Aquatic Plant Management (APM) Plan

Kirby Lake supports a diverse aquatic plant community with a number of uncommon species and a quality fishery valued by the lake community. The lake currently has only one known invasive species – reed canary grass. Nuisance conditions and navigation impairment caused by dense native plant growth occur throughout the open water season. Through public input from the KLMD and lake constituents, this Aquatic Plant Management Plan established the following goals for aquatic plant management in Kirby Lake:

1. **Preservation, Protection, and Restoration**. Preserve, protect, and restore the native plant species community in and around the lake to decrease susceptibility to the introduction of new aquatic invasive species
2. **Prevention**. Prevent the introduction and establishment of new aquatic invasive species through early detection and rapid response
3. **Management**. Maintain common navigation channels, individual riparian access lanes, and open water in areas of nuisance native plant and reed canary grass growth via mechanical and manual control.
4. **Education and Awareness**. Continue public outreach and education programs on aquatic invasive species
5. **Research and Monitoring**. Develop a better understanding of the lake and the factors affecting lake water quality through continued and expanded monitoring efforts
6. **Adaptive Management**. Follow an adaptive management approach that measures and analyzes the effectiveness of control activities and modify the management plan as necessary to meet goals and objectives

Goal 1. Preserve, Protect, Restore

To maintain the quality and diversity of the lake ecosystem, it is recommended that the KLMD provide riparian owners with educational materials on shoreland improvement and sponsor shoreland restoration training events. General information on shoreland restoration should be provided to all members in a newsletter and during public events. The cost of shoreland restoration and/or improvement projects is dependent on the size and type of restoration done, but can range in price from no cost (like for establishing no mow sites), a few hundred dollars for small restoration projects (like installing a rain garden), to several thousands of dollars for larger more comprehensive full shore restoration projects (like redesigning the shoreline to prevent erosion). There are many free on-line resources, and both free and low-cost paper resources including guides, pamphlets, and brochures available to help the average person work toward making improvements on their own properties. UW-Extension has offices in nearly every county in WI, Barron County included, and offer these materials for free or at very low prices. They also sponsor local workshops and/or training sessions, or can direct people to others who do. Local greenhouses and landscaping companies often have shoreland restoration packages for specific project types available to the public.

An alternative, or addition, to providing educational and informational materials is for the KLMD to sponsor individual property owner shoreline evaluations performed by resource professionals or trained KLMD volunteers. Recent research has revealed that riparian property owners evaluate their own shorelines significantly more natural than biologists' evaluations (26). A quick, inexpensive walk-through of a property by a shoreland restoration specialist can often identify areas in need of improvement

and provide basic consulting for how to make improvements. Shoreland restoration consultants generally charge $30-50 for first time site visits. Information collected in this manner would provide baseline data on the status of the shoreline around Kirby Lake and would allow for focused education and outreach efforts.

It is also recommended that the KLMD should further encourage riparian property owners to diversify the shoreland environment by recognizing riparian owners who implement shoreland restoration and habitat improvement projects. For example, riparian owners who have improved their shoreline could be awarded with a special sign on the shoreline or acknowledged with a short article in the annual newsletter.

Goal 2. Prevention

Aquatic invasive species (AIS) can be transported via a number of vectors, but most invasions are associated with human activity. It is recommended that Clean Boats, Clean Waters monitoring of the boat launch on Kirby Lake continue, and all watercraft inspection data collected should be submitted to the WDNR SWIMS database. It is recommended that the KLMD participate in the Fourth of July Landing Blitz, a state-wide outreach effort to warn boaters of the dangers of transporting invasive species that takes place on the Fourth of July, a high-boat traffic day. It is also recommended that the KLMD continue to maintain and update signage at the boat launch kiosk as necessary.

Early detection and rapid response efforts increase the likelihood that a new aquatic invasive species will be addressed successfully while the population is still localized and levels are not beyond that which can be contained and eradicated. Once an aquatic invasive species becomes widely established in a lake, complete eradication becomes extremely difficult, so attempting to partially mitigate negative impacts becomes the goal. The costs of early detection and rapid response efforts are typically far less than those of long-term invasive species management programs needed when an AIS becomes established.

