfish were observed within Upper Turtle Lake in 2009, but this was not verified by the WDNR, so the extent of this population is unknown.

Rusty crayfish (Figure 23) live in lakes, ponds and streams, preferring areas with rocks, logs and other debris in water bodies with clay, silt, sand or rocky bottoms. They typically inhabit permanent pools and fast moving streams of fresh, nutrient-rich water. Adults reach a maximum length of 4 inches. Males are larger than females upon maturity and both sexes have larger, heartier, claws than most native crayfish. Dark "rusty" spots are usually apparent on either side of the carapace, but are not always present in all populations. Claws are generally smooth, with grayish-green to reddish-brown coloration. Adults are opportunistic feeders, feeding upon aquatic plants, benthic invertebrates, detritus, juvenile fish and fish eggs.

The native range of the rusty crayfish includes Ohio, Tennessee, Kentucky, Indiana, Illinois and the entire Ohio River basin. However, this species may now be found in Michigan, Massachusetts, Missouri, Iowa, Minnesota, New York, New Jersey, Pennsylvania, Wisconsin, New Mexico and the entire New England state area (except Rhode Island). The Rusty crayfish has been a reported invader since at least the 1930's. Its further spread is of great concern since the prior areas of invasion have led to severe impacts on native flora and fauna. It is thought to have spread by means of released game fish bait and/or from aquarium release. Rusty crayfish are also raised for commercial and biological harvest.

Rusty crayfish reduce the amount and types of aquatic plants, invertebrate populations, and some fish populations--especially bluegill, smallmouth and largemouth bass, lake trout and walleye. They deprive native fish of their prey and cover and out-compete native crayfish. Rusty crayfish will also attack the feet of swimmers. On the positive side, rusty crayfish can be a food source for larger game fish and are commercially harvested for human consumption.

Rusty crayfish may be controlled by restoring predators like bass and sunfish populations. Preventing further introduction is important and may be accomplished by educating anglers, trappers, bait dealers and science teachers of their hazards. Use of chemical pesticides is an option, but does not target this species and will kill other aquatic organisms.

It is illegal to possess both live crayfish and angling equipment simultaneously on any inland Wisconsin water (except the Mississippi River). It is also illegal to release crayfish into a water of the state without a permit.

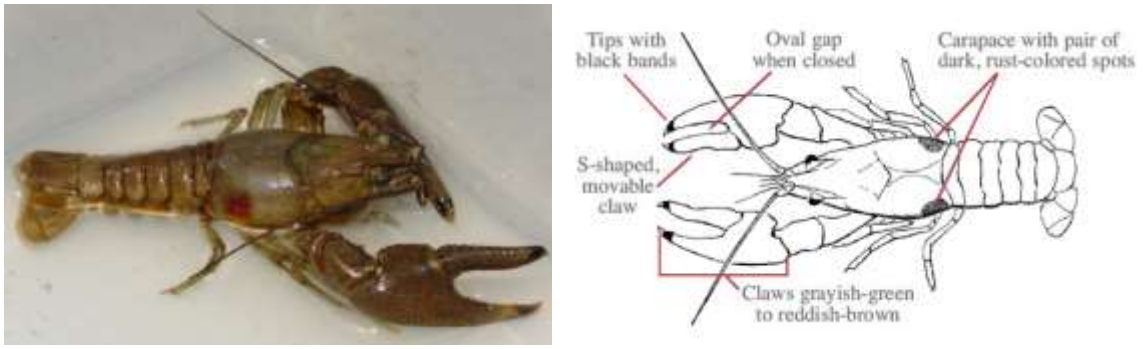


Figure 23: Rusty Crayfish and identifying characteristics

ZEBRA MUSSELS

Zebra mussels (Figure 24) are an invasive species that have inhabited Wisconsin waters and are displacing native species, disrupting ecosystems, and affecting citizens' livelihoods and quality of life. They hamper boating, swimming, fishing, hunting, hiking, and other recreation, and take an economic toll on commercial,

agricultural, forestry, and aquacultural resources. The zebra mussel is a tiny (1/8-inch to 2-inch) bottom-dwelling clam native to Europe and Asia. Zebra mussels were introduced into the Great Lakes in 1985 or 1986, and have been spreading throughout them since that time. They were most likely brought to North America as larvae in ballast water of ships that traveled from fresh-water Eurasian ports to the Great Lakes. Zebra mussels look like small clams with a yellowish or brownish D-shaped shell, usually with alternating dark- and light-colored stripes. They can be up to two inches long, but most are under an inch. Zebra mussels usually grow in clusters containing numerous individuals.

Zebra mussels feed by drawing water into their bodies and filtering out most of the suspended microscopic plants, animals and debris for food. This process can lead to increased water clarity and a depleted food supply for other aquatic organisms, including fish. The higher light penetration fosters growth of rooted aquatic plants which, although creating more habitat for small fish, may inhibit the larger, predatory fish from finding their food. This thicker plant growth can also interfere with boaters, anglers and swimmers. Zebra mussel infestations may also promote the growth of blue-green algae, since they avoid consuming this type of algae but not others.

Zebra mussels attach to the shells of native mussels in great masses, effectively smothering them. A survey by the Army Corps of Engineers in the East Channel of the Mississippi River at Prairie du Chien revealed a substantial reduction in the diversity and density of native mussels due to Zebra Mussel infestations. The East Channel provides habitat for one of the best mussel beds in the Upper Mississippi River. Future efforts are being considered to relocate such native mussel beds to waters that are less likely to be impacted by zebra mussels.

Once zebra mussels are established in a water body, very little can be done to control them. It is therefore crucial to take all possible measures to prevent their introduction in the first place. Some of the preventative and physical control measures include physical removal, industrial vacuums, and back flushing.

Chemical applications include solutions of chlorine, bromine, potassium permanganate and even oxygen deprivation. An ozonation process is under investigation (patented by Bollyky Associates Inc.) which involves the pumping of high concentrations of dissolved ozone into the intake of raw water pipes. This method only works in controlling veligers, and supposedly has little negative impacts on the ecosystem. Further research on effective industrial control measures that minimize negative impacts on ecosystem health is needed.

Figure 24: Zebra Mussels

In the fall of 2016, zebra mussels were found in a northwest Wisconsin lake for the first time. With this discovery, it increases the likelihood that zebra mussels will spread faster throughout northwest Wisconsin. A study was completed a couple of years back that identified characteristics within lakes that would best support a new infestation of zebra mussels. The result of that study was an on-line application referred to as the AIS Smart Prevention database which ranks lakes in WI as suitable, borderline suitable, or not suitable habitat for zebra mussel survival. Upper Turtle Lake is listed as suitable, so it is possible that a population would easily become established if they are ever introduced to the lake (Center for Limnology, 2016).

AIS PREVENTION STRATEGY

Upper Turtle Lake already has several established AIS. However there are many more that could be introduced to the lake. The UTLA will begin implementing a watercraft inspection and AIS Signage program at the public access point on the lake. Information will be shared with lake residents and users in an effort to expand the watercraft inspection message. In addition to the watercraft inspection program, an in-lake and shoreland AIS monitoring program will be implemented. Both of these programs will follow UW-Extension Lakes and WDNR protocol through the Clean Boats, Clean Waters program and the Citizen Lake Monitoring Network AIS Monitoring program.

Additionally, having educated and informed lake residents is the best way to keep non-native AIS at bay in Upper Turtle Lake. To foster this, the UTLA will host and/or sponsor lake community events including AIS identification and management workshops; distribute education and information materials to lake property owners and lake users through the newsletter, webpage, and general mailings.

An AIS Rapid Response Plan has been developed as a part of this APM Plan. It details actions to implement to minimize the potential introduction of a new AIS, and provides an overview of actions to take if a new AIS is identified (Appendix J).

MANAGEMENT ALTERNATIVES

Nuisance aquatic plants can be managed a variety of ways in Wisconsin. The best management strategy will be different for each lake and depends on which nuisance species needs to be controlled, how widespread the problem is, and the other plants and wildlife in the lake. In many cases, an integrated pest management (IPM) approach to aquatic plant management that utilizes a number of control methods is necessary. The eradication of non-native aquatic invasive plant species such as CLP is generally not feasible, but preventing them from becoming a more significant problem is an attainable goal. It is important to remember however, that regardless of the plant species targeted for control, sometimes no manipulation of the aquatic plant community is the best management option. Plant management activities can be disruptive to a lake ecosystem and should not be done unless it can be shown they will be beneficial and occur with minimal negative ecological impacts.

Management alternatives for nuisance aquatic plants can be grouped into four broad categories: manual and mechanical removal, chemical application, biological control, and physical habitat alteration. Manual and mechanical removal methods include pulling, cutting, raking, harvesting, suction harvesting, and other means of removing the physical plant from the water and in most cases will require a WDNR permit. Chemical application is typified by the use of herbicides that kill or impede the growth of the aquatic plant and always requires a WDNR permit. Biological control methods include organisms that use the plant for a food source or parasitic organisms that use the plant as a host, killing or weakening it. Biological control may also include the use of species that compete successfully with the nuisance species for available resources. This activity may require a WDNR permit. Physical habitat alteration includes dredging, installing lake-bottom covers, manipulating light penetration, flooding, and drawdown. These activities may require permits under the WDNR waterways and wetlands program. It may also include making changes to or in the watershed of a body of water to reduce nutrients going in.

Each of the above control categories are regulated by the WDNR and most activities require a permit from the WDNR to implement. Mechanical harvesting of aquatic plants and under certain circumstances, physical removal of aquatic plants, is regulated under Wisconsin Administrative Rule NR 109 (Appendix B). The use of chemicals and biological controls are regulated under Administrative Rule NR 107 (Appendix C). Certain habitat altering techniques like the installation of bottom covers and dredging require a Chapter 30/31 waterway protection permit. In addition, anytime wild rice is involved one or more of these permits will be required.

Informed decision-making on aquatic plant management implementation requires an understanding of plant management alternatives and how appropriate and acceptable each alternative is for a given lake. The following sections list scientifically recognized and approved alternatives for controlling aquatic vegetation.

NO MANAGEMENT

When evaluating the various management techniques, the assumption is erroneously made that doing nothing is environmentally neutral. In dealing with nonnative species like CLP, the environmental consequences of doing nothing may be high, possibly even higher than any of the effects of management techniques. Unmanaged, these species can have severe negative effects on water quality, native plant distribution, abundance and diversity, and the abundance and diversity of aquatic insects and fish (Madsen, 1997). Nonindigenous aquatic plants are the problem, and the management techniques are the collective solution. Nonnative plants are a biological pollutant that increases geometrically, a pollutant with a very long residence time and the potential to "biomagnify" in lakes, rivers, and wetlands (Madsen, 2000).

Foregoing any management of CLP in Upper Turtle Lake is not a recommended option. To keep CLP from causing greater harm, active management strategies will need to be implemented on Upper Turtle Lake.

HAND-PULLING/MANUAL REMOVAL

Manual or physical removal of aquatic plants by means of a hand-held rake or cutting implement; or by pulling the plants from the lake bottom by hand is allowed by the WDNR without a permit per NR 109.06 Waivers under the following conditions:

- Removal of native plants is limited to a single area with a maximum width of no more than 30 feet measured along the shoreline provided that any piers, boatlifts, swim rafts and other recreational and water use devices are located within that 30-foot wide zone and may not be in a new area or additional to an area where plants are controlled by another method (Figure 25)
- Removal of nonnative or invasive aquatic plants as designated under s. NR 109.07 is performed in a manner that does not harm the native aquatic plant community
- Removal of dislodged aquatic plants that drift on-shore and accumulate along the waterfront is completed.
- The area of removal is not located in a sensitive area as defined by the department under s. NR 107.05 (3) (i) 1, or in an area known to contain threatened or endangered resources or floating bogs
- Removal does not interfere with the rights of other riparian owners
- If wild rice is involved, the procedures of s. NR 19.09 (1) (Appendix D) are followed.

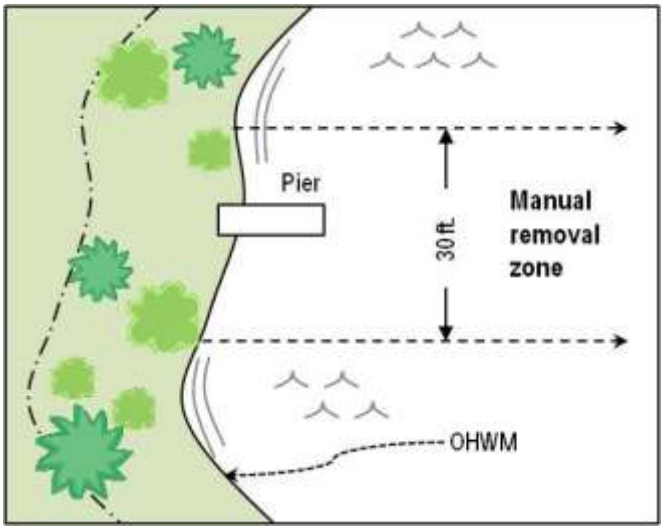


Figure 25: Aquatic vegetation manual removal zone

Although up to 30 feet of aquatic vegetation can be removed, removal should only be done to the extent necessary. There is no limit as to how far out into the lake the 30-ft zone can extend, however clearing large swaths of aquatic plants not only disrupts lake habits, it also creates open areas for non-native species to establish. Physical removal of aquatic plants requires a permit if the removal area is located in a "sensitive" or critical habitat area previously designated by the WDNR. Manual or physical removal can be effective at controlling individual plants or small areas of plant growth. It limits disturbance to the lake bottom, is inexpensive, and can be practiced by many lake residents. In shallow, hard bottom areas of a lake, or where impacts to fish spawning habitat need to be minimized, this is the best form of control. If water clarity in a body of water is such that aquatic plants can be seen in deeper water, pulling AIS while snorkeling or scuba diving is also allowable without a permit according to the conditions in NR 106.06(2) and can be effective at slowing the spread of a new AIS infestation within a lake when done properly.

In Upper Turtle Lake, CLP growing in some areas of the lake may be best managed by hand-pulling/manual removal. However it is not suitable to manage all of the CLP in the lake this way. A renewed effort to continue to teach property owners to identify, and then physically remove CLP growing in the lake near their

property is included as an activity in this plan. The UTLA will work with residents on the lake to teach them how to identify CLP and how to properly remove it from around their docks and in their swimming areas.

MECHANICAL REMOVAL

Mechanical management involves the use of devices not solely powered by human means to aid removal. This includes gas and electric motors, ATV's, boats, tractors, etc. Using these instruments to pull, cut, grind, or rotovate aquatic plants is illegal in Wisconsin without a permit. Diver Aided Suction Harvest (DASH) is considered mechanical removal. To implement mechanical removal of aquatic plants a Mechanical/Manual Aquatic Plant Control Application is required annually. The application is reviewed by the WDNR and other entities and a permit awarded if required criteria are met. Using repeated mechanical disturbance such as bottom rollers or sweepers can be effective at control in small areas, but in Wisconsin these devices are illegal and generally not permitted.

DIVER ASSISTED SUCTION HARVESTING

Diver assisted suction harvesting or DASH, as it is often called, is a fairly recent aquatic plant removal technique. It is called "harvesting" rather than "dredging" because, although a specialized small-scale dredge is used, bottom sediment is not removed from the system. The operation involves hand-pulling of the target plants from the lake bed and inserting them into an underwater vacuum system that sucks up plants and their root systems taking them to the surface. It requires water pumps on the surface (generally on a pontoon system) to move a large volume of water to maintain adequate suction of materials that the divers are processing (Figure 26). Only clean water goes through the pump. The material placed by the divers into the suction hose along with the water is deposited into mesh bags on the surface with the water leaving through the holes in the bag. The bags have a large enough 'mesh' size so that silts, clay, leaves and other plant material being collected do not immediately clog them and block water movement. If a fish or other living marine life is sucked into the suction hose it comes out the discharge unharmed and is returned to the body of water. It can have some negative impacts to other nearby non-target plants if not done carefully, particularly those plants that are perennials and expand their populations by sub-sediment runners (Eichler, Bombard, Sutherland, & Boylen, 1993).

Figure 26: DASH - Diver Assisted Suction Harvest (Aquacleaner Environmental, http://www.aquacleaner.com/index.html); Many Waters, LLC)

DASH is best suited for managing small areas of AIS which means this option is not recommended for CLP management on Upper Turtle Lake. The extent and density of the CLP within Upper Turtle Lake prevent DASH from being a viable management option at this time.

LARGE-SCALE MECHANICAL HARVESTING

Large-scale mechanical harvesting is a fairly traditional method of controlling of CLP. It is typically used to open up channels through existing beds of vegetation to improve access for both human related activities like boating, and natural activities like fish distribution and mobility. When it is done before the plants are able to for new turions, this method helps deplete the extensive CLP seed bank that builds up over time.

Mechanical harvesters are large machines which both cut and collect aquatic plants. Cut plants are removed from the water by a conveyor belt system and stored on the harvester until disposal. A barge may be stationed near the harvesting site for temporary plant storage or the harvester carries the cut weeds to shore. The shore station equipment is usually a shore conveyor that mates to the harvester and lifts the cut plants into a dump truck. Harvested weeds are disposed of in landfills, used as compost, or in reclaiming spent gravel pits or similar sites.

Harvesting is usually performed in late spring, summer, and early fall when aquatic plants have reached or are close to the water's surface. Harvesters can cut and collect several acres per day depending on weed type, plant density, and storage capacity of the equipment. Harvesting speeds for typical machines range from 0.5 to 1.5 acres per hour. Depending on the equipment used, the plants are cut from three to five feet below the water's surface in a swath 4 to 20 feet wide. Harvesting can be an excellent way to create open areas of water for recreation and fishing access.

Timing is also important. The ideal time to harvest, in order to maximize the efficiency of the harvester, is just before the aquatic plants break the surface of the lake. If the harvesting work is contracted, the equipment should be inspected before and after it enters the lake. Since these machines travel from lake to lake, they may carry plant fragments with them, and facilitate the spread of AIS from one body of water to another.

Mechanical harvesting of aquatic plants has advantages and disadvantages (State of Washington, 2016):

Advantages

- Harvesting results in immediate open areas of water.
- Removing plants from the water removes the plant nutrients, such as nitrogen and phosphorus, from the system. (Harvesting aquatic plants is not an effective tool for reducing nutrient loads in a lake and it is unlikely that any operational harvesting program will significantly impact the internal nutrient balance of the system (Madsen, 2000).
- Harvesting as aquatic plants are dying back for the winter can remove organic material and help slow the sedimentation rate in a waterbody.
- Since the lower part of the plant remains after harvest, habitat for fish and other organisms is not eliminated.
- Harvesting can be targeted to specific locations, protecting designated conservancy areas from treatment.

Disadvantages

- Harvesting is similar to mowing a lawn; the plant grows back and may need to be harvested several times during the growing season.
- There is little or no reduction in plant density with mechanical harvesting.
- Off-loading sites and disposal areas for cut plants must be available. On heavily developed shorelines, suitable off-loading sites may be few and require long trips by the harvester.
- Some large harvesters are not easily maneuverable in shallow water or around docks or other obstructions.
- Significant numbers of small fish, invertebrates, and amphibians are often collected and killed by the harvester.

- Harvesting creates plant fragments which may increase the spread of invasive plant species such as EWM throughout the waterbody.
- Although harvesters collect plants as they are cut, not all plant fragments or plants may be picked up. These may accumulate and decompose on shore.
- Harvesters are expensive and require routine maintenance.
- Harvesting may not be suitable for lakes with many bottom obstructions (stumps, logs) or for very shallow lakes (3-5 feet of water) with loose organic sediments.
- Harvesters brought into the waterbody from other locations need to be thoroughly cleaned and inspected before being allowed to launch. Otherwise new exotic species could be introduced to the waterbody.

Disposal sites are a key component when considering the mechanical harvesting of aquatic plants. The sites must be on shore and upland to make sure the plants and their reproductive structures don't make their way back into the lake or to other lakes. The number of available disposal sites and their distance from the targeted harvesting areas will determine the efficiency of the operation, in terms of time as well as cost.

Costs per acre vary with numbers of acres harvested, accessibility of disposal sites to the harvested areas, density and species of the harvested plants, and whether a private contractor or public entity does the work. Costs as low as $250 per acre have been reported. Private contractors generally charge $500 to $800 per acre. The purchase price of harvesters ranges from $45,000 to $250,000. There are several harvester manufacturers in the United States (including at least two in Wisconsin) and some lake groups may choose to operate and purchase their own machinery rather than contracting for these services.

Prior to 2017, contracted harvesting services have not been readily available in NW Wisconsin. While there are many companies offering contracted services in Minnesota, most will not contract across the border into WI. There is at least one company out of northern Illinois that would consider offering services in NW Wisconsin, but this has not happened yet. In 2017, a new company out of Chippewa Falls, WI will be offering contracted harvesting services. The company owns two 5-ft Harvesters each with a capacity to hold about 220 cubic feet or 6,500 lbs. of cut vegetation on board.

There are benefits and drawbacks for both contracted harvesting and purchasing a harvester outright. With contracted harvesting, the cost per acre can vary depending on vegetation density, distance between the area being harvesting and the off-loading site, and the distance to the designated disposal site. Another issue presented by contracting is that the timing of the harvesting is entirely dependent upon the contractor's schedule which can result in the vegetation being harvested after the optimal time. However there are many benefits to contracted harvesting, the biggest one being the reduced costs associated with contracting. There is no large outlay of funds for purchasing a harvester, not maintenance and storage costs, and there are reduced costs or no costs to the UTLA if less or no harvesting is completed in any given year.

Purchasing is the more expensive option due to not only the initial cost of purchase, but also insurance, storage, maintenance, and an operator's salary (unless volunteer operated). However, there are many benefits to purchasing as well. Purchasing a harvester eliminates the potential for new AIS to be introduced to the lake from the harvester, the cost per acre tends to go down the longer a harvester is operational, and these costs will not increase dramatically if the amount of vegetation being harvested increases. This also allows harvesting to be done during the best times as well as providing a way to maintain navigation channels throughout the summer. The biggest drawbacks to purchasing a harvester are the increased up-front cost and the annual costs associated with maintaining the harvester. Even during years with less harvesting, the maintenance, storage, and other miscellaneous costs will remain around the same as those costs would be during years that require large amounts of harvesting.

Mechanical harvesting is a recommended management option for the CLP present on Upper Turtle Lake however this would have to be a long-term option that is used in conjunction with other management options such as chemical treatment and hand removal.

SMALL-SCALE MECHANICAL HARVESTING

There are a wide range of small-scale mechanical harvesting techniques, most of which involve the use of boat mounted rakes, scythes, and electric cutters. As with all mechanical harvesting, removing the cut plants is required. Commercial rakes and cutters range in prices from $200 for rakes to around $3000 for electric cutters with a wide range of sizes and capacities. Using a weed rake or cutter that is run by human power is allowed without a permit, but the use of any device that includes a motor, gas or electric, would require a permit. Dragging a bed spring or bar behind a boat, tractor or any other motorized vehicle to remove vegetation is also illegal without a permit. Although not truly considered mechanical management, incidental plant disruption by normal boat traffic is a legal method of management. Active use of an area is often one of the best ways for riparian owners to gain navigation relief near their docks. Most aquatic plants won't grow well in an area actively used for boating and swimming. It should be noted that purposefully navigating a boat to clear large areas is not only potentially illegal it can also re-suspend sediments, encourage AIS growth, and cause ecological disruptions.

Small-scale harvesting by human power that is completed in a way such that <u>all</u> of the CLP plant and root structure is removed is recommended for limited control of AIS in the lake. Through information and training, property owners will be instructed on proper physical removal methods.

HABITAT ALTERATION

BOTTOM BARRIERS AND SHADING

Physical barriers, fabric or other, placed on the bottom of the lake to reduce CLP growth would eliminate all plants, inhibit fish spawning, affect benthic invertebrates, and could cause anaerobic conditions which may release excess nutrients from the sediment. Gas build-up beneath these barriers can cause them to dislodge from the bottom and sediment can build up on them allowing CLP to re-establish. Bottom barriers are typically used for very small areas and provide only limited relief. Currently the WDNR does not permit this type of control.

Creating conditions in a lake that may serve to shade out plant growth has also been tried with mixed success. The general intention is to reduce light penetration in the water which in turns limits the depth at which plants can grow. Typically dyes have been added to a small water body to darken the water. Bottom barriers and attempts to further reduce light penetration in Upper Turtle Lake are not recommended.

DREDGING

Dredging is the removal of bottom sediment from a lake. Its success is based on altering the target plant's environment. It is not usually performed solely for aquatic plant management but rather to restore lakes that have been filled in with sediment, have excess nutrients, inadequate pelagic and hypolimnetic zones, need deepening, or require removal of toxic substances (Peterson, 1982). In shallow lakes with excess plant growth, dredging can make areas of the lake too deep for plant growth. It can also remove significant plant root structures, seeds/turions, rhizomes, tubers, etc. In Collins Lake, New York the biomass of curly-leaf pondweed remained significantly lower than pre-dredging levels 10-yrs after dredging (Tobiessen, Swart, & Benjamin, 1992). Dredging is very expensive, requires disposal of sediments, and has major environmental impacts. It is not a selective procedure so it can't be used to target any one particular species with great success except under extenuating circumstances. Dredging at any level must be permitted by the WDNR. It should not be performed for aquatic plant management alone. It is best used as a multipurpose lake remediation technique (Madsen, 2000).

Dredging is not a recommended management action for Upper Turtle Lake.

DRAWDOWN

Dropping the lake level to allow for the desiccation, aeration, and freezing of lake sediments has been shown to be an effective aquatic plant management technique. Repeated drawdowns lasting 4 to 6 months that include a freezing period are the most effective.

Control of aquatic plants in these cases can last a number of years. The low lake levels may negatively affect native plants, provides an opportunity for adventitious species such as annuals, often reduces the recreational value of a waterbody, and can impact the fishery if spawning areas are affected. The cost of a drawdown is dependent on the outlet of the lake; if no control structure is present, pumping of the lake can be cost prohibitive whereas costs can be minimal if the lake can be lowered by opening a gate.

A drawdown is not recommended for aquatic plant control on Upper Turtle Lake. The lack of an outlet structure and the presence of a diverse aquatic plant community make water level manipulation impractical.

BIOLOGICAL CONTROL

Biological control involves using one plant, animal, or pathogen as a means to control a target species in the same environment. The goal of biological control is to weaken, reduce the spread, or eliminate the unwanted population so that native or more desirable populations can make a comeback. Care must be taken however, to insure that the control species does not become as big a problem as the one that is being controlled. A special permit is required in Wisconsin before any biological control measure can be introduced into a new area. There are no biological controls available for the management of CLP.

GALURECELLA BEETLES

Two species of Galerucella beetles are currently approved for the control of purple loosestrife in Wisconsin (Figure 27). The entire lifecycle of Galerucella beetles is dependent on purple loosestrife. In the spring, adults emerge from the leaf litter below old loosestrife plants. The adults then begin to feed on the plant for several days until they begin to reproduce. Females lay their eggs on loosestrife leaves and stems. When the larvae emerge from these eggs they begin feeding on the leaves and developing shoots. When water levels are high these larvae will burrow into the loosestrife stems to pupate into adult beetles. These new adults emerge and begin feeding on the loosestrife again (Sebolt, 1998). Galerucella beetles do not forage on any plants other than purple loosestrife. Because of this the populations, once established, are self-regulating. When the purple loosestrife population drops off, the beetle population also declines. When the loosestrife returns, the beetle numbers will usually increase.

Figure 27: Galerucella Beetle

These beetles will not eradicate purple loosestrife entirely. This is true of almost all forms of biological control. Galerucella beetles will help regulate loosestrife which will allow native plants to also become established. This allows the wetlands near Upper Turtle Lake to be diverse plant communities instead of purple loosestrife monocultures.

Beetles can be obtained from many of the public wetlands around Wisconsin. Because rearing these beetles requires the cultivation of a restricted species, a permit is necessary. Beetle rearing and release is not recommended for Upper Turtle Lake in this management plan, but if there are lake residents who wish to do so it has the potential to benefit the lake.

NATIVE PLANT RESTORATION

A healthy population of native plants might slow invasion or reinvasion of non-native aquatic plants. It should be the goal of every management plan to protect existing native plants and restore native plants after the invasive species has been controlled. In many cases, a propagule bank probably exists that will help restore native plant communities after the invasive species is controlled (Gettsinger, Turner, Madson, & Netherland, 1997). This is certainly the case in Upper Turtle Lake where native plants have been fairly diverse and abundant in the recent past. The goal of this plan is to enhance, protect, and restore native plant populations while controlling CLP and other non-native invasive species.

OTHER BIOLOGICAL CONTROLS

Currently, there are no biological control methods available for CLP management. Galerucella beetle rearing could be undertaken by interested lake residents for purple loosestrife management, but this is not a recommended management action. Weevils are another biological control that is occasionally used in Wisconsin with mixed results. However, these insects are only used for EWM management, making them inappropriate for Upper Turtle Lake.

CHEMICAL CONTROL

Aquatic herbicides are granular or liquid chemicals specifically formulated for use in water to kill plants or cease plant growth. Herbicides approved for aquatic use by the U.S. Environmental Protection Agency (EPA) are considered compatible with the aquatic environment when used according to label directions. Some individual states, including Wisconsin, also impose additional constraints on herbicide use.

The Wisconsin Department of Natural Resources evaluates the benefits of using a particular chemical at a specific site vs. the risk to non-target organisms, including threatened or endangered species, and may stop or limit treatments to protect them. The Department frequently places conditions on a permit to require that a

minimal amount of herbicide is needed and to reduce potential non-target effects, in accordance with best management practices for the species being controlled. For example, certain herbicide treatments are required by permit conditions to be in spring because they are more effective, require less herbicide and reduce harm to native plant species. Spring treatments also means that, in most cases, the herbicide will be degraded by the time peak recreation on the water starts.

The WDNR encourages minimal herbicide use by requiring a strategic Aquatic Plant Management (APM) Plan for management projects over 10 acres or 10% of the water body or any projects receiving state grants. WDNR also requires consideration of alternative management strategies and integrated management strategies on permit applications and in developing an APM plan, when funding invasive species prevention efforts, and by encouraging the use of best management practices when issuing a permit. The Department also supervises treatments, requires that adjacent landowners are notified of a treatment and are given an opportunity to request a public meeting if they want, requires that the water body is posted to notify the public of treatment and usage restrictions, and requires reporting after treatment occurs.

The advantages of using chemical herbicides for control of aquatic plant growth are the speed, ease and convenience of application, the relatively low cost, and the ability to somewhat selectively control particular plant types with certain herbicides. Disadvantages of using chemical herbicides include possible toxicity to aquatic animals or humans, oxygen depletion after plants die and decompose which can cause fishkills, a risk of increased algal blooms as nutrients are released into the water by the decaying plants, adverse effects on desirable aquatic plants, loss of fish habitat and food sources, water use restrictions, and a need to repeat treatments due to existing seed/turion banks and plant fragments. Chemical herbicide use can also create conditions favorable for non-native AIS to outcompete native plants (for example, areas of stressed native plants or devoid of plants).

When properly applied, the possible negative impacts of chemical herbicide use can be minimized. Early spring to early summer applications are preferred because exotic species are actively growing and many native plants are dormant, thus limiting the loss of desirable plant species; plant biomass is relatively low minimizing the impacts of de-oxygenation and contribution of organic matter to the sediments; fish spawning has ceased; and recreational use is generally low limiting human contact. The concentration and amount of herbicides can be reduced because colder water temperatures enhance the herbicidal effects. Selectivity of herbicides can be increased with careful selection of application rates and seasonal timing. Lake hydro-dynamics must also be considered; steep drop-offs, inflowing waters, lake currents and wind can dilute chemical herbicides or increase herbicide drift and off-target injury. This is an especially important consideration when using herbicides near environmentally sensitive areas or where there may be conflicts with other water uses in the treatment vicinity.

HOW CHEMICAL CONTROL WORKS

Aquatic herbicides are sprayed directly onto floating or emergent aquatic plants or are applied to the water in either a liquid or granular form. Herbicides affect plants through either systemic or direct contact action. Systemic herbicides are capable of killing the entire plant. Contact herbicides cause the parts of the plant in contact with the herbicide to die back, leaving the roots alive and able to re-grow.

Herbicides can be classified as broad-spectrum (kill or injure a wide variety of plant species) or selective (effective on only certain species). Non-selective, broad spectrum herbicides will generally affect all plants that they come in contact with. Selective herbicides will affect only some plants. Often dicots, like Eurasian water milfoil, will be affected by selective herbicides whereas monocots, such as curly-leaf pondweed will not be affected. The selectivity of a particular herbicide can be influenced by the method, timing, formulation, and concentration used.

Sonar® whose active ingredient is fluridone, is a broad spectrum herbicide that interferes with the necessary processes in a plant that create the chlorophyll needed to turn sunlight into plant food through a process called photo-synthesis. Rodeo® whose active ingredient is glyphosate is another broad spectrum herbicide that prevents an aquatic plant from making the protein it needs to grow. As a result the treated plant stops growing and eventually dies.

2, 4-D and triclopyr are active ingredients in several selective herbicides including Navigate®, DMA 4®, and Renovate®. These herbicides stimulate plant cell growth causing them to rupture, but primarily in dicots. These herbicides are considered selective as they have little to no effect on monocots in treated areas. Fluridone, glyphosate, 2, 4-D, and triclopyr are all considered systemic. When applied to the treatment area, plants in the treatment area draw the herbicide in through the leaves, stems, and roots killing all of the plant, not just the part that comes in contact with the herbicide.

Aquathol whose active ingredient is endothall; Reward whose active ingredient is diquat; and Cutrine whose active ingredient is a form of copper are considered broad spectrum contact herbicides. They destroy the outer cell membrane of the material they come in contact with and therefore kill a plant very quickly. None of these three are considered selective and have the potential to kill all of the plant material that they come in contact with regardless of the species. As such, great care should be taken when using these products. Certain plant species like curly-leaf pondweed begin growing very early in the spring, even under the ice, and are often the only growing plant present at that time. This is a good time to use a contact herbicide like Aquathol, as few other plants would be impacted. Using these products later in the season, will kill all vegetation in contact with the herbicide and can provide substantial nuisance relief from a variety of aquatic plants.

It is possible to apply more than one herbicide at a time when trying to establish control of unwanted aquatic vegetation. An example would be controlling EWM and CLP at the same time with an early season application, and controlling aquatic plants and algae at the same time during a mid-season nuisance relief application. Applying systemic and contact herbicides together has a synergistic effect leading to increased selectivity and control. Single applications of the two could result in reduced environmental loading of herbicides and monetary savings via a reduction in the overall amount of herbicide used and of the manpower and number of application periods required to complete the treatment.

EFFICACY OF AQUATIC HERBICIDES

The efficacy of aquatic herbicides is dependent on both application concentration and exposure time, and these factors are influenced by two separate but interconnected processes - dissipation and degradation. Dissipation is the physical movement of the active herbicide within the water column both vertically and horizontally. Dissipation rates are affected by wind, water flow, treatment area relative to untreated area, and water depths. Degradation is the physical breakdown of the herbicide into inert components. Depending on the herbicide utilized, degradation occurs over time either through microbial or photolytic (chemical reactions caused by sunlight exposure) processes.

MICRO AND SMALL-SCALE HERBICIDE APPLICATION

The determining factor in designating chemical treatments as micro or small-scale is the size of the area being treated. Small-scale herbicide application involves treating areas less than 10 acres in size. The dividing line between small-scale and micro treatments is not clearly defined, but is generally considered to be less than 3 acres. Small-scale chemical application is usually completed in the early season (April through May). Micro treatments are as well, but may be used as follow-up spot treatments after an early season application for EWM, or in instances where a new infestation has been identified in a lake with EWM already or a in a completely new lake. Recent research related to micro and small-scale herbicide application generally shows that these types of treatment are less effective than larger scale treatments due to rapid dilution and dispersion of the herbicide applied.

Some suggested ways to increase the effectiveness of this management strategy are to increase the concentration of herbicide used, use a contact herbicide like diquat that does not require as long a contact time to be effective, or in some manner contain the herbicide in the treated area by artificial means.

Pre- and post-treatment aquatic plant surveys and testing for herbicide residuals are not required by the WDNR for small-scale treatments. Nor is an approved APMP if the organization sponsoring the application is not using grant funding to help defer the costs. Even though not required by the WDNR, participating in these activities is recommended as it helps to gain a better understanding of the impact and fate of the chemical used.

LARGE-SCALE HERBICIDE APPLICATION

Large-scale herbicide application involves treating areas more than 10 acres in size. Like small-scale applications, this is usually completed in the early-season (April through May) for control of non-native invasive species like EWM and CLP while minimizing impacts on native species. It is generally accepted that lower concentration of herbicide can be used in large-scale applications as the likelihood of the herbicide staying in contact with the target plant for a longer time is greater. If the volume of water treated is more than 10% of the volume of the lake, or the treatment area is ≥160 acres, or 50% of the lakes littoral zone, effects can be expected at a whole-lake scale. Large-scale herbicide application can be extended in some lakes to include whole bay or even whole lake treatments. The size of the treatment area, the more contained the treatment area, and the depth of the water in the treatment area, are factors that impact how whole bay or whole lake treatments are implemented.

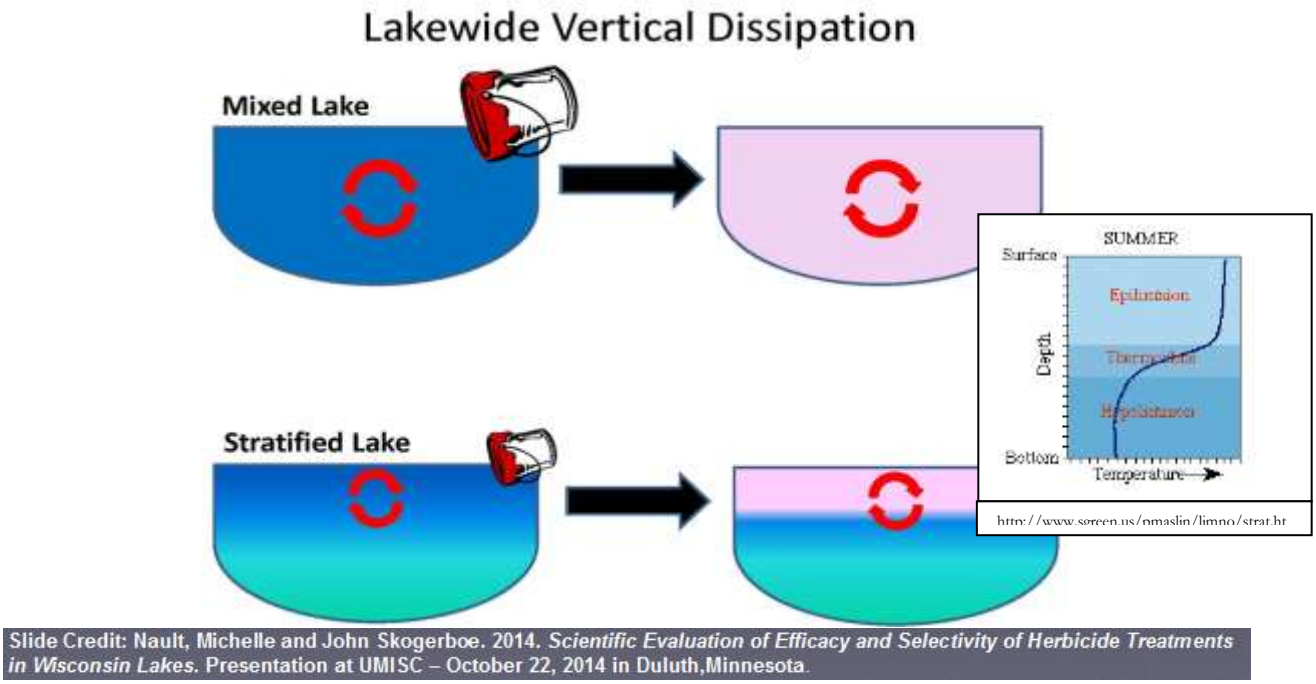
Pre- and post-treatment aquatic plant surveying and having an approved APMP are required by the WDNR when completing large-scale chemical treatments. Residual testing is not required by the WDNR, but highly recommended to gain a better understanding of the impact and fate of the chemical used.

WHOLE-LAKE, AND/OR EPILIMNION APPLICATION

Whole-lake or whole-basin treatments are those where the herbicide may be applied to specific sites, but the goal of the strategy is for the herbicide to reach a target concentration when it equally distributes throughout the entire volume of the lake (or lake basin, or within the epilimnion of the lake or lake basin). The application rate of whole-lake treatments is dictated by the volume of water in with which the herbicide will reach equilibrium. Because exposure time is expected to be so much longer, effective herbicide concentrations for whole-lake treatments are significantly less than required for small-scale or micro treatments. Whole-lake treatments are typically conducted when the target plant is spread throughout the majority of the lake or basin.

If the herbicide exposure time of the target aquatic plant can be extended, the concentration of the herbicide applied can be lowered. If the contact time between the applied herbicide and the target plant in a whole body of water or protected bay can be increased to, or is already expected to be several days to a week or more, the concentration of herbicide can be in the range of 0.25-0.5 ppm instead of the 2-4 or more ppm that is typically used in small-scale or micro treatments.

Planning to treat the whole lake can be further designed to minimize the herbicide needed to affect the desired outcome. The method used to implement whole-lake treatments changes with the type of lake. Herbicide applied to a shallow, mixed lake is expected to mix throughout the entire volume of the lake. In deep water lakes that stratify, herbicide can be applied at such a time when it is expected that it will only mix with the surface water above the thermocline in an area known as the epilimnion (Figure 28). For this to be a viable management alternative, a lake has to stratify early enough in the open water season to coincide with the optimal time for early season chemical application.



Slide Credit: Nault, Michelle and John Skogerboe. 2014. *Scientific Evaluation of Efficacy and Selectivity of Herbicide Treatments in Wisconsin Lakes.* Presentation at UMISC – October 22, 2014 in Duluth,Minnesota.

Figure 28: Lake-wide (whole-lake) dissipation of aquatic herbicides in Mixed and Stratified Lakes (Carlson, 2015). Inset: Summer thermal stratification.

EFFECTS OF WHOLE-LAKE TREATMENTS ON NATIVE AQUATIC PLANT SPECIES

Treating an entire lake with a chemical herbicide does have some concerns. One is particular is the effect on native aquatic plant vegetation in the treated body of water. Based on study results published by the WDNR in 2012 (Nault, et al., 2012) looking at nine different lakes that had whole-lake treatments completed, "year of treatment" effects on native plants were mostly negative, and on aggregate, 34 of the total 38 significant differences between species frequency of occurrence pre- and post-treatment were reductions, affecting 38 percent to 78 percent of the number of native species within a lake. Short-term reductions in native littoral frequency of occurrence occurred even at low concentrations of 2, 4-D if exposure times were long. Native dicots such as the watermilfoils (esp. northern watermilfoil), water marigold, and bladderworts are known to be susceptible to 2, 4-D, and displayed statistically-significant decreases in some of the case studies. At long-term exposures (across a range of concentrations) adverse impacts to relatively tolerant monocots such as naiads, several narrow leaf pondweeds, wild celery, and common waterweed were also observed. Water quality may also be affected by large-scale treatments. For example, in two lakes for which Secchi data was collected pre- and post-treatment (Sandbar and Tomahawk), a 40-percent reduction in water clarity was observed when comparing pre-treatment averages to year-of treatment averages. In another Wisconsin lake not part of this study (Bridge Lake), dissolved oxygen levels declined following a large-scale treatment that occurred relatively late in the season when water temperatures were higher.

PRE AND POST TREATMENT AQUATIC PLANT SURVEYING

When introducing new chemical treatments to lakes where the treatment size is greater than ten acres or greater than 10% of the lake littoral area and more than 150-ft from shore, the WDNR requires pre and post chemical application aquatic plant surveying. The protocol for pre and post treatment survey is applicable for chemical treatment of CLP and EWM.

The WDNR protocol assumes that an APMP has identified specific goals for non-native invasive species and native plants species. Such goals could include reducing coverage by a certain percent, reducing treatments to

below large-scale application designations, and/or reducing density from one level to a lower level. A native plant goal might be to see no significant negative change in native plant diversity, distribution, or density. Results from pre and post treatment surveying are used to improve consistency in analysis and reporting, and in making the next season's management recommendations.