It is recommended that the KLMD continue to implement a proactive and consistent AIS monitoring program. At least three times during the open water season, trained volunteers should patrol the shoreline and littoral zone looking for curly-leaf pondweed, Eurasian watermilfoil, purple loosestrife, Japanese knotweed, giant reed grass, zebra mussels, and other invasive species. Free support for this kind of monitoring program is provided as part of the UW-Extension Lakes/WDNR Citizen Lake Monitoring Network (CLMN) AIS Monitoring Program. Any monitoring data collected should be recorded annually and submitted to the WDNR SWIMS database.

It is also recommended that all property owners be encouraged to monitor their shoreline and open water areas for new growths of AIS. If an AIS is found, or even suspected, it should be reported to the KLMD, County, and WDNR resource personnel. See Appendix B for more information and guidelines on identifying and reporting AIS.

Goal 3. Management

Management of native aquatic plants to provide open water access, as well as improve navigation and recreational opportunities is necessary in Kirby Lake. The best methods for completing this management goal are continued manual removal and mechanical harvesting.

Manual Removal

Manual or physical removal is the recommended method to control plant growth around docks and in areas where the water depth is shallower than 3 feet. For aquatic plant control in small, shallow lake

areas adjacent to shore, it is recommended that plant removal rakes and/or razors be purchased by the KLMD and made available for riparian property owners to use. Physical removal of aquatic plants is allowable without a permit within an area up to 30-ft wide near a dock or along a shoreline used for recreational activities, provided the parts of the plant cut or pulled are removed completely from the water and disposed of properly. By its very nature, physical removal is often a difficult and daunting task, thus minimizing how much plant material is actually removed. Native plant removal should be limited only to the amount needed to access open water areas or provide navigation and access lanes. Coarse woody habitat (tree falls, logs, etc.) should be left in the water, as it is a critical feature of lakes that influences fish behavior, spawning, predator-prey interactions, growth, and species diversity. Research has shown that the growth of largemouth bass and bluegill are positively correlated with coarse woody habitat in lakes, and a whole lake removal of coarse woody habitat led to the collapse of a yellow perch population (28).

Mechanical Harvesting

Mechanical harvesting of aquatic plants can only be completed in water 3-ft or greater in depth to prevent damage to the lake bottom and its biota, as well as damage to the harvester. In waters at, or deeper than 3-ft, aquatic plants can be cut to the maximum depth of the harvester or two-thirds of the water column, whichever is less. At off-loading sites, the operator will attempt to return game fish, turtles, and other wildlife back to the water.

Plant survey work in 2020 identified approximately 80 acres of the total 98 acres as a littoral, or plant growing, zone. In an effort to protect the existing health of the lake, harvesting of navigation channels and riparian access lanes in any one season will not exceed 20% of the established littoral zone, or approximately 16.0 acres total. This acreage does not include harvested reed canary grass or areas where aquatic vegetation is managed by physical means.

It is recommended that KLMD harvester operators continue to track harvesting and paths with GPS units. At the end of each day, a tracking log should be downloaded from the GPS unit and stored in digital form, either on a computer or data disk. Daily log sheets need to be kept, including the following harvesting information: estimated total daily tonnage, number of loads, surface acres covered, plant ID list, percentage of each plant species removed, and plant bed density information. Additionally, the KLMD should obtain a harvesting report from the contractor.

Clear-cutting of aquatic vegetation adjacent to riparian shoreline for the purpose of creating weed-free areas for swimming or other recreational purposes is not an acceptable use of the mechanical harvester and is not recommended. Landowners, however, are not prohibited from physically removing aquatic vegetation in these areas, provided guidelines presented in NR 109 are followed.

Areas to be Harvested

Harvesting plans will be designed to enhance both the ecological balance and recreational uses of the lake for lake constituents and the general public by establishing common use navigation channels and individual riparian access lanes. A common use navigation channel is a common navigation route for the general lake user. It is offshore and connects areas that boaters commonly would navigate to or cross, and is for public benefit. An individual riparian access lane is an access lane to shore that normally is used by an individual riparian shore owner.