The number of pre and post treatment sampling points required is based on the size of the treatment area. Ten to twenty acres generally requires at least 100 sample points. Thirty to forty acres requires at least 120 to 160 sampling points. Areas larger than 40 acres may require as many as 200 to 400 sampling points. Regardless of the number of points, each designated point is sampled by rake, recording depth, substrate type, and the identity and density of each plant pulled out, native or invasive.

In the year prior to an actual treatment, the area to be treated must have a mid-season/summer/warm water point intercept survey completed that identifies the target plant and other plant species that are present. A pre-treatment aquatic plant survey is done in the year the herbicide is to be applied, prior to application to confirm the presence and level of growth of the target species. A post-treatment survey should be scheduled when native plants are well established, generally mid-July through mid-August. For the post-treatment survey, repeat the PI for all species in the treatment polygons, as was done the previous summer. For whole-lake scale treatments, a full lake-wide PI survey should be conducted.

CHEMICAL CONCENTRATION TESTING

Chemical concentration testing is often done in conjunction with treatment to track the fate of the chemical herbicide used. Testing is completed to determine if target concentrations are met, to see if the chemical moved outside its expected zone, and to determine if the chemical breaks down in the system as expected. Monitoring sites are located both within and outside of the treatment area, particularly in areas that may be sensitive to the herbicide used, where chemical drift may have adverse impacts, where movement of water or some other characteristic may impact the effect of the chemical, and where there may be impacts to drinking and irrigation water. Water samples are collected prior to treatment and for a period of hours and/or days following chemical application.

In some lakes, rhodamine dye is added to the herbicide at the time of application in amounts equal to the expected concentration of the herbicide and a fluorimeter is used to sample the dye as it moves around the system. Both systems for tracking the movement of the herbicide, concentration attained, and contact time maintained can be used effectively to help better current and future planning.

Because chemical management has not been undertaken on Upper Turtle Lake, concentration testing has not been conducted. Chemical concentration testing done on other lakes has shown that application of herbicides in micro or small-scale treatment areas is less effective than treating large areas. Furthermore, chemical application in deep water or along deep water edges reduces the success of chemical management. While the CLP within Upper Turtle Lake was widespread in 2017, many of these areas will likely be smaller in the coming years. Because of this chemical concentration testing should be done as a means to determine which areas are best suited to be treated and which areas would require a different management strategy or no management at all.

DYE STUDIES

One of the keys to controlling noxious and invasive aquatic weed species with aquatic herbicides is understanding how water exchange within the treatment sites might affect performance of the herbicide applied. In the mid to late 1980's US Army Corps of Engineers Aquatic Plant Management Researchers started to think about how these products uptake within target weeds, how much time the target weeds need to be exposed to the particular herbicide and how water exchange impacts efficacy. This research has led to operational improvements in using these technologies to impact invasive aquatic species and to help operational aquatic plant managers plan treatments. One tool that was used, and continues to be used is

substituting Rhodamine WT dye in the role of an aquatic herbicide. This dye can be applied at a known concentration, and it can be measured with an instrument called a flurometer. Sampling grids can then be set up within the treatment plot to monitor how long the dye remains and at what concentrations. Sampling stations outside the plot can be set up to see where a potential herbicide might go and at what concentrations. These are very useful data to have when planning CLP herbicide control projects as it makes it possible to predict with much greater certainty how much herbicide will be needed in a given situation to control the target plant. Because the dye is relatively inexpensive, using it to simulate how much herbicide should be applied, is much cheaper, and much less damaging than experimenting with the herbicide itself. It also allows management planners to more accurately predict what impacts there might be to other plants of concern. Simulated dye treatments are often done prior to completing actual herbicide treatments, but occasionally the dye is added to an actual herbicide application to make it easier to track the movement of the herbicide, particularly in a situation where there may be moving water.

MANAGEMENT DISCUSSION

The ultimate goal of this plan is to improve the usability and maintain water quality of Upper Turtle Lake through the reduction of CLP levels. Currently, there is not enough numeric data to determine if the 2017 CLP levels are the norm on Upper Turtle Lake or if the ideal conditions afforded to CLP during the winter and spring of 2017 resulted in the vast expansion of CLP from the levels seen in 2010. If the CLP levels seen in 2017 are repeated on a regular basis the best way to reach this goal will be through active management of CLP.

ESTABLISHING AND MAINTAINING AN AIS MANAGEMENT PROGRAM

Anecdotal evidence suggests that the CLP population has been showing significant growth each year since the 2010 plant survey was done, but there is not yet enough empirical data to justify a large-scale or whole-lake treatment. Additionally, it is not known how much the water moves throughout the system. Because of this, a rhodamine dye study is recommended before any large-scale or whole-lake treatment should be considered.

Annual CLP bed mapping should be conducted to determine the extent of the CLP population and allow any changes in population density or extent to be observed. Annual monitoring of CLP will result in more effective management planning and better interpretation of results. It is also recommended to regularly complete a full suite of water quality testing , TP, chlorophyll A, DO, temperature, and Secchi, in order to monitor for any changes that occur within the lake be it natural or due to management actions.

POTENTIAL AIS MANAGEMENT ACTIONS

If additional data shows that 2017 CLP levels are now the norm, a large-scale herbicide treatment may be necessary. Endothall is usually the active ingredient in herbicides used for CLP management. This is a contact herbicide which is applied early in the season before most of the native plants have begun growing. The amount of herbicide necessary would greatly depend on the amount of water movement throughout the lake. Table 4 breaks down the yearly costs of the herbicide that would be needed for a large-scale treatment. In addition to the cost for herbicide, there would be costs associated with pre- and post- treatment plant surveys which are required for any treatment greater than 10 acres. For CLP management to be effective, the herbicide would have to be applied for a minimum of three consecutive years.

Table 4: Large-scale treatment costs

Upper Turtle Lake Potential Large-Scale Treament						
Treatment Characteristics				Curly-leaf Pondweed Control Treatment application		
Treatment Site	Acreage	Mean Depth (feet)	Volume (acre-feet)	Treatment a.i. ppm	gallons†	Yearly Cost
2017 CLP Beds	132.35	9.91	1311.59	0.5	393.5	$47,217.19
	132.35	9.91	1311.59	0.75	590.2	$70,825.78
	132.35	9.91	1311.59	1.0	787.0	$94,434.37
	132.35	9.91	1311.59	1.5	1311.6	$157,390.62
* Aquathol K® liquid aquatic herbicide (a.i. endothall)						
When Treatment Concentration= 0.5 ppm, Whole Lake Concentration = 0.16 ppm						

Table 4 contains estimates of herbicide costs for several different concentrations because it is still unknown how quickly the herbicide would dissipate throughout the lake. After the completion of a dye study, the appropriate concentration can be determined. If the data collected during the initial year suggests it is appropriate, a whole-lake treatment could be done. For this treatment method, the herbicide is applied at a higher concentration to the affected areas with the expectation that the entire lake will reach the target concentration that is lower than the concentrations that would be used in a large-scale treatment. Due to the fact that Upper Turtle Lake does not stratify until relatively late in the season, an epilimnion treatment would

not be possible. If a whole lake treatment is necessary, it would be significantly more expensive with the lowest concentration of 0.25 ppm costing over $110,000 per year which would also need to be maintained for a minimum of three years, maybe longer.

Another possible management strategy could be mechanical harvesting. If it is determined that this is the most viable option, UTLA would have to determine if they would like to contract this service or purchase and operate a harvester. The costs associated with contracted harvesting would vary greatly depending on the level of support provided by the UTLA including hauling away of harvested aquatic plants. To do this a dump site for the harvested vegetation would have to be identified.

It would also be possible to use a mixture of chemical and physical treatment to manage CLP. This could be done by treating smaller areas with herbicide while doing some mechanical harvesting to maintain navigation lanes. Additional manual removal of CLP by property owners should be encouraged to supplement the management actions of the UTLA.

2018-2022 GOALS, OBJECTIVES, AND ACTIONS

The following are the goals, objectives, and actions that accompany this plan. They can also be found in Appendix F.

1. Goal 1: Support and propagate AIS management efforts that minimize negative impacts to the native plant communities
    a. Objective 1: Prepare for a management program to reduce CLP levels to those seen in 2010.
        i. Action 1: Conduct a rhodamine dye study to determine potential impacts of a herbicide application in Upper Turtle Lake
            1. Mimic a proposed treatment
            2. Administer spring of the year prior to the proposed treatment
        ii. Action 2: Conduct smaller test treatments with concentration testing to determine efficacy of herbicide treatments on CLP beds.
        iii. Action 3: CLP bed mapping surveys
            1. Conducted the spring prior to the proposed treatment.
            2. Conducted on an annual basis each spring to determine changes in CLP levels and the efficacy of any management actions.
        iv. Action 4: Conduct CLP turion density studies.
            1. Completed in the fall of the year prior to or immediately following the first year of a proposed treatment.
            2. Repeated after three years of treatment.
        v. Action 5: Complete a full suite of water quality testing
            1. Purchase a dissolved oxygen/ temperature meter
            2. Collect Temperature and Dissolved Oxygen profiles, TP, ChlorA, Secchi disk data.
            3. Monthly in accordance with the CLMN protocol.
        vi. Action 6: Determine the appropriate scale and method of CLP management.
            1. Review all data to determine when, where, and how to best manage CLP within Upper Turtle Lake.
            2. Areas that are 2.0 acres or larger will be considered for treatment.
    b. Objective 2: Implement a multi-year, native restoration and CLP control plan.
        i. Action 1: Apply liquid endothall at appropriate concentrations when the size of CLP beds warrant.
            1. Complete pre- and post-treatment aquatic plant surveys in the treated areas each year of treatment.
        ii. Action 2: Complete summer littoral point-intercept surveys to determine impacts of management actions on the native plant communities.
            1. All plants surveyed in the entire littoral zone
            2. Done in July or August
    c. Objective 3: Evaluate the use of harvesting In the absence of any herbicide application
        i. Action 1: Gather more data related to the costs and benefits associated with a CLP and native plant harvesting plan.
2. Goal 2: AIS education and prevention.

a. Objective 1: Prevent new AIS from entering and becoming established within Upper Turtle Lake
    i. Action 1: Implement Clean Boat Clean Waters
        1. 200 hours annually with grant funding
        2. Volunteer hours only without grant funding
b. Objective 2: Set up and maintain a public participation and communication program and an AIS education and information program
    i. Action 1: Develop and distribute at least two newsletters updating AIS and other UTLA activities
    ii. Action 2: Host at least one annual meeting and maintain open UTLA Board meetings
    iii. Action 3: Host an Annual Lake Fair to promote public involvement in lake activities
        1. Can be combined with the Annual Picnic or other planned event, or with another entity
    iv. Action 4: Maintain an Upper Turtle Lake Association webpage
c. Objective 3: Set up and maintain AIS monitoring efforts
    i. Action 1: Install, maintain, and/or improve AIS signage at both public access points
    ii. Action 2: Establish and maintain an in-lake and shoreline AIS monitoring program following CLMN guidelines
    iii. Action 3: Follow established EWM early detection and response plan
        1. See AIS Rapid Response Plan (Appendix J)

3. Goal 3: Promote and support nearshore, riparian, and watershed best management practices that will improve fish and wildlife habitat, reduce runoff, and minimize nutrient loading into Upper Turtle Lake.
    a. Objective 1: Adopt State of Wisconsin Healthy Lakes Initiative
        i. Action 1: Officially adopt the Wisconsin Healthy Lakes Initiative during the next annual meeting of the UTLA.
        ii. Action 2: Apply for Healthy Lakes grant funding to support projects that improve shoreland habitats and reduce runoff into the lake.
4. Goal 4: Encourage and engage lake residents and visitors to be active lake stewards.
    a. Objective 1: Encourage behavior changes in residents in the following areas: shoreland development, AIS, aquatic vegetation, recreational practices, and responsibility for the lake.
        i. Action 1: Encourage lake residents to understand AIS concerns, identify and help monitor for AIS within the lake, and report and/or remove what they find.
        ii. Action 2: Encourage boaters to implement appropriate AIS prevention strategies on their watercraft.
        iii. Action 3: Disseminate educational material related to the benefits of native plants within the lake and along the shoreline.
            1. Create and distribute welcome packets, newsletters, information/educational displays, Facebook and/or webpage, UTLA meetings, and other resources to increase the level of public awareness and interest in the lake.
    b. Objective 2: Encourage and develop volunteer action and leadership
        i. Action 1: Recruit new UTLA members, board members, and volunteers.
        ii. Action 2: Encourage lake volunteer involvement in "lake leaders" training

iii. Action 3: Recognize good lake stewards and good examples of shoreland practices.

5. Goal 5: Implement the Upper Turtle Lake Management Plan effectively and efficiently with a focus on community and constituent education, information, and involvement.
    a. Objective 1: Complete annual project activity and assessment reports
        i. Action 1: Use reports to make recommendation for annual revisions and updates to the APM Plan
    b. Objective 2: Complete an End-of-project Summary Report
        i. Action 1: Overall review of project successes and failures.
        ii. Action 2: Complete early and mid-season whole-lake point-intercept survey of all plants.
        iii. Action 3: Revise or rewrite APM Plan as needed.
    c. Objective 3: Develop partnerships to support management implementation
        i. Action 1: Communicate with local, county, and state entities; schools and local business; clubs and organizations, etc. to generate support for management actions.
        ii. Action 2: Share results with partners from Action 1

IMPLEMENTATION AND EVALUATION

This plan is intended to be a tool for use by the UTLA to move forward with aquatic plant management actions that will maintain the health and diversity of Upper Turtle Lake and its aquatic plant community. This plan is not intended to be a static document, but rather a living document that will be evaluated on an annual basis and updated as necessary to ensure goals and community expectations are being met. This plan is also not intended to be put up on a shelf and ignored. Implementation of the actions in this plan through funding obtained from the WDNR and/or UTLA funds is highly recommended. An Implementation and Funding Matrix is provided in Appendix G.

Since many actions occur annually, a calendar of actions to be implemented was created in Appendix H.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES GRANT PROGRAMS

There are several WDNR grant programs that may be able to assist the UTLA in implementing its new APMP. AIS grants are specific to actions that involve education, prevention, planning, and in some cases implementation of AIS management actions. Lake Management Planning grants can be used to support a broad range of management planning and education actions. Lake Protection grants can be used to help implement approved management actions that would help to improve water quality. WDNR Healthy Lakes grants are part of the Lake Protection program.

AIS PREVENTION AND CONTROL GRANTS

The AIS (AIS) Prevention and Control grants are a cost-share effort by the WDNR to provide information and education on types of existing and potential AIS in Wisconsin, the threats that invasive species pose to the state's aquatic resources, and available techniques for invasive species control. These grants also assist in the planning and implementation of projects that will prevent the introduction of invasive species into waters where they currently are not present, controlling and reducing the spread of invasive species from waters where they are present, and restoring native aquatic communities.

There are five AIS Prevention and Control grants subprograms:

- Education, Prevention and Planning Projects (including Clean Boats Clean Waters)
- Early Detection and Response Projects
- Established Population Control Projects
- Maintenance and Containment Projects
- Research and Demonstration Projects

Education, Prevention, and Planning; Clean Boats, Clean Waters, and Maintenance and Containment grants are applicable to Upper Turtle Lake and the UTLA.

EDUCATION, PREVENTION AND PLANNING PROJECTS

Education projects are intended to broaden the public's awareness and understanding of, and ability to identify, AIS; the threats that AIS pose to the health of aquatic ecosystems; the measures to prevent the spread of AIS; and the management practices used for control of AIS. Prevention projects are intended to prevent the introduction of new AIS into a waterbody/wetland, or prevent the spread of an AIS population from one waterbody to another unpopulated waterbody/wetland. Planning projects are intended to assist in the development of plans for the prevention and control of AIS. Eligible projects include:

- Educational programs including workshops, training sessions, or coordinated volunteer monitors. Projects will be reviewed for consistency with the DNR's statewide education strategy for controlling AIS including the use of existing publications and outreach materials.
- Development of AIS prevention and control plans
- Monitoring, mapping, and assessing waterbodies for the presence of AIS or other studies that will aid in the AIS prevention and control.
- Watercraft inspection and education projects following the guidelines of the DNR's Clean Boats, Clean Waters program.

This subprogram is not intended to provide support for any management action that may be taken.

Funding Possibilities

Maximum amount of grant funding is 75% of the total project costs, not to exceed $150,000. Applications will be separated into two classes: less than $50,000 in state funding and between $50,001 and $150,000 in state funding. Clean Boats Clean Waters projects are limited to $4,000 per public boat launch facility but may be a component of a larger project.

ESTABLISHED POPULATION CONTROL PROJECTS

Established population control grants are intended to assist applicants in eradicating or substantially reducing established populations of AIS to protect and restore native species communities. Established populations are defined as substantial reproducing populations of AIS that are not pioneer populations. Eligible projects include activities recommended in a DNR-approved control plan including monitoring, education, and prevention activities. Ineligible projects include the following:

- Dredging
- Chemical treatments or mechanical harvesting of aquatic plants to provide single season nuisance or navigational relief.
- Maintenance and operation of aeration systems and mechanical structures used to suppress aquatic plant growth.
- Structural facilities for providing boat washing stations. Equipment associated with boat washing facilities is eligible if included in a management plan.

Funding Possibilities

Maximum amount of the grant funding is 75% of the total project costs, not to exceed $200,000.

MAINTENANCE AND CONTAINMENT PROJECTS

Maintenance and containment grants are intended to provide sponsors limited financial assistance for the ongoing control of established AIS population without the assistance of an Established Population Control grant. These projects are intended for waters where management activity has achieved the target level of control identified in an approved plan that meets the criteria of s. NR 198.43, Wis. Adm. Code. Ongoing maintenance is needed to contain these populations so they do not re-establish throughout the waterbody, spread to other waters, or impair navigation and other beneficial uses of the waterbody.

Funding Possibilities

Maximum amount of grant funding will be determined by DNR based on the sponsor's permit application fee, specified monitoring and reporting requirements in the permit, or DNR-approved management plan. The maximum grant amount shall not exceed the cost of the permit application fee.

LAKE MANAGEMENT PLANNING GRANTS

Lake management planning grants are intended to provide financial assistance to eligible applicants for the collection, analysis, and communication of information needed to conduct studies and develop management plans to protect and restore lakes and their watersheds. Projects funded under this subprogram often become the basis for implementation projects funded with Lake Protection grants. There are two categories of lake management planning grants: small-scale and large-scale.

SMALL SCALE LAKE MANAGEMENT PROJECTS

Small-scale projects are intended to address the planning needs of lakes where education, enhancing lake organizational capacity, and obtaining information on specific lake conditions are the primary project objectives. These grants are well suited for beginning the planning process, conducting minor plan updates, or developing plans and specification for implementing a management recommendation. Eligible projects include:

- Collect and report chemical, biological, and physical data about lake ecosystems for a Tier I assessments, Tier II diagnostic or Tier III project evaluation.
    - Tier I if initial basic monitoring is needed to assess the general condition or health of the lake.
    - Tier II if an assessment has been conducted and more detailed data collection is needed to diagnose suspected problems and identify management options.
    - Tier III if the monitoring and assessment will be used to evaluate the effectiveness of a recently implemented project or lake management strategy.
- Collecting and disseminating existing information about lakes for the purpose of broadening the understanding of lake use, Lake Ecosystem conditions and lake management techniques.
- Conducting workshops or trainings needed to support planning or project implementation.
- Projects that will assist management units as defined in s. NR191.03 (4) & s. NR 190.003 (4) the formation of goals and objectives for the management of a lake or lakes.

Funding Possibilities

Maximum amount of grant funding is 67% of the total project costs, not to exceed $3,000.

LARGE SCALE LAKE MANAGEMENT PROJECTS

Large-scale projects are intended to address the needs of larger lakes and lakes with complex and technical planning challenges. The result will be a lake management plan; more than one grant may be needed to complete the plan. Eligible projects include:

- Collection of new or updated, physical, chemical and biological information about lakes or lake ecosystems.
- Definition and mapping of Lake Watershed boundaries, sub-boundaries and drainage system components.
- Descriptions and mapping of existing and potential land conditions, activities and uses within lake watersheds that may affect the water quality of a lake or its ecosystem.
- Assessments of water quality and of fish, aquatic life, and their habitat.
- Institutional assessment of lake protection regulations - review, evaluation or development of ordinances and other local regulations related to the control of pollution sources, recreational use or other human activities that may impact water quality, fish and wildlife habitat, natural beauty or other components of the lake ecosystem.
- Collection of sociological information through surveys or questionnaires to assess attitudes and needs and identify problems necessary to the development of a long-term lake management plan.
- Analysis, evaluation, reporting and dissemination of information obtained as part of the planning project and the development of management plans.
- Development of alternative management strategies, plans and specific project designs, engineering or construction plans and specifications necessary to identify and implement an appropriate lake protection or improvement project.

Funding Possibilities

Maximum amount of grant funding is 67% of the total project costs, not to exceed $25,000. Multiple grants in sequence may be used to complete a planning project, not to exceed $100,000 for each lake. The maximum grant award in any one year is $50,000 for each lake. If phasing is necessary, all phases should be fully identified and a timeline identified in the initial application.

LAKE PROTECTION GRANTS

Lake protection and classification grants assist eligible applicants with implementation of lake protection and restoration projects that protect or improve water quality, habitat or the elements of lake ecosystems. There are four basic Lake Protection subprograms: a) Fee simple or Easement Land Acquisition b) Wetland and Shoreline Habitat Restoration c) Lake Management Plan Implementation d) Healthy Lakes Projects.

HEALTHY LAKES PROJECTS

The Healthy Lakes grants are a sub-set of Plan Implementation Grants intended as a way to fund increased installation of select best management practices (BMPs) on waterfront properties without the burden of developing a complex lake management plan. Details on the select best practices can be found in the Wisconsin Healthy Lakes Implementation Plan and best practice fact sheets.

Eligible best practices with pre-set funding limits are defined in the Wisconsin Healthy Lakes Implementation Plan, which local sponsors can adopt by resolution and/or integrate into their own local planning efforts. By adopting the Wisconsin Healthy Lakes Implementation Plan, your lake organization is immediately eligible to implement the specified best practices. Additional technical information for each of the eligible practices is described in associated factsheets. The intent of the Healthy Lakes grants is to fund shovel-ready projects that are relatively inexpensive and straight-forward. The Healthy Lakes grant category is not intended for large, complex projects, particularly those that may require engineering design. All Healthy Lake grants have a standard 2-year timeline.

Funding Possibilities

Maximum amount of grant funding is 75% of the total project cost, not to exceed $25,000. Grants run for a 2-year time period. Maximum costs per practice are also identified in the Wisconsin Healthy Lakes Implementation Plan.

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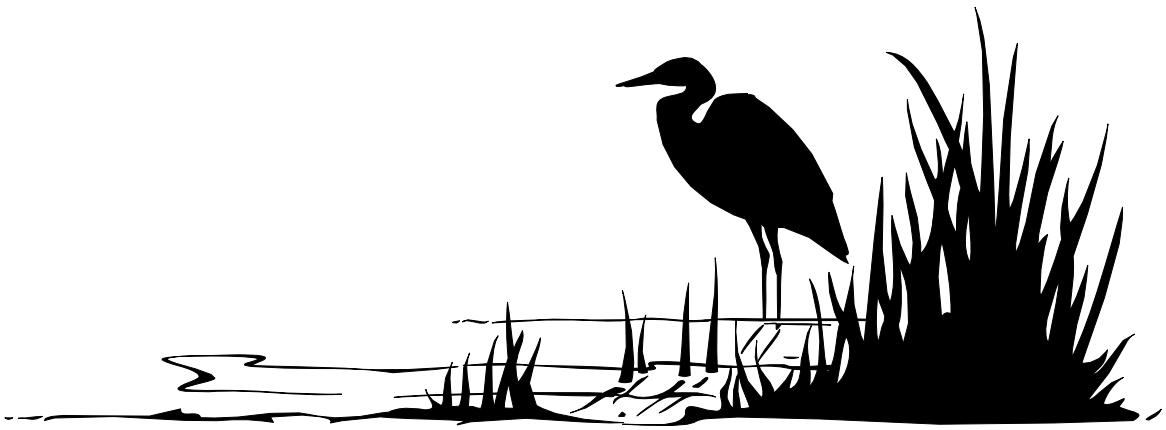
Appendix A

WDNR Upper Turtle Sensitive Areas Report

UPPER TURTLE LAKE
SENSITIVE AREA SURVEY REPORT
AND MANAGEMENT GUIDELINES



This document is to be used
with its companion document
"Guidelines for protecting, maintaining,
and understanding lake sensitive areas"

Upper Turtle Lake (Barron Co.)
Integrated Sensitive Area Survey Report

Date of Survey: 12 August 1993 Number of Sensitive Areas: 3
Site Revisited: 20 August 2001

Site Evaluators: Frank Koshere, Water Resources Biologist
Mark Sundeen, Aquatic Plant Specialist
Kurt Roblek, Water Resources Biologist
Ashley Darkow, Fisheries Technician – Co-Author
Jim Cahow, - Co-Author

Lake Sensitive Area Survey results identified three areas that merit special protection of the aquatic habitat. These areas of aquatic vegetation on Upper Turtle Lake offer critical or unique fish and wildlife habitat. These habitats provide the necessary seasonal or life stage requirements of the associated fisheries, and the aquatic vegetation offers water quality or erosion control benefits to the body of water.

During this survey there were no documented occurrences of Purple Loosestrife. However, the threat of Purple Loosestrife is always a concern and should be dealt with immediately. Methods for control are to remove the entire plant before it produces seeds or by cutting the flower head and spraying with and approved herbicide. You should contact the Department before any of these methods are implemented.

The reader should consider that any buffer that does not extend back from the waters edge at least 35' is not providing adequate protection for water quality and should be expanded to at least 35'. Local zoning ordinances and lakes classification systems have tried to provide better guidelines pertaining to buffer widths and set backs based on lake type. Landowners are encouraged to go beyond the minimum requirements laid out by zoning and consider extending buffer widths to beyond 35' and integrating other innovative ways to capture and reduce the runoff flowing off from their property while improving critical shoreline habitat. Berms and low head retention areas can greatly increase the effective capture rate from developed portions in addition to that portion captured within the buffer.

Site conditions may dictate that a buffer has to be much wider than 35' to be effective at capturing the sediments and nutrients running off the developed portions of the shoreline. If the shoreline is steeply sloped (>7%slope) greater widths should definitely be used.

No mowing should take place within the buffer area (with the exception of a narrow access trail and small picnic area), and trees and shrubs should not be cut down even when they become old and die; because they provide important woody debris habitat within the buffer zone as well as aquatic habitat when they fall into the lake.

The following is a brief summary of the Upper Turtle Lake sensitive area sites and the management guidelines. Also, the "Guidelines for Protecting, Maintaining, and Understanding Sensitive Areas" provides management guidelines and considerations for different lake sensitive areas (Attached).

I. Aquatic Plant Sensitive Areas

Sensitive areas A, B and C contain aquatic plant communities, which provide important fish and wildlife habitat as well as important shoreline stabilization functional values. Sensitive areas provide important enough habitat for the Upper Turtle Lake ecosystem that conservation easements, deed restrictions, or zoning should be used to protect them. Management guidelines for aquatic plant sensitive areas are (unless otherwise specifically stated):

1. Limit aquatic vegetation removal to navigational channels no greater than 25 feet wide where necessary, the narrower the better. These channels should be kept as short in length as possible and it is recommended that people do not completely eliminate aquatic vegetation within the navigation channel; but instead only remove what is necessary to prevent fouling of propellers to provide access to open water areas. Chemical treatments should be discouraged and if a navigational channel must be cleared, pulling by hand is preferable over mechanical harvesters where practical.
2. Prohibit littoral zone alterations covered by Wisconsin Statutes Chapter 30, unless there is clear evidence that such alterations

would benefit the lake's ecosystem. Rock riprap permits should not be approved for areas that already have a healthy native plant community stabilizing the shoreline and property owners should not view riprap as an acceptable alternative in these situations.

3. Leave large woody debris, logs, trees, and stumps, in the littoral zone to provide habitat for fish, wildlife, and other aquatic organisms.
4. Leave an adequate shoreline buffer of un-mowed natural vegetative cover and keep access corridors as narrow as possible (preferable less than 30 feet or 30% of any developed lot which ever is less).
5. Prevent erosion, especially at construction sites. Support the development of effective county erosion control ordinances. The proper use of Best Management Practices (BMP's) will greatly reduce the potential of foreign materials entering the waterway (i.e. silt, nutrients).
6. Strictly enforce zoning ordinances and support development of new zoning regulations where needed.
7. Eliminate nutrient inputs to the lake caused by lawn fertilizers, failing septic systems, and other sources.
8. Control exotic species such as purple loosestrife.

Resource Value of Site A

Sensitive area A consists of a small, shallow bay located on the southwestern shore of Upper Turtle Lake.

This area provides important habitat for centrarchid (bass and panfish) and esocid (northern pike) spawning and nursery areas. This area also provides important habitat for forage species. Wildlife also are reliant upon this area for habitat. Eagles, loons, herons, waterfowl, songbirds, furbearers, turtles, and amphibians benefit from this valuable habitat.

The emergent, floating, and submergent plant community structure of Sensitive area A includes: **Emergents;** broad-leafed cattail (*Typha latifolia*), water willow (*Decodon verticillatus*), and common bur-reed (*Sparganium eurycarpum*). **Floating leafed**; spatterdock (*Nuphar variegata*), white water lily (*Nymphaea odorata),* and duckweed (*Lemna sp.*). **Submergents;** wild

celery/eel-grass (*Vallisneria americana*), flat stem pondweed (*Potamogeton zosteriformis*), sago pondweed (*P. pectinatus*), curly leaf pondweed (*P. crispus*), clasping leaf pondweed (*P. richardsonii*), bushy pondweed (*Najas flexis*), illinois pondweed (*P. illinoensis),* coontail (*Ceratophyllum demersum*), northern milfoil (*Myriophyllum sibiricum)*, muskgrass (*Chara sp.*), and elodea.

Chemical treatments and/or mechanical harvesting are strongly discouraged. Historical chemical treatments and mechanical harvesting should be limited to navigational channels only. All other interests in chemical treatments and mechanical harvesting should be scrutinized.

Resource Value of Site B

Sensitive area B consists of a small bay located at the west side of Upper Turtle Lake.

This area provides important habitat for centrarchid (bass and panfish) and esocid (northern pike) spawning and nursery areas. This area also provides important habitat for forage species. Wildlife also are reliant upon this area for habitat. Eagles, loons, herons, waterfowl, songbirds, furbearers, turtles, and amphibians benefit from this valuable habitat.

The emergent, floating and submergent plant community structure of Sensitive area B includes: **Emergents;** common bur-reed (*Sparganium eurycarpum*), soft stem bulrush (*Scripus validus*), arrowhead (*Sagittaria sp.*), and broad-leafed cattail (*Typha latifolia*). **Floating leafed** duckweed (*Lemna sp.*) and white water lily (*Nymphaea odorata*). **Submergents;** wild celery/eel grass (*Vallisneria americana*), flat stem pondweed (*Potamogeton zosteriformis*), bushy pondweed (*Najas flexis*), clasping leaf pondweed (*P. richardsonii*), sago pondweed (*P. pectinatus*), northern milfoil (*Myriophyllum sibiricum*), coontail (*Ceratophyllum demersum*), muskgrass (*Chara sp.*), and elodea.

Chemical treatments and/or mechanical harvesting are strongly discouraged. Historical chemical treatments and mechanical harvesting should be limited to navigational channels only. All other interests in chemical treatments and mechanical harvesting should be scrutinized.

Resource Value of Site C

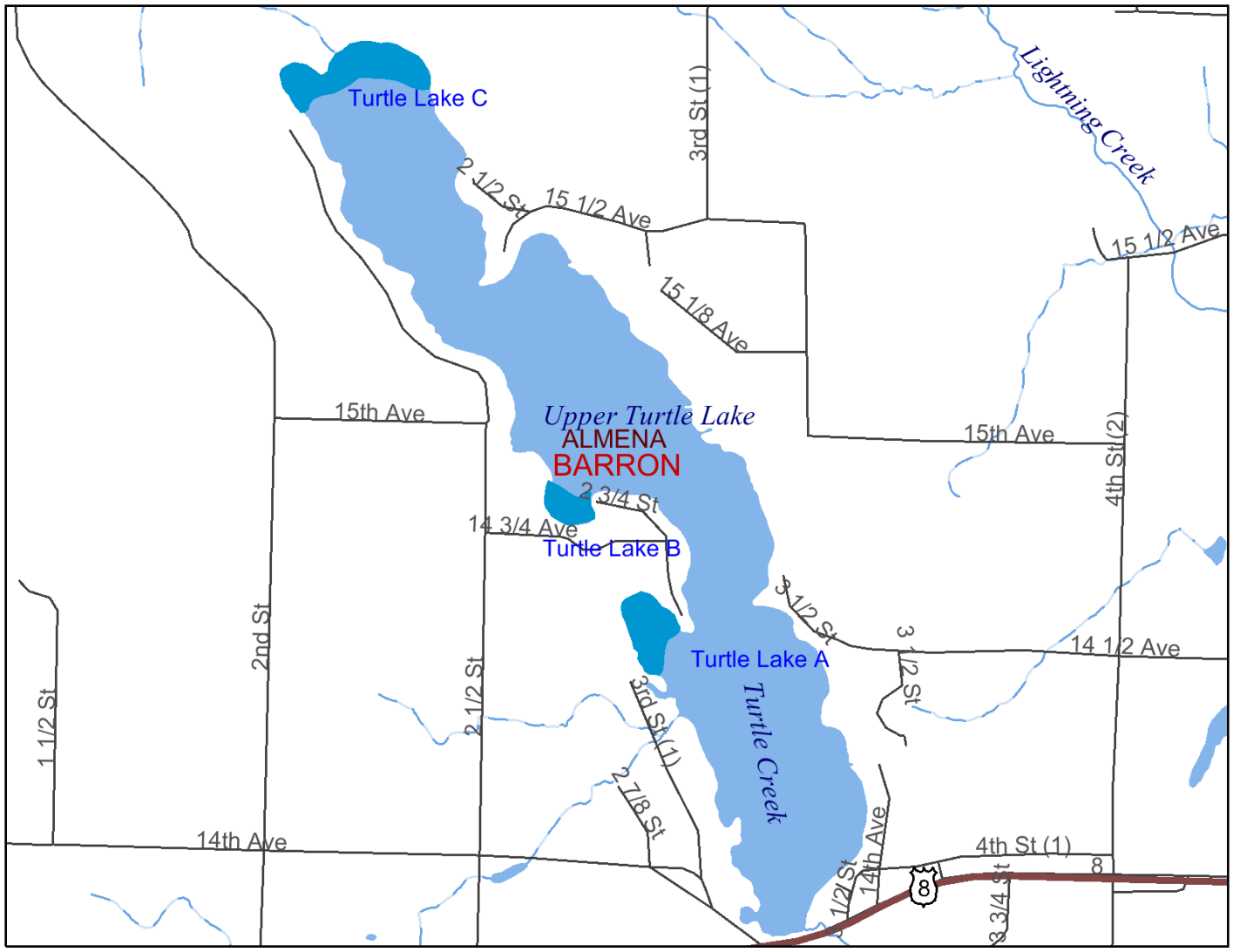
Sensitive area C is located in the northern bay on the end of Upper Turtle Lake.

This area provides important habitat for centrarchid (bass and panfish) and esocid (northern pike) spawning and nursery areas. This area also provides important habitat for forage species. Wildlife also are reliant upon this area for habitat. Eagles, loons, herons, waterfowl, songbirds, furbearers, turtles, and amphibians benefit from this valuable habitat.

The emergent, floating and submergent plant community structure of Sensitive area C includes: **Emergents;** soft stem bulrush (*Scirpus validus*) and broad leaf cattail (*Typha latifolia*). **Floating leafed**; spatterdock (*Nuphar variegata*), duckweed (*Lemna sp.*) and white water lily (*Nymphaea odorata*). **Submergents;** flat stem pondweed (*Potamogeton zosteriformis*), curly leaf pondweed (*P. crispus*), variable pondweed (*P. gramineus*), coontail (*Ceratophyllum demersum)*, illinois pondweed (*P. illinoensis*), northern milfoil (*Myriophyllum sibiricum),* and elodea.

Chemical treatments and/or mechanical harvesting are strongly discouraged. Historical chemical treatments and mechanical harvesting should be limited to navigational channels only. All other interests in chemical treatments and mechanical harvesting should be scrutinized.

Upper Turtle Lake Sensitive Areas



0 2400 4800 7200 ft.

Legend

Major Highways
- Interstate
- State Highway
- U.S. Highways

County Roads

Local Roads

24K County Boundaries

Civil Towns
- Civil Town

Critical Habitat Areas
- Sensitive Area Designation
- Other Public Rights Feature

24K Open Water

24K Rivers and Shorelines
- Intermittent
- Fluctuating
- Perennial

Cities and Villages
- Village
- City

N

Scale: 1:24,540

Appendix B

NR 109

Chapter NR 109

AQUATIC PLANTS: INTRODUCTION, MANUAL REMOVAL AND MECHANICAL CONTROL REGULATIONS

NR 109.01 Purpose. The purpose of this chapter is to establish procedures and requirements for the protection and regulation of aquatic plants pursuant to ss. 23.24 and 30.07, Stats. Diverse and stable communities of native aquatic plants are recognized to be a vital and necessary component of a healthy aquatic ecosystem. This chapter establishes procedures and requirements for issuing aquatic plant management permits for introduction of aquatic plants or control of aquatic plants by manual removal, burning, use of mechanical means or plant inhibitors. This chapter identifies other permits issued by the department for aquatic plant management that contain the appropriate conditions as required under this chapter for aquatic plant management, and for which no separate permit is required under this chapter. Introduction and control of aquatic plants shall be allowed in a manner consistent with sound ecosystem management, shall consider cumulative impacts, and shall minimize the loss of ecological values in the body of water. The purpose of this chapter is also to prevent the spread of invasive and non−native aquatic organisms by prohibiting the launching of watercraft or equipment that has any aquatic plants or zebra mussels attached.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03; **correction made under s. 13.92 (4) (b) 7., Stats., Register March 2011 No. 663.**

NR 109.02 Applicability. A person sponsoring or conducting manual removal, burning or using mechanical means or aquatic plant inhibitors to control aquatic plants in navigable waters, or introducing non−native aquatic plants to waters of this state shall obtain an aquatic plant management permit from the department under this chapter.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

NR 109.03 Definitions. In this chapter:

(1) "Aquatic community" means lake or river biological resources.

(2) "Beneficial water use activities" mean angling, boating, swimming or other navigational or recreational water use activity.

(3) "Body of water" means any lake, river or wetland that is a water of this state.

(4) "Complete application" means a completed and signed application form, the information specified in s. NR 109.04 and any other information which may reasonably be required from an applicant and which the department needs to make a decision under applicable provisions of law.

(5) "Department" means the Wisconsin department of natural resources.

(6) "Manual removal" means the control of aquatic plants by hand or hand−held devices without the use or aid of external or auxiliary power.

(7) "Navigable waters" means those waters defined as navigable under s. 30.10, Stats.

(8) "Permit" means aquatic plant management permit.

(9) "Plan" means aquatic plant management plan.

(10) "Wetlands" means an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

NR 109.04 Application requirements and fees. **(1)** Permit applications shall be made on forms provided by the department and shall be submitted to the regional director or designee for the region in which the project is located. Permit applications for licensed aquatic nursery growers may be submitted to the department of agriculture, trade and consumer protection.

Note: Applications may be obtained from the department's regional headquarters or service centers. DATCP has agreed to send application forms and instructions provided by the department to aquatic nursery growers along with license renewal forms. DATCP will forward all applications to the department for processing.

(2) The application shall be accompanied by all of the following unless the application is made by licensed aquatic nursery growers for selective harvesting of aquatic plants for nursery stock. Applications made by licensed aquatic nursery growers for harvest of nursery stock do not have to include the information required by par. (d), (e), (h), (i) or (j).

(a) A nonrefundable application fee. The application fee for an aquatic plant management permit is:

1. $30 for a proposed project to manage aquatic plants on less than one acre.

2. $30 per acre to a maximum of $300 for a proposed project to manage aquatic plants on one acre or larger. Partial acres shall be rounded up to the next full acre for fee determination. An annual renewal of this permit may be requested with an additional application fee of one−half the original application fee, but not less than $30.

(b) A legal description of the body of water including township, range and section number.

(c) One copy of a detailed map of the body of water with the proposed introduction or control area dimensions clearly shown. Private individuals doing plant introduction or control shall provide the name of the owner riparian to the management area, which includes the street address or block, lot and fire number where available and local telephone number or other pertinent information necessary to locate the property.

(d) One copy of any existing aquatic management plan for the body of water, or detailed reference to the plan, citing the plan references to the proposed introduction or control area, and a description of how the proposed introduction or control of aquatic plants is compatible with any existing plan.

(e) A description of the impairments to water use caused by the aquatic plants to be managed.

(f) A description of the aquatic plants to be controlled or removed.

(g) The type of equipment and methods to be used for introduction, control or removal.

(h) A description of other introduction or control methods considered and the justification for the method selected.

(i) A description of any other method being used or intended for use for plant management by the applicant or on the area abutting the proposed management area.

(j) The area used for removal, reuse or disposal of aquatic plants.

(k) The name of any person or commercial provider of control or removal services.

(3) (a) The department may require that an application for an aquatic plant management permit contain an aquatic plant management plan that describes how the aquatic plants will be introduced, controlled, removed or disposed. Requirements for an aquatic plant management plan shall be made in writing stating the reason for the plan requirement. In deciding whether to require a plan, the department shall consider the potential for effects on protection and development of diverse and stable communities of native aquatic plants, for conflict with goals of other written ecological or lake management plans, for cumulative impacts and effect on the ecological values in the body of water, and the long−term sustainability of beneficial water use activities.

(b) Within 30 days of receipt of the plan, the department shall notify the applicant of any additional information or modifications to the plan that are required. If the applicant does not submit the additional information or modify the plan as requested by the department, the department may dismiss the aquatic plant management permit application.

(c) The department shall approve the aquatic plant management plan before an application may be considered complete.

(4) The permit sponsor may request an annual renewal in writing from the department under s. NR 109.05 if there is no change proposed in the conditions of the original permit issued.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

NR 109.05 Permit issuance. (1) The department shall issue or deny issuance of the requested permit within 15 working days after receipt of a completed application and approved plan as required under s. NR 109.04 (3).

(2) The department may specify any of the following as conditions of the permit:

(a) The quantity of aquatic plants that may be introduced or controlled.

(b) The species of aquatic plants that may be introduced or controlled.

(c) The areas in which aquatic plants may be introduced or controlled.

(d) The methods that may be used to introduce or control aquatic plants.

(e) The times during which aquatic plants may be introduced or controlled.

(f) The allowable methods used for disposing of or using aquatic plants that are removed or controlled.

(g) Annual or other reporting requirements to the department that may include information related to pars. (a) to (f).

(3) The department may deny issuance of the requested permit if the department determines any of the following:

(a) Aquatic plants are not causing significant impairment of beneficial water use activities.

(b) The proposed introduction or control will not remedy the water use impairments caused by aquatic plants as identified as a part of the application in s. NR 109.04 (2) (e).

(c) The proposed introduction or control will result in a hazard to humans.

(d) The proposed introduction or control will cause significant adverse impacts to threatened or endangered resources.

(e) The proposed introduction or control will result in a significant adverse effect on water quality, aquatic habitat or the aquatic community including the native aquatic plant community.

(f) The proposed introduction or control is in locations identified by the department as sensitive areas, under s. NR 107.05 (3) (i) 1., except when the applicant demonstrates to the satisfaction of the department that the project can be conducted in a manner that will not alter the ecological character or reduce the ecological value of the area.

(g) The proposed management will result in significant adverse long−term or permanent changes to a plant community or a high value species in a specific aquatic ecosystem. High value species are individual species of aquatic plants known to offer important values in specific aquatic ecosystems, including Potamogeton amplifolius, Potamogeton Richardsonii, Potamogeton praelongus, Stuckenia pectinata (Potamogeton pectinatus), Potamogeton illinoensis, Potamogeton robbinsii, Eleocharis spp., Scirpus spp., Valisneria spp., Zizania spp., Zannichellia palustris and Brasenia schreberi.

(h) If wild rice is involved, the stipulations incorporated by *Lac Courte Oreilles v. Wisconsin*, 775 F. Supp. 321 (W.D. Wis. 1991) shall be complied with.

(i) The proposed introduction or control will interfere with the rights of riparian owners.

(j) The proposed management is inconsistent with a department approved aquatic plant management plan for the body of water.

(4) The department may approve the application in whole or in part consistent with the provisions of sub. (3). A denial shall be in writing stating the reasons for the denial.

(5) (a) The department may issue an aquatic plant management permit on less than one acre in a single riparian area for a 3−year term.

(b) The department may issue an aquatic plant management permit for a one−year term for more than one acre or more than one riparian area. The permit may be renewed annually for up to a total of 3 years in succession at the written request of the permit holder, provided no modifications or changes are made from the original permit.

(c) The department may issue an aquatic plant management permit containing a department−approved plan for a 3 to 5 year term.

(d) The department may issue an aquatic plant management permit to a licensed nursery grower for a 3−year term for the harvesting of aquatic plants from a publicly owned lake bed or for a 5−year term for harvesting of aquatic plants from privately owned beds with the permission of the property owner.

(6) The approval of an aquatic plant management permit does not represent an endorsement of the permitted activity, but represents that the applicant has complied with all criteria of this chapter.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03; reprinted to restore dropped language from rule order, Register October 2003 No. 574.

NR 109.06 Waivers. The department waives the permit requirements under this chapter for any of the following:

(1) Manual removal or use of mechanical devices to control or remove aquatic plants from a body of water 10 acres or less that is entirely confined on the property of one person with the permission of that property owner.

Note: A person who introduces native aquatic plants or removes aquatic plants by manual or mechanical means in the course of operating an aquatic nursery as authorized under s. 94.10, Stats., on privately owned non−navigable waters of the state is not required to obtain a permit for the activities.

(2) A riparian owner who manually removes aquatic plants from a body of water or uses mechanical devices designed for cutting or mowing vegetation to control plants on an exposed lake bed that abuts the owner's property provided that the removal meets all of the following:

(a) 1. Removal of native plants is limited to a single area with a maximum width of no more than 30 feet measured along the shoreline provided that any piers, boatlifts, swimrafts and other recreational and water use devices are located within that 30−foot wide zone and may not be in a new area or additional to an area where plants are controlled by another method; or

2. Removal of nonnative or invasive aquatic plants as designated under s. NR 109.07 when performed in a manner that does not harm the native aquatic plant community; or

3. Removal of dislodged aquatic plants that drift on−shore and accumulate along the waterfront.

(b) Is not located in a sensitive area as defined by the department under s. NR 107.05 (3) (i) 1., or in an area known to contain threatened or endangered resources or floating bogs.

(c) Does not interfere with the rights of other riparian owners.

(d) If wild rice is involved, the procedures of s. NR 19.09 (1) shall be followed.

(4) Control of purple loosestrife by manual removal or use of mechanical devices when performed in a manner that does not harm the native aquatic plant community or result in or encourage re−growth of purple loosestrife or other nonnative vegetation.

(5) Any aquatic plant management activity that is conducted by the department and is consistent with the purposes of this chapter.

(6) Manual removal and collection of native aquatic plants for lake study or scientific research when performed in a manner that does not harm the native aquatic plant community.

Note: Scientific collectors permit requirements are still applicable.

(7) Incidental cutting, removal or destroying of aquatic plants when engaged in beneficial water use activities.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

NR 109.07 Invasive and nonnative aquatic plants. (1) The department may designate any aquatic plant as an invasive aquatic plant for a water body or a group of water bodies if it has the ability to cause significant adverse change to desirable aquatic habitat, to significantly displace desirable aquatic vegetation, or to reduce the yield of products produced by aquaculture.

(2) The following aquatic plants are designated as invasive aquatic plants statewide: Eurasian water milfoil, curly leaf pondweed and purple loosestrife.

(3) Native and nonnative aquatic plants of Wisconsin shall be determined by using scientifically valid publications and findings by the department.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

NR 109.08 Prohibitions. (1) No person may distribute an invasive aquatic plant, under s. NR 109.07.

(2) No person may intentionally introduce Eurasian water milfoil, curly leaf pondweed or purple loosestrife into waters of this state without the permission of the department.

(3) No person may intentionally cut aquatic plants in public/navigable waters without removing cut vegetation from the body of water.

(4) (a) No person may place equipment used in aquatic plant management in a navigable water if the person has reason to believe that the equipment has any aquatic plants or zebra mussels attached.

(b) This subsection does not apply to equipment used in aquatic plant management when re−launched on the same body of water without having visited different waters, provided the re−launching will not introduce or encourage the spread of existing aquatic species within that body of water.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

NR 109.09 Plan specifications and approval. (1) Applicants required to submit an aquatic plant management plan, under s. NR 109.04 (3), shall develop and submit the plan in a format specified by the department.

(2) The plan shall present and discuss each of the following items:

(a) The goals and objectives of the aquatic plant management and protection activities.

(b) A physical, chemical and biological description of the waterbody.

(c) The intensity of water use.

(d) The location of aquatic plant management activities.

(e) An evaluation of chemical, mechanical, biological and physical aquatic plant control methods.

(f) Recommendations for an integrated aquatic plant management strategy utilizing some or all of the methods evaluated in par. (e).

(g) An education and information strategy.

(h) A strategy for evaluating the efficacy and environmental impacts of the aquatic plant management activities.

(i) The involvement of local units of government and any lake organizations in the development of the plan.

(3) The approval of an aquatic plant management plan does not represent an endorsement for plant management, but represents that adequate considerations in planning the actions have been made.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

NR 109.10 Other permits. Permits issued under s. 30.12, 30.20, 31.02 or 281.36, Stats., or under ch. NR 107 may contain provisions which provide for aquatic plant management. If a permit issued under one of these authorities contains the appropriate conditions as required under this chapter for aquatic plant management, a separate permit is not required under this chapter. The permit shall explicitly state that it is intended to comply with the substantive requirements of this chapter.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

NR 109.11 Enforcement. (1) Violations of this chapter may be prosecuted by the department under chs. 23, 30 and 31, Stats.

(2) Failure to comply with the conditions of a permit issued under or in accordance with this chapter may result in cancellation of the permit and loss of permit privileges for the subsequent year. Notice of cancellation or loss of permit privileges shall be provided by the department to the permit holder.

History: CR 02−061: cr. Register May 2003 No. 569, eff. 6−1−03.

Appendix C

NR 107

Chapter NR 107

AQUATIC PLANT MANAGEMENT

Note: Chapter NR 107 as it existed on February 28, 1989 was repealed and a new Chapter NR 107 was created effective March 1, 1989.

NR 107.01 Purpose. The purpose of this chapter is to establish procedures for the management of aquatic plants and control of other aquatic organisms pursuant to s. 227.11 (2) (a), Stats., and interpreting s. 281.17 (2), Stats. A balanced aquatic plant community is recognized to be a vital and necessary component of a healthy aquatic ecosystem. The department may allow the management of nuisance−causing aquatic plants with chemicals registered and labeled by the U.S. environmental protection agency and labeled and registered by firms licensed as pesticide manufacturers and labelers with the Wisconsin department of agriculture, trade and consumer protection. Chemical management shall be allowed in a manner consistent with sound ecosystem management and shall minimize the loss of ecological values in the water body.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; **correction made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540.**

NR 107.02 Applicability. Any person sponsoring or conducting chemical treatment for the management of aquatic plants or control of other aquatic organisms in waters of the state shall obtain a permit from the department. Waters of the state include those portions of Lake Michigan and Lake Superior, and all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, watercourses, drainage systems and other ground or surface water, natural or artificial, public or private, within the state or its jurisdiction as specified in s. 281.01 (18), Stats.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; **correction made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540.**

NR 107.03 Definitions. (1) "Applicator" means the person physically applying the chemicals to the treatment site.

(2) "Chemical fact sheet" means a summary of information on a specific chemical written by the department including general aquatic community and human safety considerations applicable to Wisconsin sites.

(3) "Department" means the department of natural resources.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.04 Application for permit. (1) Permit applications shall be made on forms provided by the department and shall be submitted to the district director for the district in which the project is located. Any amendment or revision to an application shall be treated by the department as a new application, except as provided in s. NR 107.04 (3) (g).

Note: The DNR district headquarters are located at:

1. Southern — 3911 Fish Hatchery Road, Fitchburg 53711
2. Southeast — 2300 N. Dr. Martin Luther King Jr. Dr., Box 12436, Milwaukee 53212
3. Lake Michigan — 1125 N. Military Ave., Box 10448, Green Bay 54307
4. North Central — 107 Sutliff Ave., Box 818, Rhinelander 54501
5. Western — 1300 W. Clairemont Ave., Call Box 4001, Eau Claire 54702
6. Northwest — Hwy 70 West, Box 309, Spooner 54801

(2) The application shall be accompanied by:

(a) A nonrefundable permit application fee of $20, and, for proposed treatments larger than 0.25 acres, an additional refundable acreage fee of $25.00 per acre, rounded up to the nearest whole acre, applied to a maximum of 50.0 acres.

1. The acreage fee shall be refunded in whole if the entire permit is denied or if no treatment occurs on any part of the permitted treatment area. Refunds will not be prorated for partial treatments.

2. If the permit is issued with the proposed treatment area partially denied, a refund of acreage fees shall be given for the area denied.

(b) A legal description of the body of water proposed for treatment including township, range and section number;

(c) One copy of a detailed map or sketch of the body of water with the proposed treatment area dimensions clearly shown and with pertinent information necessary to locate those properties, by name of owner, riparian to the treatment area, which may include street address, local telephone number, block, lot and fire number where available. If a local address is not available, the home address and phone number of the property owner may be included;

(d) A description of the uses being impaired by plants or aquatic organisms and reason for treatment;

(e) A description of the plant community or other aquatic organisms causing the use impairment;

(f) The product names of chemicals proposed for use and the method of application;

(g) The name of the person or commercial applicator, and applicator certification number, when required by s. NR 107.08 (5), of the person conducting the treatment;

(h) A comparison of alternative control methods and their feasibility for use on the proposed treatment site.

(3) In addition to the information required under sub. (2), when the proposed treatment is a large−scale treatment exceeding 10.0 acres in size or 10% of the area of the water body that is 10 feet or less in depth, the application shall be accompanied by:

(a) A map showing the size and boundaries of the water body and its watershed.

(b) A map and list identifying known or suspected land use practices contributing to plant−related water quality problems in the watershed.

(c) A summary of conditions contributing to undesirable plant growth on the water body.

(d) A general description of the fish and wildlife uses occurring within the proposed treatment site.

(e) A summary of recreational uses of the proposed treatment site.

(f) Evidence that a public notice of the proposed application has been made, and that a public informational meeting, if required, has been conducted.

1. Notice shall be given in 2 inch x 4 inch advertising format in the newspaper which has the largest circulation in the area affected by the application.

2. The notice shall state the size of the proposed treatment, the approximate treatment dates, and that the public may request within 5 days of the notice that the applicant hold a public informational meeting on the proposed application.

a. The applicant will conduct a public informational meeting in a location near the water body when a combination of 5 or more individuals, organizations, special units of government, or local units of government request the meeting in writing to the applicant

with a copy to the department within 5 days after the notice is made. The person or entity requesting the meeting shall state a specific agenda of topics including problems and alternatives to be discussed.

b. The meeting shall be given a minimum of one week advance notice, both in writing to the requestors, and advertised in the format of subd. 1.

(g) The provisions of pars. (a) to (e) shall be repeated once every 5 years and shall include new information. Annual modifications of the proposed treatment within the 5−year period which do not expand the treatment area more than 10% and cover a similar location and target organisms may be accepted as an amendment to the original application. The acreage fee submitted under sub. (2) (a) shall be adjusted in accordance with any proposed amendments.

(4) The applicant shall certify to the department that a copy of the application has been provided to any affected property owners' association, inland lake district, and, in the case of chemical applications for rooted aquatic plants, to any riparian property owners adjacent to and within the treatment area.

(5) A notice of the proposed treatment shall be provided by the department to any person or organization indicating annually in writing a desire to receive such notification.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.05 Issuance of permit. (1) The department shall issue or deny issuance of the requested permit between 10 and 15 working days after receipt of an acceptable application, unless:

(a) An environmental impact report or statement is required under s. 1.11, Stats. Notification to the applicant shall be in writing within 10 working days of receipt of the application and no action may be taken until the report or statement has been completed; or

(b) A public hearing has been granted under s. 227.42, Stats.

(2) If a request for a public hearing is received after the permit is issued but prior to the actual treatment allowed by the permit, the department is not required to, but may, suspend the permit because of the request for public hearing.

(3) The department may deny issuance of the requested permit if:

(a) The proposed chemical is not labeled and registered for the intended use by the United States environmental protection agency and both labeled and registered by a firm licensed as a pesticide manufacturer and labeler with the Wisconsin department of agriculture, trade and consumer protection;

(b) The proposed chemical does not have a current department aquatic chemical fact sheet;

(c) The department determines the proposed treatment will not provide nuisance relief, or will place unreasonable restrictions on existing water uses;

(d) The department determines the proposed treatment will result in a hazard to humans, animals or other nontarget organisms;

(e) The department determines the proposed treatment will result in a significant adverse effect on the body of water;

(f) The proposed chemical application is for waters beyond 150 feet from shore except where approval is given by the department to maintain navigation channels, piers or other facilities used by organizations or the public including commercial facilities;

(g) The proposed chemical applications, other than those conducted by the department pursuant to ss. 29.421 and 29.424, Stats., will significantly injure fish, fish eggs, fish larvae, essential fish food organisms or wildlife, either directly or through habitat destruction;

(h) The proposed chemical application is in a location known to have endangered or threatened species as specified pursuant to s. 29.604, Stats., and as determined by the department;

(i) The proposed chemical application is in locations identified by the department as sensitive areas, except when the applicant demonstrates to the satisfaction of the department that treatments can be conducted in a manner that will not alter the ecological character or reduce the ecological value of the area.

1. Sensitive areas are areas of aquatic vegetation identified by the department as offering critical or unique fish and wildlife habitat, including seasonal or lifestage requirements, or offering water quality or erosion control benefits to the body of water.

2. The department shall notify any affected property owners' association, inland lake district, and riparian property owner of locations identified as sensitive areas.

(4) New applications will be reviewed with consideration given to the cumulative effect of applications already approved for the body of water.

(5) The department may approve the application in whole or in part consistent with the provisions of subs. (3) (a) through (i) and (4). Denials shall be in writing stating reasons for the denial.

(6) Permits may be issued for one treatment season only.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; **corrections in (3) (g) and (h) made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540.**

NR 107.06 Chemical fact sheets. (1) The department shall develop a chemical fact sheet for each of the chemicals in present use for aquatic nuisance control in Wisconsin.

(1m) Chemical fact sheets for chemicals not previously used in Wisconsin shall be developed within 180 days after the department has received notice of intended use of the chemical.

(2) The applicant or permit holder shall provide copies of the applicable chemical fact sheets to any affected property owners' association and inland lake district.

(3) The department shall make chemical fact sheets available upon request.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.07 Supervision. (1) The permit holder shall notify the district office 4 working days in advance of each anticipated treatment with the date, time, location, and proposed size of treatment. At the discretion of the department, the advance notification requirement may be waived.

(2) Supervision by a department representative may be required for any aquatic nuisance control project involving chemicals. Supervision may include inspection of the proposed treatment area, chemicals, and application equipment before, during or after treatment. The inspection may result in the determination that treatment is unnecessary or unwarranted in all or part of the proposed area, or that the equipment will not control the proper dosage.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.08 Conditions of the permit. (1) The department may stop or limit the application of chemicals to a body of water if at any time it determines that chemical treatment will be ineffective, or will result in unreasonable restrictions on current water uses, or will produce unnecessary adverse side effects on nontarget organisms. Upon request, the department shall state the reason for such action in writing to the applicant.

(2) Chemical treatments shall be performed in accordance with label directions, existing pesticide use laws, and permit conditions.

(3) Chemical applications on lakes and impoundments are limited to waters along developed shoreline including public parks except where approval is given by the department for projects of public benefit.

(4) Treatment of areas containing high value species of aquatic plants shall be done in a manner which will not result in adverse long−term or permanent changes to a plant community in a specific aquatic ecosystem. High value species are individual species of aquatic plants known to offer important values in spe-

cific aquatic ecosystems, including *Potamogeton amplifolius, Potamogeton Richardsonii, Potamogeton praelongus, Potamogeton pectinatus, Potamogeton illinoensis, Potamogeton robbinsii, Eleocharis spp., Scirpus spp., Valisneria spp., Zizania aquatica, Zannichellia palustris* and *Brasenia schreberi.*

(5) Treatment shall be performed by an applicator currently certified by the Wisconsin department of agriculture, trade and consumer protection in the aquatic nuisance control category whenever:

(a) Treatment is to be performed for compensation by an applicator acting as an independent contractor for hire;

(b) The area to be treated is greater than 0.25 acres;

(c) The product to be used is classified as a "restricted use pesticide"; or

(d) Liquid chemicals are to be used.

(6) Power equipment used to apply liquid chemicals shall include the following:

(a) Containers used to mix and hold chemicals shall be constructed of watertight materials and be of sufficient size and strength to safely contain the chemical. Measuring containers and scales for the purpose of measuring solids and liquids shall be provided by the applicator;

(b) Suction hose used to deliver the chemical to the pump venturi assembly shall be fitted with an on−off ball−type valve. The system shall also be designed to prevent clogging from chemicals and aquatic vegetation;

(c) Suction hose used to deliver surface water to the pump shall be fitted with a check valve to prevent back siphoning into the surface water should the pump stop;

(d) Suction hose used to deliver a premixed solution shall be fitted with an on−off ball−type valve to regulate the discharge rate;

(e) Pressure hose used to discharge chemicals to the surface water shall be provided with an on−off ball−type valve. This valve will be fitted at the base of the hose nozzle or as part of the nozzle assembly;

(f) All pressure and suction hoses and mechanical fittings shall be watertight;

(g) Equipment shall be calibrated by the applicator. Evidence of calibration shall be provided at the request of the department supervisor.

(h) Other equipment designs may be acceptable if capable of equivalent performance.

(7) The permit holder shall be responsible for posting those areas of use in accordance with water use restrictions stated on the chemical label, but in all cases for a minimum of one day, and with the following conditions:

(a) Posting signs shall be brilliant yellow and conspicuous to the nonriparian public intending to use the treated water from both the water and shore, and shall state applicable label water use restrictions of the chemical being used, the name of the chemical and date of treatment. For tank mixes, the label requirements of the most restrictive chemical will be posted;

(b) Minimum sign dimensions used for posting shall be 11 inches by 11 inches or consistent with s. ATCP 29.15. The department will provide up to 6 signs to meet posting requirements. Additional signs may be purchased from the department;

(c) Signs shall be posted at the beginning of each treatment by the permit holder or representing agent. Posting prior to treatment may be required as a permit condition when the department determines that such posting is in the best interest of the public;

(d) Posting signs shall be placed along contiguous treated shoreline and at strategic locations to adequately inform the public. Posting of untreated shoreline located adjacent to treated shoreline and noncontiguous shoreline shall be at the discretion of the department;

(e) Posting signs shall be made of durable material to remain up and legible for the time period stated on the pesticide label for water use restrictions, after which the permit holder or representing agent is responsible for sign removal.

(8) After conducting a treatment, the permit holder shall complete and submit within 30 days an aquatic nuisance control report on a form supplied by the department. Required information will include the quantity and type of chemical, and the specific size and location of each treatment area. In the event of any unusual circumstances associated with a treatment, or at the request of the department, the report shall be provided immediately. If treatment did not occur, the form shall be submitted with appropriate comment by October 1.

(9) Failure to comply with the conditions of the permit may result in cancellation of the permit and loss of permit privileges for the subsequent treatment season. A notice of cancellation or loss of permit privileges shall be provided by the department to the permit holder accompanied by a statement of appeal rights.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89**;** correction in (7) (b) made under s. 13.93 (2m) (b) 7., Stats., Register, September, 1995, No. 477.

NR 107.09 Special limitation. Due to the significant risk of environmental damage from copper accumulation in sediments, swimmer's itch treatments performed with copper sulfate products at a rate greater than 10 pounds of copper sulfate per acre are prohibited.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.10 Field evaluation use permits. When a chemical product is considered for aquatic nuisance control and does not have a federal label for such use, the applicant shall apply to the administrator of the United States environmental protection agency for an experimental use permit under section 5 of the federal insecticide, fungicide and rodenticide act as amended (7 USC 136 et seq.). Upon receiving a permit, the permit holder shall obtain a field evaluation use permit from the department and be subject to the requirements of this chapter. Department field evaluation use permits shall be issued for the purpose of evaluating product effectiveness and safety under field conditions and will require in addition to the conditions of the permit specified in s. NR 107.08 (1) through (9), the following:

(1) Treatment shall be limited to an area specified by the department.

(2) The permit holder shall submit to the department a summary of treatment results at the end of the treatment season. The summary shall include:

(a) Total chemical used and distribution pattern, including chemical trade name, formulation, percent active ingredient, and dosage rate in the treated water in parts per million of active ingredient;

(b) Description of treatment areas including the character and the extent of the nuisance present;

(c) Effectiveness of the application and when applicable, a summary comparison of the results obtained from past experiments using the same chemical formulation;

(d) Other pertinent information required by the department; and

(e) Conclusions and recommendations for future use.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.11 Exemptions. (1) Under any of the following conditions, the permit application fee in s. NR 107.04 (2) (a) will be limited to the basic application fee:

(a) The treatment is made for the control of bacteria on swimming beaches with chlorine or chlorinated lime;

(b) The treatment is intended to control algae or other aquatic nuisances that interfere with the use of the water for potable purposes;

(c) The treatment is necessary for the protection of public health, such as the control of disease carrying organisms in sanitary sewers, storm sewers, or marshes, and the treatment is sponsored by a governmental agency.

(2) The treatment of purple loosestrife is exempt from ss. NR 107.04 (2) (a) and (3), and 107.08 (5).

(3) The use of chemicals in private ponds is exempt from the provisions of this chapter except for ss. NR 107.04 (1), (2), (4) and (5), 107.05, 107.07, 107.08 (1), (2), (8) and (9), and 107.10.

(a) A private pond is a body of water located entirely on the land of an applicant, with no surface water discharge or a discharge that can be controlled to prevent chemical loss, and without access by the public.

(b) The permit application fee will be limited to the non−refundable $20 application fee.

(4) The use of chemicals in accordance with label instructions is exempt from the provisions of this chapter, when used in:

(a) Water tanks used for potable water supplies;

(b) Swimming pools;

(c) Treatment of public or private wells;

(d) Private fish hatcheries licensed under s. 95.60, Stats.;

(e) Treatment of emergent vegetation in drainage ditches or rights−of−way where the department determines that fish and wildlife resources are insignificant; or

(f) Waste treatment facilities which have received s. 281.41, Stats., plan approval or are utilized to meet effluent limitations set forth in permits issued under s. 283.31, Stats.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; **corrections in (4) (d) and (f) made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540.**

Appendix D

NR 19

Chapter NR 19

MISCELLANEOUS FUR, FISH, GAME AND OUTDOOR RECREATION

Note: Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, January, 1999, No. 517; CR 03−029: renum. NR 19.75 through 19.84 to be NR 12.30 through 12.41 Register December 2003 No. 576, eff. 1−1−04.

Subchapter I — Miscellaneous

NR 19.001 Definitions. (1) "Active service", for purposes of s. 29.194, Stats., means full time employment as a member of the armed services and does not include annual summer training by members of the national guard or reserves.

(1m) "Animal part or animal byproduct" has the meaning given in s. NR 10.001 (1r).

(2) "Application" means a written request for any approval of a regulatory agency required as a condition of operating a business in this state completed in the form required by and acceptable to the department and accompanied by additional plans, information and the appropriate fee.

(3) "Approval" means a license, permit or other form of approval required from the department to conduct business activities in Wisconsin.

(4) "Bird feeding devices and structures" means any device or structure that has the primary purpose of attracting or feeding birds or small mammals.

(4m) "Business" means a building used primarily to carry out commercial activities at which regular scheduled business hours are maintained for employees and the public such as restaurants and retail stores, but does not include associated lands, warehouses, outbuildings or other buildings that are not normally open to the public.

(5) "Carcass" means the dead body of any animal including the head, hair, skin, plumage, skeleton, eggs, or any other part thereof.

Note: Milk is not considered to be a part of an animal carcass or an animal byproduct for the purposes of this chapter.

(5m) "Daily bag limit" as used in s. NR 19.275, means the maximum number of a turtle species or group of turtle species which may be taken by a person each day.

(6) "Environmental consulting organization" means an individual or consortium of individuals funded to provide consulting services including status assessment of wild animals and their habitats.

(6d) "Feed" has the meaning given in s. NR 10.001 (10).

(6h) "Feeding site" has the meaning given in s. NR 10.001 (10c).

(6m) "Fish, fur, game seal" or "seal" means a numbered, non−reusable, locking device bearing the embossed inscription Fish, Fur, Game F−(number) which is issued by the department.

(7) "File" or "filed" means receipt by the department of a written notice, verified claim or other document.

(7m) "Hooking", as used in s. NR 19.275, means any activity which utilizes a dull−pointed, metal, barbless hook attached to a staff to remove a turtle from a body of water.

(8) "In the process of being mounted" means, for the purposes of the sale of part or all of a private collection, as authorized by s. 29.354, Stats., a physical process which includes taxidermy work accomplished on the carcass, including at least removal of the skin.

(8g) "Live fish" means, for purposes of this chapter, any fish possessed by a person that is handled or treated in a manner that will keep it alive, such as keeping it in water, or that is revived by placement back into water. "Live fish" includes any minnow that is possessed by a person for use as bait and that dies while the person who possesses it is on the water, bank or shore for the purpose of fishing, but only until the minnow is transported away from water, bank or shore where it died.

(8r) "Live fish eggs" means, for purposes of this chapter, fertilized or unfertilized fish eggs that are handled or treated in a manner likely to keep them alive or viable for the purpose of propagation.

(9) "Maintain records" means, for the purpose of s. 29.503 (5), Stats., to legibly prepare triplicate records and retain at least one copy of each record at the place of business for inspection purposes.

(10) "Mount", "mounted", or "mounting" means, for the purposes of ss. 29.354 (3) and 29.506 (1), Stats., and this section, to prepare and preserve the head, skin or carcass in a lifelike manner.

(11) "Natural resources", for purposes of s. 23.095, Stats., includes wild rice growing in navigable lakes.

(12) "Navigable lake", for the purpose of interpreting s. 29.607, Stats., means a natural navigable lake or a flowage or pond, or portion of a flowage or pond, where the bed is in town, county, city, village, state or federal ownership.

(12e) "Owner−occupied residence" for the purpose of this section means a dwelling or building devoted to human occupancy when used while feeding deer as a residence by the owner, members of the owner's immediate family, or when used as a residence by individuals as a rental property while feeding deer.

(12m) "Possession limit" as used in s. NR 19.275, means the maximum number of a turtle species or group of turtle species which may be possessed by a person at any time.

(13) "Private collection" means, for the purposes of s. 29.354, Stats.:

(a) A privately owned collection mounted for the purpose of display, exhibition or personal use and does not include wild animals mounted for the purpose of sale. In determining whether a wild animal was mounted for the purpose of sale, at a minimum, factors to be considered are the intent of the owner at the time of mounting, the length of time from mounting to sale, display or use of the mounted wild animal prior to sale, frequency of such sales by the owner and the reasons provided by the owner for the sale. This does not preclude the ultimate sale of a mount from a private collection.

(b) A mounted collection sold upon the death of the owner.

(13m) "Preserve" means, for the purposes of s. 29.506 (1), Stats., and this chapter, to treat or process the carcass of a wild animal to prevent the carcass from decaying or spoiling for the purpose of mounting the carcass or parts of the carcass in a lifelike manner.

(14) "Protected wild animals" means those animals for which a closed season, bag limit, size limit or possession limit has been provided by statute or administrative rule, and includes:

(a) Nongame species unless specifically designated as unprotected by the department;

(b) Game fish, game animals, game birds and fur bearing animals during closed seasons;

(c) Endangered and threatened species listed in ch. NR 27.

(15) "Records" means, for the purpose of s. 29.506 (7) (b), Stats., the taxidermist permit, sales forms, information records, records of deliveries and shipments, and the identification tag as described in s. 29.506 (5) (b), Stats.

(15m) "Small mammals" mean all mammals other than bear, deer and elk.

(16) "Stationed", for purposes of s. 29.194, Stats., means residing in Wisconsin in compliance with military orders.

(16m) "Turtle", as used in this chapter, means a reptile having horny, toothless jaws and a body enclosed in a bony or leathery shell into which the head, limbs and tail may be partially or fully withdrawn, and includes parts of turtles and turtle eggs.

(17) "Unprotected wild animals" means those animals for which no closed season, bag limit, size limit or possession limit has been provided by statute or administrative rule.

(18) "Verified" means to confirm or establish by oath, normally in the form of a notarized statement.

(19) "Wild animal" means any mammal, bird, fish, or other creature of a wild nature endowed with sensation and the power of voluntary motion.

History: Cr. Register, September, 1978, No. 273, eff. 10−1−78; r. and recr. Register, January, 1980, No. 289, eff. 2−1−80; cr. (5m) and am. (7), Register, August, 1980, No. 296, eff. 9−1−80; r. (2), (3), (4), (5) and (6), Register, January, 1984, No. 337, eff. 2−1−84; renum. (1) to be (3), cr. (1), (2), (4) and (4m), Register, August, 1985, No. 356, eff 9−1−85; cr. (2m), Register, August, 1986, No. 368, eff. 9−1−86; cr. (2f), (3m), (3p), (3t), (5), (6) and (9), Register, March, 1987, No. 375, eff. 4−1−87; cr. (2e), Register, June, 1988, No. 390, eff. 7−1−88; renum. (1) to (9) to be (2) to (15) and (17) to (19), cr. (1) and (16), Register, October, 1988, No. 394, eff. 11−1−88; emerg. r. (4), eff. 10−16−89; cr. (6m), Register, March, 1990, No. 411, eff. 4−1−90; r. (4), Register, May, 1990, No. 413, eff. 6−1−90; cr. (5m), (7m), (12m) and (16m), Register, February, 1997, No. 494, eff. 3−1−97; CR 04−078: cr. (1m), (4), (4m), (6d), (6h), (12e), and (15m) Register April 2005 No. 592, eff. 5−1−05; emerg. cr. (8g) and (8r), eff. 11−2−07; CR 07−074: cr. (8g) and (8r) Register May 2008 No. 629, eff. 6−1−08; CR 08−021: cr. (13m) Register November 2008 No. 635, eff. 12−1−08; CR 11−030: am. (5) Register February 2012 No. 674, eff. 3−1−12; correction in (2) made under s. 13.92 (4) (b) 6., Stats., Register May 2013 No. 689.

NR 19.01 Approval deadlines. (1) GENERAL. Upon receipt of an application for an approval required to conduct business activities under ch. 29, Stats., ss. 30.50 to 30.54, 350.12 and 350.125, Stats., the department shall review and issue a decision on the application within 10 business days unless a different period is otherwise provided in subs. (2) to (6) or other statutes or rules.

(2) SPECIFIC APPROVAL DEADLINES. The following approvals will be acted on as follows:

APPROVALS		BUSINESS DAYS
(a)	Commercial fishing licenses issued under s. 29.519, Stats.	50
(b)	Approvals for falconry, wildlife rehabilitation and chemical control of birds and animals under ss. 23.09, 29.053, 29.088 and 29.601, Stats.	30
(c)	Boat certificates of number and registration under s. 30.52, Stats.	30
(d)	Snowmobile registrations under ss. 350.12 and 350.125, Stats.	30

(2m) APPROVAL TO REMOVE WILD ANIMALS CAUSING DAMAGE. Permits to remove wild animals causing damage shall be issued within 48 hours of receipt of a written complaint. Permits may be granted orally, but shall be confirmed in writing by the department.

(3) STANDARDS AND CONDITIONS. If the department requires standards or conditions to be met or complied with prior to issuance of an approval, the time periods for issuing an approval do not begin to run until the applicant has met such standards or conditions as determined by the department.

Example: An applicant for a wildlife exhibit, game, bird and animal farm, or deer farm license is required to meet pen specifications or fencing requirements before the time system for issuance of approvals begins to apply.

(4) WILDLIFE SURVEYS. If a survey of wildlife on the property is required, the time periods for issuing an approval do not apply until completion of that survey. The survey shall be completed within 30 business days from the time of year that, in the opinion of a professional department wildlife manager, is optimum for determining accurate wildlife populations. At the time the application is received, the department shall inform the applicant of the date by which the survey will be completed.

(5) ENVIRONMENTAL IMPACT. If an environmental analysis, environmental impact report or environmental impact statement is required under ss. 1.11 and 23.11 (5), Stats., and ch. NR 150, the time periods for issuing an approval do not apply until ss. 1.11 and 23.11 (5), Stats., and ch. NR 150 have been complied with.

(6) OTHER APPROVALS. The time for an approval for an activity under sub. (1) will not begin to run until other approvals for that activity are obtained.

History: Cr. Register, August, 1985, No. 356, eff. 9−1−85; cr. (2) (l) and (m), Register, July, 1987, No. 379, eff. 8−1−87; emerg. cr. (2) (n), eff. 9−21−88; cr. (2) (n), Register, January, 1989, No. 397, eff. 2−1−89; emerg. r. (2) (l) to (o), cr. (2m), eff. 10−16−89; r. (2) (l) to (n), cr. (2m), Register, May, 1990, No. 413, eff. 6−1−90; CR 05−031: r. (2) (b) to (h), renum. (2) (i), (j) and (k) to be (b), (c) and (d) and am. (c) and (d) Register November 2005 No. 599, eff. 12−1−05; CR 13−022: am. (5) Register March 2014 No. 699, eff. 4−1−14.

NR 19.02 Handling fees for certain approvals. (1) PURPOSE. This section establishes and describes handling

fees which may be charged for processing requests for approvals ordered by mail, telephone or electronic means.

(2) APPLICABILITY. The provisions of this section apply to licenses, permits, stamps and other approvals issued under the authority of ch. 29, Stats., and offered by the department under extended issuance options and ordered by mail, telephone, or electronic means.

(3) DEFINITIONS. As used in this section:

(a) "Approval" has the meaning in s. 29.001 (12), Stats.

(b) "Department" means the department of natural resources.

(c) "Extended issuance options" means the ability to obtain an approval in person and by mail, telephone or electronic means.

(d) "Order" means a single request from a person for an approval or approvals.

(4) FEE FOR HANDLING APPLICATIONS FOR CERTAIN APPROVALS. (a) In addition to the obligation to pay all fees imposed under s. 29.563, Stats., a person who orders an approval by mail, telephone or electronic means is required to pay a handling fee established in accordance with this section for each order.

(b) The handling fee for each order shall be established by the department based upon projected mailing costs, credit transaction fees, credit verification fees, personnel costs, telecommunications costs and lock box charges associated with processing the order and may not exceed $5.00 per order.

(c) The handling fee under this section shall be established consistent with par. (b) annually prior to April 1 by the secretary of the department.

(d) An order submitted by mail, telephone, or electronic means without payment of all associated fees required under s. 29.563, Stats., and the handling fee in a manner acceptable by the department is not a complete application for the approval and the order will be returned.

(e) If an application for an approval is denied, the handling fee is not refundable.

History: Cr. Register, July, 1996, No. 487, eff. 8−1−96; CR 04−020: am (2) and (3) (c) Register August 2004 No. 584, eff. 9−1−04; CR 05−086: am. (4) (b) Register June 2006 No. 606, eff. 7−1−06.

NR 19.025 Waivers for an educational recreational activity. (1) PURPOSE. This section contains rules for the procedures required to apply to the department for a waiver of approvals, applicable fees and other requirements pursuant to s. 29.197 (2) and (5), Stats., for an educational, recreational and skills development activity that is sponsored or approved by the department. It further explains the reasonable conditions, limitations and restrictions that will be necessary to allow for approval of the waiver.

(2) DEFINITIONS. As used in this section:

(a) "Accompany" means be in immediate presence of the novice participant.

(b) "Educational outdoor skills activity" means a course to teach novice participants how to hunt, trap or fish.

(c) "Mentor" means a person who is instructing or assisting with teaching of the educational outdoor skills activity.

(d) "Novice participant" means for hunting any person who is 10 years old or older, who has not received an approval authorizing hunting in any prior hunting license year, including a class B bear license, for the species that will be pursued in the specific educational outdoor skills activity they desire to attend. For fishing, it means any person who is 5 years of age or older who has less than 2 years of fishing experience.

(e) "Substantial loss of revenue" means a loss of fishing, trapping and hunting license fees from persons who are not novice participants.

(3) GENERAL; CONDITIONS, LIMITATIONS AND RESTRICTIONS. (a) An applicant shall submit a request for a waiver at least 30 days prior to a hunting or trapping event and 15 days before a fishing event. The department may waive the 15 day period for fishing events when the department determines it is not required to conduct criminal history, character or background checks. All applications shall be submitted on forms provided by the department.

(b) A written course outline shall be submitted along with the request for waiver for approval by the department.

(c) There shall be a minimum of 4 hours of classroom and field instruction prior to the hunting or fishing activity.

(d) A novice participant may not obtain more than one waiver of fees for the same hunting or fishing instructional activity.

(dm) If there are more novice participant applicants for a specific educational outdoor skills activity event or location than the department or applicant sponsoring the event is able to accommodate, the department may select which of the novice participant applicants will be allowed to participate. When making this selection, the department shall give preference to those novice participant applicants who have had the least previous exposure, as determined by the department, to that recreational activity or the least opportunity to accompany others and learn about that recreational activity.

(e) Where applicable, written authorization from host landowner shall be obtained and submitted with the application. It shall include the legal description of the lands on which the activity will be conducted. If department lands are to be used, the written approval of the property manager shall be obtained.

(f) Unless otherwise approved, the novice participants and mentors participating in the activity shall comply with all natural resource rules and regulations.

(g) Waivers may not be issued that allow for the shooting of wild animals or the catching of fish by a mentor or instructor.

(h) Novice participants may not be charged a fee which exceeds the costs of materials used in the course, equipment rental, meals and overnight accommodations.

(i) Upon receipt of information indicating prior illegal activity relevant to a mentor's ability to properly assist or instruct novice participants, the department may make appropriate inquiry into criminal history, character and background of mentoring applicants and determine their suitability for the proposed activity.

(j) One of the mentors shall carry the department approved waiver with list of participants during the educational recreational activity.

(k) Waivers under this section shall only apply to novice participants.

(L) The waiver of the approval and applicable fees will not result in a substantial loss of revenue to the department.

Note: Applications may be obtained from any department office.

(4) SPECIAL HUNTING CONDITIONS, LIMITATIONS AND RESTRICTIONS. (a) During the field portion of the hunting activity a mentor shall accompany a novice participant.

(b) During hunting skills field activities the area shall be posted with a sign advising of the activity.

(c) At least one mentor shall be a certified hunter education instructor.

(d) Mentors shall have at least 5 years of hunting experience.

(5) SPECIAL FISHING CONDITIONS, LIMITATIONS AND RESTRICTIONS. (a) Except as provided in par. (b), the applicant, instructors and mentors shall possess a valid fishing approval.

(b) Non−licensed mentors may be involved with assisting but will need approvals if they take part in the actual fishing activity unless they are enrolled as a novice participant.

(6) STATE PARKS. Waivers may be issued that allow the following activities in state parks:

(a) Possession of loaded and uncased firearms.

(b) Possession of strung and uncased bows.

(c) Hunting or trapping on properties opened for the hunting of these species under s. 29.089 (1m), Stats.

(d) Use of unleashed dogs.

(7) EXEMPTIONS. This section does not apply to special hunting events established under s. NR 10.01.

History: Cr. Register, July, 1997, No. 499, eff. 8−1−97; CR 06−012: am. (2) (d) Register December 2006 No. 612, eff. 2−1−07; CR 09−018: am. (3) (a) and (5) (a) Register February 2010 No. 650, eff. 3−1−10; CR 09−024: am. (2) (b), (d) and (e) Register May 2010 No. 653, eff. 6−1−10; CR 10−020: am. (2) (d), cr. (3) (dm) Register October 2010 No. 658, eff. 2−1−11; CR 13−108: am. (6) (c) Register August 2014 No. 704, eff. 9−1−14.

NR 19.03 Control of muskrats on cranberry marshes. (1) The owner or lessee of any improved cranberry marsh area shall comply with s. 29.885, Stats.

(3) The provisions of this section shall not apply to any person or persons who own or are interested in a cranberry marsh situated in the same area wherein said owners are the licensees of a muskrat farm or in which such person or persons have an interest.

(4) The department or its authorized agents may assist any owner or operator of improved cranberry marsh areas with the removal of muskrats from areas that have been damaged, or are being damaged by such muskrats, wherein they believe that the muskrats can be taken alive and removed to other localities deemed advisable by the department.

(5) Any such cranberry marsh areas where muskrats are being controlled as provided in this section shall be open to the inspection of the department or its authorized agents at any time.

History: 1−2−56; r. (2), Register, August, 1966, No. 128, eff. 9−1−66; renum. from WCD 19.03 to be NR 19.03, and am. (1), (4) and (5), Register, April, 1971, No. 184, eff. 5−1−71; r. and recr. (1), Register, August, 1979, No. 284, eff. 9−1−79.

NR 19.05 Release, importation and transportation of fish. (1) No person, persons, firm or corporation may bring into the state to introduce or release or cause to be introduced or released in any manner into the inland or outlying waters any fish or the eggs or spawn thereof, without first applying for in writing and receiving a written permit from the department or its duly authorized agents. The permit shall be granted only after the department or its agents investigates and inspects the fish or the eggs or spawn thereof as it deems necessary to determine that the introduction or release will not be detrimental in any manner to the conservation of the natural resources of the state. Inspection may include removal of reasonable samples of fish and eggs for biological examination. The responsibility of licensees holding private fish hatchery licenses is stated in ss. 29.735 and 29.736, Stats.

(2) Permits to import fish or eggs of the family Salmonidae (trout, char, salmon) shall be issued at no charge to a person who has applied on a special form furnished by the department. Such permit will be issued only if the immediate source of fish or eggs is certified free of infectious hematopoietic necrosis, viral hemorrhagic septicaemia, whirling disease, enteric redmouth and Ceratomyxa shasta, except that eggs from wild stocks do not have to be certified free of whirling disease. Certification shall be made in the state of origin and may be accomplished only by biologists recognized by the department as competent in diagnosis of fish diseases. For informational purposes the source of fish or eggs will also be inspected for infectious pancreatic necrosis, kidney disease and bacterial furunculosis. Inspecting biologists will submit a written inspection report to the department. A copy of the importation permit must accompany each shipment of fish or eggs.

(3) No person may transport live fish or live fish eggs away from any inland or outlying water or its bank or shore, except:

(a) Live fish or live fish eggs being transported out of state in compliance with the United States Department of Agriculture Animal and Plant Health Inspection Service's regulations and orders.

(b) Live fish or live fish eggs that have been tested for Viral Hemorrhagic Septicemia using methods approved by the department of agriculture, trade and consumer protection and that were found to be free of the Viral Hemorrhagic Septicemia virus.

(c) Live fish or live fish eggs being transported with the prior written approval of the department, where the department has determined that the proposed activity will not allow Viral Hemorrhagic Septicemia virus to be transported to other waters.

(d) Live minnows being transported away from the water where they were taken by a bait dealer who harvested the minnows in compliance with a wild bait harvest permit issued under s. NR 19.057.

(e) Live minnows that were obtained from a Wisconsin bait dealer and subsequently possessed by the person while on an inland or outlying water, its bank or shore, if the minnows have not been exposed to water or fish from that inland or outlying water.

(f) Live minnows that were obtained from a Wisconsin bait dealer and subsequently possessed by the person while on an inland or outlying water, its bank or shore, if the minnows will be used for bait only on the same inland or outlying water, its bank or shore.