Navigation channels will be limited to 20-ft wide and individual riparian access lanes and fishing recreation lanes will be limited to 10-ft wide and both must be in water at a depth of 3-ft or greater (Appendix C). Once harvested, these areas should be kept open, and even expanded, through regular use of watercraft. If the navigation channels or access lanes fill in again, they can be re-cut under the same harvesting permit that allowed their initial cutting.

Additionally, maintaining open water navigation on Kirby Lake is critical to ensuring that the lake is usable and navigable for lake constituents, as well as the general public. As such, we recommend that approximately 11 acres of aquatic vegetation be harvested to provide lake users more recreational opportunities while simultaneously maintaining the ecological integrity of the lake. These values may need to be re-evaluated on a yearly basis to account for changes in water levels and year-to-year plant growth. See Appendix C for locations of areas to be harvested to maintain open water in Kirby Lake.

The harvesting plan will be assessed annually to determine if changes should be made. Areas designated for harvesting in a given year, can be repeatedly harvested as needed in that year to maintain their function without the need for additional WDNR permitting or fees. An example harvesting plan is included in Appendix C. Changes in the harvesting plan can be requested by property owners, and will be evaluated on an individual case basis as they arise. Appendix D provides guidelines for evaluating land owner requests and documenting the need to pursue management. Larger changes in the harvesting plan may be necessary due to variability in water levels, changes in lake use patterns, or with the introduction of a new aquatic invasive species.

Management Alternatives

Protecting native plants should be a primary focus of plant management in Kirby Lake due to its rich and diverse plant community and the benefits they offer including providing fish and wildlife habitat, keeping aquatic invasive plant species at bay, maintaining water quality, protecting the shoreline from erosion, improving lake aesthetics, and increasing land owner privacy. Management of aquatic vegetation and can take many alternate forms to the mechanical harvesting proposed in this plan. There are several management alternatives that have been determined to be inadequate and/or inappropriate for Kirby Lake.

Generally, control methods for nuisance aquatic plants can be grouped into four broad categories:

- Mechanical/physical control: pulling, cutting, raking and harvesting
- Chemical control: use of herbicides
- Biological control: the use of species that compete successfully with the nuisance species for resources
- Aquatic plant habitat manipulation: dredging, flooding and drawdown

In many cases, an integrated approach to aquatic plant management is the best way to protect and enhance the native plant community while maintaining functional use of the lake.

No Management: Not Recommended

Regardless of the target plant species, native or non-native, sometimes no management is the best management option. Plant management activities can be disruptive to areas identified as critical habitat for fish and wildlife and should not be done unless it can occur without ecological impacts. This management alternative is not recommended for Kirby Lake due to the excessive restrictions to public and lake property owner access to the lake caused by the extensive growth of native vegetation.

Physical/Manual Removal: Recommended

There is no limit as to how far out into the lake this management activity can occur, provided the area cleared is no more than 30-ft wide. 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 may be the best form of control. Pulling aquatic invasive species while snorkeling or scuba diving in deeper water is also allowable without a permit and can be effective at slowing the spread of a new aquatic invasive species infestation within a waterbody when done properly.

Many property owners along the shores of Kirby Lake already implement this management action, and it is recommended to continue. Some residents keep small areas around their docks or swimming areas open by raking and/or cutting plants. For residents where dense beds of aquatic vegetation can extend far out into the lake, this method of management is more difficult. In many cases, a dock area is cleared out, and then daily boat traffic from that area to the open water keeps a channel open.

Mechanical Harvesting: Recommended

Harvesters can remove thousands of pounds of vegetation in a relatively short time period. They are not, however, species specific. Everything in the path of the harvester will be removed, including the target species, other plants, macro-invertebrates, semi-aquatic vertebrates, forage fishes, young-of-the-year fishes, and even adult game fish found in the littoral zone (Booms, 1999). Plants are cut at a designated depth, but the root of the plant are often not disturbed. Cut plants will usually grow back after time, and re-cutting several times a season is often required to provide adequate annual control (Madsen, 2000). Harvesting activities in shallow water can re-suspend bottom sediments into the water column releasing nutrients and other accumulated compounds (Madsen, 2000). Even the best aquatic plant harvesters leave some cutting debris in the water to wash up on the shoreline or create loose mats of floating vegetation on the surface of the lake. This "missed" cut vegetation can cause hardship of its own. Some research indicates that after cutting, reduction in available plant cover causes declines in fish growth and zooplankton densities. Other research finds that creating deep lake channels by harvesting increases the growth rates of some age classes of bluegill and largemouth bass (Greenfield et al. 2004). A major benefit of aquatic plant harvesting is the removal of large amounts of plant biomass from a water body.

A combination of small and large-scale (described below) is recommended to continue in Kirby Lake to make the lake navigable and open to recreation for the public and lake property owners. These methods are recommended because they will effectively and efficiently open navigation channels and areas in a controlled manner to protect and improve the ecological function and use of Kirby Lake.

Small-Scale Mechanical Harvesting

Removing a small amount of aquatic vegetation through mechanical harvesting is classified as small-scale mechanical harvest. The depth at which these mowers cut is set by the operator and is only limited by the depth of the lake, and the pole attached to the mower blade. However, it would not be expected that this kind of mower would be operated in deep water, and is likely most effective in water depth below five or six feet. In addition, this type of mower would cut the vegetation, but not remove it from the system. A second boat or pontoon would have to follow to remove the cut vegetation. Cutting equipment of this nature can be purchased for just a few thousand dollars.

Small-scale aquatic plant harvesting in addition to larger scale contracted mechanical harvesting in Kirby Lake is likely the best management option to meet the lake's overall goal of maintaining recreational use of the lake for the general public and lake constituents. It would be expected that once the first round of harvesting was done, that regular boat traffic would keep navigation lanes open. By doing so, the amount of effort needed to open the lanes, particularly when using a mower blade attached to a pontoon or boat, would be minimized.

Large-Scale Mechanical Harvesting

Large-scale harvesting is removing several acres of aquatic vegetation, potentially at multiple times during a season. A mechanical harvester that would cut, remove, store, and transport aquatic vegetation would be needed. Large-scale harvesting is recommended for Kirby Lake to maintain open water areas, navigational lanes, and access lanes in addition to small scale harvesting performed by the KLMD and physical removal conducted by property owners.

Aquatic Herbicides: Not Recommended

Because the WDNR does not issue permits for chemical control of native aquatic vegetation, it is unlikely that the use of herbicides to treat native aquatic plants in Kirby Lake would be permitted. Furthermore, the plant community of Kirby Lake is highly diverse and contains several rare species; thus, using aquatic herbicides in Kirby Lake is not recommended.

Management Discussion

The main focus of native aquatic plant harvesting on Kirby Lake is to provide navigation relief by opening designated navigation and access lanes, as well as maintaining open water areas, to improve access to open water and recreational opportunities for all lake users. Much of the shoreline in Kirby Lake is impounded and inaccessible due to large, dense beds of native vegetation comprised of floating-leaf species like watershield and submerged species like small pondweed. Limited harvesting through these beds using mechanical and manual means would maintain access and recreation in the lake, and it is not likely that limited harvesting will negatively impact the overall abundance and diversity of native aquatic vegetation in the lake. Additionally, secondary benefits of limited native aquatic plant harvesting would be improving fishing access, possibly improving the fishery, and reducing nutrient loading from decaying vegetation.

Goal 4. Education and Awareness

Providing education, outreach opportunities, and materials to the lake community will improve general knowledge and likely increase participation in lake protection and restoration activities. It is recommended that the KLMD continue to cultivate an awareness of the problems associated with AIS and enough community knowledge about certain species to aid in detection, planning, and implementation of management alternatives within their lake community. It is also recommended that the KLMD continue to strive to foster greater understanding and appreciation of the entire aquatic ecosystem including the important role plants, animals, and people play in that system.

Understanding how their activities impact the aquatic plants and water quality of the lakes is crucial in fostering a responsible community of lakeshore property owners. To accomplish this, the KLMD should distribute, or re-distribute, informational materials and provide educational opportunities on aquatic invasive species and other factors that affect Kirby Lake. At least one annual activity (picnic at the lake, public workshop, guest speakers, etc.) should be sponsored and promoted by the KLMD that is focused on AIS. Maintaining signs, continuing aquatic invasive species monitoring, and active inspections of

watercraft at the public launch should be done to educate lake users about what they can do to prevent the spread of AIS. Results of water quality monitoring should be shared with the lake community at the annual meeting, or another event, to promote a greater understanding of the lake ecosystem and potentially increase participation in planning and management.