History: 1−2−56; am. (2), Register, October, 1969, No. 166, eff. 1−1−70; renum. from WCD 19.05 to be NR 19.05, and am. (1), (2) and (3), Register, April, 1971, No. 184, eff. 5−1−71; r. and recr. Register, August, 1977, No. 260, eff. 9−1−77; CR 03−030: am. (1) Register October 2003 No. 574, eff. 11−1−03; emerg. am. (title), cr. (3), eff. 11−2−07; EmR0808: emerg. cr. (3) (e) and (f), eff. 4−4−08; CR 07−074: am. (title), cr. (3) Register May 2008 No. 629, eff. 6−1−08.

NR 19.055 Drainage of water from boats and equipment required. (1) Except as provided in subs. (3) to (5), any person who removes a boat, boat trailer, boating equipment or fishing equipment from any inland or outlying water or its bank or shore shall drain all water from the boat, boat trailer, boating equipment or fishing equipment, including water in any bilge, ballast tank, bait bucket, live well or other container immediately after removing the boat, boat trailer, boating equipment or fishing equipment from the water, bank or shore.

(2) Except as provided in subs. (3) and (4), no person may transport over land from another state any boat, boat trailer, boating equipment or fishing equipment for use on any water of the state or its bank or shore unless the person drains all water from the boat, boat trailer, boating equipment or fishing equipment, including water in any bilge, ballast tank, bait bucket, live well or other container before entering the state.

(3) The department may exempt any boat, boat trailer, boating equipment or fishing equipment in writing from sub. (1) or (2) if it determines that it will not allow Viral Hemorrhagic Septicemia virus to be transported to other waters.

(4) Subsections (1) and (2) do not apply to tanks or containers of potable drinking water or other beverages meant for human consumption.

(5) Subsection (1) does not apply to water in a container that holds live bait minnows obtained from a Wisconsin bait dealer, if the container holds no other fish, contains 2 gallons or less of water, and is used to transport only live minnows that have not been exposed to water or fish from that inland or outlying water or will be used for bait only on the same inland or outlying water, its bank or shore.

History: Emerg. cr. eff. 11−2−07; EmR0808: emerg. cr. (5), eff. 4−4−08; CR 07−074: cr. Register May 2008 No. 629, eff. 6−1−08.

NR 19.057 Bait dealer's wild harvest permit required; criteria; records required. (1) No bait dealer may take minnows for use as bait from any inland or outlying water unless the bait dealer possesses a wild harvest permit issued by the department under this section and the bait dealer complies with all terms and conditions of the wild harvest permit. A bait dealer shall apply for a permit on forms available from the department. Applications may be submitted no earlier than 30 days prior to the proposed starting date of harvesting. The department shall act on a complete permit application within 10 business days after receipt, based on the criteria in sub. (2). Except as provided in sub. (5), permits shall be valid for the dates specified on the permit, not to exceed 30 days, and shall require compliance with all minnow collecting requirements. A complete application shall include the

applicant's name, street address, bait dealer's license number if any, the specific water body where bait will be harvested, the town, range and section where bait will be harvested, the species of bait that will be harvested, the maximum quantity of bait expected to be harvested, and any other information required on the application form.

Note: Permit application forms may be obtained at no charge from the Bureau of Fisheries Management, Department of Natural Resources, PO Box 7921, Madison, WI 53707−7921 or on the Internet at http://dnr.wi.gov/topic/fishing/vhs/vhs_wbh-permit.html.

Note: See s. NR 20.14 for general minnow collecting restrictions, s. NR 20.20 for county and statewide restrictions on waters, authorized methods, open seasons, size limits, bag limits and other restrictions, and s. NR 20.39 for permits authorizing the use of non−standard minnow gear on inland waters.

(2) The department shall grant an application for a wild harvest permit under this section if it determines that all of the following criteria are met, but the department may set specific conditions in permits or deny applications when necessary to ensure compliance with this section and prevent or control the spread of the Viral Hemorrhagic Septicemia virus or other invasive species. By written notice mailed to the permittee's last known address, the department may revoke a permit to ensure compliance with this section or to prevent or control the spread of the Viral Hemorrhagic Septicemia virus or other invasive species.

(a) The applicant is a bait dealer who holds a bait dealer's license or is exempt under s. 29.509 (3), Stats., from the requirement to hold a bait dealer's license.

(b) Minnows may not be taken from Lake Michigan, Green Bay, Lake Superior, the Mississippi River, Lake Winnebago, the Fox River from Lake Winnebago to Green Bay, or any bay, slough or backwater of these waters, or any water connected to these waters, upstream to the first dam or other obstruction impassible to fish, or from any other waters where the department has reason to believe that the Viral Hemorrhagic Septicemia virus may be present, or where other invasive species may be present.

(c) Minnow gear and harvest and transport equipment shall be disinfected after use to prevent the spread of the Viral Hemorrhagic Septicemia virus and other invasive species.

(d) Minnows taken from inland or outlying waters may not be given, sold or bartered to another person unless applicable fish health requirements specified by the department of agriculture, trade and consumer protection in ch. ATCP 10 have been met.

(3) Each permit holder shall maintain a clear, legible daily record in the English language on forms available from the department of all minnows harvested from any inland or outlying water. The record shall include the water body of origin, the town, range and section where harvested, the species harvested, the date of harvest, the quantity or volume harvested, the disposition, except that retail sales to consumers need not be recorded, and any other information required on the record form.

Note: Minnow harvest record forms may be obtained at no charge from the Bureau of Fisheries Management, Department of Natural Resources, PO Box 7921, Madison, WI 53707−7921 or on the Internet at http://dnr.wi.gov/topic/fishing/vhs/vhs_wbhpermit.html.

(4) No bait dealer may possess farm−raised fish while engaged in the harvest of wild bait, or while transporting wild harvested bait from the water where it was harvested to the bait dealer's business location or from the water where it was harvested to the point of sale.

(5) Notwithstanding the 30−day limit in sub. (1), the department may issue a wild harvest permit that is valid for the dates specified on the permit, which may exceed 30 days duration, if the permit is for the harvest of minnows from a water of the state stocked with minnows by the applicant pursuant to a stocking permit under s. 29.736, Stats., or for the harvest of minnows from a lake stocked with minnows by the applicant pursuant to a permit for private management under s. 29.737, Stats. The department may issue a wild harvest permit under this section in conjunction with a stocking permit or a permit for private management.

History: Emerg. cr. eff. 11−1−07; CR 07−074: cr. Register May 2008 No. 629, eff. 6−1−08.

NR 19.058 Sport trolling. No operator of a boat may engage in trolling, as defined in s. NR 20.03 (40), with the use of downriggers on outlying waters, as defined in s. 29.001 (63), Stats., without direct and immediate access to a wire cutter or other hand−held device on board capable of immediately severing any fishing line or cable being used in the water behind the boat.

History: CR 12−022: cr. Register May 2013 No. 689, eff. 6−1−13.

NR 19.06 Fish nets and traps. (1) It shall be unlawful for any person or persons to take, catch or kill fish or fish for fish of any species when such fish are being held in any fish net, fish holding net, fish trap, fish pond, either artificial or natural, or any structure or net placed in any of the waters of the state by the department or under its authority for the purpose of taking or holding fish therein at any time, or for any person or persons to lift, molest, cut or destroy any fish net, fish holding net, fish trap, fish pond, or any structure or net placed in any of the waters of the state by the department or under its authority for the purpose of taking or holding fish therein.

(2) It shall be unlawful for any person or persons to take, catch, capture or kill fish or pursue fish in any fishing operations within 500 feet above or 500 feet below any net, dam or weir wherein the state of Wisconsin is fishing or holding fish for commercial, scientific, or biological purposes, when the area is properly posted by the department.

(3) No provisions in this section shall prohibit the department, its agents, deputy conservation wardens or representatives of the division of fish, game and enforcement of such department from taking any of the fish mentioned in any of the sections of this order at any time or from lifting, setting, or transferring any nets or structures used in holding or capturing fish, wherein they deem it advisable and necessary to promote the department fish management program.

History: 1−2−56; am. (1), Register, December, 1960, No. 60, eff. 1−1−61; am. (1), Register, December, 1961, No. 72, eff. 1−1−62; renum from WCD 19.06 to be NR 19.06 and am. (1), (2) and (3), Register, April, 1971, No. 184, eff. 5−1−71.

NR 19.09 Wild rice conservation. (1) REMOVAL OR DESTRUCTION OF WILD RICE. (a) No person may remove or destroy by hand, mechanical or chemical means wild rice growing in navigable lakes unless the department has approved the removal or destruction under par. (b).

(b) In addition to harvest in accordance with s. 29.607, Stats., and subs. (2) to (8), the department may authorize by written approval the removal of wild rice growing in navigable lakes upon a finding that:

1. The wild rice resource in the navigable lake will not be substantially affected. The department may consider cumulative effects of an approval on such a lake under this paragraph; and

2. The removal or destruction is necessary to allow reasonable access to the lake by the riparian owner.

(c) Persons requesting an approval under this subsection, shall apply on department forms and provide information requested by the department.

Note: The forms may be obtained from department regional offices.

(2) A closed season is established for the harvesting or gathering of wild rice in the following described areas at all times except as hereinafter provided and it is unlawful for any person to harvest or gather wild rice in any manner or at any time during such closed season.

(3) The secretary is authorized and directed, after determining by investigation and study that the wild rice is ripe, to designate the open season for harvesting or gathering wild rice in each of the areas described in sub. (4). The open season in any area may continue in effect for not more than 60 days. The open season in any area as designated by the secretary pursuant to this subsection shall be put into effect by posting of proper notice of the open season on the shores of, and at places of public access to, the lakes and

streams in which the open season is effective at least 24 hours before the beginning of the open season.

(4) There is no closed season for the harvesting of wild rice in any other area of the state of Wisconsin not herein described:

(a) *Ashland county.* All waters north of highway 2 including outlying waters.

(aa) *Barron county.* Bear lake, Beaver Dam lake and Red Cedar lake.

(b) *Bayfield county.* Totogatic lake.

(c) *Burnett county.* Bashaw lake, Big Clam lake, Big Sand lake, Briggs lake, Gaslyn lake, Long lake, Mud lake, town of Oakland, Mud lake, town of Swiss, Mud Hen lake, Spencer lake and Trade lake.

(d) *Douglas county.* In Allouez Bay in the city of Superior and Mulligan lake.

(e) *Forest county.* Atkins lake, Riley lake, Big Rice lake and Wabigon lake.

(f) *Marinette county.* Noquebay lake.

(g) *Oneida county.* Atkins lake, Big lake and Big lake thoroughfare, Gary lake, Little Rice lake, Rice lake and Spur lake.

(h) *Polk county.* Balsam Branch, Big Round lake, East lake, Glenton lake, Little Butternut lake, Nye lake, Rice lake and White Ash lake.

(i) *Sawyer county.* Musky Bay located in sections 10 and 11, T39N, R9W, on Big Lac Court Oreilles lake.

(j) *Vilas county.* Allequash lake, Little Rice lake, Nixon lake, Irving lake, Aurora lake, West Plum lake, Devine lake, West Ellerson lake, Micheys Mud lake, Frost lake, Rice lake, Sand lake and Sugar Bush Chain.

(k) *Washburn county.* Bear lake, Gilmore lake, Little Mud lake, Long lake, Mud lake, Nancy lake, Rice lake, Spring lake and Tranus lake.

(5) No person may harvest or gather any wild rice in any area of the state of Wisconsin between sunset and the following 10:00 a.m. central daylight time.

(6) No person may harvest or gather any wild rice in any navigable lake by the use of any method other than smooth, rounded, wooden rods or sticks not more than 38 inches in length and which are held and operated by hand.

Note: Section 29.607, Stats., prohibits the use of any mechanical device in any water of the state for harvesting or gathering wild rice.

(7) No person may harvest or gather any wild rice in any navigable lake by the use of any boat longer than 17 feet or greater than 38 inches in width or by the use of any boat propelled by other than muscular power using only a push−pole or canoe paddle.

(8) (a) All licensed wild rice dealers shall file reports on forms furnished by the department covering the license period with the Department of Natural Resources, Box 7924, Madison, 53707, prior to obtaining a wild rice dealer's license.

(b) Such reports shall summarize the book records required and shall include the total number of transactions and the total amount of wild rice bought, sold or processed during the period covered by such license.

(9) Nothing in the provisions of this section shall prohibit authorized agents of the department from harvesting or gathering wild rice in the performance of their official duties.

History: Cr. Register, July, 1960, No. 55, eff. 8−1−60; r. and recr. Register, July, 1964, No. 103, eff. 8−1−64; renum. from WCD 19.09 to be NR 19.09 and am. (2), intro. par., (6) and (7), Register, April, 1971, No. 184, eff. 5−1−71; am. (2) (c), (k) and (m), Register, November, 1976, No. 251, eff. 12−1−76; am. (5), Register, April, 1978, No. 268, eff. 5−1−78; am. (1) (c), Register, December, 1978, No. 276, eff. 1−1−79; r. and recr. (2) (a) to (m), and am. (6), Register, August, 1979, No. 284, eff. 9−1−79; am. (2m) (c), Register, September, 1983, No. 333, eff. 10−1−83; emerg. cr. (2m) (aa), am. (2m) (c), (d), (g), (h) and (k), eff. 8−13−84; emerg. am. (3) eff. 8−27−84, cr. (2m) (aa), am. (2m) (c), (d), (e), (g), (h), (k) and (3), Register, May, 1985, No. 353, eff. 6−1−85; r. (8), renum. (1) to (7) to be (2) to (9) and am. (6) and (7), cr. (1), Register, August, 1985, No. 356, eff. 9−1−85; am. (3), Register, July, 1987, No. 379, eff. 8−1−87; am. (3), Register, July, 1988, No. 391, eff. 8−1−88.

NR 19.11 Scientific collectors permits and scientific research licenses. (1) DEFINITIONS. For the purposes of implementing ss. 29.614 and 169.25, Stats., and within this section, the following definitions apply:

(a) "Qualified natural person" or "person" means any individual complying with s. 29.614, Stats., and this section, not including a corporation, partnership, cooperative, society, association or other organization.

(b) "Bonafide research program" means planned study and investigation undertaken to discover or establish facts or principles leading to increased, useful scientific knowledge.

(c) "Useful scientific knowledge" means new information contributing to the long−term well−being of wild animals and their habitats, or providing educational opportunities in the natural sciences.

(2) APPLICABILITY. (a) *Permits not required.* Scientific collectors permits are not required for the collection of wild plants, unprotected wild animals taken legally, or wild animals obtained from licensed game farms or fish hatcheries.

(b) *Bird banding.* Scientific collectors permits will be required for trapping and banding protected nonmigratory upland game birds.

(c) *Licenses.* A person is not required to possess a separate hunting, fishing or trapping license while collecting under a scientific collector permit.

(d) *Endangered species.* Endangered or threatened wild animals may be collected only under authority of endangered species permits issued by the department pursuant to s. 29.604, Stats., and ch. NR 27.

(e) *Tagging of fish.* Scientific collectors permits are required to capture a wild fish, attach a tag to any part of it, and then to release it back into waters of the state.

(3) PERMIT APPLICATIONS. (a) *Forms.* Applications for scientific collectors permits shall be made on application forms provided by the department and include:

1. Name and address of the applicant;
2. Applicant's personal description;
3. Purpose of the request;
4. Species and number of specimens to be collected;
5. Places and times when specimens are to be collected;
6. Method of collecting;
7. Place where collections will be kept; and
8. Such additional information as may be requested by the department.
9. The period of the permit.

(b) *Narrative proposal.* All permit applications shall be accompanied by a written proposal stating the objectives, justifications, procedures, times and places of collection, application of results and sponsor, if any, of the project described in the application.

(4) PERMIT ISSUANCE. (a) *Issuance.* Permits shall be issued in the name of the applicant. All agents of the permittee assisting in the permitted collections will be listed on the permit. Separate copies of permits shall be signed and carried by each person named in the permit when that person is acting under it in the absence of the permittee.

(b) *Specimen materials.* A permit will be issued for collections yielding preserved specimen materials only when such materials are to be kept in a place and manner where students and the public have access to them. Private collections to be kept in a manner not open to the public will not be approved.

(c) *Conditions.* 1. 'Contents.' Permits will contain conditions deemed necessary by the department to protect the resources of the state and assure use of specimens taken are in compliance with s. 29.614, Stats.

2. 'Nonresidents.' Permits issued to nonresidents will set forth conditions of removal of specimens from the state.

3. 'Federal permits.' a. Permits involving the capture, marking, collection, possession or salvage of migratory birds or parts, nests or eggs of migratory birds will not be issued under this section until the applicant possesses a permit issued by the U.S. fish and wildlife service for that activity.

b. Permits under this section are not required for banding or marking capture−and−release activities authorized under a permit issued by the U.S. fish and wildlife service.

4. 'Size of collections.' Permits will not be issued which authorize collections endangering the population of animals the collection would draw from, or exceeding the number of animals required to meet the permittee's objectives.

5. 'Unprotected species.' Permits will not be issued for the collection of protected species if unprotected species can be used to accomplish the same purposes.

(5) PERMIT USAGE. (a) *Disposition of specimens.* 1. Living unharmed specimens collected during the course of permitted activities shall be returned to the wild at the point of capture, unless otherwise provided in the permit.

2. Any endangered or threatened species taken unintentionally during the course of permitted activities shall be immediately released if unharmed.

3. Injured or dead wild animal specimens shall be immediately turned over to the department employee named in the permit unless otherwise provided in the permit.

(b) *Notification of department.* Each permittee shall notify the department employee named in the permit at least 48 hours prior to collecting of the time and place where specimens will be collected.

(c) *Marked gear.* All traps, nets and any other gear used for capturing wild animals under terms of a permit shall be marked with the permit number, name and address of the permittee.

(d) *Trap and net tending.* All traps, nets and other capture emptied by the permittee at least once each 24−hour period.

(e) *Fishing gear restrictions.* 1. 'Gill nets.' Gill nets may not be used in inland waters unless specifically authorized by a permit.

2. 'Buoys.' All buoys and buoy staffs shall be marked and maintained as required by the department. The permit number, name and address of the permittee shall be maintained in plain figures on the bowl of the buoy.

3. 'Sport fishing equipment.' Hook and line fishing equipment and spearing equipment may not be possessed on a boat operating under a permit without prior approval of the department.

(6) RECORDKEEPING AND ANNUAL REPORTS. (a) *Records.* Each permittee shall keep current records, in the English language, of all collections under the permit. Records of collections shall be made available to the department during normal business hours, or upon 8 hours notice at other times.

(b) *Required reports.* Permittees shall supply information requested by the department and annually file a complete and accurate report on forms covering activities conducted under authority of the permit. Unless otherwise provided in the permit, such reports shall be filed using a report form provided by the department not later than January 10 of the year following expiration of the permit.

(c) *Content.* Annual reports by permittees shall include:

1. The common name, scientific name and number of each species and type of specimen material collected;

2. The date and geographic location of each collection;

3. Disposition of collected specimens; and

4. Any other information requested by the department.

(7) DISPOSITION. Specimens collected under the authority of the scientific collector permit may be transferred to and possessed by an educational institution for exhibition or education purposes upon completion of the project or expiration of the permit. Environmental consulting organizations may retain specimens following permit expiration provided the specimens are marked in a manner prescribed by the department. An educational institution or environmental consulting organization possessing specimens shall possess written proof of source, including the scientific collector permit number of the source and present that proof upon request by the department.

Note: Application forms for scientific collectors permits under this section may be obtained from any department regional office. Federal permits for migratory birds may be obtained from the Special Agent in Charge, U.S. Fish and Wildlife Service, Federal Building, Fort Snelling, Twin Cities, MN 55111.

History: Cr. Register, April, 1966, No. 124, eff. 5−1−66; renum. from WCD 19.11 to be NR 19.11, and am. (1) intro. par., (1) (h), (2) intro. par. and (2) (c), Register, April, 1971, No. 184, eff. 4−1−71; cr. (5) (e) and (6), Register, September, 1978, No. 273, eff. 10−1−78; r. and recr. (2), r. (5) (a), Register, August, 1979, No. 284, eff. 9−1−79; r. and recr. Register, November, 1981, No. 311, eff. 12−1−81; r. and recr. (2) (c), cr. (3) (a) 9., (4) (c) 3.b. and (7), am. (4) (c) 3., r. (6) (c) 3., renum. (6) (c) 4. and 5. to 3. and 4., Register, August, 1986, No. 368, eff. 9−1−86; CR 03−030: am. (1) (intro.) Register October 2003 No. 574, eff. 11−1−03; CR 03−014: cr. (2) (e) Register October 2003 No. 575, eff. 4−1−04.

NR 19.115 Fish, fur, game seals. Fish, fur, game seals shall be attached by or at the direction of the department to fish, fur or game articles which may be sold pursuant to s. 29.934 (1), Stats. Each seal shall be issued for a particular article only and no seal may be attached or assigned to any other article. No person may possess or transfer any seal to another person except as incidental to the possession, purchase, sale, trade or transfer of the article of fish, fur, or game for which the seal was issued.

History: Cr. Register, March, 1990, No. 411, eff. 4−1−90.

NR 19.12 Tagging the carcasses of wild animals, birds and fish taken on Indian reservations. (1) (a) Each authorized person who has taken a protected wild animal, bird or fish on an Indian reservation, under provisions of the reservation's treaty rights during the off−reservation closed season for such game set by the department of natural resources, shall before removing the carcass or part thereof of such animal, bird or fish from the reservation, contact and exhibit it during ordinary working hours to a conservation warden of the department of natural resources or to any tribal member authorized by the particular tribe and designated by the department of natural resources.

(b) The conservation warden or designated tribal member shall inspect all such carcasses, attach and lock a special lettered and numbered tag to each carcass or part thereof, and maintain a record book containing the following information: the date, the reservation, the name and address of the person being issued the tag, the species and description of the wild animal, bird or fish being tagged, the destination, and the name and address of the person issuing the tag. Such record book shall be exhibited to the department of natural resources at reasonable hours for inspection and duplication. Failure to maintain and exhibit such a record book containing the above information shall be sufficient cause for the department of natural resources to revoke the authority of the official to issue any more tags. The secretary of the department of natural resources may take such revocation action without requiring that a hearing be held on the matter.

(c) The special lettered and numbered tag shall be distributed to the conservation warden or designated tribal member by the department of natural resources at such times and in such numbers as it deems appropriate. During the off−reservation closed season for such wild animal, bird or fish, no person shall remove any such carcass or part thereof from an Indian reservation without such a tag being attached and locked. No person shall remove the tag prior to consumption of the animal, bird or fish carcass tagged. No endangered species shall be tagged. No person other than a conservation warden or designated tribal member shall have unused tags in his or her possession.

(d) If a Wisconsin tribe has a tagging and registration system similar to the department's and an approved memorandum of understanding with the department pertaining to the system, tagging requirements under this section may be waived by the department. Tribal tags shall be validated and affixed to the carcass.

History: Cr. Register, April, 1976, No. 244, eff. 5−1−76; CR 08−021: cr. (1) (d) Register November 2008 No. 635, eff. 12−1−08.

NR 19.13 Disposition of deer accidentally killed by a motor vehicle. (1) The driver of a motor vehicle involved in a vehicle−deer collision may have first priority to the deer killed. However, if the driver does not want to take possession of the deer it may be given to another party at the scene of the accident by the department or its agents.

(2) If a driver collides with and kills 2 or more deer at one time, the driver is eligible to receive as many of these deer as the driver wishes.

(3) No vehicle−killed deer, or any parts thereof, may be sold or bartered by the individual to any other person at any time, except the head or hide, which may be disposed of pursuant to s. 29.539, Stats. Vehicle−killed deer may be given to another person or to charitable organizations, except that spotted hides or velvet antler possession shall comply with sub. (4).

(4) Possession of vehicle−killed deer shall be limited to 90 days. Pursuant to ss. 29.347 (3) and 29.349 (2), Stats., if the vehicle−killed deer is a spotted fawn or a deer with antlers in velvet and the person who possesses the deer wants to retain the spotted hide or velvet antlers for more than 90 days, the person shall contact the department for written authorization to retain the spotted hide or velvet antlers before the end of the 90 day period. Written authorization to possess spotted hides and velvet antlers from a vehicle−killed deer does not allow sale or transfer to another.

(5) White deer may not be released by the department.

(6) No deer may be retained until it has been tagged as required under this section.

(7) Permits shall be issued and attached by the department or its agents for each deer released.

(8) The permit shall contain the following information:

(a) Name and address of permittee.

(b) Vehicle license number if deer given to driver involved in the collision.

(c) Date of accident.

(d) Date of issuance.

(e) Identification of permittee as driver of vehicle, or other.

(f) Sex of deer and approximate weight.

(g) Location of kill as to county and deer management unit.

(h) Name of officer who issued permit carcass tag and the name and address of the officer's agency.

(i) Statement that the permit is valid for a period of 90 days after the date of issuance.

(9) One copy of permit shall be issued to permittee, one copy sent to the department, and one copy retained by issuing agency.

(10) Provisions of permit and restrictions shall be printed on the back of the permit form.

(11) If a deer is not released pursuant to sub. (1), it may be sold by the department at the highest price obtainable or otherwise disposed of.

(12) The entrails or any other parts of deer killed in vehicle−deer collisions may not be disposed of on the highway right−of−way.

History: Cr. Register, June 1976, No. 246, eff. 7−1−76; am. Register, August, 1994, No. 464, eff. 9−1−94; am. (3), Register, October, 1997, No. 502, eff. 11−1−97; CR 04−046: am. (4) and (5) Register September 2004 No. 585, eff. 10−1−04; CR 05−031: am. (3) Register November 2005 No. 599, eff. 12−1−05; correction in (4) made under s. 13.92 (4) (b) 7., Stats., Register May 2013 No. 689.

NR 19.25 Wild animal protection. Unless engaged in dog training or dog trials as authorized by the department in s. NR 17.001 (3) and (5), or other activity specifically authorized by the department, a closed season is established and no person may harass, disturb, pursue, shoot, trap, catch, take, or kill protected wild animals by any means, except as described under s. NR 12.10 (1) (b) 4.

History: Cr. Register, August, 1980, No. 296, eff. 9−1−80; correction made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1997, No. 502; CR 01−006: am. Register August 2001 No. 548, eff. 9−1−01; CR 05−031: am. Register November 2005 No. 599, eff. 12−1−05.

NR 19.26 Season and restrictions for taking frogs. (1) The open season for frogs runs from the Saturday nearest to May 1 to December 31.

(2) No person may take frogs with the aid of a firearm or air gun.

(3) Possession limits for frogs are established in s. NR 16.12.

History: Cr. Register, May, 2000, No. 533, eff. 6−1−00; CR 03−030: r. and recr. Register October 2003 No. 574, eff. 11−1−03.

NR 19.27 Seasons, limits, restrictions on taking crayfish. There is a closed season established for taking crayfish except when taken during the open season by the following methods:

Animal and locality	Open season (both dates inclusive)	Bag limit	Size limit	Methods of taking
(1) Crayfish All areas except Wis.−Minn. boundary waters. See s. NR 21.04 (12)	Continuous	None	None	Crayfish may be taken by hand, minnow seine, minnow dipnets or minnow traps, as defined in s. NR 20.10, and by crayfish traps with any entrance not to exceed $2\frac{1}{2}$ inches at its greatest diagonal measurement. All traps used to take crayfish shall be raised and crayfish removed at least once each day following the day set unless otherwise authorized by the district director. All traps shall be tagged with a tag clearly bearing in the English language the name and address of the owner and trapper.

(4) ADDITIONAL RESTRICTIONS. (a) *Crayfish.* 1. 'Prohibitions.' No person may:

a. Use live crayfish as bait on the inland waters except on the Mississippi river.

b. Possess live crayfish while on any inland waters of the state, except the Mississippi river, unless that person is engaged in crayfish removal. Simultaneous possession of live crayfish and hook and line fishing equipment while on the inland waters, except the Mississippi river, shall be considered prima facie evidence of a violation of this subsection.

c. Place, deposit, throw or otherwise introduce live crayfish into any waters of the state unless a permit authorizing introduction has been issued by the department.

d. Take, possess or control a crayfish unless the person is in possession of a valid approval which authorizes the hunting of small game or which authorize fishing, unless otherwise exempt from the need to possess one of more of these approvals to hunt or fish under ch. 29, Stats.

2. 'Bait.' a. Crayfish may not be taken with use of bait consisting of fish, including parts of fish lawfully taken, fish by−products including fish meal or prepared parts of fish, except in the same body of water from which the fish was obtained, or if the fish

are minnows obtained from a Wisconsin bait dealer, or with written approval of the department.

b. Bait or parts of bait authorized in this subdivision may not be deposited in the waters of this state unless they are enclosed within the trap.

3. 'Floats or markers.' Floats or markers used to locate traps for the taking of crayfish:

a. May not exceed 5 inches in size at its greatest dimension;

b. May not extend more than 4 inches above the surface of the water.

c. Shall plainly and clearly display in the English language the name and address of the owner or operator; and

d. Shall be of a color other than orange or fluorescent colorations.

4. 'Traps.' Crayfish traps placed in trout streams shall conform to the dimensions of minnow traps described in s. NR 20.03 (26) unless otherwise authorized by the department.

History: Cr. Register, December, 1982, No. 324, eff. 1−1−83; r. and recr. Register, June, 1984, No. 342, eff. 7−1−84; cr. (4) (a) 4., Register, December, 1984, No. 348, eff. 1−1−85; am. (1), Register, July, 1988, No. 391, eff. 8−1−88; am. (intro.), r. (3), Register, February, 1997, No. 494, eff. 3−1−97; correction in (4) (a) 4. made under s. 13.93 (2m) (b) 7., Stats., Register, September, 1999, No. 525; am. (intro.), r. (2) and (4) (b), Register, May, 2000, No. 533, eff. 6−1−00; emerg. am. (4) (a) 2. a., eff. 11−2−07; CR 07−074: am. (4) (a) 2. a. Register May 2008 No. 629, eff. 6−1−08; CR 09−018: cr. (4) (a) 1. d. Register February 2010 No. 650, eff. 3−1−10.

NR 19.275 Turtles. (1) APPLICABILITY. This section applies to the taking and possession of turtles in Wisconsin, except for the Wisconsin−Minnesota boundary waters and the Wisconsin−Iowa boundary waters, where the taking and possession of turtles is governed by ss. NR 21.13 and 22.13, respectively.

(2) SEASONS; POSSESSION AND DAILY BAG LIMITS. No person may take turtles except during the open seasons established in sub. (4). For the purpose of turtle harvest, the possession limits are the same as the daily bag limits.

(3) ADDITIONAL RESTRICTIONS. No person may do any of the following:

(a) Take, possess or control a turtle unless the person is in possession of a valid approval which authorizes the hunting of small game or which authorize fishing, unless otherwise exempt from the need to possess one of more of these approvals to hunt or fish under ch. 29, Stats.

Note: The s. 29.228, Stats., fishing license exemption for nonresidents under age 16 only applies to taking fish by hook and line. Therefore, any nonresident under age 16 who takes turtles by hand, hooking or with hoop net turtle traps must possess a valid fishing or small game authorization.

(b) Take turtles by methods other than hoop net turtle traps that comply with par. (c), hand, hook, and line when in possession of a fishing license, setline, or set or bank poles when in possession of a setline or set or bank pole license used in compliance with s. NR 20.12, or hooking.

(c) Use a hoop net turtle trap to take turtles unless it complies with all of the following criteria:

1. It is constructed with no less than 6 inch stretch measure mesh net as defined in s. NR 25.02 (28).

2. The net is nylon or other stretchable fabric. Wire may not be used.

3. It is constructed with a funnel entrance at one or both ends which are tied off to the sides or the opposite ends. The opening in the funnel may be round or oval.

4. It is designed and set so the closed sides sit horizontal in the water.

Note: There is no restriction on the size of the trap itself or the number of hoops used in its construction.

(d) Use a hoop net turtle trap unless it is placed on the bed of the stream, river, lake or pond so that a minimum of 2 inches of the trap is above the water's surface.

(e) Use a hoop net turtle trap unless it is checked and the entrapped contents removed at least once each day.

(f) Place, use or tend more than 3 hoop net turtle traps.

(g) Use a hoop net turtle trap unless a stamped or engraved metal tag, bearing the name and address of the operator of the trap in the English language, is attached in a manner that is visible above water and legible at all times.

(h) Place, use or tend a hoop net turtle trap or remove its entrapped contents unless that person is the operator identified on the trap tag.

(i) Use fish, including parts of fish, as bait except that fish and fish parts may be used as bait in the same body of water from which the fish was obtained, or if the fish are minnows obtained from a Wisconsin bait dealer, or with written approval of the department.

(j) Place, set, or use a hoop net turtle trap within 200 feet of any fishway, lock, or dam.

(k) Place, set or use any hook and line, setline or bank pole for taking turtles in a manner or at any time during which these methods are not allowed for taking fish under ss. NR 20.06 and 20.12.

(4) SEASONS AND LIMITS:

Turtle species	Open seasons (both dates inclusive)	Daily bag and possession limit	Size limit
(a) Snapping turtle	July 15 to Nov. 30	3	12 inch minimum 16 inch maximum top shell measured from front to back
(b) Softshell turtle	July 15 to Nov. 30	3	None
(bm) Blanding's turtle	None	0	None
(c) All other turtles not listed as threatened or endangered in ch. NR 27	July 15 to Nov. 30	5 in total	None

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97; CR 06−011: am. (3) (a) Register September 2006 No. 609, eff. 4−1−07; emerg. cr. (3) (i), eff. 11−1−07; CR 07−074: cr. (3) (i) Register May 2008 No. 629, eff. 6−1−08; CR 09−018: am. (3) (a) Register February 2010 No. 650, eff. 3−1−10; CR 09−051: cr. (3) (j) and (k) Register June 2010 No. 654, eff. 7−1−10; CR 13−001: am. (3) (b) Register August 2013 No. 692, eff. 9−1−13; CR 14−025: cr. (4) (bm) Register May 2015 No. 713, eff. 6−1−15.

NR 19.28 Taxidermy. (1) TRANSPORTATION. Whenever a permitted taxidermist, or his or her agent, takes a wild animal carcass into possession at a location other than the taxidermist's place of business, the records required by s. 29.506 (5) (b) and (6), Stats., shall be completed immediately and shall accompany the carcass during transportation.

(2) POSSESSION. (a) If a permitted taxidermist holds wild animal carcasses received in connection with his or her business pursuant to the authorization in s. 29.506 (4), Stats., in the same storage area or freezer with personally acquired wild animal carcasses, every wild animal carcass so held shall be tagged in the manner described in s. 29.506 (5) (b), Stats. Wild animal carcasses so tagged and stored may not be considered to be commingled.

(b) The authorization of s. 29.506 (4), Stats., does not apply to wild animal carcasses acquired by a taxidermist for purposes not related to the business of taxidermy.

(3) MOUNTED COLLECTION OF A TAXIDERMIST. This section does not permit seizure of, nor prohibit possession or sale of a lawfully obtained wild animal carcass by a permitted taxidermist which is mounted or is in the process of being mounted for the private collection of a permitted taxidermist provided that the tagging and record keeping requirements and the commingling prohibitions of s. 29.506, Stats., have been complied with. Included

is any such wild animal carcass received by a permitted taxidermist in connection with his or her business which has been abandoned by the customer.

History: Cr. Register, March, 1987, No. 375, eff. 4−1−87.

NR 19.30 Criminal history checks; volunteer instructors. Whenever application is made to the department by a person interested in becoming certified to instruct as a volunteer all−terrain vehicle, boating, bow hunter, hunter education, Wisconsin cooperative trapper education program or snowmobile safety instructor, the bureau of law enforcement shall conduct a criminal history, character and background check on the applicant. Notwithstanding s. NR 19.025, the bureau of law enforcement shall conduct a background check on any person who applies to serve as an angler or aquatic education instructor, or an educational outdoor skills activity mentor. Upon becoming aware of information indicating prior illegal activity, the department shall make appropriate inquiry into criminal history and character of instructor or mentoring applicants and determine their suitability for the proposed activity.

History: Cr. Register, July, 1996, No. 487, eff. 8−1−96; am. Register, September, 1998, No. 513, eff. 10−1−98; CR 09−018: am. Register February 2010 No. 650, eff. 3−1−10.

NR 19.40 Department authority to void local hunting, fishing and trapping ordinances. (1) PURPOSE. These rules are developed, pursuant to s. 227.11, Stats., to establish procedures for determining when local ordinances should be voided under s. 29.038, Stats., because they have more than an incidental effect on hunting, fishing or trapping, or do not have public health and safety as a primary purpose.

(2) DEFINITIONS. In this section:

(a) "Building devoted to human occupancy" has the meaning used in s. 941.20 (1) (d), Stats.

(b) "Undeveloped lands" has the meaning given in s. 943.13 (1e) (cr), Stats.

(3) DEPARTMENT DETERMINATIONS. Department determinations related to the legality of local ordinances regulating hunting, fishing or trapping shall consider the following factors when determining the validity of a local ordinance. The listed factors are not weighted and are factors which would favor a department decision to void the ordinance.

(a) The extent to which the ordinance affects undeveloped lands or lands which are zoned agricultural, forestry, lowland conservancy, upland conservancy or flood plain.

(b) The extent to which the department has received complaints about the ordinance.

(c) Whether the ordinance purports to directly regulate hunting.

(d) Whether the ordinance requires a permit to discharge a firearm or a bow, whether a fee is charged which exceeds 150 percent of the issuance fee established by s. NR 19.02 (4) (b), creates a higher fee for non−residents or requires a background check.

Note: At the current time, the fee established by s. NR 19.02 (4) (b) is $3.00.

(e) Whether the ordinance restricts the discharge of fine shot while the shooter is in or on the water more than 100 yards from the nearest developed shoreline, and shooting away from or parallel to that shoreline.

(f) Whether the ordinance prohibits the discharge of fine shot when on undeveloped lands which are more than 100 yards from buildings devoted to human occupancy, and shooting away from the buildings.

(g) Whether the ordinance prohibits hunting, fishing or trapping on department property otherwise open to hunting, fishing or trapping or on property leased by or under easement to the department for the purpose of hunting, fishing or trapping.

(h) Whether the ordinance prohibits the discharge of shotguns or bows within all areas of the municipality.

(i) Whether the ordinance prohibits the discharge of bows.

(j) Whether existing state laws adequately address the local safety concerns.

(k) Whether the ordinance prohibits fishing by individuals located on public waters.

(L) Whether less restrictive alternatives are available to address a municipality's safety concerns.

(m) Whether the ordinance prohibits live trapping.

(n) Whether the ordinance has no apparent health or safety purpose.

(4) EXCEPTION. This section does not apply to fishing rafts subject to regulation under s. 30.126, Stats.

(5) PROCEDURES. (a) Prior to holding a hearing to determine the validity of a local ordinance under s. 29.038, Stats., the department shall mail the affected municipality a notice of the time and location of the hearing. The department shall also publish a class I notice under ch. 985, Stats., of the hearing in the county in which the municipality is located. The notice shall be given at least 30 days prior to the date set for the hearing.

(b) Hearings shall be conducted to the extent possible in a manner consistent with s. 227.18 (1) and (2), Stats.

(c) The final decision shall be made by the secretary or the secretary's designee.

(d) The decision shall be in writing and accompanied by findings of fact and conclusions of law.

(e) The department may void ordinances found to be in violation of s. 29.038, Stats., in whole or in part, or as applied to certain areas, certain classes of persons, certain times of the year, or certain circumstances.

History: Cr. Register, May, 2001, No. 545, eff. 6−1−01; correction in (2) (b) made under s. 13.92 (4) (b) 7., Stats., Register May 2013 No. 689.

NR 19.50 All−terrain vehicle and bowhunter, snowmobile and hunter education program fee. The fee for the all−terrain vehicle and bowhunter, snowmobile and hunter education certification programs shall be $10.00 per student. The department may authorize the instructors to retain up to 50 percent of the fee to defray authorized expenses incurred locally to operate the program based on the actual cost incurred to the instructor. The remaining funds shall be turned in to the department to defray expenses incurred to operate these programs during the year. The fee for advanced hunter education courses shall only be the amount necessary, but not to exceed $50 per student. Only instructors certified by the department to teach advanced education courses under this section may charge a fee for the advanced education courses. The department may authorize specialized fees for Internet based all−terrain vehicle and snowmobile education certification programs pursuant to a memorandum of understanding with entities managing these programs for the department. The specialized fee shall be in lieu of the $10.00 per student fee and shall be sufficient to defray authorized operational costs of entities managing these programs for the department as well as operational costs of the department.

History: CR 00−110: cr. Register April 2002 No. 556, eff. 5−1−02; emerg. am. eff. 10−3−05; CR 05−088: am. Register March 2006 No. 603, eff. 4−1−06; CR 06−134: am. Register August 2007 No. 620, eff. 9−1−07.

NR 19.51 Wisconsin cooperative trapper education program fee. The fee for the course of instruction under the Wisconsin cooperative trapper education program shall be $12.00 per student. The fee for correspondence trapper education certification program shall be $12.00 per student for correspondence programs that require in−state mailing of course materials and shall be $28.00 per student for correspondence programs that require out−of−state mailing of course materials. In addition to the fees established in this section, for correspondence courses, each student shall pay a $17.00 deposit that shall be refunded when the course materials are returned. The fee for a duplicate copy of a trapper education course certificate of accomplishment

is $2.75. The fee for advanced trapper education courses shall be that amount needed to pay for the cost of the course, but not to exceed $50.00 per student. Only instructors who are certified by the department to teach trapper education courses under s. 29.597, Stats., may charge a fee for a trapper education course established under s. 29.597, Stats.

History: CR 07−015: cr. Register September 2007 No. 621, eff. 2−1−08; CR 08−011: am. Register September 2008 No. 633, eff. 2−1−09.

NR 19.60 Feeding of wild animals. (1) GENERAL PROHIBITIONS. (a) No person may place, deposit or allow the placement of any material to feed or attract wild animals for non−hunting purposes including recreational and supplemental feeding, except as provided in sub. (2) or (3), or as specifically authorized in a permit or license issued under s. 29.614 (1) or 169.25 (1) (a), Stats., or s. NR 12.06 (11) or 12.10 (1).

Note: Section 29.614, Stats., states: Scientific collector permit. (1) Application for a scientific collector permit shall be submitted to the department. The department may issue a scientific collector permit if the department determines that the applicant is a natural person and is engaged in a bona fide program leading to increased, useful scientific knowledge.

Note: Section 169.25, Stats., states: Scientific research license. (1) Issuance. (a) The department shall issue a scientific research license to any person who is engaged in a study or in research that the department determines will lead to increased, useful scientific knowledge and who files a proper application and who pays the applicable fee.

(b) Any person placing feed to attract wild animals in violation of this section or s. NR 10.07 (2) or (2m) shall remove all feed or other material illegally placed or deposited when notified by the department to do so.

(c) Landowners, lessees or occupants of any property where feed or other material in violation of this section or s. NR 10.07 (2) or (2m) is present shall remove all feed or other material illegally placed or deposited upon notification by the department of the illegal activity if not otherwise removed in accordance with par. (b).

(d) Except as authorized under sub. (3) (a) 1., no person may place feed in a feeder designed to deposit or replenish the feed automatically, mechanically or by gravity.

(2) FEEDING DEER AUTHORIZED. (a) *Affected area*. This subsection applies statewide, except for those counties where deer baiting and feeding is prohibited under par. (b).

(b) *Excluded area.* Deer baiting and feeding is prohibited in entire counties where any of the following criteria apply:

1. A CWD−affected area has been established in the county or a portion of the county, or

2. A CWD or bovine tuberculosis positive captive or free−roaming, domestic or wild animal has been confirmed after December 31, 1997 from the county, or

3. The county or portion of the county is within a 10 mile radius of a captive or free−roaming, domestic or wild animal that has been tested and confirmed to be positive for CWD or bovine tuberculosis after December 31, 1997.

(c) *Inclusion of additional counties.* 1. The department may add additional counties under par. (b) if they meet the criteria established in par. (b) 1., 2. or 3.

2. The prohibitions and exemptions in this subsection shall become effective upon issuance of an order by the secretary of the department and publication in the official state newspaper. In addition, a notice of the order shall be provided to newspapers, legislators and hunting license outlets in the area affected.

(d) *Deer feeding.* A person may place or deposit material to feed or attract wild deer for recreational and supplemental feeding purposes outside of the counties where deer feeding is prohibited under par. (b), but may not place or allow the placement of any feed material:

1. In excess of 2 gallons of feeding material within 50 yards of any owner occupied residence or business.

2. More than 50 yards from an owner occupied residence or business.

3. Within 100 yards from a roadway, as defined in s. 340.01 (54), Stats., having a posted speed limit of 45 miles per hour or more.

Note: Section 340.01 (54), Stats., "Roadway" means that portion of a highway between the regularly established curb lines or that portion which is improved, designed or ordinarily used for vehicular travel, excluding the berm or shoulder. In a divided highway, the term "roadway" refers to each roadway separately but not to all such roadways collectively.

4. That contains any animal part or animal byproduct.

5. Without the approval of the owner of the owner−occupied residence or business.

6. At a feeding site that the person knows or should have known is also being used by bear or elk. If the owner of the residence or business is notified by the department or otherwise becomes aware that bear or elk have been using a deer feeding site, the owner may not place or allow others to place any feed material that is accessible to deer, bear or elk within 50 yards of the owner−occupied residence or business for a period not less than 30 days.

(3) EXCEPTIONS. (a) This section does not prohibit any of the following activities:

1. Material placed solely for the purpose of attracting and feeding wild birds and small mammals when placed in bird feeding devices and structures at a sufficient height or design to prevent access by deer and only when the structures and devices are no further than 50 yards from a dwelling devoted to human occupancy unless authorized by the department. If the department determines that wild deer are utilizing bird feeding devices or structures, the devices or structures shall be enclosed or elevated higher to prevent access by deer.

2. Feeding of wild animals, other than deer, elk or bear, by hand if:

a. Feed placed not more than 30 feet away from the person feeding, and

b. The person feeding makes all reasonable attempts to clean up the unconsumed feed before moving a distance greater than 30 feet from the deposited feed.

3. Feed deposited by natural vegetation or found solely as a result of normal agricultural or gardening practices.

4. Standing crops planted and left standing as wildlife food plots that may be used by wild animals.

5. Feed material placed for deer or bear hunting or bear dog training as authorized under s. NR 10.07 (2m).

6. Feed material placed for trapping as specified in s. NR 10.13.

7. The use of scents, provided the material is not accessible for consumption by deer or elk or scent placed in compliance with s. NR 10.07 (2) (b) 4.

8. Feed or bait material placed or used for fish, reptiles, amphibians or arthropods, provided the material is not accessible to bear, deer or elk.

9. Feeding of deer as authorized under sub. (2).

Note: These feeding rules do not apply to captive wild animals held and licensed under ch. 169, Stats.

History: CR 04−078: cr. Register April 2005 No. 592, eff. 5−1−05; CR 07−015: cr. (2) (d) 6. Register September 2007 No. 621, eff. 10−1−07; CR 08−013: am. (2) (b) 1., Register August 2008 No. 632, eff. 9−1−08; **CR 14−071: am. (2) (b) 1. Register July 2015 No. 715, eff. 8−1−15.**

Subchapter II — Wildlife Rehabilitation

NR 19.70 Purpose. This subchapter is adopted to establish consistent standards for the rehabilitation of wildlife in Wisconsin. The intent is to ensure all persons engaged in wildlife rehabilitation are qualified and provide humane care and housing for wildlife being rehabilitated.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.71 Definitions. In this subchapter:

(1) "Advanced license" means a wildlife rehabilitation license issued by the department to a person qualifying under s. NR 19.73 (1) and (3).

(2) "Basic license" means a wildlife rehabilitation license issued by the department to a person qualifying under s. NR 19.73 (1) and (2).

(3) "Department" means the department of natural resources.

(4) "Euthanasia" means the humane killing of a wildlife in accordance with the current American veterinary medical association standards contained in the 2000 Report of the AVMA Panel on Euthanasia.

Note: Copies of the 2000 Report of the AVMA Panel on Euthanasia, JAVA, Vol. 218, No. 5, dated March 1, 2001, are available for inspection at the offices of the Secretary of State, 30 W. Mifflin Street, Madison, WI, the Legislative Reference Bureau, One E. Main Street, Madison, WI, or the department.

(5) "Facilities" means any equipment, housing or shelter used for wildlife rehabilitation.

(6) "Federal permit" means a special purpose permit issued under 50 CFR Part 13 and 50 CFR 21.27 by the United States fish and wildlife service for the rehabilitation of migratory birds and federally endangered or threatened species.

(7) "Protective device" means a device that is designed to prevent the escape of an animal at the entrance of a primary enclosure.

(8) "Sponsor" means an advanced licensee who has volunteered to mentor a basic licensee.

(9) "Sponsorship agreement" means a document that establishes an advanced licensee as a sponsor for a basic licensee.

(10) "Volunteer" means any person, including interns, working in a limited capacity subject to the limits under s. NR 19.73 (3) (d) and under the supervision of an advanced licensee on wildlife rehabilitation activities.

(11) "Wildlife" means "wild animal" as defined in s. 169.01 (37), Stats.

(12) "Wildlife rehabilitation" means "rehabilitate" as defined in s. 169.01 (30m), Stats.

(13) "Wildlife rehabilitation advisory committee" means a group of volunteers appointed by the secretary or secretary's designee to advise and provide recommendations about wildlife rehabilitation to the department.

(14) "Wildlife rehabilitator" means a person authorized to capture, receive, temporarily possess, transport or transfer orphaned, sick or injured wildlife for the purpose of wildlife rehabilitation under a valid license issued pursuant to this subchapter.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04; CR 09−024: am. (10) Register May 2010 No. 653, eff. 6−1−10.

NR 19.72 General wildlife rehabilitation provisions. **(1)** The title to all wildlife and their offspring held under a wildlife rehabilitation license remains under the jurisdiction of the department as described in s. 169.02, Stats., and may not be sold, traded or bartered without the consent of the department.

(2) The department may restrict wildlife rehabilitation of specific wildlife species, either statewide or in certain geographic areas to control the spread of disease, to protect public health or to prevent harmful environmental impacts.

(3) The department may restrict wildlife species authorized for rehabilitation based on the facilities and qualifications of the applicant or licensee.

(4) A wildlife rehabilitation license does not authorize the capture, receipt, possession, transportation or transfer of wildlife for any purpose other than wildlife rehabilitation.

(5) This license does not exempt the licensee from local ordinances that apply to activities authorized by this license.

(6) This license does not authorize the practice of veterinary medicine as defined in s. 453.02 (6), Stats.

(7) The licensee shall display his or her license to department agents or other law enforcement agents upon request.

(8) Any costs incurred by the licensee for wildlife rehabilitation activities shall be the responsibility of the licensee.

(9) Unless specifically authorized by the department for educational purposes, no person may place wildlife being rehabilitated on public exhibit, in ways that may lead to inappropriate imprinting, socialization, habituation or stress.

(10) Wildlife being rehabilitated may not be transported outside Wisconsin for release or any other purpose unless the licensee has verbal, or written, permission from the department and possesses a wildlife rehabilitation license pursuant to this subchapter.

(11) No person may import or accept wildlife for rehabilitation from outside Wisconsin unless he or she has verbal, or written, permission from the department and possesses a wildlife rehabilitation license pursuant to this subchapter.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.73 Licenses. **(1)** GENERAL RESTRICTIONS. (a) *Requirements.* No person may rehabilitate wildlife unless he or she possesses a valid license pursuant to s. 169.24, Stats.

(b) *Transferability.* A rehabilitation license is not transferable.

(c) *Reporting.* The licensee shall notify the department within 7 days of any change of name, address, telephone number, associated federal permit status, substantial changes to facility, a decision to discontinue as a sponsor or wildlife rehabilitation activities before license expiration.

(2) BASIC LICENSE. (a) *Requirements.* An applicant for a basic license shall meet all of the following requirements:

1. Possess a signed sponsorship agreement stating an advanced licensee is willing to mentor the applicant's wildlife rehabilitation activities.

2. Possess a signed consulting veterinarian agreement stating a veterinarian, licensed to practice in Wisconsin or state of residence, is willing to consult and assist with care and treatment of wildlife being rehabilitated.

3. Pass an examination meeting the requirements of s. NR 19.75.

4. Allow an inspection of facilities to assure that the applicant's facilities meet the requirements of s. NR 19.77.

(b) *Restrictions.* Basic licensees may not possess any of the following:

1. Federal migratory birds or federal or state endangered or threatened species unless authorized by appropriate federal and state permit.

2. Mammals belonging to the family cervidae (deer, elk, and moose) or other harmful wild animals designated under s. 169.11, Stats.

3. Species of bird belonging to the order ciconiformes (vultures, bitterns and herons), falconiformes (hawks, eagles, harriers, osprey, kites and falcons) with the exception of American kestrel, the order Strigiformes (all owls), with the exception of saw−whet and screech owls or the families gruidae (cranes) or gavidae (loons).

(c) *Euthanasia.* Euthanasia may only be performed under direct supervision of the sponsoring advanced licensee or consulting veterinarian.

(d) *Volunteers.* Basic licensees may not list volunteers on their license.

(3) ADVANCED LICENSE. (a) *Requirements.* Applicants shall meet all of the following requirements:

1. Possess a basic evaluation form signed by the applicant's advanced licensee sponsor stating that the applicant has been a licensed basic rehabilitator for a minimum of 2 years and has satisfactorily engaged in the practice of wildlife rehabilitation.

2. Possess a signed consulting veterinarian form stating a veterinarian, licensed to practice in Wisconsin or licensee's state of residence, is willing to consult and assist with care and treatment of wildlife being rehabilitated.

3. Allow an inspection of facilities to assure that the applicant's facilities meet the requirements of s. NR 19.77.

(b) *Restrictions.* Advanced licensees may not possess any of the following:

1. Species of wildlife not authorized by their license.

2. Federal migratory birds or federal or state endangered or threatened species unless authorized by the appropriate federal and state permit.

(c) *Euthanasia.* Euthanasia may be performed by the advanced licensee or consulting veterinarian.

(d) *Volunteers.* Volunteers may be authorized to assist with the rehabilitation of wildlife under the authority of an advanced licensee's license provided that all of the following conditions apply:

1. An updated list of volunteers assisting the advanced licensee is retained by the advanced licensee, and shall be provided to a department agent upon request.

2. Volunteers operating at a location other than the advance licensee's facility shall retain a copy of the advanced licensee's license which shall be provided to a department agent upon request.

3. Advanced licensees accept responsibility for the actions and activities of volunteers and shall be responsible for any violations by volunteers in violation of this chapter or ch. 169, Stats.

4. Advanced licensees that utilize volunteers that are not assisting with wildlife rehabilitation activities under the direct supervision of the advanced licensee shall be responsible for the volunteers' facilities meeting the standards defined in s. NR 19.77.

Note: Wildlife rehabilitation sponsorship and veterinary agreements will be available upon request at DNR Service Centers, by writing the Bureau of Wildlife Management, PO Box 7921, 101 S. Webster St., Madison, WI 53707−7921 or by calling (608) 266−8204.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04; CR 08−021: am. (3) (a) (intro.), r. (3) (e) Register November 2008 No. 635, eff. 12−1−08; CR 09−024: renum. (3) (a) 4. to be (3) (a) 3. Register May 2010 No. 653, eff. 6−1−10.

NR 19.74 Application. (1) A person desiring to rehabilitate wildlife in Wisconsin shall submit all of the following information required by the department on an application form supplied by the department:

(a) A signed consulting veterinarian agreement from a veterinarian who is willing to consult and assist applicant with care and treatment of wildlife being rehabilitated.

(b) A signed sponsorship agreement from an advanced licensee who has agreed to sponsor the basic applicant.

(c) For an advanced license applicant, a signed evaluation form from the advanced sponsor and consulting veterinarian which indicates compliance with s. NR 19.73 (3).

(d) Certification that the applicant has read and understands this subchapter and that the applicant agrees to comply with all provisions of this subchapter.

(2) The department may issue the appropriate rehabilitation license to an individual possessing a valid rehabilitators license or permit from another state or province, provided that the minimum requirements of the basic or advanced rehabilitators licenses described in this subchapter are met.

Note: Wildlife rehabilitation application, evaluation form, sponsorship agreement, and veterinary agreements will be available upon request at DNR Service Centers, by writing the Bureau of Wildlife Management, PO Box 7921, 101 S. Webster St., Madison, WI 53707−7921 or by calling (608) 266−8204.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.75 Examination. (1) A person desiring a basic license to rehabilitate wildlife in Wisconsin shall take a written examination, provided and administered by the department, and score 80 percent or greater.

(2) The examination shall be prepared by the wildlife rehabilitation advisory committee and administered by a representative of the department.

(3) An applicant failing to correctly answer at least 80 percent of the questions on the examination described in this section may not be issued a license but may repeat the exam 30 days after the examination was completed.

(4) The department shall provide an examination study guide and other information regarding wildlife rehabilitation to each applicant upon request.

Note: The wildlife rehabilitation study guide will be available upon request at DNR Service Centers, by writing the Bureau of Wildlife Management, PO Box 7921, 101 S. Webster St., Madison, WI 53707−7921 or by calling (608) 266−8204.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.76 Facility inspection. (1) By accepting a license under this section a licensee consents to the facility inspection requirements established in s. 169.37, Stats., by the department and its agents.

(2) An applicant for a license under this section shall allow inspection of the applicant's facilities.

(3) Following an inspection, the department may do any of the following:

(a) Remove any wildlife if it is in the best interest of the animals until the facility complies with the standards established in s. NR 19.77.

(b) Deny the licensee or applicant the privilege to rehabilitate certain species until licensee or applicant can prove that the rehabilitation facilities are in compliance with this subchapter.

(c) Suspend a rehabilitation license for 30 days to allow a licensee's facilities to be brought into compliance.

(d) Allow a licensee under this subchapter a specified period of time to comply with s. NR 19.77 without revocation or suspension of license privileges designated in this subchapter.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.77 Facility standards. (1) GENERAL OPERATING STANDARDS. Prior to engaging in wildlife rehabilitation activities, protocols for disease prevention and transmission, euthanasia, pharmaceutical use, pest control, carcass and biological waste disposal and adequate veterinary care shall be established by the licensee and reviewed and signed by licensee's consulting veterinarian. Wildlife being rehabilitated shall be subject to all of the following conditions:

(a) If suspected of having an infectious disease, be quarantined in areas designated for that purpose.

(b) Be kept separated from human living quarters and activities.

(c) Have no contact with captive wildlife licensed under ch. 169, Stats., with the exception of other wildlife held under a rehabilitation license.

(d) Have no contact with the general public unless specifically authorized by the department for educational purposes.

(e) Be kept in enclosures at all times, and have contact with the licensee or designated volunteers only to the extent necessary to provide adequate care and treatment.

(f) Not be tamed, used as pets, held with domestic animals or habituated to humans.

(g) Be of compatible species when housed together, and not pose a threat to health or well−being of other wildlife in the same enclosure.

(h) Be raised with other wild animals of the same species held under the authority of a rehabilitation license whenever appropriate and possible, to ensure proper species orientation.

(2) ENCLOSURE SIZE AND CONSTRUCTION. (a) Enclosures shall be structurally sound, of sufficient strength for species involved, and maintained in good repair to prevent escape or injury to wildlife being rehabilitated.

(b) Enclosures shall be constructed to allow sufficient space for individual posture and social movements, unless medical treatment necessitates restricted mobility.

(c) All outdoor wildlife enclosures shall have protective devices at entrances and exits to prevent escapes.

(d) Enclosures shall be secured when unattended.

(e) No exposed sharp objects, ponds with steeply sloped banks, toxic paints or sealants, poisonous vegetation or other hazardous items may be used in the construction of enclosures.

(f) Enclosures shall have visual barriers to restrict wildlife's view of humans, domestic animals, and other species being rehabilitated to reduce inappropriate imprinting, socialization, habituation or stress.

(3) ENVIRONMENTAL CONDITIONS. (a) Ambient temperatures shall be sufficient for species involved.

(b) Adequate ventilation by means of windows, doors, vents, fans or air conditioning shall be provided to protect wildlife health and to minimize drafts, odors and condensation.

(c) Adequate lighting shall be provided by artificial or natural means and cycled for appropriate photoperiod for species involved.

(d) Adequate shade, weatherproof shelters, nest boxes, perches and dens shall be provided to protect wildlife from inclement weather and direct sun.

(e) Wildlife being rehabilitated shall be gradually acclimated before being exposed to extreme outdoor conditions.

(4) FOOD. (a) Adequate feeding schedules shall be maintained for species involved unless medical treatment necessitates restricted food intake.

(b) All food shall be palatable, free of contamination, and of sufficient quantity and nutritive value.

(c) Wildlife's diets shall be supplemented with vitamins and minerals when necessary for species involved.

(d) Food receptacles shall be appropriately sized, easily accessible, kept sanitary and safe.

(5) WATER. (a) Fresh uncontaminated water for drinking shall be provided at all times unless medical treatment necessitates restricted water intake.

(b) Water, separate from drinking water, shall be provided for species requiring bathing, swimming or misting unless medical treatment necessitates restricted water exposure.

(c) Water receptacles shall be appropriately sized, easily accessible, kept sanitary and safe.

(6) SANITATION. (a) Removal and disposal of wildlife food wastes, feces and urine, bedding, carcasses, trash, garbage, and debris from the enclosure and premises shall be performed frequently to maintain sanitary conditions and protect wildlife and human health.

(b) Cages, rooms, hard surfaced pens, kennels, runs, equipment, and food and water receptacles shall be sanitized between each wildlife use to prevent disease transmission.

(c) Excess water shall be drained from enclosures and may not drain into neighboring enclosures.

(d) Wildlife in enclosures shall be protected from contact with cleaning activities and chemicals.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04; CR 08−021: am. (2) (f) Register November 2008 No. 635, eff. 12−1−08.

NR 19.78 Care and treatment of wildlife. (1) Any orphaned, sick or injured wildlife, except endangered or threatened species, that the licensee determines is not capable of being rehabilitated or having a reasonable chance of survival in the wild shall be treated under one of the following options:

(a) Euthanized.

(b) Turned over to the department.

(c) Disposed of as directed by the department.

(d) Retained for the purpose of long−term care at the direction of the department.

(2) A licensee shall notify the department within 48 hours of receipt of federal or state endangered or threatened species.

(3) State endangered or threatened species may be euthanized and disposed of only under direction of the department.

(4) Federally endangered or threatened migratory birds may only be euthanized and disposed of under the direction of the migratory bird permit office, United States fish and wildlife service, and the department.

(5) Federally endangered or threatened mammals shall only be euthanized and disposed of under direction of the endangered species permit office of the United States fish and wildlife service and the department.

(6) No licensee may keep any orphaned, sick or injured migratory bird for the purpose of rehabilitation, including birds not ready for release prior to the onset of cold weather, longer than 180 days unless an extension is granted by the migratory bird permit office of the United States fish and wildlife service, and the department for each individual case.

(7) No licensee may keep any orphaned, sick or injured wildlife for the purpose of rehabilitation, including wildlife not ready for release prior to the onset of cold weather, longer than 180 days unless an extension is granted by the department for each individual case.

(8) When the licensee determines that the injured or sick wildlife have sufficiently recovered, or orphaned wildlife has matured to an age where there is reasonable chance for survival in the wild, wildlife shall be released at an appropriate location with landowner permission unless otherwise authorized by the department.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04; CR 08−021: am. (2) Register November 2008 No. 635, eff. 12−1−08; CR 09−024: am. (4) Register May 2010 No. 653, eff. 6−1−10.

NR 19.79 Infectious disease reporting. A licensee or consulting veterinarian shall report animal diseases as required by s. ATCP 10.02 if diagnosed in wildlife being rehabilitated and to the department's wildlife health program.

Note: The wildlife health program may be contacted by sending an e−mail to wildlifehealth@dnr.state.wi.us or by calling (608) 266−8204.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.80 Record keeping and reporting. (1) A wildlife rehabilitation license may not be renewed until the licensee has submitted an annual report in accordance with s. 169.36 (10), Stats., and any additional required records that the department has specifically requested.

(2) An advanced licensee and a basic licensee shall provide a copy of the records required to be maintained for that license to the department quarterly as follows:

(a) Quarterly submission of records shall be provided to the department by April 30th, July 31st, October 31st and January 31st each year, and shall consist of a copy of all required records maintained during the 3 previous months.

(b) Records to be included in the quarterly report shall consist of complete records of all transactions or activity involving any wild animals of the following families:

1. Canidae (coyotes, foxes, wolves).
2. Ursidae (bears).
3. Mustelidae (badger, mink, otter, skunk).
4. Felidae (bobcat, lynx, cougars).

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04; corrections made to (2) under s. 13.93 (2m) (b) 1., Stats., Register December 2003 No. 576.

NR 19.81 Qualifications of sponsors. Advanced licensees may volunteer to sponsor, or provide consultation and advice to basic licensees. A person desiring to be an advanced sponsor shall do all of the following:

(1) Submit a request to the wildlife rehabilitation advisory committee established in s. NR 19.82 requesting designation as a sponsor.

(2) Have experience rehabilitating those wildlife species which the basic licensee is authorized to possess.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.82 Wildlife rehabilitation advisory committee. (1) The secretary shall appoint persons experienced with wildlife biology, rehabilitation, law enforcement, and veterinary medicine to a wildlife rehabilitation advisory committee.

(2) The wildlife rehabilitation advisory committee shall assist the department with development of wildlife rehabilitation examinations, facility inspections, and recommendations which may be used in department decision making as it pertains to wildlife rehabilitation activities.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.83 Additional conditions. (1) Any license issued after January 1, 2004, is subject to requirements of this subchapter.

(2) On January 1, 2004, all existing Wisconsin wildlife rehabilitation permittees will be granted a provisional license for 2 years. After 2 years from the effective date of the provisional license, these provisional licensees may apply for a license pursuant to this subchapter.

(3) An individual applying for a license pursuant to s. NR 19.73 (2) and (3) shall take the examination and meet the requirements established in s. NR 19.75.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.84 Modifications. The department may amend or add conditions to licenses issued under this subchapter at any time if there is a risk to public health and human welfare or there is a risk to the health and welfare of the environment.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

NR 19.85 Disclaimer. The number of licenses issued under this subchapter may be restricted by the department based on the need for wildlife rehabilitation. Possession and care of any wildlife under this subchapter does not create a property right to the wildlife for the licensee.

History: CR 03−029: cr. Register December 2003 No. 576, eff. 1−1−04.

Subchapter III — Permitting the Use of Natural Bodies of Water as Fish Farms

NR 19.90 Purpose and applicability. (1) PURPOSE. The purpose of this subchapter is to establish fees, criteria and procedures to be used for permitting the use of natural bodies of water as fish farms as required under s. 29.733 (2) (f), Stats.

(2) APPLICABILITY. The provisions of this subchapter are applicable to:

(a) Fish farms and state−owned hatcheries located in or proposed to be located in freeze−out ponds.

(b) Natural bodies of water that were licensed as a private fish hatchery or licensed as a part of a private fish hatchery in 1997.

(c) A freeze−out pond or more than one freeze−out pond that is proposed as a fish farm at the time of application and is located on the same contiguous parcel of property under the same ownership or leasehold.

(d) Bodies of water for which a person was issued a permit under ss. 30.19, 30.195, or 31.04, Stats.

History: Cr. Register, April, 1999, No. 520, eff. 5−1−99; CR 03−030: renum. from s. NR 16.70 Register October 2003 No. 574, eff. 11−1−03; correction made under s. 13.93 (2m) (b) 1., Stats., Register October 2003 No. 574; CR 13−001: cr. (2) (d) Register August 2013 No. 692, eff. 9−1−13.

NR 19.91 Definitions. In this subchapter:

(1) "Barrier equipped" means the placement of a structure or device which prevents the movement of fish or bait from a fish farm to a natural body of water.

(1m) "Department fish hatching and rearing facilities" means all fish hatching and rearing waterbodies owned by the department, or leased or controlled through a cooperative agreement between the property owner and the department and where the department owns all the fish.

(2) "Freeze−out pond" has the meaning specified in s. 29.001 (29), Stats.

(3) "Natural body of water" means any spring, stream, pond, lake, or wetland that was historically present in a natural state but may have been physically altered over time.

(4) "Preexisting fish rearing facility" has the meaning specified in s. 29.001 (64), Stats.

(5) "Transfer of permit" means the conveyance of a permit from one party to another as a result of change in ownership or leasehold interest of a fish farm.

(6) "Wetland" has the meaning specified under s. 23.32, Stats.

Note: For purposes of this subchapter, a natural body of water does not include an artificial wetland, as defined under s. NR 103.02 (1m) or any swale, bermed area or excavation that is not located in a wetland, pond, lake, stream or spring that was historically present in a natural state, if the artificial wetland, swale, bermed area or excavation retains water as the result of human modification of the landscape or is constructed of man−made materials.

History: Cr. Register, April, 1999, No. 520, eff. 5−1−99; CR 01−128: cr. (1m), am. (3) Register June 2002 No. 558, eff. 7−1−02; CR 03−030: renum. from s. NR 16.71 Register October 2003 No. 574, eff. 11−1−03; correction made under s. 13.93 (2m) (b) 1., Stats., Register October 2003 No. 574; CR 13−001: am. (3) Register August 2013 No. 692, eff. 9−1−13.

NR 19.92 Natural body of water permit application fees. Permit application fees for the use of natural bodies of water for fish farms shall be as follows:

(1) Permit applicants for the initial use of freeze−out ponds as fish farms shall pay a $500.00 non−refundable permit application fee.

(2) Permit applicants for permit transfers shall pay a non−refundable permit transfer fee of $100.00.

(3) Permit applicants for permit renewals shall pay a non−refundable permit renewal fee of $50.00.

History: Cr. Register, April, 1999, No. 520, eff. 5−1−99; CR 03−030: renum. from s. NR 16.72 Register October 2003 No. 574, eff. 11−1−03; correction made under s. 13.93 (2m) (b) 1., Stats., Register October 2003 No. 574; CR 13−001: am. (intro.), r. (1), renum. (2) to (1), renum. (3) to (2) and am., cr. (3) Register August 2013 No. 692, eff. 9−1−13.

NR 19.93 Applicant permit procedures for use of natural bodies of water for fish farms. (1) The deadline for permits reauthorized under s. 29.733 (2) (b), Stats., was January 1, 2003.

(2) For renewal of permits, the applicant shall submit a new application to the department not more than 16 months before the expiration date of the permit granted under this chapter but not less than 2 months from the expiration date of the permit.

(3) Applications for permits under this subchapter shall include documents verifying all of the following:

(a) The land that is riparian to the body of water is owned, leased or controlled by the owners of the fish farm.

(b) None of the owners of the fish farm or of the riparian lands provides access to the body of water to the public by means of an easement or other right−of way or by means of a business open to the public, except that the owners of the fish farm may allow fishing by the public for a fee.

(c) Documentation that the natural body of water may be a freeze−out pond or that the natural body of water is a preexisting fish rearing facility that is barrier equipped.

(d) Copies of any other permits or authorization required by ch. 30 or 31, Stats., the Army corps of engineers and any other federal, state or local laws and zoning ordinances.

(e) All applicants shall identify the water source and quantity used for the fish farm and whether there is any discharge to a water of the state.

(f) Any other information requested by the department to determine whether a permit would or would not be granted by the department.

Note: Permit application forms are available from the Bureau of Fisheries Management, 101 South Webster St., P.O. Box 7921, Madison, WI 53707.

(4) The department may issue a notice of intent to use a natural body of water as a fish hatching or rearing facility that was not being used as of January 1, 1998 by the department. The department shall comply with all provisions of s. NR 19.94 before it may use a natural body of water as a fish hatching or rearing facility.

History: Cr. Register, April, 1999, No. 520, eff. 5−1−99; CR 01−128: am. (1) Register June 2002 No. 558, eff. 7−1−02; CR 03−030: renum. from s. NR 16.73 Register October 2003 No. 574, eff. 11−1−03; corrections made under s. 13.93 (2m) (b) 1. and 7., Stats., Register October 2003 No. 574; CR 13−001: am. (1), (2), (4) Register August 2013 No. 692, eff. 9−1−13.

NR 19.94 Department determinations. (1) The department shall issue a permit for use of a natural body of water as a fish farm or as a part of a fish farm if all requirements of this subchapter have been met and if the department determines that no substantial public interest exists in the body of water and that no public or private rights in the body of water will be adversely impacted. Among the factors considered, the following are indicative of public rights and interests including but not limited to:

(a) Plant and wild animal habitat or plant and wild animal populations.

(b) Threatened or endangered species or their habitat.

(c) Water quality related functional values or uses of wetlands identified in s. NR 103.03.

(d) Surface water quality standards identified in chs. NR 102, 104, 105, 106 and 107 and minimum water quantity requirements identified in s. 31.02, Stats.

(e) The public's right to navigate and associated incidents to navigation including fishing, swimming, wading and canoeing.

(2) Fish farms may not introduce or propagate any non−native fish species if the department has determined that having the fish in that particular self−contained fish rearing facility or preexisting fish rearing facility will pose a risk of being detrimental to the waters of the state.

(3) Physical improvements or modifications to natural bodies of water used as fish farms shall comply with all federal, state and local laws and ordinances.

(4) Permits approved under this subchapter may be transferred to another party if the department determines that all conditions of this subchapter and s. 29.733, Stats., have been satisfied.

(5) The department shall issue or renew a permit issued under s. 29.733 (2) (a) and (b), Stats., for use of a natural body of water as a fish farm or any part of a fish farm in a natural body of water unless the department determines there has been a substantial adverse change affecting one or more of the criteria specified in subs. (1) (a) to (e), (2), or (3), or s. 29.734, Stats., resulting from the operation of the fish farm. The department shall consider the historical condition of the natural water body prior to the presence and operation of the fish farm as part of their permit renewal decision.

Note: Under this paragraph, historical conditions refer to known uses of the natural body of water prior to the inception of the fish farm.

(6) The department shall deny a permit for use of a natural body of water as a fish farm or as part of a fish farm if the requirements of this subchapter have not been met.

(6m) A single permit shall be issued for multiple natural bodies of water located on the same contiguous parcel of property under the same ownership or leasehold.

(7) Upon receipt of a complete permit application, the department shall post notice of every application submitted to the department on the department's Internet Web site. The department may schedule a hearing or provide notice stating that it will proceed on the application without a hearing if no substantive written objections to issuance of the permit is received within 30 days after publication or notice. The notice may be provided to news media and other persons according to the procedures in s. NR 27.07 (1) (b) and (c). The department may provide notice to other persons as it deems appropriate. The department will assume the cost of publishing the notice.

History: Cr. Register, April, 1999, No. 520, eff. 5−1−99; CR 01−128: r. and recr. (5), cr. (6m) Register June 2002 No. 558, eff. 7−1−02; CR 03−030: renum. from s. NR 16.74 Register October 2003 No. 574, eff. 11−1−03; corrections made under s. 13.93 (2m) (b) 1. and 7., Stats., Register October 2003 No. 574; CR 13−001: am. (5), (7) Register August 2013 No. 692, eff. 9−1−13.

NR 19.95 Enforcement. The department may suspend or revoke a permit issued under this subchapter subject to the provisions of s. 29.733 (2) (e), Stats. A fish farmer operating a fish farm in a natural body of water as defined in s. NR 19.91 (3) without a valid permit under this subchapter may be penalized under s. 29.971, Stats.

History: Cr. Register, April, 1999, No. 520, eff. 5−1−99; CR 01−128: am. Register June 2002 No. 558, eff. 7−1−02; CR 03−030: renum. from s. NR 16.75 Register October 2003 No. 574, eff. 11−1−03; corrections made under s. 13.93 (2m) (b) 1. and 7., Stats., Register October 2003 No. 574.

Appendix E

WDNR Lake Shoreland and Shallows Habitat Monitoring Field Protocol

DRAFT Lake Shoreland & Shallows Habitat Monitoring Field Protocol

Wisconsin Department of Natural Resources
May 27, 2016

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Contents

Overview and Purpose

This guidance document provides a standard methodology for surveying, assessing, and mapping habitat in lakeshore areas, including the Riparian Buffer, Bank, and Littoral Zones. This survey will be conducted by county staff, consultants, Wisconsin Department of Natural Resources (WDNR) staff, and other professionals and can be funded through the surface water grant program (Lake Protection, River Protection, and Aquatic Invasive Species are authorized by ss. 281.68, 281.69, 281.70, 281.71, 281.72, and 23.22(2)(c), Wis. Stats. and administered under chapters NR 190, 191, 192, 195, and 198, Wis. Admin. Codes).

The data is being collected to provide important and useful information to local and regional resource managers, community stakeholders, and others who are interested in protecting and enhancing Wisconsin's lakes. We anticipate that the data generated from this protocol will be used for:

- Teaching and outreach
- Identifying areas for protection or restoration
- Targeting future Critical Habitat Designations within lakes
- Creating lake management plans
- Creating county comprehensive plans
- Aiding management at the county level
- Planning Aquatic Plant Management
- Evaluating trends in lakeshore habitat over time (repeat survey every ~5 years)
- Understanding trends in lake ecology (e.g., fish, wildlife, invasive species)

Reporting tools that stem from this survey are currently under development. Examples of information to be gathered lake-wide include: percent cover of impervious surface, mowed lawn, or plants in the Riparian Buffer Zone, number of parcels with erosion concerns, total length of modified banks, density of human structures (piers, buildings, etc.), general distribution of floating and emergent aquatic plants, and density of coarse woody habitat. For each metric, a threshold identifying healthy habitat will be developed. This information may eventually be used for the WDNR Water Quality Report to Congress, which summarizes the condition of surface waters in Wisconsin.

The time commitment to complete the protocol is reasonable for most Wisconsin lakes, although it will take substantial effort on lakes with long shorelines. We recommend conducting this protocol by circling the lake three times with two people in a small boat:

1. Loop 1 - Take georeferenced photos that slightly overlap
2. Loop 2 - Assess the riparian, bank, and littoral habitat by parcel
3. Loop 3 - Count and map all pieces of large woody habitat in water less than 2 feet deep

Loops 1 and 2 could be combined into a single lap if the team is able to take photos from a consistent perspective and track photo boundaries while also conducting the habitat assessment. Woody habitat should be inventoried separately because the team will need to get close to shore and use extreme focus to find all pieces of large woody habitat.

Requirements

- The habitat assessment should be conducted during the growing season at a date late enough for plants to have leafed out and landowners to have landscaped their property, but before plants senesce and landowners store piers and other equipment for the winter.
- The woody habitat survey could occur at a separate time; spring and fall provide optimal conditions with clear water and few aquatic plants in many lakes.
- The same people should assess all properties on the lake.
- The team should calibrate their eyes to recognize distances by physically measuring common distances with a tape measure or range finder (see Estimating Distance).
- The team should calibrate their eyes to recognize log diameters using the wood calibration stick (see Estimating Diameter and Length of Coarse Woody Habitat).

Equipment

General

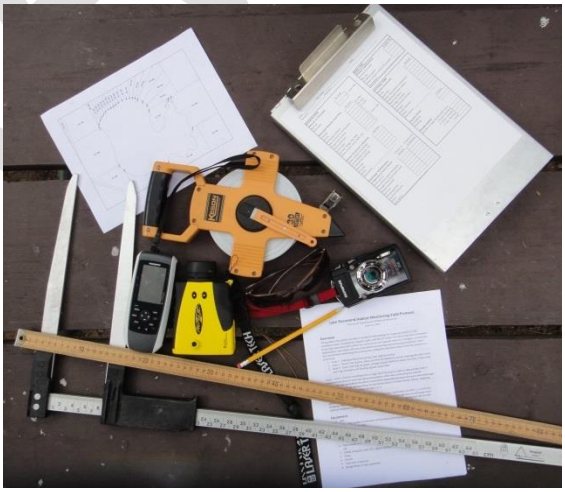
- Data sheets ("Rite in the Rain" paper)
  OR
- Tablet computer with GPS, digital camera, and virtual forms (optional, but useful)
- Pencils
- Boat Equipment
  - Life Jackets
  - Anchor
  - Oars
  - Motor & Fuel

Georeferenced Photos

- Digital camera with GPS
  - Spare SD Card (or other storage)
  - Spare batteries

Habitat Assessment

- GPS
  - Pre-loaded coordinates of shoreland parcel property boundaries
  - Spare batteries
  - Spare GPS unit
- Maps
- Range finder in feet
- Forestry tape measure (50 feet)
- Yard stick or handheld depth finder
- Flagging tape or cones
- Polarized sunglasses



Coarse Woody Habitat Inventory

- GPS
- Secchi disk
- Wood calibration stick
- Polarized sunglasses

Georeferenced Photos (Loop 1)

This is an opportunity to document shoreland habitat condition at a single point in time, and the results may be referred to years later. The entire shoreline should be photographed with slightly overlapping images that are taken from a vantage point ~50 feet from and perpendicular to shore. The water's edge and understory vegetation 35 feet inland should be visible in the photo. Tree crowns may be partially cropped out of the photo.

Photographic Equipment

A variety of cameras may be used:

1. Digital Camera with internal GPS – this option results in high quality, georeferenced photos. The latitude and longitude of the camera's position when the photo was taken is stored with the photo, and locations can be uploaded directly to GIS.
2. Digital Camera and separate GPS unit – this option results in high quality photos that can be georeferenced with post-processing work. Manually adjust your camera's clock so that it displays the same time as your GPS clock. The locations of individual photos can be derived by matching the date/time of each photo with the date/time of the location recorded by the GPS. Check to make sure that the date and time is recorded for each photo and that the GPS unit is continuously recording your path.
3. Smartphone with camera and georeferencing capacity – this option may result in lower photo quality depending on the phone, but has the ability to georeference each photo.
4. Tablet computer with internal GPS and camera – this option has the ability to georeference and store each photo. Check the quality of the camera.

Photo Tips

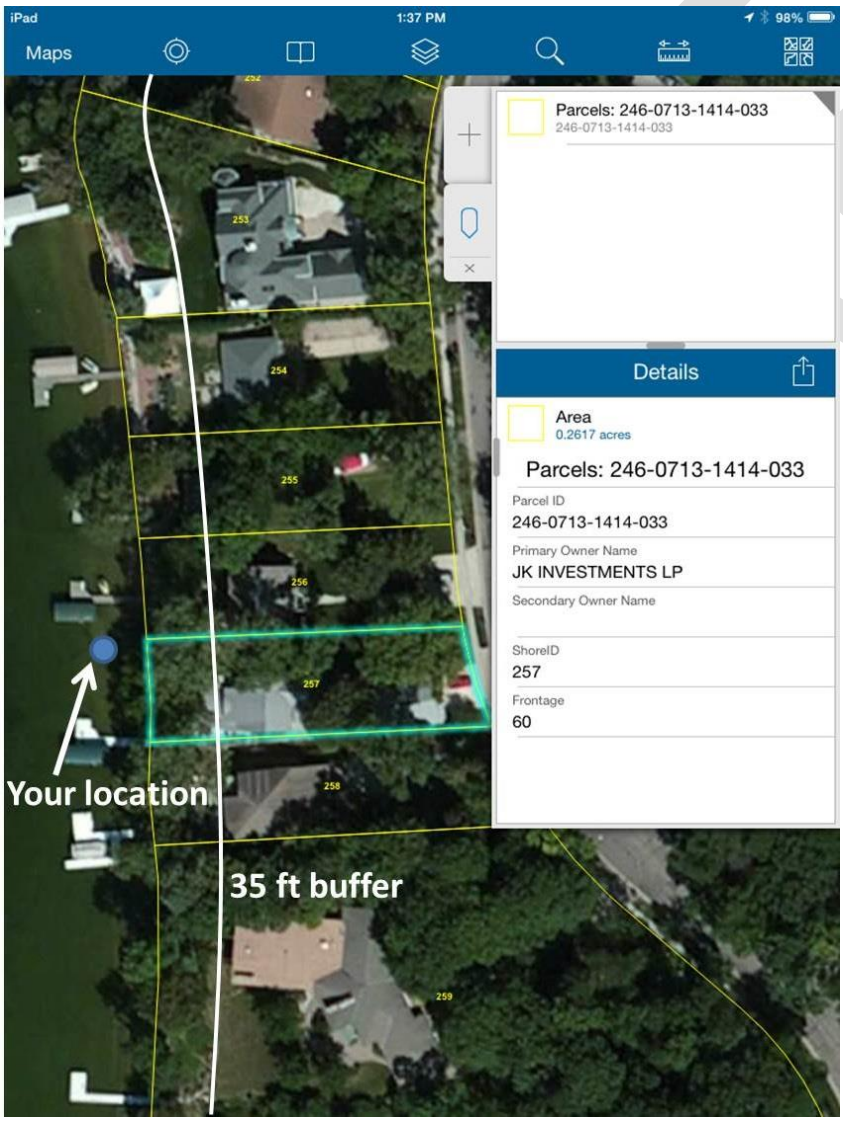
- If possible, photograph early in the morning or early in the evening to avoid harsh sunlight conditions (or do half the lake in the morning and half in the evening to avoid backlit conditions).
- Do not take photos into the sun.
- Make sure the photo is level and in focus.
- Increase the focal length (high f-stop) to improve depth of field (full frame in focus) or use auto settings with Landscape option.
- Increase the shutter speed to prevent blur.
- Avoid zooming in too close. Try to frame the water's edge up to the canopy with sufficient detail for assessment.
- Respect privacy:
    - Notify the lake association or local paper about the habitat survey in advance.
    - Do not take photos with people in them (weekday mornings are ideal).
    - Avoid taking photos too close to shore or into windows.
    - Listen and respect resident's concerns. These photos will primarily be used for shoreland habitat assessment and lake management plans, but will be a public record and may be used for additional purposes.

Habitat Assessment (Loop 2)

Mapping Prior to Field Work

The shoreland habitat assessment is conducted for each parcel around the lake. Prior to doing field work, maps must be created. At a minimum, maps should include:

1. Satellite imagery of the lake (e.g., Google or World Imagery in ArcMap)
2. Parcel layer that shows the parcel boundaries: http://www.sco.wisc.edu/wisconsin-geospatial-news/statewide-parcel-database-of-wisconsin-now-available-online.html
3. Parcel ID and the feet of frontage for each parcel
4. Line depicting the 35 foot riparian buffer (use the lake edge of the parcel boundary, not a separate lake polygon file)
5. GPS coordinates where each parcel boundary intersects the lake shore (depending on technology used)

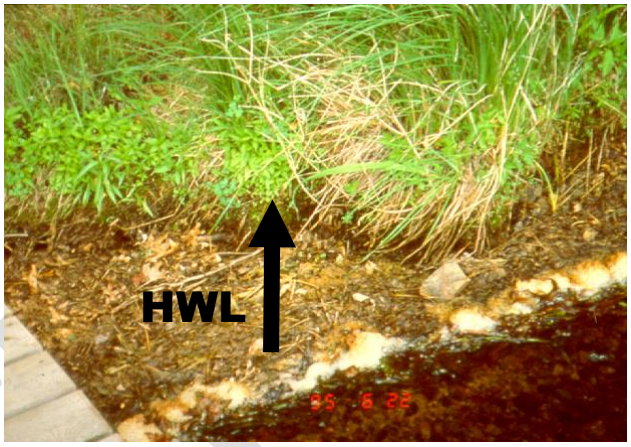


Depending on available technology, there are a variety of ways that navigation in the field may be accomplished. The first option is to use a handheld GPS to navigate to the parcels in conjunction with a paper map. This option requires uploading x,y coordinates for each parcel-lakeshore intersection point to the GPS unit. Use the GPS to navigate close to each point and reference the paper maps to determine the parcel boundaries.

Alternatively, you may take a tablet computer loaded with all necessary map layers into the field. The GPS within the tablet will allow you to view your location relative to the mapped parcel boundaries. This works well with ArcPad, an ESRI software package. If you do not have a license for ArcPad, you may instead use free software (ArcGIS Collector and Google Maps) on a tablet computer or a smartphone. However, a 3G/4G signal is required to view your location relative to the map.

Quality Assurance – Determining High Water Level and Estimating Distances

High Water Level



This protocol is meant to assess habitat regardless of water levels. Before initiating monitoring, the lake level in relation to the approximate Ordinary High Water Mark (OHWM) should be determined and recorded on the quality assurance data sheet. **The OHWM has legal ramifications and must be determined by qualified staff. This protocol will not make legal OHWM determinations, but will borrow the concept to approximate a boundary between land and water called the "High Water Level" or "HWL" in this protocol.** Check the corresponding box if the current water level is below, at, or above the HWL (see Definitions). If water levels are low, the Riparian Buffer Zone could be tens of feet (or more) inland from the present waterline. If the water level is above the HWL, expect to find terrestrial vegetation underwater.

Estimating Distance

This protocol requires estimating distances inland and along the length of shore. Improving your ability to estimate distance inland and along the shore requires practice, so all observers should practice estimating both types of distances before conducting the survey. One quality assurance data sheet must be filled out per crew and lake.

MEASURE & FLAG:
Find a riparian property where you may enter to measure and flag various distances onshore. Measure and flag distances **only** on land you may legally access: public land or private land you were given permission to access.

1. Measure distance inland: Measure 35 feet inland from the HWL perpendicular to shore and place a flag at that point. If possible, repeat this exercise on public land with varying degrees of vegetation (e.g., an open boat landing vs. dense forest) and varying slopes. Measure the 35 foot distance inland horizontally (do not follow the slope angle).
2. Measure distances parallel to shore: Measure five 10-foot intervals, one 50-foot interval, and one 100-foot interval on shore and flag them. Bank modifications require estimating horizontal distances.
3. Observe those distances from the water: Go out on the boat and observe the flags; try to get a sense of the 35 foot buffer inland distance and the varying distances parallel to shore (Fig. 1).

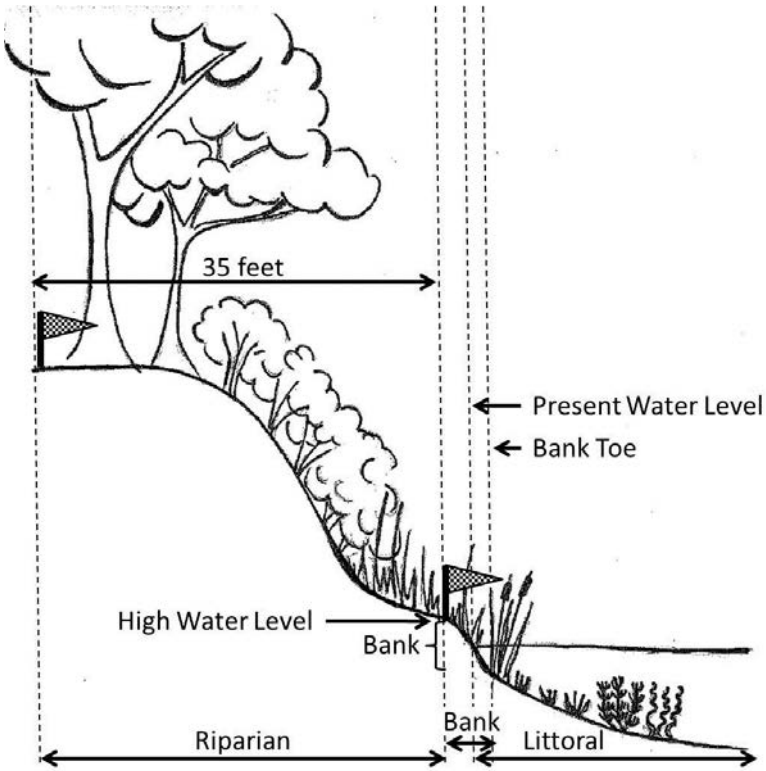
ESTIMATE:

Next, practice estimating the length of shoreline features of unknown distance. Make all estimations from the boat as if you were conducting the survey.

4. For each of 3 replicates, record the estimated and measured distances. You may either:
    a. Flag at least 3 unknown distances of each type (3 inland and 3 parallel to shore) for the rest of the crew to estimate before going out on the boat.
    b. Choose landmarks on shore and estimate their distances from the water (at least 3 distances of each type for a total of 6). Then go back to shore to measure the actual length of the estimated feature with a tape measure.
    c. Choose landmarks on shore and estimate their distances from the water (at least 3 distances of each type for a total of 6). Then use a range finder to test your inland distances. Use a tape measure on land to test the parallel distances.
5. Test the accuracy of your range finder by shooting it to at least 3 different objects on land and then measuring the distance with a tape measure. For each replicate, record the distance estimated by the range finder and the distance measured with a tape measure. Ensure that the range finder is accurate within 2 feet.

Figure 1. Example of cones marking the Riparian Buffer Zone (yellow vest on post 35 feet inland along the horizontal) and distances parallel to shore as viewed from a boat.

Defining an Assessment Boundary



Shoreland habitat will be evaluated within each parcel. The *Riparian Buffer Zone* begins at the HWL and extends inland 35 feet (Fig. 2). The *Littoral Zone* extends from the present waterline into the lake. The width of the Littoral Zone may vary, but generally includes the area near shore where aquatic plants and human structures are present in the water. The *Bank Zone* is the region between the edge of the top-of-the-bank lip and the bank toe, which is the inflection point between the bank face and the lake bed. It includes the bank face and the shore.

Figure 2. Profile view of lake shore illustrating three habitat zones when water level is average.

The HWL will normally be on the bank face (Fig. 3). Note that depending on where the HWL and the present water levels fall, the Bank Zone can overlap with the riparian and Littoral Zones. In Fig. 3, the Riparian Buffer Zone includes the upper part of the bank. When water levels are low, the lake bed is exposed (Fig. 3). Exposed Lake Bed should be assessed if the present water line is at least 3 feet horizontally out from the bank toe.

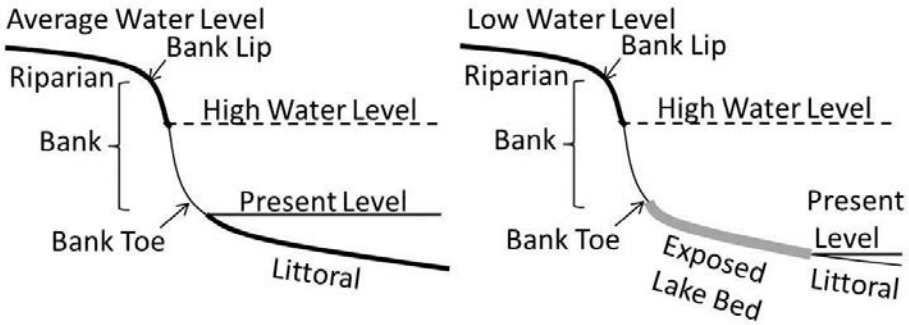


Figure 3. Habitat zones in relation to the High Water Level when the present water level is average (left) or low (right).

From a boat, navigate to the first parcel you will assess. Use landmarks and aerial photography from your map together with GPS coordinates and the rangefinder to define the parcel boundaries and the 35 foot setback. Go close to shore to view the parcel.

Riparian Buffer Zone

Percent Cover

Using your satellite imagery map and observations from the boat, visualize looking down on the Riparian Buffer Zone from the air. If a rain drop fell from the sky, what would it land on? Estimate the percent covered by each of the following in the Riparian Buffer Zone only:

1. Canopy - large trees at least ~16 feet tall (0-100%)

Ground layers (sum to 100%):

2. Shrubs and herbaceous plants - shrubs are woody plants with multiple stems or tree saplings approximately < 16 feet tall and herbaceous plants are grasses and forbs
3. Impervious surface – concrete, decking, boulders, stone, rip rap, rooftops, compacted gravel/soil, boats flipped over on shore
4. Manicured lawn
5. Agriculture - row crops, pasture, range, hay field
6. Other - duff, bedrock, gravel, bare soil, sand, mulch, etc.

Percent canopy cover can be up to 100% regardless of the other percent cover categories because tree canopies can overlap with the other categories. For example, tree branches may shade patio, lawn, and herbaceous plants. The sum of all "ground layers" (shrub/herbaceous plants, impervious surface, manicured lawn, agriculture, and other) must equal 100%. Shrubs and herbaceous plants may overlap and be difficult to distinguish. Estimate their combined percent cover and mark whether the estimate included shrubs and/or herbaceous plants. Check both boxes if both were present. Report percent covers in multiples of 5%. For example, if impervious surface only includes a couple of stairs on a 100 foot long parcel, report 5% cover.

Plants are only quantified in terms of their growth form, but not their taxonomic identity. Percent cover of non-native plants are quantified together with native plants. Species identification skills are not required to conduct this survey. Thus, a Riparian Buffer Zone with 100% cover of reed canary grass, an invasive, will appear the same as a buffer with 100% cover of native sedges. Species identification could be added for individual surveys if desired.

On some lakes, individual parcels could be very large, covering miles of shoreline. If the shoreline is completely undeveloped (i.e., no buildings, mowing, cleared vegetation, etc.), list 100% canopy cover and 100% shrub/herbaceous cover. If a lot of shoreline is covered by wetlands or prairie without trees, try to estimate the actual percent canopy cover (do not assign 100%). If there are signs of human disturbance (structures, cleared vegetation, etc.) in a small section of the entire parcel (e.g., 50 feet of shoreline on a 1600 foot long parcel), then you may assume the disturbed area covers 5% of the entire Riparian Buffer Zone (see example Parcel E on page 28).

Human Structures in the Riparian Buffer Zone

Count the number of structures that are present within the Riparian Buffer Zone of the parcel.

- Buildings (e.g., residence, shed, boathouse, garage, commercial building)
- Boats (generally flipped upside down on shore for storage)
- Fire pits (free standing or built in the ground)
- Other – include written description (e.g., retaining wall), but avoid counting small objects that are easily moved (e.g., toys or lawn chairs)

Runoff Concerns

Look for changes to the land that would increase runoff into the lake (see list below). Record whether the runoff concern occurs within the Riparian Buffer Zone ("Present in Riparian") or within the parcel but outside of the Riparian Buffer Zone ("Present out of Riparian"). If the runoff concern is present in the Riparian Buffer Zone, you do not need to search in detail outside of the Riparian Buffer Zone. You may still check both boxes if the concern occurs both in and out of the Riparian Buffer Zone.

Record presence of:

- Point sources (e.g., culverts, drain pipes, rain gutters, sump pumps, gray water outflow)
- Channelized flow or gullies
- Stairways, trails or roads leading directly to the Bank Zone (top of the bank lip)
- Sloped lawn/soil (such that water runoff leads directly to the lake)
- Bare soil
- Sand/silt deposits
- Other – include written description

Bank Zone

Bank Modifications and Erosion

Estimate the length (to the nearest 10 feet) of the following items if present. Train your eye to recognize 10 foot increments along the shoreline. You may also use the recorded shoreline length of the parcel to aid length estimation.

- Vertical sea wall
- Rip rap
- Other erosion control structures (note what the material is under "Notes")
- Artificial beach
- Slumping banks or bank erosion > 1 foot vertical bank face
- Slumping banks or bank erosion < 1 foot vertical bank face

Littoral Zone

Human Structures

Count the number of human structures present within the Littoral Zone:

- Piers
- Boat lifts (count lifts with and without canopies the same)
- Swim rafts/water trampolines (Do not count rafts beyond ~50 feet out into the water from shore. Rafts may be placed up to 200 feet from shore.)
- Boat houses (over the water)
- Marinas
- Other – include written description

Aquatic Plants

Check the box if emergent and/or rooted floating aquatic plants are present within the Littoral Zone of the parcel. Plants growing only underwater (submergent) are not included in the survey because they may be difficult to observe. Check the box if there are obvious aquatic plant removal areas in the Littoral Zone of the parcel. Aquatic plant removal areas are generally demarcated by straight lines of cleared vegetation that are perpendicular to shore and adjacent to plant beds.

Exposed Lake Bed Zone

When lake levels are low and expose at least 3 horizontal feet of the lake bed (Fig. 3 and 4), this portion of the data sheet should be filled out. Otherwise, skip the Exposed Lake Bed Zone portion of the data sheet. Wisconsin case law grants an owner of riparian property the right to exclude members of the public from the Exposed Lake Bed abutting his property. Members of the public may only access Exposed Lake Bed adjacent to public land or to private land with the consent of the adjacent riparian landowner. Thus, do not step out of the boat and walk on the Exposed Lake Bed toward the HWL unless you have permission from the owner of the private abutting land. This means that the Riparian Buffer and Bank Zones cannot be accurately surveyed when the Exposed Lake Bed becomes very wide. In Fig. 4b, the observers would be too far away to assess the Riparian Buffer and Bank Zones. When lake levels are extremely low, only surveys of the Littoral and Exposed Lake Bed Zones are appropriate. The full survey should be postponed or repeated when water levels are higher.

Plants

Check the appropriate box if plants are growing on the Exposed Lake Bed. Use the same 3 plant growth forms as in the Riparian Buffer Zone: canopy, shrub, herbaceous. At left, the Exposed Lake Bed is sandy with herbaceous plants (Fig. 4a). At right, the Exposed Lake Bed is completely covered with Fasset's Loco Weed, an herbaceous plant (Fig. 4b).

Disturbances

Look for signs of disturbances to the Exposed Lake Bed and check the appropriate box. Specifically, look to see if plants were mowed or removed and look for signs of tilling or digging up the sediment.

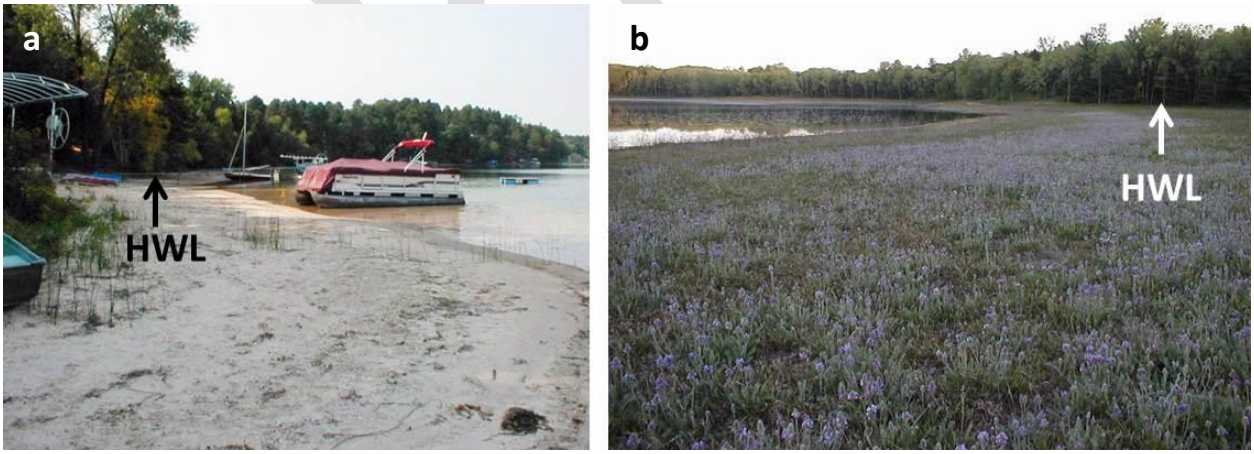


Figure 4. In both examples, the "Exposed Lake Bed" is the land between High Water Level and the present water level.

Coarse Woody Habitat Inventory (Loop 3)

Conduct the woody habitat protocol from a small boat or kayak, not a pontoon or large boat. Small boats can be maneuvered close enough to shore to see woody habitat. First, observe Secchi depth near shore. If the Secchi depth is less than 2 feet, this protocol should not be used because visual estimates of woody habitat will be unreliable.

Second, observe the current water level as compared to the High Water Level (HWL). Check the corresponding box if the current water level is below, at, or above the HWL. If water levels are low, the Riparian Buffer Zone could be tens of feet (or more) inland from the present waterline (Fig. 4 and 5). Coarse woody habitat below the HWL and above the present waterline should still be counted.

Figure 5. Wood stranded above water should be counted if below the HWL.

The woody habitat survey does not need to be associated with parcels. The boat driver should slowly drive the perimeter of the lake at the 2 foot depth contour with help from the observer, who shall periodically check water depth and find the 2 foot depth contour (use a yardstick, handheld depth finder, or marked wood calibration stick). If the Littoral Zone is relatively flat, then follow the 2 foot depth contour at the nearest point to shore. The observer should search for wood while wearing polarized sun glasses to improve visibility. The observer will mark a GPS waypoint for each piece of large wood.

This protocol only enumerates "large wood," defined as greater than 4 inches in diameter somewhere along its length and at least 5 feet long. Only count wood that is between the HWL and the 2 foot depth contour. The large wood section must be in the water or below the HWL. Tree branches hanging over the water may be counted if the required size occurs below the HWL. If water levels are low, note that you will also be counting wood lying on the ground that is out of the water, but still below the HWL. Live branches and non-anchored logs count if they meet the other requirements. Live/dead wood standing vertically in the water and tree stumps with roots should be counted if they meet the size criteria. Do not count lumber (e.g., railroad ties, fish cribs, rip rap).

Coarse Woody Habitat Step by Step Instructions

1. Before searching for wood, measure the Secchi depth in deep water.
2. Record whether the current water level is below, at, or above the HWL.
3. Mark a GPS waypoint for each piece of large wood between the HWL and the 2 foot depth contour.

4. Give each piece of large wood a branchiness ranking:
    0 = no branches
    1 = a few branches
    2 = tree trunk has a full crown

Figure 6. From left to right, woody habitat without branches (0), with few branches (1), and with a full crown (2).

5. Touch Shore: Mark "1" if the log crosses the HWL (comes out of the water onto shore); mark "0" if it does not. Logs parallel to shore count if they touch the HWL.

Figure 7. Example of woody habitat connected to shore (top). If bog mats extend far out from shore, count as connected to shore when wood extends above water and touches the bog mat. Woody habitat parallel to shore may be counted if the log touches shore. In the bottom photo, the piece of wood is off shore and would not be counted as connected to shore.

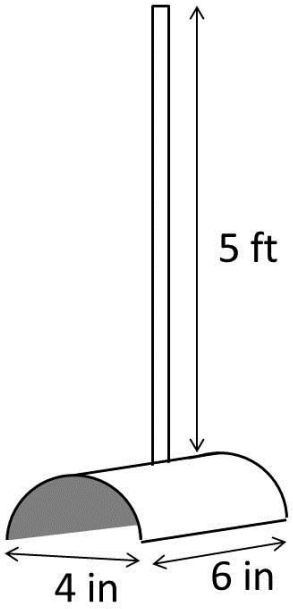
6. In Water: Mark "1" if at least 5 feet of log is currently underwater; mark "0" if the log is below the HWL, but less than 5 feet of the log is currently underwater.

Figure 8. This photo illustrates an example of trees hanging over the water. In this case, only the trunk closest to the water with inundated branches will be counted. It has few branches, touches shore, and is out of the water (Branch = 1, Touch Shore = 1, In Water = 0). The other trunks are too far above the water.

Estimating Diameter and Length of Coarse Woody Habitat

Coarse woody habitat greater than 4 inches diameter and 5 feet long that is in the water and/or below the HWL will be counted. First, the observers must familiarize themselves with wood of this size. Use the "wood calibration stick" to find trees on shore whose largest diameter is greater than or less than 4 inches diameter.

Bring the "wood calibration stick" on the boat. This is a 6 inch length of 4 inch inner diameter PVC pipe cut in half lengthwise and attached perpendicular to a 5 foot long pole. The pole is used to judge whether the piece of wood is at least 5 feet long and the PVC section is used to judge wood diameter at its widest point. If the PVC fits over the wood, the wood is too small to count. If it does not fit over the wood, it is large enough to count. One foot intervals should be marked on the pole, which can then be used to measure the 2-foot depth contour.



Measure various sized pieces until you begin to recognize the size thresholds. Before you begin the survey, use your eye to identify "large wood" and then measure the length and diameter with the wood calibration stick.

- After you are correct on at least 5 consecutive pieces of wood, you may begin the survey.
- As you proceed with the survey, use the wood calibration stick to measure the diameter and length of 1 in every 20 pieces of wood as a quality assurance measure.

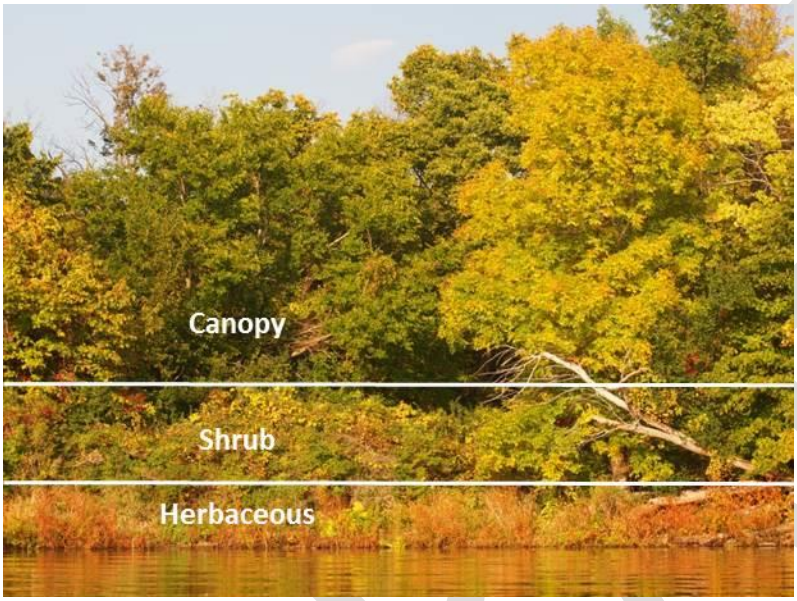
The measurements do not need to be recorded.

Definitions

Percent Cover – an estimation of the fraction of the plot that is dominated by each of a number of categories, such as lawn, impervious surface, and plants. The fraction is given as a percentage from 0 to 100 at 5% intervals.

Riparian Buffer Zone Definitions

Riparian Buffer Zone – land area from the High Water Level to 35 feet inland along the horizontal

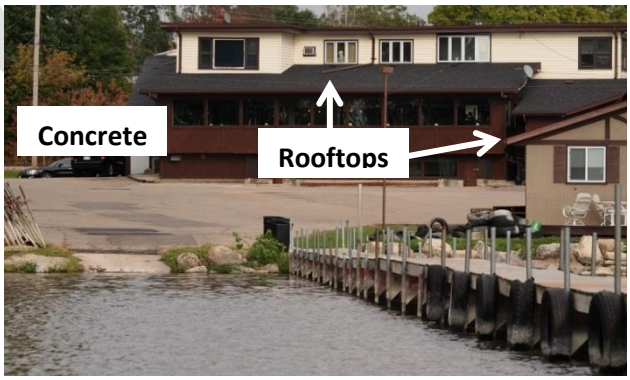


Canopy layer – area that is shaded by trees that are at least 16 feet tall

Shrub layer – woody plants with multiple stems and small trees less than 16 feet tall

Herbaceous plant layer – plants without woody stems. Grasses and sedges have slender leaves and inconspicuous flowers. Forbs are broad-leaved plants that often have showy flowers.

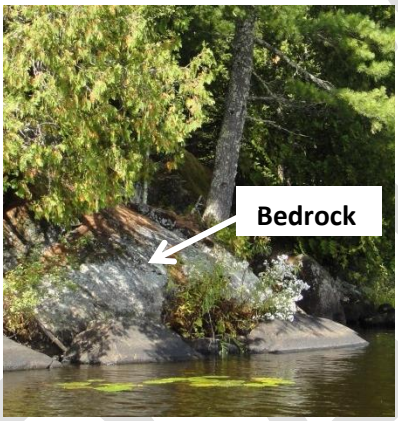
Impervious surface – an area that releases as runoff all or a majority of the precipitation that falls onto it (e.g. rooftops, sidewalks, driveways, parking lots, concrete, boulders, stone, decks, stairs, compacted gravel/soil, and boats flipped over on shore). Rocks used for rip rap also count as impervious surface.

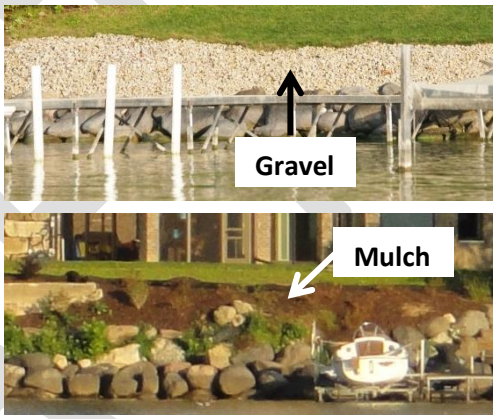


Rocks for rip rap →

Agriculture – agricultural fields planted in rows or grasslands used for grazing livestock

Manicured lawn – grass that is mowed short





Other Percent Cover – this category includes cover types that are not on the data sheet, such as bedrock, gravel, bare soil, sand, mulch, and dead plant material (duff)

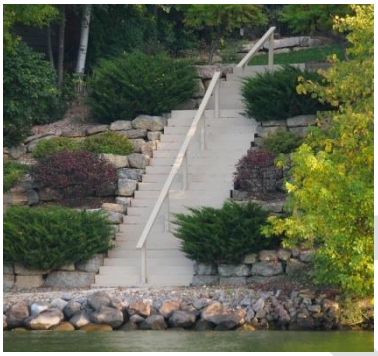
Building – any roofed structure (house, cabin, shed, boathouse, garage, commercial)

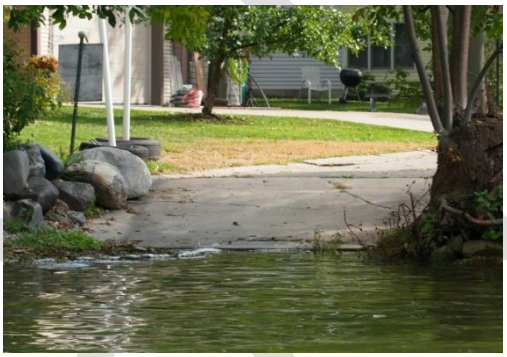
Fire pit – circular indentation in the ground or portable structure used for fires

Boats on shore – boats flipped upside down for storage in the Riparian Buffer Zone

Point Source – look for a pipe bringing water directly to the lake. This pipe could be directing stormwater, gray water, or other water sources to the lake.

Channelized water flow/gully – sharp indentation into the ground where water flows downhill and has eroded away the soil





Stair/trail/road to lake – stairs, dirt or paved trails, or roads that lead directly to the lake and would cause rainfall to flow into the water. Roads to the lake may be old, private boat landings.

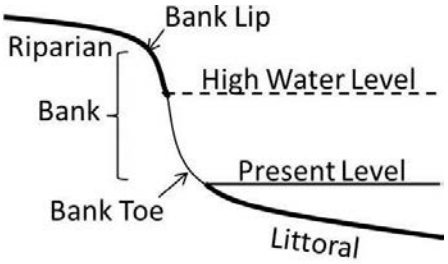
Lawn/Soil Sloping to Lake – the land slopes toward the lake and lacks natural vegetation that would prevent runoff/erosion (e.g., slope covered by lawn, bare soil, gravel, mulch)

Bare soil – unvegetated ground that could be eroded in a rain storm

Eroding, Slumping bank – obvious signs that soil on the bank is washing into the lake, location on the shoreline where the bank is lower than expected due to erosion

Sand/silt deposit – pile of fine sediments (< 2 mm diameter) that collected at a site due to erosion

Bank Zone Definitions

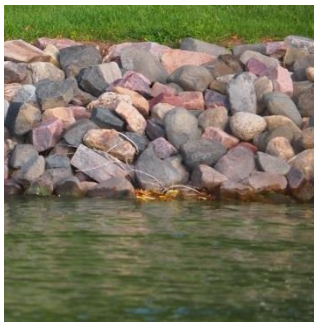


Bank Zone - The Bank Zone is variable in width, and is the region between the edge of the top-of-the-bank lip and the lake bed. The Bank Zone includes the bank face, high water level and the shore (or beach).

Bank Toe – the inflection point between the bank face and the lake bed

High Water Level (HWL) – the point on the bank or shore where the water is present often enough so that the lake or streambed begins to look different from the upland. Specifically, the HWL is the point on the bank or shore up to which the water, by its presence, wave action, or flow, leaves a distinct mark on the shore or bank. The mark may be indicated by erosion, destruction of or change in vegetation, or other easily recognizable characteristics. The HWL can be located through on-site studies of physical and biological conditions at the shoreline. The principal indicator is the change from water plants to land plants. In the area where the plants change, the investigator may also use indicators such as change in soil type, ridges, or other erosion marks or water stains on rocks, soils, trees, or structures. If none of these indicators are available in the immediate location, the elevation of the HWL may be found at another spot and transferred to that site in question (from NRCS 643A). The water level is below the HWL in the two sites pictured to the upper right (arrows point to the HWL).

Vertical Sea Wall – upright structure that is steeper than 1.5 feet vertical to one foot horizontal installed parallel to the shore to prevent the sliding or slumping of the land and to protect the adjacent upland from wave action. **Note:** Seawalls are commonly constructed of timber, rock (including gabions), concrete, steel or aluminum sheet piling and may incorporate biological components



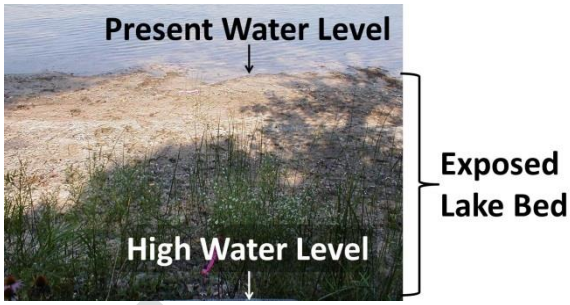
Rip rap – rock or concrete piles used to armor shorelines and prevent erosion; this may also include natural cobbles and gravel that were clearly taken from the water and piled on the bank

Other erosion control structures – any other type of erosion control structure on the shoreline; may include inert materials (rocks) at the bank toe and biological materials on the upper portion of the bank, non-treated wood, stakes and posts, jute netting, biologs, fiber rolls and mats, logs, and branches

Artificial beach– sand along the shoreline used to create a beach (versus shorelines that naturally have sand substrate). It may have been created by dumping sand along the bank or by scraping away top soil and vegetation to expose sand underneath.

Erosion >/< 1 ft. face – estimate the length (to the nearest 10 feet) of shoreline with eroding banks that are less than or greater than 1 foot vertical height. The picture to the left shows about 10 ft. of eroding bank face > 1 ft. tall.

Littoral Zone Definitions



Littoral Zone – water area from the present water line into the lake (~50 ft.), generally including the area near shore where aquatic plants and human structures are present in the water

Exposed Lake Bed – land area between the High Water Level and present water level (when water level is low)

Pier – structure leading out from shore into a body of water. One pier may have multiple mooring locations for boats. One pier should be counted for each access to shore. Count wharves, which are structures that run parallel to shore, as additional piers.

Boat lift and shelter – the lift stores a boat over and above the water. Some lifts have a canopy over the boat. Count together as 1.

Swim raft/water trampoline – floating structure that is anchored up to 200 ft. from shore. Count rafts within ~50 ft. from shore.

Boathouse – roofed structure over the water used to store boats

Marina – facility that provides secured moorings or dry storage for boats

Emergent aquatic plant – plants that live in the water and have leaves that extend above the water surface (e.g., bulrush, sedge, wild rice, arrowhead, cattails)

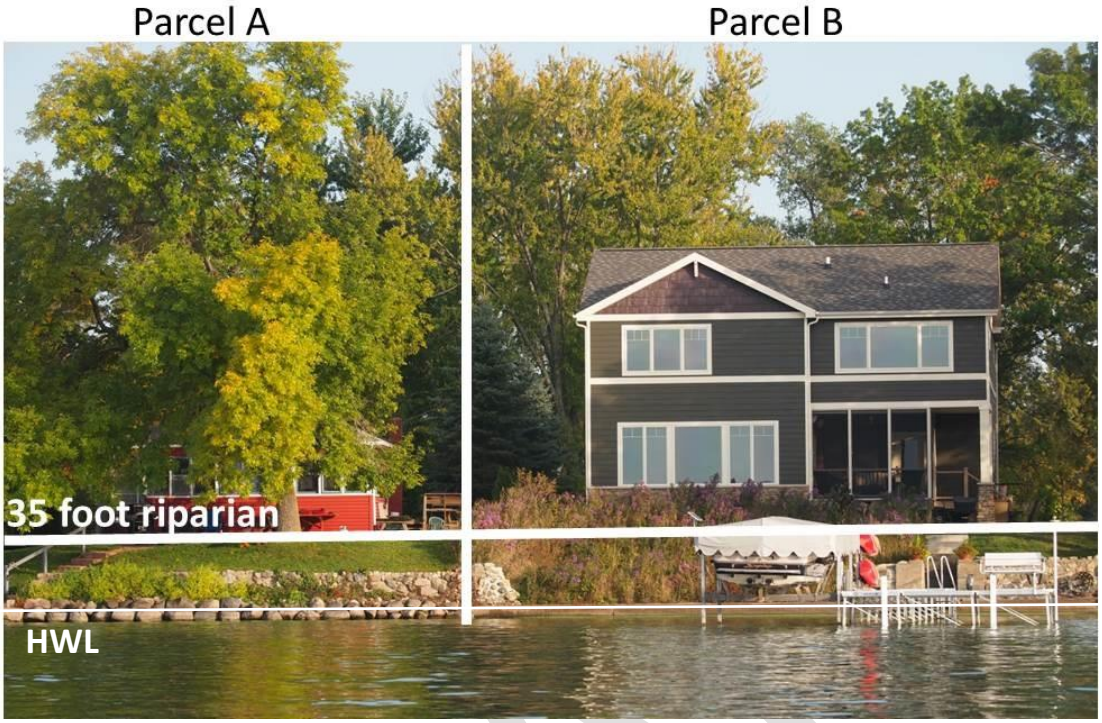
Floating aquatic plant – rooted plants with leaves that float on the water surface (e.g., lily pads)

Removed aquatic plants – littoral area where submergent or emergent aquatic plants have obviously been removed as evidenced by adjacent plant beds on both sides of the removal area. The removed area will often be along a straight line perpendicular to shore.

Coarse Woody Habitat – a piece of wood greater than 4 inches in diameter and 5 feet in length that is in the water or below the HWL. Live and dead wood standing vertically in the water should be counted if it is large enough. Tree stumps with roots should only be counted if they meet the size criteria.

Wood Calibration Stick – a 6 inch length of 4 inch inner diameter PVC pipe cut in half lengthwise attached perpendicular to a 5 foot long pole that is used to measure large wood in the water. One foot intervals should also be marked on the stick (to measure 2-foot depth).

Sample Parcel Assessments



The vegetation and shoreline erosion structures show a distinct boundary between Parcel A and B. The Riparian Buffer Zone is marked by the horizontal white line, but a rangefinder would be used to find the 35 foot inland distance in the field.

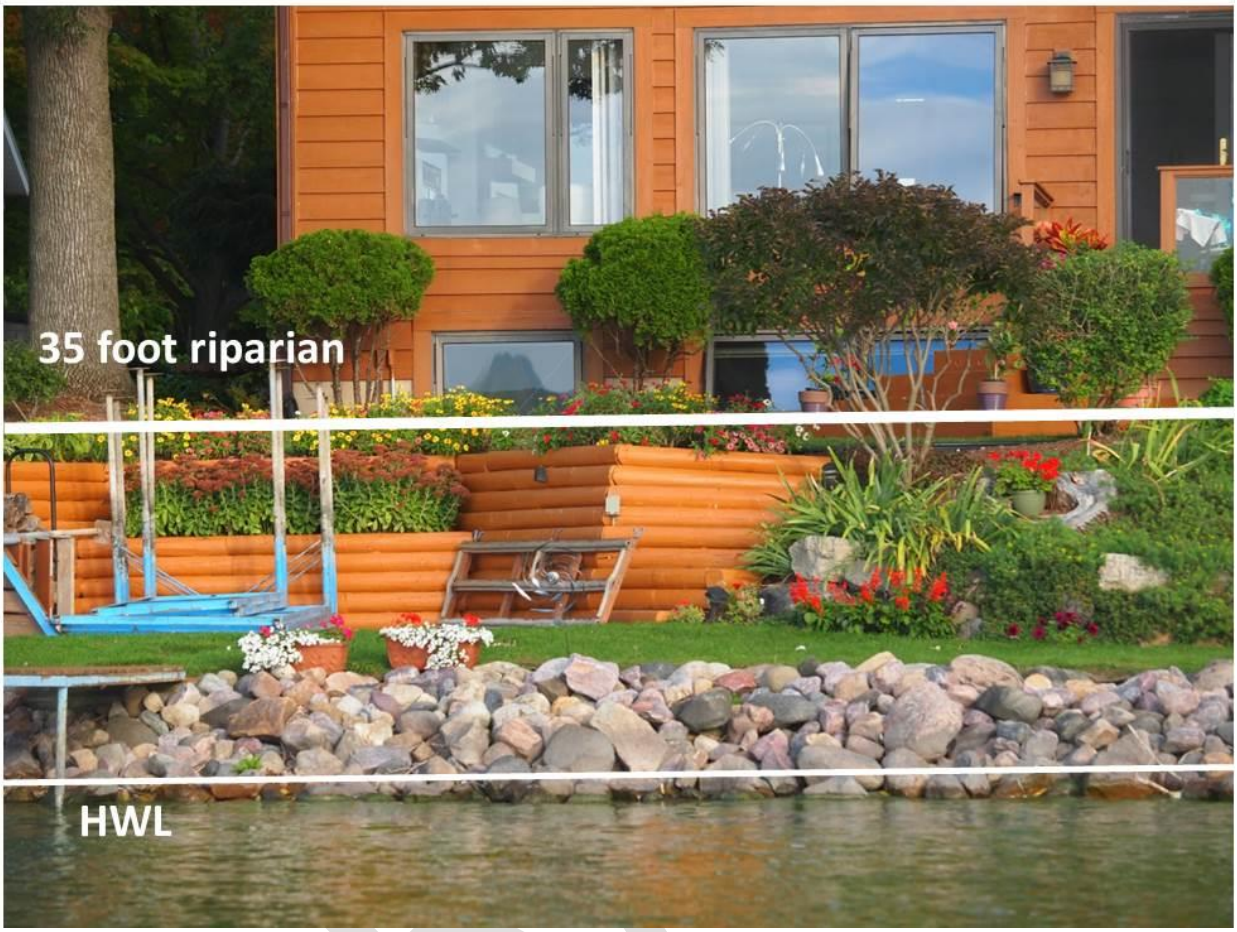
In Parcel A, the tree trunk is behind the Riparian Buffer Zone, but part of the canopy extends over the Riparian Buffer Zone (~10%). There are some herbaceous plants growing in the rip rap, but very few (5%). Mark herbaceous plants as present, but not shrubs. The rest of the parcel is made up of lawn and impervious surface (stairs and rip rap that extend landward from the water). Estimate impervious surface in the Riparian Buffer Zone as 15% and the remainder as lawn (100 – 5 – 15 = 80%). None of the "Human Structures" listed on the data sheet in the Riparian Buffer Zone or Littoral Zone boxes are present, so write "0" beside each item. There is sloped lawn present in the Riparian Buffer Zone, as well as a straight stairway to the lake that would deliver runoff during rain events, so check the appropriate boxes under Runoff Concerns. The entire Bank Zone is covered in rip rap; use the parcel shoreline length to record length of rip rap in feet. Aquatic plants are absent (leave blank).

There is no canopy cover in Parcel B. The majority of the parcel has been restored with native prairie plants (herbaceous cover). Approximately 5% is impervious surface (stairs and stone wall on the right), 10% is lawn, and the remaining 85% is herbaceous plants (no shrubs). There are no human structures in the Riparian Buffer Zone. There is 1 pier and 1 boat lift in the Littoral Zone. Under Runoff Concerns, sloped lawn and straight stair to lake are present in the Riparian Buffer Zone. There is a vertical sea wall along the entire length of the parcel. Aquatic plants are absent. The Exposed Lake Bed section does not apply.

Parcel C

Note that the HWL is slightly above the present waterline, so the sand and small grasses between the present waterline and HWL will not be a part of the percent cover estimation in the Riparian Buffer Zone. There are a lot of trees on the parcel, but some gaps near shore (90% canopy cover). The entire parcel except for the path leading to the water is covered by shrubs and herbaceous plants (mark as 95% cover and check both the shrub and herbaceous boxes). The remaining 5% cover is other (bare dirt on the path). There are no human structures in the Riparian Buffer Zone, but there is 1 pier in the Littoral Zone. There is a narrow path leading to the lake, which should be checked under “Present in Riparian” as “Stair/trail/road to lake” and “Bare soil”. Emergent plants are present. The Exposed Lake Bed Zone applies to this parcel because the width of the Exposed Lake Bed is at least 3 feet between the HWL and present water level. Herbaceous plants are present and there are no signs of disturbance.

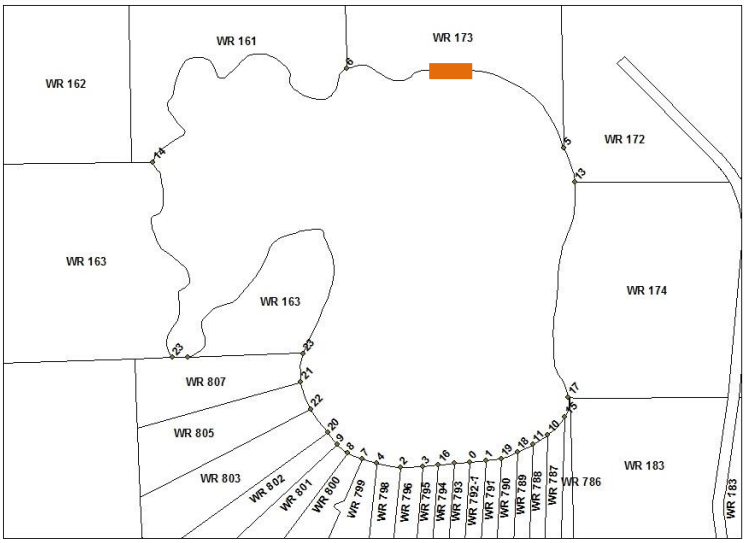
Parcel D



For instructional purposes, we will describe how to assess the portion of Parcel D pictured here. The house is just barely outside the Riparian Buffer Zone. Canopy cover is 0%. The garden area may be counted for shrub and herbaceous vegetation because it serves a structural function even though many of the species are ornamentals. Note the spaces between plants that are mulched; mulch will count as “other”. The top of the wooden boards that form the planter and the rip rap will count as impervious surface, but not the upside down pier section, which may only be stored there temporarily. Thus, the percent cover of shrub/herbaceous vegetation is 30%, impervious surface is 15%, lawn is 50%, and other is 5%. The garden planter may be counted as a human structure in the Riparian Buffer Zone under “Other”. There is 1 pier in the Littoral Zone. There are no runoff concerns. Rip rap covers the entire shoreline (approximately 20 feet in this photo). There are no aquatic plants and no visible plant removal areas. The Exposed Lake Bed Zone does not apply.

Parcel E

This is an example of state land that is natural, but shows signs of previous human disturbance. Parcels WR 163 – 183 in the map below are state land; the orange bar depicts the disturbed area in the photo above. There is an old forest road in the Riparian Buffer Zone. The area in the center of the photo lacks shrubs and trees, has sparse herbaceous vegetation, and large areas of bare soil with pine needles on top, but the majority of the 1600 feet of shoreline in parcel WR 173 has full coverage of herbaceous plants, shrubs, and trees. Assume that this disturbed area is 5% of the entire Riparian Buffer Zone in this parcel. Report 95% canopy cover, 95% shrub/herbaceous, and 5% other for the entire parcel. After "description", note that other percent cover is bare soil with pine needles. Runoff Concerns Present in Riparian include: "Lawn/soil sloping to lake" and "Bare soil". Human structures are absent in the Riparian Buffer and Littoral Zones. The Bank Zone is not modified. Emergent plants are present.



Time Estimate

This protocol is designed for a crew of 2 people in a small motor boat or, in some cases, a kayak. To help with planning, we approximate the time spent per monitoring activity. Time estimates represent the time that it takes a well-trained crew to complete a parcel. During training, the time to complete a parcel was approximately twice that reported here. Photos were taken on 13 lakes, the habitat assessment was done on 15 lakes, and the coarse woody habitat assessment was done on 5 lakes. The lakes range from very natural to highly developed and are spread throughout the state.

Table 1. Minimum and maximum time spent on each of the three parts of the protocol.

Protocol	Min	Max
Photos (minutes/mile of shoreline)	14	50
Parcel Assessment (minutes/parcel)	3.5	4
Coarse Woody Habitat (minutes/mile of shoreline)	29	120

Taking photos from a kayak added a substantial amount of time (max. in Table 1). This mode of transportation was required because the lake was so shallow. The time spent on the woody habitat inventory varied greatly as well. On most lakes, the time ranged from 29 to 50 minutes per mile, but one lake took 120 minutes per mile. This lake was stained and had very dense floating aquatic plants, making it hard to see and navigate. In this type of lake, the woody habitat inventory would be more efficient and accurate if conducted in early spring or late fall. The time spent managing data post-field work is not accounted for here. It takes approximately one hour to enter data from 35 parcels into Excel. However, data management effort will depend on whether data is captured on paper sheets or in a tablet computer. Eventually, data will be entered directly into the SWIMS database.

The total amount of time to complete the habitat survey on a lake depends largely on the length of shoreline and number of parcels. Green Lake (in Green Lake County) is one of the largest lakes in the state and will take at least two weeks to complete under the best conditions. Rock Lake (Jefferson County) is still quite large with a lot of parcels, and could be completed in less than a week. Small lakes with a lot of state land could be completed in a half day. Note that the time estimates in Table 2 do not account for travel time, set up, breaks, bad weather, etc.

Table 2. Examples of lakes that were sampled during summer of 2015. The total hours spent monitoring each lake was estimated using the minimum number of minutes per mile or parcel listed in Table 1.

Lake	Area (acre)	Shoreline length (mi)	Parcels	Total Hours Photos	Total Hours Parcels	Total Hours Wood	Total Hours
Green	7433	23.6	~1000	5.5	58.3	11.4	75
Rock	1364	11.2	341	2.6	17.5	6.5	27
Buffalo	105	2.1	26	0.5	1.5	1.0	3

This protocol will be a major undertaking on Wisconsin's largest lakes and flowages. Lake Chippewa (250 miles) and Turtle Flambeau flowage (209 miles) have the longest shorelines in the state and could take ~950 hours to complete all three aspects of the survey. However, this protocol could be accomplished quickly on smaller lakes, and most lakes in the state are small; 88% of the 1793 lakes with boat launches have <10 miles of shoreline (Fig. 9). Lakes with approximately 10 miles of shoreline should take approximately 2.5, 5, and 31 hours to complete the photo, woody habitat, and parcel assessments, respectively. This assumes the minimum time per mile or parcel in Table 1 and assumes that all parcels on a lake are 100 feet wide. The estimated time to complete the photo survey varies from < 10 minutes to 58 hours (Fig. 10), and the time to complete the woody habitat inventory varies from < 10 minutes to 120 hours (Fig. 11). It is harder to estimate total time on the parcel survey because the size of parcels can vary greatly. A lot of lakes have large parcels with state or federal land and will take less time than the estimate assuming 100 foot parcels around the entire lake.

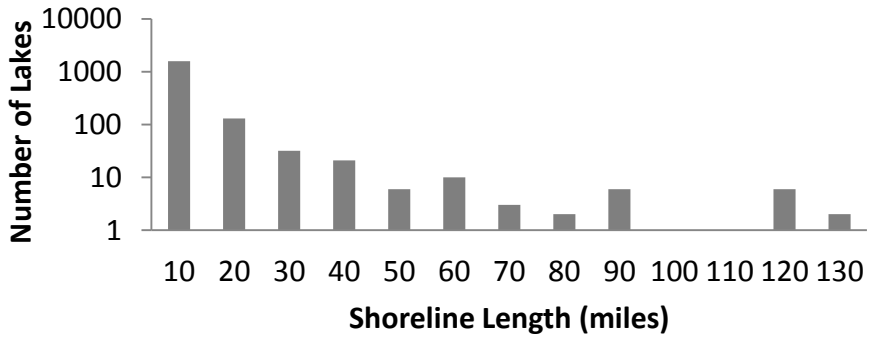


Figure 9. Frequency distribution of lake size for all lakes in the state with boat launches. Lake Chippewa and Turtle Flambeau Flowage are not included here.

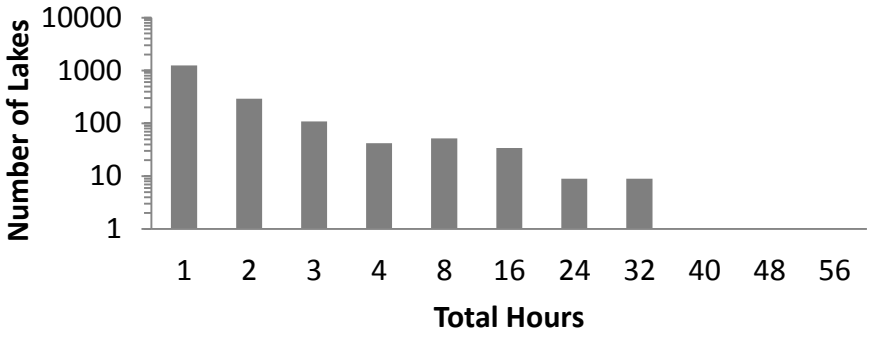


Figure 10. Total hours to complete the photo survey on lakes with boat launches given shoreline length. It will take 1 hour or less to complete the survey on 1244 lakes.

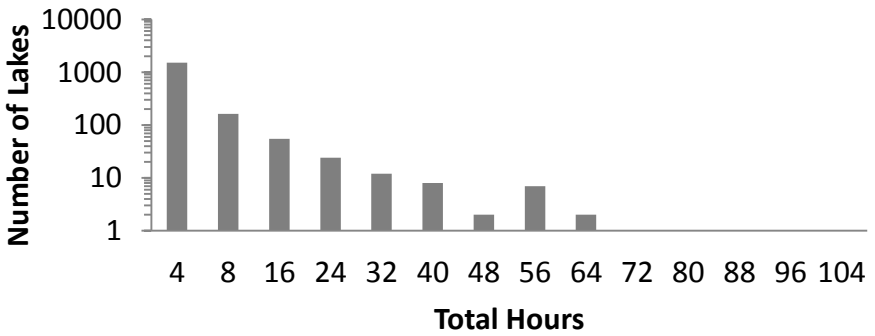


Figure 11. Total hours to complete the coarse woody habitat survey on lakes with boat launches given shoreline length. It will take 4 hours or less to complete the survey on 1518 lakes.

Data Sheets

Quality Assurance

Date _____ Lake name _____ WBIC_____
Observers_____

Present water level is ☐ Below ☐ At ☐ Above the High Water Level

Riparian Distance (landward)

Replicate	Estimated	Measured
1		
2		
3		

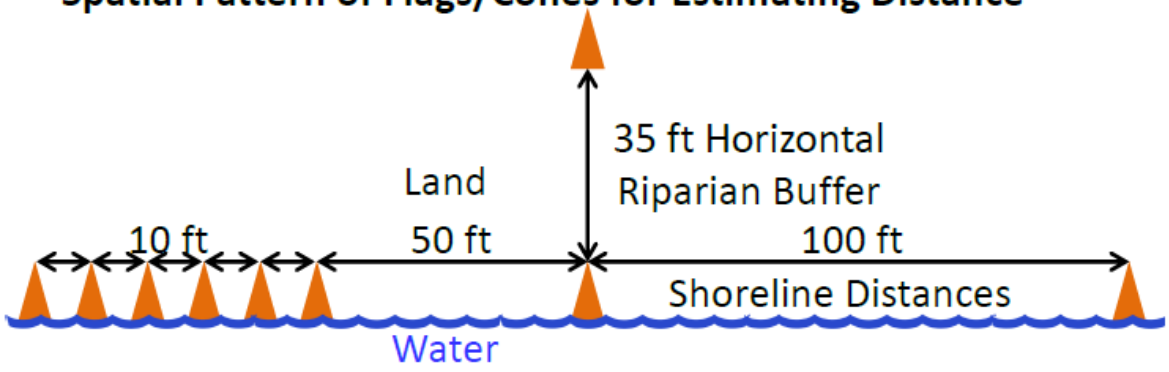
Shoreline Length

Replicate	Estimated	Measured
1		
2		
3		

Rangefinder Calibration

Replicate	Rangefinder	Tape Measure
1		
2		
3		

Spatial Pattern of Flags/Cones for Estimating Distance



Habitat Assessment Data Sheet (one per parcel)

Date _____ Lake name _____ WBIC_____
Parcel ID_____ Observers_____

RIPARIAN BUFFER ZONE

Percent Cover	Percent	
Canopy		(0-100)
Shrub ☐ Herbaceous ☐		
Shrub/Herbaceous		sum=100
Impervious surface		
Manicured lawn		
Agriculture		
Other (e.g. duff, soil, mulch)		

description:_____

Human Structures	Number
Buildings	
Boats on shore	
Fire pits	
Other	

description:_____

Runoff Concerns in Riparian or Entire Parcel	Present in Riparian	Present out of Riparian
Point source	☐	☐
Channelized water flow/gully	☐	☐
Stair/trail/road to lake	☐	☐
Lawn/soil sloping to lake	☐	☐
Bare soil	☐	☐
Sand/silt deposits	☐	☐
Other	☐	☐

description:_____

Notes:

BANK ZONE	Length (ft)
Vertical sea wall	
Rip rap	
Other erosion control structures	
Artificial beach	
Bank erosion > 1 ft face	
Bank erosion < 1 ft face	

LITTORAL ZONE

Human Structures	Number
Piers	
Boat lifts	
Swim rafts/water trampolines	
Boathouses (over water)	
Marinas	
Other	

description:_____

Aquatic Plants	Present
Emergents	☐
Floating	☐
Plant Removal	☐

If Applicable (low water level):
EXPOSED LAKE BED ZONE

Plants	Present
Canopy	☐
Shrubs	☐
Herbaceous	☐
Disturbed	
Plants (mowed or removed)	☐
Sediment (tilled or dug)	☐

Coarse Woody Habitat Inventory Data Sheet

Date _____ Lake name _____ WBIC_____

Observers_____

Present water level is ☐ Below ☐ At ☐ Above the High Water Level Secchi depth _____ ft

ID	Branch	Touch Shore	In Water	ID	Branch	Touch Shore	In Water	ID	Branch	Touch Shore	In Water	ID	Branch	Touch Shore	In Water
1				26				51				76			
2				27				52				77			
3				28				53				78			
4				29				54				79			
5				30				55				80			
6				31				56				81			
7				32				57				82			
8				33				58				83			
9				34				59				84			
10				35				60				85			
11				36				61				86			
12				37				62				87			
13				38				63				88			
14				39				64				89			
15				40				65				90			
16				41				66				91			
17				42				67				92			
18				43				68				93			
19				44				69				94			
20				45				70				95			
21				46				71				96			
22				47				72				97			
23				48				73				98			
24				49				74				99			
25				50				75				100			

Branch: 0 = no branches, 1 = a few branches, 2 = full tree crown

Touch Shore: 0 = entirely below High Water Level (HWL), 1 = crosses HWL

In Water: 0 = less than 5 ft of log is currently underwater, 1 = at least 5 ft of log is currently underwater

Appendix. Additional Parameters of Interest

There may be local reasons for including additional parameters into the minimum protocols described in this document. The following list gives a few examples that were included in past surveys. This list is not meant to be exhaustive.

General

Average width of natural vegetation from water's edge landward

Human Structures in Riparian Buffer

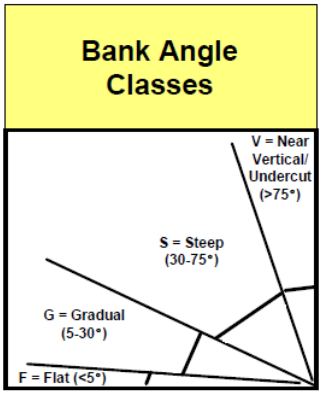
Boathouse – the number of boathouses on the lake could be quantified separately from buildings

Littoral Zone

Watercraft in the water – the number of watercraft in the water at piers and mooring buoys could be counted in addition to boat lifts if the lake group wants to find out the total number of watercraft at riparian lots. This count could be compared to counts from previous years and analyzed for a historical trend.

Bank Zone

Bank slope – this parameter could be documented with the use of GIS or by visually estimating categories of bank slope as in the National Lakes Assessment protocol



Aquatic Plants

Submergent Plants – submergent plants could be marked as present, absent, or unknown if water clarity was too low to judge.

Invasive Species

Percent cover of canopy, shrub, and herbaceous plants is quantified regardless of whether the species are native or invasive. In addition to estimating percent cover of each vegetation layer, percent cover of invasive species could be quantified separately. A checklist of invasive species could also be filled in for each parcel with special attention to riparian plant species.

Appendix F

Upper Turtle Lake Aquatic Plant Management Goals, Objectives, and Actions

Appendix F – Aquatic Plant Management Plan Goals, Objectives, and Actions

1. Goal 1: Support and propagate AIS management efforts that minimize negative impacts to the native plant communities
    a. Objective 1: Prepare for a management program to reduce CLP levels to those seen in 2010.
        i. Action 1: Conduct a rhodamine dye study to determine potential impacts of a herbicide application in Upper Turtle Lake
            1. Mimic a proposed treatment
            2. Administer spring of the year prior to the proposed treatment
        ii. Action 2: Conduct smaller test treatments with concentration testing to determine efficacy of herbicide treatments on CLP beds.
        iii. Action 3: CLP bed mapping surveys
            1. Conducted the spring prior to the proposed treatment.
            2. Conducted on an annual basis each spring to determine changes in CLP levels and the efficacy of any management actions.
        iv. Action 4: Conduct CLP turion density studies.
            1. Completed in the fall of the year prior to or immediately following the first year of a proposed treatment.
            2. Repeated after three years of treatment.
        v. Action 5: Complete a full suite of water quality testing
            1. Purchase a dissolved oxygen/ temperature meter
            2. Collect Temperature and Dissolved Oxygen profiles, TP, ChlorA, Secchi disk data.
            3. Monthly in accordance with the CLMN protocol.
        vi. Action 6: Determine the appropriate scale and method of CLP management.
            1. Review all data to determine when, where, and how to best manage CLP within Upper Turtle Lake.
            2. Areas that are 2.0 acres or larger will be considered for treatment.
    b. Objective 2: Implement a multi-year, native restoration and CLP control plan.
        i. Action 1: Apply liquid endothall at appropriate concentrations when the size of CLP beds warrant.
            1. Complete pre- and post-treatment aquatic plant surveys in the treated areas each year of treatment.
        ii. Action 2: Complete summer littoral point-intercept surveys to determine impacts of management actions on the native plant communities.
            1. All plants surveyed in the entire littoral zone
            2. Done in July or August
    c. Objective 3: Evaluate the use of harvesting In the absence of any herbicide application
        i. Action 1: Gather more data related to the costs and benefits associated with a CLP and native plant harvesting plan.
2. Goal 2: AIS education and prevention.
    a. Objective 1: Prevent new AIS from entering and becoming established within Upper Turtle Lake
        i. Action 1: Implement Clean Boat Clean Waters

1. 200 hours annually with grant funding
2. Volunteer hours only without grant funding

b. Objective 2: Set up and maintain a public participation and communication program and an AIS education and information program
   i. Action 1: Develop and distribute at least two newsletters updating AIS and other UTLA activities
   ii. Action 2: Host at least one annual meeting and maintain open UTLA Board meetings
   iii. Action 3: Host an Annual Lake Fair to promote public involvement in lake activities
      1. Can be combined with the Annual Picnic or other planned event, or with another entity
   iv. Action 4: Maintain an Upper Turtle Lake Association webpage

c. Objective 3: Set up and maintain AIS monitoring efforts
   i. Action 1: Install, maintain, and/or improve AIS signage at both public access points
   ii. Action 2: Establish and maintain an in-lake and shoreline AIS monitoring program following CLMN guidelines
   iii. Action 3: Follow established EWM early detection and response plan
      1. See AIS Rapid Response Plan (Appendix J)

3. Goal 3: Promote and support nearshore, riparian, and watershed best management practices that will improve fish and wildlife habitat, reduce runoff, and minimize nutrient loading into Upper Turtle Lake.
   a. Objective 1: Adopt State of Wisconsin Healthy Lakes Initiative
      i. Action 1: Officially adopt the Wisconsin Healthy Lakes Initiative during the next annual meeting of the UTLA.
      ii. Action 2: Apply for Healthy Lakes grant funding to support projects that improve shoreland habitats and reduce runoff into the lake.
4. Goal 4: Encourage and engage lake residents and visitors to be active lake stewards.
   a. Objective 1: Encourage behavior changes in residents in the following areas: shoreland development, AIS, aquatic vegetation, recreational practices, and responsibility for the lake.
      i. Action 1: Encourage lake residents to understand AIS concerns, identify and help monitor for AIS within the lake, and report and/or remove what they find.
      ii. Action 2: Encourage boaters to implement appropriate AIS prevention strategies on their watercraft.
      iii. Action 3: Disseminate educational material related to the benefits of native plants within the lake and along the shoreline.
         1. Create and distribute welcome packets, newsletters, information/educational displays, Facebook and/or webpage, UTLA meetings, and other resources to increase the level of public awareness and interest in the lake.
   b. Objective 2: Encourage and develop volunteer action and leadership
      i. Action 1: Recruit new UTLA members, board members, and volunteers.
      ii. Action 2: Encourage lake volunteer involvement in "lake leaders" training
      iii. Action 3: Recognize good lake stewards and good examples of shoreland practices.
5. Goal 5: Implement the Upper Turtle Lake Management Plan effectively and efficiently with a focus on community and constituent education, information, and involvement.

a. Objective 1: Complete annual project activity and assessment reports
    i. Action 1: Use reports to make recommendation for annual revisions and updates to the APM Plan
b. Objective 2: Complete an End-of-project Summary Report
    i. Action 1: Overall review of project successes and failures.
    ii. Action 2: Complete early and mid-season whole-lake point-intercept survey of all plants.
    iii. Action 3: Revise or rewrite APM Plan as needed.
c. Objective 3: Develop partnerships to support management implementation
    i. Action 1: Communicate with local, county, and state entities; schools and local business; clubs and organizations, etc. to generate support for management actions.
    ii. Action 2: Share results with partners from Action 1

Appendix G

Upper Turtle Lake APMP Implementation Matrix

Recommended mplementation Funding and riorit lan for t e Upper Turtle Lake A uatic lant Management lan ( )

	oals ecti es Actions	riorit Le el (set t e UTLA)	A S Education rant	A S Control rant	L L rant	ealt Lakes rant	mplementers					
Support and propagate A S management efforts t at minimi e negati e impacts to t e nati e plant communities												
1.1 Prepare for a management program to reduce CLP by in the lake to those seen in 2010												
1	Conduct a rhodamine dye study to determine the efficacy of a large-scale or whole-lake herbicide application		×	×	×		UTLA, RP, WDNR	×				
2	Conduct smaller test treatments to determine the efficacy of herbicide treatments on CLP beds		×	×	×		UTLA	×	×	×	×	×
3	CLP Bed mapping surveys		×	×	×		UTLA, RP	×	×	×	×	×
4	Conduct CLP turion density studies		×	×	×		UTLA, RP	×				×
5	Complete a full suite of water quality testing (DO, Temperature profiles, TP, ChlorA, and Secchi disk)		×	×	×		UTLA	×	×	×	×	×
6	Determine the appropriate scale and method of CLP management						UTLA, RP	×				
1.2 Implement a multi-year,native restoration, and CLP control plan												
1	Apply liquid endothall at the appropriate concentrations when the size of CLP beds warrant		×	×			UTLA, RP		×	×	×	?
2	Complete summer littoral point-intercept surveys to determine impacts of management actions on the native plant communities		×	×			UTLA, RP	×			×	
1.3 Evaluate the use of harvesting In the absence of any herbicide application												
1	Work with consultant to gather cost-benefit analysis data for harvesting		×	×	×		UTLA, RP, WDNR	×	?	?	?	?
A S re ention and Education												
2.1 Prevent new AIS from entering and becoming established within Upper Turtle Lake												
1	Implement Clean Boat Clean Waters				×		UTLA	×	×			
2.2 Set up and maintain a public participation and communication program and an AIS education and information program												
1	Develop and distribute at least two newsletters updating AIS and other UTLA activities		×				UTLA	×	×	×	×	×
2	Host at least one annual meeting and maintain open UTLA Board meetings						UTLA	×	×	×	×	×
3	Host an Annual Lake Fair to promote public involvement in lake activities						UTLA	×	×	×	×	×
4	Maintain an Upper Turtle Lake Association webpage						UTLA	×	×	×	×	×
2.3 Set up and maintain AIS monitoring efforts												
1	Install, maintain, and/or improve AIS signage at both public access points		×	×			UTLA, WDNR, BarCo	×	×	×	×	×
2	Establish and maintain an in-lake and shoreline AIS monitoring program following CLMN guidelines		×	×			UTLA, RP	×	×	×	×	×
3	Follow established EWM early detection and response plan		×	×			UTLA	×	×	×	×	×
romote and support nears ore riparian and aters ed est management practices t at ill impro e fis and ildlife a itat reduce runoff and minimi e nutrient loading into Upper Turtle Lake												
3.1 Adopt State of Wisconsin Healthy Lakes Initiative for both lakes												
1	Officially adopt the Wisconsin Healthy Lake Initiative						UTLA	×				
2	Apply for Healthy Lake grant funding to support projects					×	UTLA, RP, WDNR		×		×	
Encourage and engage lake residents and isitors to e acti e lake ste ards												
4.1 Encourage behavior changes in residents in the following areas: shoreland development, AIS, aquatic vegetation, recreational practices, and responsibility for the lake												
1	Encourage lake residents to understand AIS concerns, identify and help monitor for AIS within the lake, and report and/or remove what they find		×	×	×		UTLA, RP	×	×	×	×	×
2	Encourage boaters to implement appropriate AIS prevention strategies on their watercraft		×	×	×		UTLA	×	×	×	×	×
3	Disseminate educational material related to the benefits of native plants within the lake and along the shoreline		×	×	×		UTLA, RP	×	×	×	×	×
4.2 Encourage and develop volunteer action and leadership												
1	Recruit new UTLA members, board members, and volunteers						UTLA	×	×	×	×	×
2	Encourage lake volunteer involvement inlake leadersòtraining						UTLA, RP	×	×	×	×	×
3	Recognize good lake stewards and good examples of shoreland practices						UTLA	×	×	×	×	×
mplement t e Upper Turtle Lake Management lan effecti el and efficientl it a focus on communit and constituent education information and in ol ement												
5.1 Complete annual project activity and assessment reports												
1	Use reports to make recommendation for annual revisions and updates to the APM Plai		×	×	×		UTLA, RP	×	×	×	×	×
5.2 Complete an End-of-project Summary Report												
1	Overall review of project successes and failures						UTLA. RP					×
2	Complete early and mid-season whole-lake point-intercept survey of all plants		×	×	×		UTLA, RP	×	×	×	×	×
3	Revise or rewrite APM Plan as needed		×	×	×		UTLA, RP					×
5.3 Develop partnerships with Towns, County, schools, local businesses, eté to help support management actions												
1	Communicate with local, county, and state entities; schools and local business; clubs and organizations, etc. to generate support for management actions.				×		UTLA	×	×	×	×	×
2	Share results with partners from 5.3.1				×		UTLA, RP	×	×	×	×	×

Implementers: UTLA, Upper Turtle Lake Association; RP, resource professionals/consultant; BarCo, Barron County; WDNR, Wisconsin Department of Natural Resources; CLMN, Citizen Lake Monitoring Network; AIS, aquatic invasive species; CLP, curly-leaf pondweed; DO, dissolved oxygen; BMP, best management practice; LPL, lake management planning

Appendix H

Annual Calendar of Actions to be Implemented

Upper Turtle Lake Aquatic Plant Management Plan Calendar of Actions

Action	January	February	March	April	May	June	July	August	September	October	November	December
CLP Management Planning and Implementation												
Preliminary CLP Management Planning												
Final CLP Management Planning												
Chemical Application Permit Preparation												
CLP Pre-Treatment survey												
CLP Bed-mapping												
Rhodamine Dye Study												
Spring CLP Chemical Treatment												
Herbicide Concentration Testing												
CLP Turion Density Study												
CLP harvesting (if recommended)												
Prior Year End of Season Management Summary Report												
AIS Education and Prevention												
Inspect/repair/replace AIS Signage												
CBCW Time at the Landing												
Complete CLMN AIS Monitoring												
AIS Education Events												
Annual Meeting												
Lake Fair												
Grant Preparation/Application												
CBCW Grant Preparation (annually)												
CBCW Grant Application Due Date												10-Dec
AIS Education Grant Application Preparation												
AIS Education Grant Application Due Date												10-Dec
Lake Management Planning Grant Preparation												
Lake Management Planning Grant Due Date												10-Dec
Identify Healthy Lakes Grant Projects (annually)												
Healthy Lakes Grant Application Preparation												
Healthy Lakes Grant Application Due Date		1-Feb										
Lake Protection Grant Application Preparation												
Lake Protection Grant Due Date		1-Feb										
Aquatic Plant Surveying												
Summer PI Survey of the Littoral Zone												
Monitoring and Surveys												
CLMN Water Quality Monitoring												
Other Project Preparation, Planning, and Implementation												
Fishsticks Installation												
Install Healthy Lakes Projects												

Appendix I

WDNR Healthy Lakes Initiative

Green Lake, Green Lake County - Lisa Reas

WISCONSIN'S HEALTHY LAKES IMPLEMENTATION PLAN

2014-2017

WISCONSIN DEPT. OF NATURAL RESOURCES

Wisconsin Lakes Partnership

TABLE OF CONTENTS

Team Members:
Dave Ferris, Burnett County Land and Water Conservation Department
Pat Goggin, Lake Specialist, UW-Extension Lakes
Jane Malischke, Wisconsin DNR Environmental Grants Specialist
Tom Onofrey, Marquette County Zoning Department
Carroll Schaal, Wisconsin DNR Lakes and Rivers Section Chief
Pamela Toshner, Wisconsin DNR Lake Biologist

The statewide Healthy Lakes initiative is a true, collaborative team effort. The Healthy Lakes Implementation Plan describes relatively simple and inexpensive best practices that lakeshore property owners can implement. The Plan also includes funding/accountability, promotion, and evaluation information so we can grow and adapt the Plan and our statewide strategy to implement it into the future. Working together, we can make Healthy Lakes for current and future generations.

Design and layout by Amy Kowalski, UWEX Lakes

INTRODUCTION

Wisconsin's lakes define our state, local communities, and our own identities. Fond memories of splashing in the water, seeing moonlight reflect off the lake, and catching a lunker last a lifetime. With over 15,000 lakes dotting the landscape, it's no surprise that fishing alone generates a $2.3 billion economic impact each year , and the majority of property tax base rests along shorelines in some of our counties. Unfortunately, we've learned through science that our love for lakes causes management challenges, including declines in habitat and water quality. In fact, the loss of lakeshore habitat was the number one stressor of lake health at a national scale. Lakes with poor lakeshore habitat tend to have poor water quality. Working together to implement *Wisconsin's Healthy Lakes Implementation Plan* (Plan), we can improve and protect our lakes for future generations to enjoy, as well.

This Plan identifies relatively simple habitat and water quality best practices that may be implemented on the most typical lakeshore properties in Wisconsin. We encourage do-it-yourselfers to use these practices but have also created a Wisconsin Department of Natural Resources (DNR) Lake Classification and Protection Grant *Healthy Lakes* sub-category for funding assistance. Furthermore, local partners like lake groups and counties may choose to integrate the Plan into their lake management, comprehensive planning, and shoreland zoning ordinance efforts.

It's important to consider this plan in the context of the lake and local community's management complexity. The best practices' effectiveness will increase cumulatively with additional property owner participation and depend on the nature and location of the lake. For example, if every property owner implemented appropriate Healthy Lakes best practices on a small seepage lake, also known as a pothole or kettle lake, within a forested watershed, the impact would be greater than on a large impoundment in an agricultural region of Wisconsin. Nevertheless, all lakes will benefit from these best practices, and even with limited impact, they are a piece of the overall lake management puzzle that lakeshore property owners can directly control. More lakeshore property owners choosing to implement Healthy Lakes best practices through time means positive incremental change and eventually success at improving and protecting our lakes for everyone.

GOALS AND OBJECTIVES

Wisconsin's Healthy Lakes Implementation Plan goal is to protect and improve the health of our lakes by increasing lakeshore property owner participation in habitat restoration and runoff and erosion control projects.

- Statewide objective: single-parcel participation in Healthy Lakes will increase 100% in 3 years (i.e. 2015 to 2017).
- Individual lake objective: lake groups or other partners may identify their own habitat, water quality, and/or participation goal(s) through a local planning and public participation process.
  - Partners may adopt this Plan, as is by resolution, or integrate the Plan into a complimentary planning process such as lake management or comprehensive planning.

Wisconsin's Healthy Lakes Implementation Plan, and the diversion and rock infiltration practices in particular, are not intended for heavily developed parcels, sites with large volumes of runoff, or sites with complex problems that may require engineering design. Technical assistance and funding are still available for these sites; contact your county land and water conservation department or local DNR lakes biologist for more information.

The target audience for this Plan and implementation of the associated practices is lakeshore property owners, including: permanent and seasonal homeowners, municipalities, and businesses.

It will be necessary to do additional planning work to implement Wisconsin's Healthy Lakes Plan and, again, the level of effort will depend on the complexity of the lake and its local community. Planning could be as simple as site-specific property visits and development of design plans, to integrating the Plan into a broader and more comprehensive effort. Your lake group, county land and water conservation department, non-profit conservation association, UW-extension lakes specialist or local educator, and/or DNR lake biologist can provide planning guidance or contacts.

ILLUSTRATION: KAREN ENGELBRETSON

DEFINITIONS

Best practice: a working method, described in detail, which has consistently shown results.

Divert: redirect runoff water.

Habitat: where a plant or animal lives.

Infiltrate: soak into the ground.

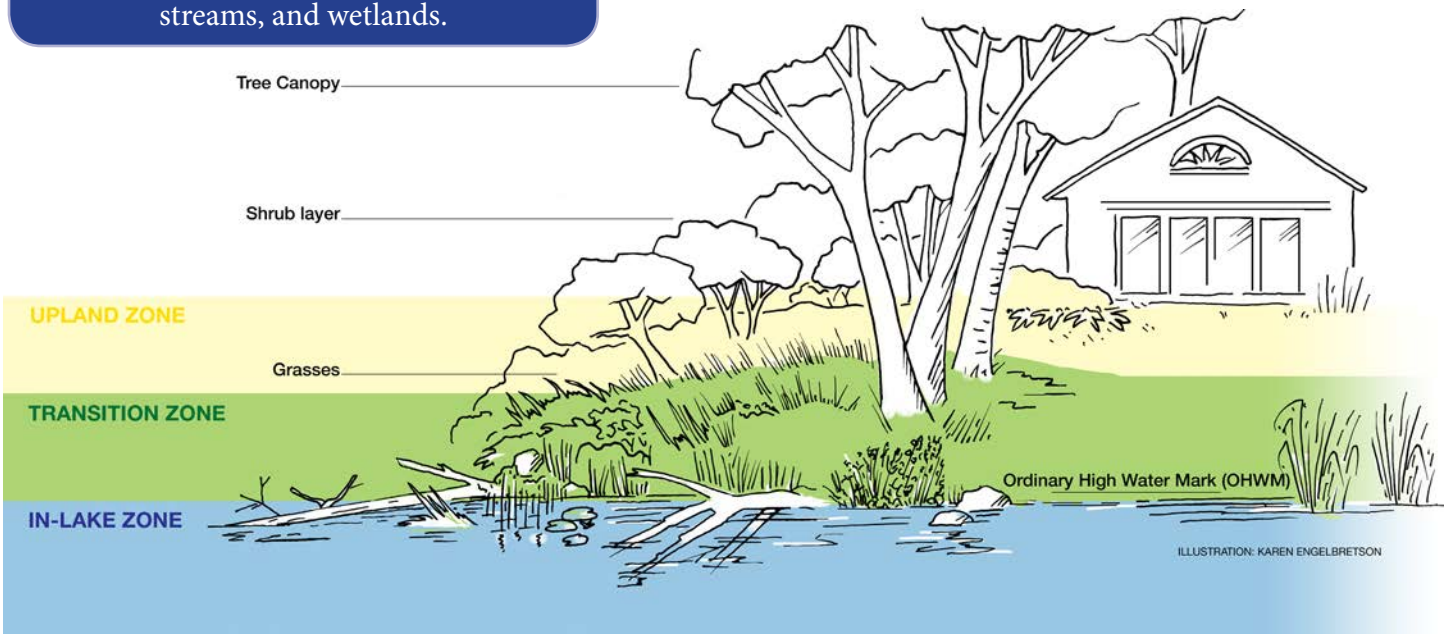
Installed: project cost that includes all materials, labor, and transportation.

Runoff: rain and snowmelt that doesn't soak into the ground and instead moves downhill across land and eventually into lakes, streams, and wetlands.

Wisconsin's Healthy Lakes Implementation Plan divides a typical lakeshore parcel into the following 3 management zones: 1) in-lake, 2) transition, and 3) upland (see illustration below). Best practices are identified for each zone. A team selected these practices based on customer feedback. These practices are:

- relatively simple and inexpensive to implement,
- appropriate for typical lakeshore properties, and
- beneficial to lake habitat and/or water quality.

The Plan also provides cost ranges and averages and technical, regulatory, and funding information for each practice. Fact sheets for each best practice support the Plan and provide more technical detail, and additional guidance is referenced if it currently exists. There is also a funding and administration FAQ fact sheet for those considering pursuing Healthy Lakes grants.



HEALTHY LAKES PLAN

BEST PRACTICES

Best practice descriptions follow. Each description defines the practice, identifies lake health benefits, provides cost ranges and averages based on recent projects, and identifies additional technical and regulatory information. The costs provided are installed costs, which include all materials, labor, and transportation but do not include technical assistance, including design and project management/administration work. Cost ranges are a result of geographic location, property conditions like soils and slopes, and contractor supply and proximity to the project site.

PRACTICE 1 | FISH STICKS

...large woody habitat structures that utilize whole trees grouped together resulting in the placement of more than one tree per 50 feet of shoreline. Fish Sticks structures are anchored to the shore and are partially or fully submerged.

Bony Lake, Bayfield County - Pamela Toshner

LAKE HEALTH BENEFITS	Improve fish and wildlife habitat Prevent shoreline erosion
COSTS	Range - $100-$1000 per cluster (3-5 trees), installed Average - Cost per unit (3-5 trees) averages $500, installed
TECHNICAL REQUIREMENTS	Healthy Lakes Fact Sheet Series: *Fish Sticks* http://tinyurl.com/healthylakes DNR Fish Sticks Best Practices Manual http://dnr.wi.gov (search for *Fish Sticks best practices*)
REGULATORY INFORMATION	DNR: **Habitat Structure - Fish Sticks General Permit** ($303 fee unless DNR grant-funded) Fish Sticks must comply with the local shoreland zoning ordinance. Consult with your county or municipal zoning staff.
HEALTHY LAKES GRANT FUNDING	Maximum of $1000/cluster of 3-5 trees Fish Sticks may be a stand-alone grant activity only if the vegetation protection area (i.e. buffer) complies with local shoreland zoning. If not, the property owner must commit to leaving a 350 ft^2 area un-mowed at the base of the cluster(s) or implement native plantings (Practice 2).

PRACTICE 2 | 350 FT² NATIVE PLANTINGS

...template planting plans with corresponding lists of native plants suited to the given function of the plan. The 350 ft² area should be planted adjacent to the lake and include a contiguous area, rather than be planted in patches. Functions are based on the goals for the site. For example, one property owner may want to increase bird and butterfly habitat while another would like to fix an area with bare soil. Native planting functions include the following: lakeshore, bird/butterfly habitat, woodland, low-growing, deer resistant, and bare soil area plantings.

Green Lake, Green Lake County - Lisa Reas

LAKE HEALTH BENEFITS	Improve wildlife habitat Slow water runoff Promote natural beauty
COSTS	Range - $480-$2400 for 350 ft² area, installed Average - $1000 per 350 ft², installed
TECHNICAL REQUIREMENTS	Healthy Lakes Fact Sheet Series: *350 ft² Native Plantings* http://tinyurl.com/healthylakes 350 ft² Native Plantings Best Practices Manual
REGULATORY INFORMATION	DNR: an aquatic plant chemical control permit may be necessary if using herbicides in or adjacent to the lakeshore. Native plantings must comply with the local shoreland zoning ordinance. Consult with your county or municipal zoning staff.
HEALTHY LAKES GRANT FUNDING	Maximum of $1000/350 ft² native plantings installed and implemented according to the technical requirements. Only one 350 ft² native planting per property per year is eligible for funding. The native plantings dimension must be 350 ft² of contiguous area at least 10 feet wide and installed along the lakeshore. Final shape and orientation to the shore are flexible.

PRACTICE 3 | DIVERSION PRACTICE

...includes a water bar, diverter, and broad-based dip. These practices use a berm or shallow trench to intercept runoff from a path or road and divert it into a dispersion area. Depending on the site, multiple diversion practices may be necessary.

http://awwatersheds.org

LAKE HEALTH BENEFITS	Divert runoff water.
COSTS	**Range** - $25-$3750, installed **Average** - $200, installed
TECHNICAL REQUIREMENTS	Healthy Lakes Fact Sheet Series: *Diversion Practice* http://tinyurl.com/healthylakes
REGULATORY INFORMATION	DNR: none. Diversion practices must comply with the local shoreland and floodplain zoning ordinance. Consult with your county or municipal zoning staff.
HEALTHY LAKES GRANT FUNDING	Maximum of $1000/diversion practice installed and implemented according to the technical requirements. Healthy Lakes diversion practice grant funding is not intended for large, heavily developed parcels, sites with large volumes of runoff, or sites with complex problems that may require engineering design.

PRACTICE 3 | DIVERSION PRACTICE

...includes a water bar, diverter, and broad-based dip. These practices use a berm or shallow trench to intercept runoff from a path or road and divert it into a dispersion area. Depending on the site, multiple diversion practices may be necessary.

http://awwatersheds.org

LAKE HEALTH BENEFITS	Divert runoff water.
COSTS	Range - $25-$3750, installed Average - $200, installed
TECHNICAL REQUIREMENTS	Healthy Lakes Fact Sheet Series: *Diversion Practice* http://tinyurl.com/healthylakes
REGULATORY INFORMATION	DNR: none. Diversion practices must comply with the local shoreland and floodplain zoning ordinance. Consult with your county or municipal zoning staff.
HEALTHY LAKES GRANT FUNDING	Maximum of $1000/diversion practice installed and implemented according to the technical requirements. Healthy Lakes diversion practice grant funding is not intended for large, heavily developed parcels, sites with large volumes of runoff, or sites with complex problems that may require engineering design.

PRACTICE 4 | ROCK INFILTRATION PRACTICE

...ian excavated pit or trench filled with rock that reduces runoff by storing it underground to infiltrate. A catch basin and/or perforated pipe surrounded by gravel and lined with sturdy landscape fabric may be integrated into the design to capture, pre-treat, and redirect water to the pit or trench. Pit and trench size and holding capacity are a function of the area draining to it and the permeability of the underlying soil.

Deer Lake, Polk County - Cheryl Clemens

LAKE HEALTH BENEFITS	Divert runoff water. Clean runoff water. Infiltrate runoff water.
COSTS	Range - $510-$9688 per rock infiltration practice, installed Average - $3800 per rock infiltration practice, installed
TECHNICAL REQUIREMENTS	Healthy Lakes Fact Sheet Series: *Rock Infiltration Practice* http://tinyurl.com/healthylakes
REGULATORY INFORMATION	DNR: none. Rock infiltration practices must comply with the local shoreland zoning ordinance. Consult with your county or municipal zoning staff.
HEALTHY LAKES GRANT FUNDING	Maximum of $1000/rock infiltration practice installed and implemented according to the technical requirements. Healthy Lakes rock infiltration practice grant funding is not intended for heavily developed parcels, sites with large volumes of runoff, or sites with complex problems that may require engineering design.

ZONE 3: UPLAND

PRACTICE 5 | RAIN GARDEN

...a landscaped shallow depression with loose soil designed to collect roof and driveway runoff.

Shell Lake, Washburn County - Brent Edlin

LAKE HEALTH BENEFITS	Improve wildlife habitat. Divert runoff water. Clean runoff water. Infiltrate runoff water. Promote natural beauty. 
COSTS	Range - $500-$9000 per rain garden, installed Average - $2500 per rain garden, installed
TECHNICAL REQUIREMENTS	Healthy Lakes Fact Sheet Series: *Rain Garden* http://tinyurl.com/healthylakes *Rain Gardens: A How-to Manual for Homeowners* http://dnr.wi.gov/topic/Stormwater/documents/RgManual.pdf
REGULATORY INFORMATION	DNR: none. Rain gardens must comply with the local shoreland zoning ordinance. Consult with your county or municipal zoning staff.
HEALTHY LAKES GRANT FUNDING	Maximum of $1000/rain garden installed and implemented according to the technical requirements. Healthy Lakes rain garden grant funding is not intended for heavily developed parcels, sites with large volumes of runoff, or sites with complex problems that may require engineering design.

FUNDING AND ACCOUNTABILITY

Administrative details and the application process are described in detail in the DNR's Water Grant Application and Guidelines (http://dnr.wi.gov/ search for surface water grants) and the Healthy Lakes website (http://tinyurl/healthylakes) and *Administration and Funding FAQ* fact sheet.

Healthy Lakes grant funding highlights:

- 75% state share grant with a maximum award of $25,000, including up to 10% of the state share available for technical assistance and project management. Technical assistance and project management do not include labor and are based on the entire state share of the grant, not the best practice caps.
- 25% match from sponsors, participating property owners or other partners. The grant sponsor may determine individual property owner cost share rates, provided the state's share of the practice caps ($1000) and total grant award (75%) are not exceeded. The grant sponsor's match may include technical assistance and project management costs beyond the state's 10% share.
- Sponsor may apply on behalf of multiple property owners, and the property owners do not have to be on the same lake.
- Standard 2-year grant timeline to encourage shovel-ready projects.
- Landowners may sign a participation pledge to document strong interest in following through with the project.
- Standard deliverables, including a signed Conservation Commitment with operation and maintenance information and 10-year requirement to leave projects in place. Also:
  - Native plantings must remain in place according to local zoning specs if within the vegetation protection area (i.e. buffer).
  - Fish Sticks projects require a 350 ft^2 native planting at shoreline base or commitment not to mow, if the property does not comply with the shoreland vegetation protection area (i.e. buffer) specifications described in the local shoreland zoning ordinance.
- Standardized application and reporting forms and process.
- 10% of projects randomly chosen each year for self-reporting and/or professional site visits.

PROMOTION

Wisconsin's Healthy Lakes Implementation Plan will be supported and promoted as a statewide program. Lake groups, counties, towns, villages, cities, and other partners may choose to adopt and implement the Plan as is or to integrate into their own planning processes. Statewide promotion, shared and supported by all partners, includes the following:

- A Healthy Lakes logo/brand.
- A website with plan, practice, and funding detail to be housed on the Wisconsin Department of Natural Resources' and University of Wisconsin-Extension Lakes' websites. It may also include the following:
  - Link to science and supporting plans.
  - Shoreline restoration video.
  - How-to YouTube clips.
  - Tips on how to communicate and market healthy lakeshores.
  - Maps with project locations without personally identifiable information.

EVALUATION OF RESULTS

Wisconsin's Healthy Lakes Implementation Plan and results will be evaluated annually and updated in 2017, if warranted. Best practices may be modified, removed, or added depending on the results evaluation.

Lime Lake, Portage County - Robert Korth

The following information will be collected to support an objective evaluation:

- County and lake geographic distribution and participation in Healthy Lakes projects.
- Lakeshore property owner participation in Healthy Lakes projects, including numbers and locations of best practices implemented.
- Standardized Healthy Lakes grant project deliverable report including:
  - Numbers of Fish Sticks trees and clusters.
  - Dimensional areas restored.
  - Structure/floral diversity (i.e. species richness).
  - Impervious surface area and estimated water volumes captured for infiltration.

The results may be used to model nutrient loading reductions at parcel, lake, and broader scales and to customize future self-reporting options, like plant mortality and fish and wildlife observations, for lakeshore property owners.

ACKNOWLEDGEMENTS

Amy Kowalski

L to R: Patrick Goggin, Jane Malischke, Pamela Toshner, Carroll Schaal, Tom Onofrey, Dave Ferris

Wisconsin's Healthy Lakes Implementation Plan and corresponding technical information and grant funding are the results of a collaborative and participatory team effort. We would like to thank the staff, agency, business, and citizen partners, including *Advanced Lake Leaders*, who provided feedback for our team, including the many partners who completed a customer survey and provided valuable comments during the public review of proposed DNR guidance. We would like to express our gratitude to the following contributors and information sources, respectively: Cheryl Clemens, John Haack, Dave Kafura, Amy Kowalski, Jesha LaMarche, Flory Olson, Tim Parks, Bret Shaw, Shelly Thomsen, Scott Toshner, Bone Lake Management District, Maine Lake Smart Program, and Vermont Lake Wise Program.

We appreciate your continued feedback as our Healthy Lakes initiative evolves into the future. Please contact DNR Lake Biologist Pamela Toshner (715) 635-4073 or pamela.toshner@wisconsin.gov if you have comments or questions.

Appendix J

Upper Turtle Lake AIS Rapid Response Plan

Aquatic Invasive Species Rapid Response Plan

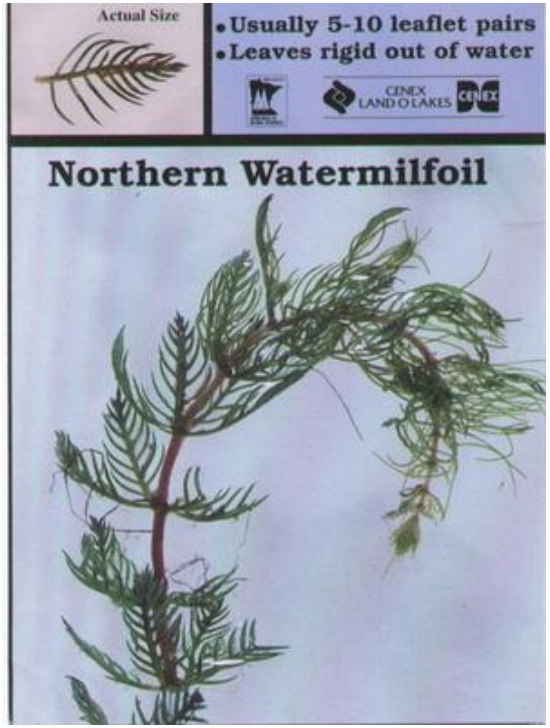
For Upper Turtle Lake, Barron County, Wisconsin

Prepared by: Lake Education and Planning Services, LLC

EWM Verses NWM

Northern Watermilfoil

- Native
- Less than 10 pairs of leaflets
- Leaflets remain stiff out of water



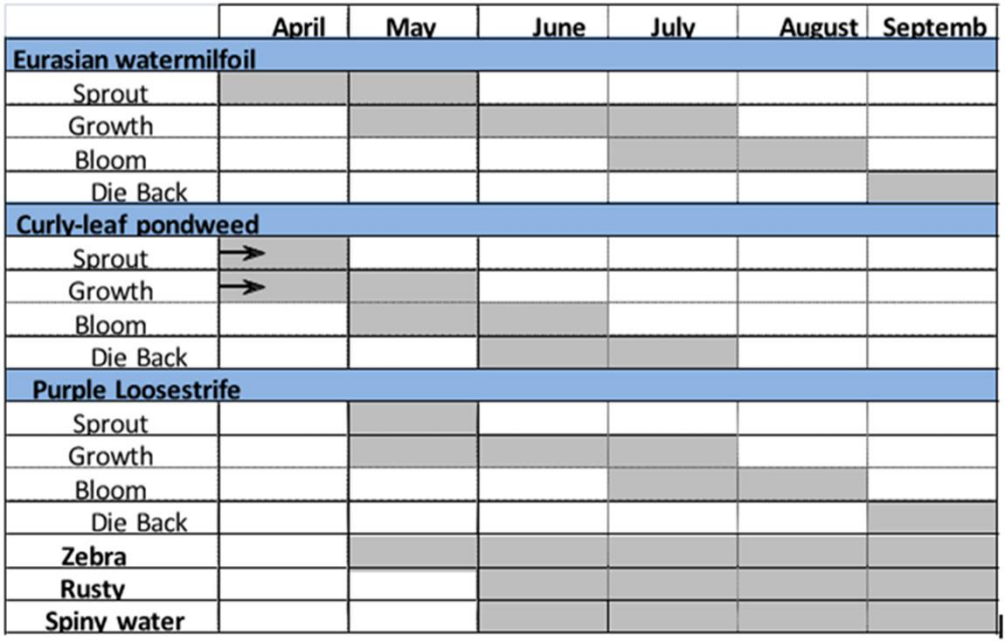
Eurasian Watermilfoil

- Non-Native
- 12-20 pairs of leaflets
- Leaflets are limp out of water
- Bright red tips

Monitoring for EWM

Å When and Where To look.

- ï Check boat landings weekly
- ï Check the entire littoral zone monthly. Pay special attention to any protected bay areas.



	April	May	June	July	August	Septemb
Eurasian watermilfoil						
Sprout						
Growth						
Bloom						
Die Back						
Curly-leaf pondweed						
Sprout	→					
Growth	→					
Bloom						
Die Back						
Purple Loosestrife						
Sprout						
Growth						
Bloom						
Die Back						
Zebra						
Rusty						
Spiny water						

Volunteer monitoring timetable (Scholl, 2006)

Suspected Eurasian Watermilfoil (EWM) Found

Contact

- Notify UTLA Board and Rapid Response Coordinator of suspected EWM.
- Contact WDNR Regional Lakes Coordinator

Locate

- Accurately mark all suspected locations
- Submit lake map with locations marked and GPS coordinates to WDNR Regional Lakes Coordinator

Sample

- Collect 5-10 specimens including roots, stems, and head if possible
- Place in a sealable bag without water
- Label with collectorûs name, date, lake name, and county
- Ice or refrigerate
- Submit to WDNR Regional Lakes Coordinator within 3 days

WDNR Regional Lakes Coordinator
Alex Smith
(715) 635-4142
Alex.smith@wisconsin.gov

UTLA Board
NAME
PHONE
EMAIL

UTLA Rapid Response Coordinator
NAME
PHONE
EMAIL

After Samples Have Been Analyzed

Samples are not EWM

- Notify UTLA Board and Rapid Response Coordinator
- Continue regular monitoring

WDNR Regional Lakes Coordinator
Alex Smith
(715) 635-4142
Alex.smith@Wisconsin.gov

Lake Management Consultant
Dave Blumer
Phone: 715-642-0635
dblumerleaps@gmail.com

UTLA Board
NAME
PHONE
EMAIL

UTLA Rapid Response Coordinators
NAME
PHONE
EMAIL

Samples Are EWM

- Notify UTLA Board, Rapid Response Coordinators, and lake management consultant
- Complete form 8700-058 (Appendix C) to obtain permits needed to place buoys around the infested area(s). **optional*
- Notify property owners.
- Place notification at the boat landing
- Complete and submit an early detection and rapid response grant application to WDNR (form 8700-307) (Appendix C)
- Complete a whole lake littoral zone survey of the lake to determine size of EWM population **this may be contracted through a plant survey specialist (Appendix A)*

Determining Management Strategy

If EWM is a Pioneer Colony
(less than 5 acres or 5% of surface area)

- Physical removal by hand or using a rake
- Physical removal by hand through snorkel or scuba diving
- Complete and submit a Chemical Application and/or Mechanical Harvesting Permit (Appendix C)
- Diver Aided Suction Harvest (DASH)
- Small-scale application of an aquatic herbicide
  - Navigate (granular 2,4-D)
  - Reward (liquid diquat)
  - Aquathol Super K (granular endothall)
  - See Chemical Labels in Appendix D
- UTLA board to agree on the cost and contract with treatment operator (Appendix B)
- Conduct treatment
- Reimbursable expense

If EWM is a Well Established Population
(More than 5 acres or 5% of surface area)

- Complete and submit a Chemical Application and/or Mechanical Harvesting Permit (Appendix C)
- Diver Aided Suction Harvest (DASH)
- Small-scale application of an aquatic herbicide
  - Navigate (granular 2,4-D)
  - Reward (liquid diquat)
  - Aquathol Super K (granular endothall)
- Large-scale application of an aquatic herbicide
  - DMA 4 (liquid 2,4-D)
  - Aquathol K (liquid endothall)
- See Chemical Labels in Appendix D
- UTLA board to agree on the cost and contract with treatment operator (Appendix B)
- Conduct treatment
- Reimbursable expense

After Treatment

Pioneer Colony

(less than 5 acres or 5% of surface area)

- Rake sample the treated area monthly
- Complete follow-up monitoring in treated area
- Keep buoys in place **optional*
- Continue monthly whole lake monitoring
- Revise existing APMP to include EWM management recommendations

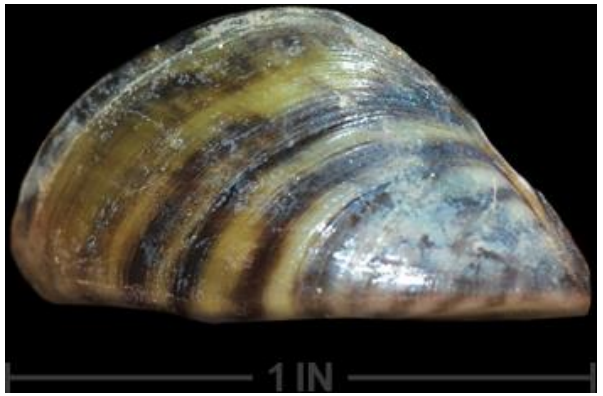
Well Established Population

(More than 5 acres or 5% of surface area)

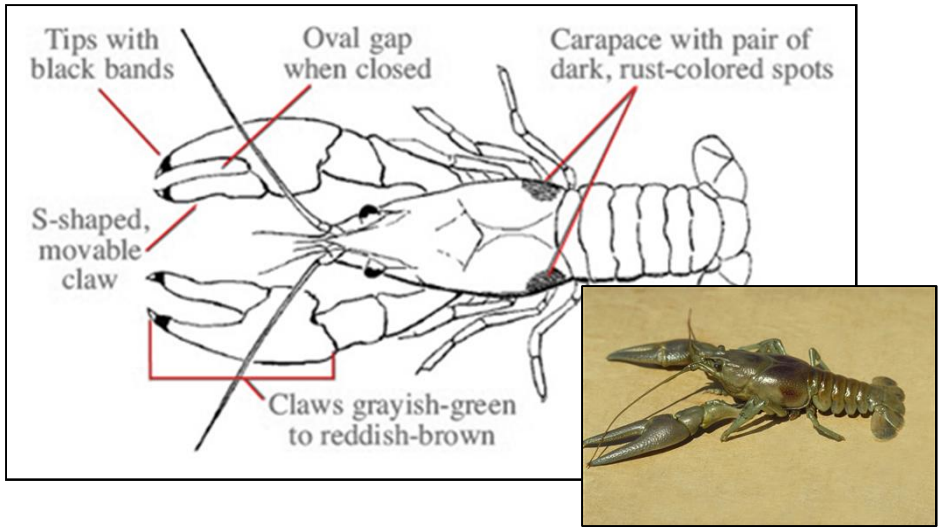
- Conduct post treatment plant survey and compare results to pre-treatment survey.
- Complete follow-up monitoring in treated area
- Keep buoys in place **optional*
- Continue monthly whole lake monitoring.
- Revise existing APMP to include EWM management recommendations

Other Invasive Species to Look Out For

- Zebra mussels (Right)- Upper Turtle Lake was listed as “suitable” and could support these (UW-Wisconsin Center for Limnology, 2016)
- Purple Loosestrife (Right)- Found around Upper Turtle Lake
- Rusty Crayfish (Below)- Found in Upper Turtle Lake



*Zebra mussels were found in Big McKenzie Lake in Washburn County in October 2016



*Not from Upper Turtle Lake

Contacts

WDNR Regional Lakes Coordinator

Alex Smith

(715) 635-4142

Email:
Alex.smith@Wisconsin.gov

Lake Management Consultant

Dave Blumer

Phone: 715-642-0635

Email:
dblumerleaps@gmail.com

UTLA Board

NAME

PHONE

EMAIL

UTLA Rapid Response Coordinator

NAME

PHONE

EMAIL

References

Center for Limnology, UW-Madison. Aquatic Invasive Species Smart Prevention. 2016. http://www.aissmartprevention.wisc.edu/ (accessed January 2017)

Scholl, C. Aquatic Invasive Species: A Guide for Proactive and Reactive Management. Project # ASP-001-04, Rhinelander: WDNR, 2006.

Appendices

Appendix A: Aquatic Plant Survey Specialists

Appendix B: Aquatic Plant Management Specialists – Treatment Operators

Appendix C: WDNR Buoy Placement Application, Early Detection and Rapid Response Grant Application, Mechanical Harvesting Permit, and Chemical Application Permit

Appendix D: Chemical herbicide labels

Appendix A: Aquatic Plant Survey Specialists

Endangered Resource Sciences, LLC
St. Croix Falls, WI
715-338-7502
saintcroixdfly@gmail.com
Services: Aquatic plant survey, physical removal with rake or scuba diving

Ecological Integrity Service, LLC
Amery, WI
715-554-1168
ecointegservice@gmail.com
Services: Aquatic plant survey, watershed management

Aquatic Plant and Habitat Services, LLC
Taylor, WI
715-299-4604
sarahatleli97@gmail.com
Services: Aquatic plant survey

Brad Morris
Siren, WI
715-566-4866
bmorris4748@gmail.com
Services: Aquatic plant survey

Appendix B: Aquatic Plant Management Specialists - Treatment Operators

TSB Lakefront Restoration and Diving
Chippewa Falls, WI
715-828-5530
tsblakefrontrestorationanddiving@yahoo.com
Services: DASH removal, hand harvesting, small-scale mechanical harvesting

Many Waters, LLC
Iron River, MI
715-617-4688
skih2o@hotmail.com
Services: DASH removal

Northern Aquatic Services, Inc
Dresser. WI
715-495-5252
NorthernAquaticServices@gmail.com
Services: Herbicide application

Lake Management, Inc
Marine an St. Croix, MN
651-433-3283
info@lakemanagementinc.com
Services: Herbicide application

Lake Restoration, Inc
Rogers, MN
763-428-9777
chad@lakerestoration.com
Services: Herbicide application

Midwest Aqua Care
Chaska, MN
952-403-6879
sales@midwestaquacare.com
Services: Herbicide application

Appendix C: WDNR Permits and Grant Application Forms

- Buoy Placement – Form 8700-058
  - http://dnr.wi.gov/topic/waterways/permit_apps/waterway_marker_application_permit_form_8700-058.pdf
- Early Detection and Rapid Response Grant – Form 8700-307
  - http://dnr.wi.gov/files/PDF/forms/8700/8700-307.pdf
- Mechanical Harvesting Permit – Form 3200-113
  - http://dnr.wi.gov/files/pdf/forms/3200/3200-113.pdf
- Chemical Application Permit – Form 3200-004
  - http://dnr.wi.gov/files/pdf/forms/3200/3200-004.pdf

Appendix D: Aquatic Plant Management Chemical Herbicide Labels

Appendix K

Aquathol K Product Label

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON DC

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

April 23, 2015

Rebecca Clemmer
Regulatory Manager
United Phosphorus, Inc.
630 Freedom Business Center, Suite 402
King of Prussia, PA 19406

Subject: Notification per PRN 98-10 – Label language correction and clarification
Product Name: Aquathol K Aquatic Herbicide
EPA Registration Number: 70506-176
Application Date: March 24, 2015
Decision Number: 503467

Dear Ms. Clemmer:

The Agency is in receipt of your Application for Pesticide Notification under Pesticide Registration Notice (PRN) 98-10 for the above referenced product. The Registration Division (RD) has conducted a review of this request for its applicability under PRN 98-10 and finds that the action requested falls within the scope of PRN 98-10.

The label submitted with the application has been stamped "Notification" and will be placed in our records.

If you have any questions, you may contact Sarah Meadows at 703-347-0505 or via email at meadows.sarah@epa.gov.

Sincerely,

Kathryn V. Montague

Kathryn V. Montague, Product Manager 23
Herbicide Branch
Registration Division (7505P)
Office of Pesticide Programs

AQUATHOL® K

AQUATIC HERBICIDE

NOTIFICATION
70506-176
The applicant has certified that no changes, other than those reported to the Agency have been made to the labeling. The Agency acknowledges this notification by letter dated:
04/23/2015

For aquatic plant control in quiescent, slow moving, and flowing water aquatic sites.

ACTIVE INGREDIENT:	
Dipotassium salt of endothall*……	40.3%
OTHER INGREDIENTS:……..	59.7%
TOTAL	100.0%

Contains 4.23 lbs. dipotassium endothall* per gallon
*7-oxabicyclo [2.2.1]heptane-2,3-dicarboxylic acid equivalent 28.6%

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.
- Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER: Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 866-673-6671 (Rocky Mountain Poison Control Center) for emergency medical treatment information.
See inside for additional precautionary statements.
NOTE TO PHYSICIAN: Measures against circulatory shock, respiratory depression, and convulsion may be needed.

EPA Registration No. 70506-176

EPA Establishment No. 62171-MS-003

United Phosphorus, Inc.
630 Freedom Business Center, Suite 402
King of Prussia, PA 19406

Net Contents:
Batch/Lot No.: _____

PRODUCT INFORMATION

Aquathol K is a liquid concentrate soluble in water which is effective against a broad range of aquatic plants. Dosage rates indicated for the application of Aquathol K are measured in parts per million (ppm) of dipotassium endothall.

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
DANGER

CORROSIVE. CAUSES IRREVERSIBLE EYE DAMAGE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. AVOID BREATHING VAPORS OR SPRAY MIST. PROLONGED OR FREQUENTLY REPEATED SKIN CONTACT MAY CAUSE ALLERGIC REACTIONS IN SOME INDIVIDUALS.

Personal Protective Equipment (PPE)

Mixers, Loaders, Applicators and other handlers must wear:

- Long-sleeved shirt and long pants,
- Shoes and socks,
- Chemical-resistant gloves made of any waterproof material,
- Protective eyewear,
- NIOSH-approved respirator with a dust/mist filter with MSHA/NIOSH approval number prefix TC-21C or any N, R, P, or HE filter.
  Exception: During application, the respirator need not be worn, provided that the pesticide is applied in a manner (such as direct metering or subsurface application from the rear of a vessel that is moving into the wind) such that the applicator will have no contact with the pesticide.

See Engineering Controls for additional requirements.

User Safety Requirements:

Follow the manufacturers' instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing or other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

Engineering Controls:

When mixers and loaders use a closed system designed by the manufacturer to enclose the pesticide to prevent it from contacting handlers or other people AND the system is functioning properly and is used and maintained in accordance with the manufacturers written operating instructions, the handlers need not wear a respirator, provided the required respirator is immediately available for use in an emergency such as a spill or equipment breakdown.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations
User should:
- Wash hands thoroughly after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Do not contaminate water by cleaning of equipment or disposal of equipment washwaters.

This pesticide is toxic to mammals.

Treatment of aquatic plants can result in oxygen loss from decomposition of dead plants. This loss can cause fish suffocation. Water bodies containing very high plant density should be treated in sections to prevent suffocation of fish.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Do not apply this product in a way that will contact workers or other persons, either directly or through drift.

- For quiescent or slow moving water treatments: Waters treated with Aquathol K may be used for swimming, fishing, and irrigating turf, ornamental plants and crops immediately after treatment.

- Do not use treated water for animal consumption within the following periods:

  0.5 ppm dipotassium salt – 7 days after application
  4.25 ppm dipotassium salt – 14 days after application
  5.0 ppm dipotassium salt – 25 days after application

- For flowing water treatments: Waters treated with Aquathol K may be used for swimming, fishing, livestock watering, and irrigating turf, ornamental plants and crops immediately after treatment.
- Phytotoxicity is not expected on plants or crops irrigated with Aquathol K treated water, however, all species and cultivars (varieties) have not been tested.
- Undiluted Aquathol K may be injurious to crops, grass, ornamentals, and other foliage.
- Do not use Aquathol K treated water for chemigation as interactions between Aquathol K and other pesticides and fertilizers are not known.
- Do not use Aquathol K in brackish or saltwater.
- Wash out spray equipment with water after each operation.
- Avoid contact of spray concentrate (product) directly or by drift with non-target plants or crops as injury may result.
- United Phosphorus, Inc. recommends not ~~lowering~~ reducing Aquathol K rates below those specified within this label, when using Aquathol K in a treatment combination, or as a tank mix, with product(s) containing ALS inhibitor active ingredients, unless specified otherwise on this label or a United Phosphorus, Inc. supplemental label.

HOW TO APPLY:
Aquathol K is a contact herbicide; consequently, apply when target plants are present.

Aquathol K should be sprayed on the water or injected below the water surface. It may be applied as a concentrate or diluted with water depending on the equipment.

In instances where the plant(s) to be controlled is an exposed surface problem (i.e., some of the broad-leaved pond weeds), coverage is important. For best results, apply the concentrate with the least amount of water compatible with the application equipment.

Drinking Water (Potable Water)
Consult with appropriate state or local water authorities before applying this product to public waters. State or local agencies may require permits.
The drinking water (potable water) restrictions on this label are to ensure that consumption of water by the public is allowed only when the concentration of endothall acid in the water is less than the MCL (Maximum Contamination Level) of 0.1 ppm. Applicators should consider the unique characteristics of the treated waters to assure that endothall acid concentrations in potable drinking water do not exceed 0.1 ppm at the time of consumption.

For Lakes, Ponds, and other Quiescent Water Bodies:

- For Aquathol K applications, the drinking water setback distance from functioning potable water intakes in the treated water body must be greater than or equal to 600 feet.
- Note: Existing potable water intakes that are no longer in use, such as those replaced by a connection to a municipal water system or a potable water well, are not considered to be functioning potable water intakes.

For Flowing Water Bodies:

- Applicator is responsible to assure that treated water exceeding the MCL of 0.1 ppm does not enter potable water intakes. For Aquathol K applications, potable water intakes must be closed when treated water exceeding the MCL of 0.1 ppm is present at the intake. In the event the water intake cannot be closed (when treated water is present that exceeds 0.1 ppm), treatments must only be made downstream from the intake in order to assure Aquathol K treated water above 0.1 ppm does not enter the potable water system.

QUIESCENT OR SLOW MOVING WATER TREATMENTS: SURFACE OR INJECTED APPLICATIONS

For aquatic plant control in quiescent or slow moving water, Aquathol K use rates can be found in the following chart. Since the active ingredient is water soluble and tends to diffuse from the treated area, select the dosage rate applicable to the area to be treated. Marginal treatments of large bodies of water require higher rates as indicated.

Use higher labeled rates of Aquathol K when making treatments to small areas with an increased potential for rapid dilution or when treating narrow areas such as boat lanes or shoreline treatments where dilution may reduce the exposure of plants to Aquathol K.

Use lower labeled rates of Aquathol K for large contiguous treatment blocks or in protected areas such as coves where reduced water movement will not result in rapid dilution of Aquathol K from the target treatment area or when treating entire lakes or ponds.

PLANTS CONTROLLED AND AQUATHOL K DOSAGE RATES FOR SURFACE OR INJECTED APPLICATION IN QUIESCENT OR SLOW-MOVING WATER

Aquatic Plant	APPLICATION RATE			
	Entire Pond/Lake or Large Area Treatment		Spot or Lake Margin Treatment	
	ppm Dipotassium Endothall	gallons Aquathol K per Acre Ft.	ppm Dipotassium Endothall	gallons Aquathol K per Acre Ft.
Coontail, *Ceratophyllum* spp.	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Horned Pondweed, *Zannichellia palustris*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Sago Pondweed, *Stuckenia pectinata*	1.0-2.0	0.6-1.3	2.0-5.0	1.3-3.2
Hydrilla, *Hydrilla verticillata*	1.0-4.0	0.6-2.6	2.0-5.0	1.3-3.2
Hygrophila *, *Hygrophila polysperma*	4.0-5.0	2.6-3.2	5.0	3.2
Milfoil, *Myriophyllum* spp.	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Naiad, *Najas* spp.	2.0-4.0	1.3-2.6	3.0-5.0	1.9-3.2
Pondweed, *Potamogeton* spp.	0.75-3.0	0.45-1.9	1.5-5.0	1.0-3.2
Including:				
American, *P. nodosus*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Largeleaf (Bass Weed), *P. amplifolius*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Curlyleaf, *P. crispus*	0.75-1.5	0.45-1.0	1.5-5.0	1.0-3.2
Flatstem, *P. zosteriformis*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Floating-leaf, *P. natans*	1.0-2.0	0.6-1.3	2.0-5.0	1.3-3.2
Illinois, *P. Illinoensis*	1.5-2.5	1.0-1.6	2.5-5.0	1.6-3.2
Narrowleaf, *P. pusillus*	1.0-2.0	0.6-1.3	2.0-5.0	1.3-3.2
Threadleaf, *P. filiformis*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Variable Leaf, *P. diversifolius*	1.0-2.0	0.6-1.3	2.0-5.0	1.3-3.2
Parrotfeather, *Myriophyllum aquaticum*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Water Stargrass, *Heteranthera spp.*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2

* Suppression only

The following charts indicate the quantity of Aquathol K to be applied.

Gallons of Aquathol K to Treat One Acre-Foot of Water

	Rate (ppm)						
	0.75	**1.0**	**1.5**	**2.0**	**3.0**	**4.0**	**5.0**
1 acre ft	**gallons/A-ft**						
	0.45	0.6	1.0	1.3	1.9	2.6	3.2

Fluid Ounces of Aquathol K to Treat 1,000 Square-Feet per Foot of Depth

	Rate (ppm)						
	0.75	**1.0**	**1.5**	**2.0**	**3.0**	**4.0**	**5.0**
1000 ft^2	**fl oz/1000 ft^2**						
	1.4	1.9	2.8	3.8	5.7	7.6	9.4

FLOWING WATER TREATMENTS (WITH THE EXCEPTION OF IRRIGATION CANALS): DRIP OR METERING SYSTEM APPLICATIONS

For aquatic plant control in flowing water, Aquathol K use rates can be found in the following chart. Apply Aquathol K in a manner to achieve the desired rate and adequate mixing so product is distributed throughout the entire water column. Adequate concentration (rate) and exposure time (length of treatment) will impact Aquathol K efficacy on the target plant species. Although Aquathol K is a contact herbicide adequate exposure time is critical. The following rate chart has been developed based on Concentration Exposure Time (CET) data for Aquathol K. The CET concept allows rates and the length of exposure to be adjusted for different treatment scenarios.

AQUATHOL K APPLICATION RATES FOR DRIP OR METERING APPLICATION SYSTEMS IN FLOWING WATER

Plant Species	Length of Treatment (hours)							
	6	8	12	18	24	36	48	72
	Rate (ppm)							
Pondweeds (*Potamogeton* spp.) Sago Pondweed (*Stuckenia pectinata*)	4.0-5.0	3.0-4.0	2.0-3.0	1.5-2.5	1.0-2.0	0.75-1.5	0.5-1.0	0.5
Milfoil (*Myriophyllum* spp.) Parrotfeather (*Myriophyllum aquaticum*) Coontail (*Ceratophyllum* spp.) Horned pondweed (*Zannichellia*) spp.) Hydrilla (*Hydrilla verticillata*) Naiad (*Najas* spp.) Water Stargrass (*Heteranthera* spp.)	5.0	4.0-5.0	3.0-4.0	2.0-3.0	1.5-2.5	1.0-2.0	0.75-1.5	0.5-1.0

NOTE: Hygrophila (*Hygrophila polysperma*) may be suppressed at the higher application rates listed in this table.

Restrictions: Do not apply more than 30 ppm per growing season, not to exceed 5 ppm per application. Do not apply more than a total of 5 ppm within a 7-day interval.

Note: There is no Pre-harvest Interval (PHI) for crops irrigated with treated water.

To calculate the amount of Aquathol K required for a particular treatment use the following formula;

[Cubic Feet per Second (CFS) X Length of Treatment (hrs) X rate (ppm)] x 0.052947 = Gallons of Aquathol K needed for treatment

To calculate the amount of Aquathol K to be applied per hour use the following formula:

Gallons of Aquathol K per hour = Total gallons of Aquathol K / Length of Treatment (hrs)

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal.

Pesticide Storage: Store in the original container. Do not store in a manner where cross-contamination with other pesticides, fertilizers, food or feed could occur. Storage at temperatures below 32°F may result in the product freezing or crystallizing. Should this occur the product must be warmed to 50°F or higher and thoroughly agitated. In the event of a spill during handling or storage, absorb with sand or other inert material and dispose of absorbent in accordance with the Pesticide Disposal Instructions listed below.

Pesticide Disposal: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Handling:
(for Nonrefillable containers)
Nonrefillable container. Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

For containers 5 gallons or less:
Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

Or

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

For containers more than 5 gallons:

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container ¼ full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times.

Or

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Pour or pump rinsate into application equipment or rinsate collection system. Drain for 10 seconds after the flow begins to drip.

Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

(for Refillable containers)
Refillable container. Refill this container with pesticide only. Do not use this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times. Then offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

EMER ENC TELE NE NUMBERS
C EMTREC ( )
MED CAL ( ) Rock Mountain oison Control Center

IMPORTANT INFORMATION
READ BEFORE USING PRODUCT

CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY

NOTICE: Read the entire Directions for Use and Conditions of Sale and Limitation of Warranty and Liability before buying or using this product. If the terms are not acceptable, return the product at once, unopened, and the purchase price will be refunded.

The Directions for Use of this product reflect the opinion of experts based on field use and tests, and must be followed carefully. It is impossible to eliminate all risks associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as manner of use or application, weather or crop conditions, presence of other materials or other influencing factors in the use of the product, which are beyond the control of United Phosphorus, Inc. or Seller. Handling, storage, and use of the product by Buyer or User are beyond the control of United Phosphorus, Inc. and Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer and User, and Buyer and User agree to hold United Phosphorus, Inc. and Seller harmless for any claims relating to such factors.

TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, UNITED PHOSPHORUS, INC. AND SELLER MAKE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ON THIS LABEL.

To the extent consistent with applicable law, United Phosphorus, Inc. or Seller shall not be liable for any incidental, consequential or special damages resulting from the use or handling of this product and **THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE EXCLUSIVE LIABILITY OF UNITED PHOSPHORUS, INC. AND SELLER FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY, CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT OR, AT THE ELECTION OF UNITED PHOSPHORUS, INC. OR SELLER, THE REPLACEMENT OF THE PRODUCT.**

United Phosphorus, Inc. and Seller offer this product, and Buyer and User accept it, subject to the foregoing conditions of sale and limitations of warranty and of liability, which may not be modified except by written agreement signed by the duly authorized representative of United Phosphorus, Inc.

Rev. 3/1~~2~~3/15

CASCADE®

AQUATIC HERBICIDE

For aquatic plant control in irrigation systems and other flowing water aquatic sites and quiescent,or slow moving waters.

ACTIVE INGREDIENT:
Dipotassium salt of endothall*……40.3%
OTHER INGREDIENTS:……...59.7%
TOTAL 100.0%

Contains 4.23 lbs. dipotassium endothall* per gallon
*7-oxabicyclo [2.2.1]heptane-2,3-dicarboxylic acid equivalent 28.6%

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.
- Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER: Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 866-673-6671 (Rocky Mountain Poison Control Center) for emergency medical treatment information.
See inside for additional precautionary statements.
NOTE TO PHYSICIAN: Measures against circulatory shock, respiratory depression, and convulsion may be needed.

EPA Registration No. 70506-176

EPA Establishment No. 62171-MS-003

United Phosphorus, Inc.
630 Freedom Business Center, Suite 402
King of Prussia, PA 19406

Net Contents:
Batch/Lot No.:

PRODUCT INFORMATION

Cascade is a liquid concentrate soluble in water which is effective against a broad range of aquatic plants. Dosage rates indicated for the application of Cascade are measured in parts per million (ppm) of dipotassium endothall.

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
DANGER

CORROSIVE. CAUSES IRREVERSIBLE EYE DAMAGE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. AVOID BREATHING VAPORS OR SPRAY MIST. PROLONGED OR FREQUENTLY REPEATED SKIN CONTACT MAY CAUSE ALLERGIC REACTIONS IN SOME INDIVIDUALS.

Personal Protective Equipment (PPE)

Mixers, Loaders, Applicators and other handlers must wear:

- Long-sleeved shirt and long pants,
- Shoes and socks,
- Chemical-resistant gloves made of any waterproof material,
- Protective eyewear,
- NIOSH-approved respirator with a dust/mist filter with MSHA/NIOSH approval number prefix TC-21C or any N, R, P, or HE filter.
  Exception: During application, the respirator need not be worn, provided that the pesticide is applied in a manner (such as direct metering or subsurface application from the rear of a vessel that is moving into the wind) such that the applicator will have no contact with the pesticide.

See Engineering Controls for additional requirements.

User Safety Requirements:

Follow the manufacturers' instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing or other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

Engineering Controls:

When mixers and loaders use a closed system designed by the manufacturer to enclose the pesticide to prevent it from contacting handlers or other people AND the system is functioning properly and is used and maintained in accordance with the manufacturers written operating instructions, the handlers need not wear a respirator, provided the required respirator is immediately available for use in an emergency such as a spill or equipment breakdown.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations
User should:
- Wash hands thoroughly after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Do not contaminate water by cleaning of equipment or disposal of equipment washwaters.

This pesticide is toxic to mammals.

Treatment of aquatic plants can result in oxygen loss from decomposition of dead plants. This loss can cause fish suffocation. Water bodies containing very high plant density should be treated in sections to prevent suffocation of fish.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Do not apply this product in a way that will contact workers or other persons, either directly or through drift.

- For quiescent or slow moving water treatments: Waters treated with Cascade may be used for swimming, fishing, and irrigating turf, ornamental plants and crops immediately after treatment.

- Do not use treated water for animal consumption within the following periods:

  0.5 ppm dipotassium salt – 7 days after application
  4.25 ppm dipotassium salt – 14 days after application
  5.0 ppm dipotassium salt – 25 days after application

- For flowing water treatments: Waters treated with Cascade may be used for swimming, fishing, livestock watering, and irrigating turf, ornamental plants and crops immediately after treatment.
- Phytotoxicity is not expected on plants or crops irrigated with Cascade treated water, however, all species and cultivars (varieties) have not been tested.
- Undiluted Cascade may be injurious to crops, grass, ornamentals or other foliage.
- Do not use Cascade treated water for chemigation as interactions between Cascade and other pesticides and fertilizers are not known.
- Do not use Cascade in brackish or saltwater.
- Wash out spray equipment with water after each operation.
- Avoid contact of spray concentrate (product) directly or by drift with non-target plants or crops as injury may result.
- United Phosphorus, Inc. recommends not ~~lowering~~ reducing Cascade rates below those specified within this label, when using Cascade in a treatment combination, or as a tank mix, with copper-based product(s), unless specified otherwise on this label or a United

Phosphorus, Inc. supplemental label.

HOW TO APPLY:
Cascade is a contact herbicide; consequently, apply when target plants are present.

Cascade should be sprayed on the water or injected below the water surface. It may be applied as a concentrate or diluted with water depending on the equipment.

In instances where the plants(s) to be controlled is an exposed surface problem (i.e., some of the broad-leaved pond weeds), coverage is important. For best results, apply the concentrate with the least amount of water compatible with the application equipment.

Drinking Water (Potable Water)
Consult with appropriate state or local water authorities before applying this product to public waters. State or local agencies may require permits.
The drinking water (potable water) restrictions on this label are to ensure that consumption of water by the public is allowed only when the concentration of endothall acid in the water is less than the MCL (Maximum Contamination Level) of 0.1 ppm. Applicators should consider the unique characteristics of the treated waters to assure that endothall concentrations in potable drinking water do not exceed 0.1 ppm at the time of consumption.

For Lakes, Ponds, and other Quiescent Water Bodies:

- For Cascade applications, the drinking water setback distance from functioning potable water intakes in the treated water body must be greater than or equal to 600 feet.
- Note: Existing potable water intakes that are no longer in use, such as those replaced by a connection to a municipal water system or a potable water well, are not considered to be functioning potable water intakes.

For Irrigation Canals and other Flowing Water Bodies:
Applicator is responsible to assure that treated water exceeding the MCL of 0.1 ppm does not enter potable water intakes. For Cascade applications, potable water intakes must be closed when treated water exceeding the MCL of 0.1 ppm is present at the intake. In the event the water intake cannot be closed (when treated water is present that exceeds 0.1 ppm), treatments must only be made downstream from the intake in order to assure Cascade treated water exceeding the MCL of 0.1 ppm does not enter the potable water system

QUIESCENT OR SLOW MOVING WATER TREATMENTS: SURFACE OR INJECTED APPLICATIONS

For aquatic plant control in quiescent or slow moving water, Cascade use rates can be found in the following chart. Since the active ingredient is water soluble and tends to diffuse from the treated area, select the dosage rate applicable to the area to be treated. Marginal treatments of large bodies of water require higher rates as indicated.

Use higher labeled rates of Cascade when making treatments to small areas with an increased potential for rapid dilution or when treating narrow areas such as boat lanes or shoreline treatments where dilution may reduce the exposure of plants to Cascade.

Use lower labeled rates of Cascade for large contiguous treatment blocks or in protected areas such as coves where reduced water movement will not result in rapid dilution of Cascade from the target treatment area or when treating entire lakes or ponds.

PLANTS CONTROLLED AND CASCADE DOSAGE RATES FOR SURFACE OR INJECTED APPLICATIONS TO QUIESCENT OR SLOW-MOVING WATER

Aquatic Plant	APPLICATION RATE			
	Entire Pond/Lake or Large Area Treatment		Spot or Lake Margin Treatment	
	ppm Dipotassium Endothall	gallons Aquathol K per Acre Ft.	ppm Dipotassium Endothall	gallons Aquathol K per Acre Ft.
Bur Reed, *Sparganium* spp.	3.0-4.0	1.9-2.6	4.0-5.0	2.6-3.2
Coontail, *Ceratophyllum* spp.	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Horned Pondweed, *Zannichellia palustris,*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Sago Pondweed, *Stuckenia pectinata*	1.0-2.0	0.6-1.3	2.0-5.0	1.3-3.2
Hydrilla, (*Hydrilla verticillata*	1.0-4.0	0.6-2.6	2.0-5.0	1.3-3.2
Hygrophila *, *Hygrophila polysperma*	4.0-5.0	2.6-3.2	5.0	3.2
Milfoil, *Myriophyllum* spp.	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Naiad, *Najas* spp.	2.0-4.0	1.3-2.6	3.0-5.0	1.9-3.2
Pondweed, *Potamogeton* spp.	0.75-3.0	0.45-1.9	1.5-5.0	1.0-3.2
Including:				
American, *P. nodosus*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Largeleaf (Bass Weed), *P. amplifolius*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Curlyleaf, *P. crispus*	0.75-1.5	0.45-1.0	1.5-5.0	1.0-3.2
Flatstem, *P. zosteriformis*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Floating-leaf, *P. natans*	1.0-2.0	0.6-1.3	2.0-5.0	1.3-3.2
Illinois, *P. Illinoensis*	1.5-2.5	1.0-1.6	2.5-5.0	1.6-3.2
Narrowleaf, *P. pusillus*	1.0-2.0	0.6-1.3	2.0-5.0	1.3-3.2
Threadleaf, *P. filiformis*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Variable Leaf, *P. diversifolius*	1.0-2.0	0.6-1.3	2.0-5.0	1.3-3.2
Parrotfeather, *Myriophyllum aquaticum*	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2
Water Stargrass, *Heteranthera spp*.	2.0-3.0	1.3-1.9	3.0-5.0	1.9-3.2

* Suppression only

The following charts indicate the quantity of Cascade to be applied.

Gallons of Cascade to Treat One Acre-Foot of Water

	Rate (ppm)						
	0.75	**1.0**	**1.5**	**2.0**	**3.0**	**4.0**	**5.0**
1 acre ft	**gallons/A-ft**						
	0.45	0.6	1.0	1.3	1.9	2.6	3.2

Fluid Ounces of Cascade to Treat 1,000 Square-Feet per Foot of Depth

	Rate (ppm)						
	0.75	**1.0**	**1.5**	**2.0**	**3.0**	**4.0**	**5.0**
1000 ft^2	**Fl oz/1000 ft^2**						
	1.4	1.9	2.8	3.8	5.7	7.6	9.4

IRRIGATION SYSTEMS AND FLOWING WATER TREATMENTS: DRIP OR METERING SYSTEM APPLICATIONS

For aquatic plant control in flowing water, Cascade use rates can be found in the following chart. Apply Cascade in a manner to achieve the desired rate and adequate mixing so product is distributed throughout the entire water column. Adequate concentration (rate) and exposure time (length of treatment) will impact Cascade efficacy on the target plant species. Although Cascade is a contact herbicide adequate exposure time is critical. The following rate chart has been developed based on Concentration Exposure Time (CET) data for Cascade. The CET concept allows rates and the length of exposure to be adjusted for different treatment scenarios.

CASCADE APPLICATION RATES FOR DRIP OR METERED APPLICATIONS TO IRRIGATION SYSTEMS AND FLOWING WATER

Plant Species	Length of Treatment (hours)							
	6	8	12	18	24	36	48	72
	Rate (ppm)							
Pondweeds (*Potamogeton* spp.) Sago Pondweed (*Stuckenia pectinata*)	4.0-5.0	3.0-4.0	2.0-3.0	1.5-2.5	1.0-2.0	0.75-1.5	0.5-1.0	0.5
Milfoil (*Myriophyllum* spp.) Parrotfeather (*Myriophyllum aquaticum*) Coontail (*Ceratophyllum* spp.) Horned pondweed (*Zannichellia*) spp.) Hydrilla (*Hydrilla verticillata*) Naiad (*Najas* spp.) Water Stargrass (*Heteranthera* spp.)	5.0	4.0-5.0	3.0-4.0	2.0-3.0	1.5-2.5	1.0-2.0	0.75-1.5	0.5-1.0

NOTE: Hygrophila (*Hygrophila polysperma*) may be suppressed at the higher application rates listed in this table.

Restrictions: Do not apply more than 30 ppm per growing season, not to exceed 5 ppm per application. Do not apply more than a total of 5 ppm within a 7-day interval.

Note: There is no Pre-harvest Interval (PHI) for crops irrigated with treated water.

To calculate the amount of Cascade required for a particular treatment use the following formula;

[Cubic Feet per Second (CFS) X Length of Treatment (hrs) X rate (ppm)] x 0.052947 = Gallons of Cascade needed for treatment

To calculate the amount of Cascade to be applied per hour use the following formula:

Gallons of Cascade per hour = Total gallons of Cascade / Length of Treatment (hrs)

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal.

Pesticide Storage: Store in the original container. Do not store in a manner where cross-contamination with other pesticides, fertilizers, food or feed could occur. Storage at temperatures below 32°F may result in the product freezing or crystallizing. Should this occur the product must be warmed to 50°F or higher and thoroughly agitated. In the event of a spill during handling or storage, absorb with sand or other inert material and dispose of absorbent in accordance with the Pesticide Disposal Instructions listed below.

Pesticide Disposal: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Handling:
(for Nonrefillable containers)
Nonrefillable container. Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

For containers 5 gallons or less:
Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

Or

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

For containers more than 5 gallons:

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container ¼ full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times.

Or

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Pour or pump rinsate into application equipment or rinsate collection system. Drain for 10 seconds after the flow begins to drip.

Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

(for Refillable containers)
Refillable container. Refill this container with pesticide only. Do not use this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times. Then offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

EMER ENC TELE NE NUMBERS
C EMTREC ( )
MED CAL ( ) Rock Mountain oison Control Center

IMPORTANT INFORMATION
READ BEFORE USING PRODUCT

CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY

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