It is recommended that the KLMD continue to provide educational materials related to wildlife and wildlife monitoring programs during public events and meetings and in newsletters. Volunteers are currently participating in the Loon Watch program sponsored by the Sigurd Olson Institute. Other programs sponsored by the Citizen-based Monitoring Network of Wisconsin (http://wiatri.net/cbm/) should be promoted by the KLMD and member participation encouraged. The KLMD should help make arrangements for training opportunities for these and other wildlife monitoring and appreciation events.

Goal 5. Research and Monitoring

Long-term data can be used to identify the factors leading to changes to water quality, such as aquatic plant management activities, changes in the watershed land use, and the response of the lakes to environmental changes. Thus, it is recommended that the KLMD continue to participate in the CLMN Water Quality Monitoring Program. CLMN expanded monitoring parameters (Secchi, temperature, dissolved oxygen, total phosphorus, and chlorophyll-*a*) should be continued at the Deep Hole Site. The intensity of water quality monitoring efforts should be evaluated at least every three years. These evaluations should consider cost and their contribution to the creation of knowledge and formation of an effective lake management program. The background information and trends provided by these data are invaluable for comprehensive lake management planning.

Water quantity monitoring is also recommended, including lake level and precipitation. This information can also be used for comprehensive planning when determining hydrologic and nutrient budgets. Long-term lake level monitoring can provide information on how much water levels vary in a normal year (or longer time period) which can be useful in identifying processes that drive lake hydrology so management or adaptation can continue.

It is also recommended that an official staff gage be installed on a permanent structure in the lake or placed in reference to a permanent and unchanging structure on the shore. To facilitate daily readings, the staff gauge should be installed at the property of a volunteer who is a permanent resident on the lake. Lake levels can be recorded by reading the staff gauge on a daily or weekly basis.

To monitor any changes in the plant community, it is recommended that whole-lake point intercept aquatic plant surveys be completed at three to five-year intervals. This will allow managers to adjust the APM Plan as needed in response to how the plant community changes as a result of management and natural factors like water level.

Goal 6. Adaptive Management

This APM Plan is a working document guiding management actions on Kirby Lake for the next five years. This plan will follow an adaptive management approach by adjusting actions as the results of management and data obtained deem fit. This plan is therefore a living document, progressively evolving and improving to meet environmental, social, and economic goals, to increase scientific knowledge, and to foster good relations among stakeholders. Annual and end of project assessment reports are necessary to monitor progress and justify changes to the management strategy. Project reporting will meet the requirements of all stakeholders, gain proper approval, allow for timely reimbursement of expenses, and

provide the appropriate data for continued management success. Success will be measured by the efficiency and ease in which these actions are completed.

The KLMD and their retainers will compile, analyze, and summarize management operations, public education efforts, and other pertinent data into an annual report each year. The information will be presented to members of the KLMD, Barron County and the WDNR and made available in hardcopy and digital format on the internet. These reports will serve as a vehicle to propose future management recommendations and will therefore be completed prior to implementing following year management actions (approximately March 31st annually). At the end of this five-year project, all management efforts (including successes and failures) and related activities will be summarized in a report to be used for revising the Aquatic Plant Management Plan.

Timeline of Activities

The activities in this APM Plan are designed to be implemented over a 5-year period beginning in 2022. Appendix E is a timeline for implementation of activities. The plan is intended to be flexible to accommodate future changes in the needs of the lake and its watershed, as well as those of the KLMD. Some activities in the timeline are eligible for grant support to complete (for more information: https://dnr.wisconsin.gov/aid/SurfaceWater.html).

Funding and Permitting

Because cutting and removal and/or harvesting is considered maintenance management by the WDNR, it is expected that the KLMD will cover the costs of any necessary management planning and aquatic plant cutting and removal and/or harvesting through Lake District funds. Recreational Boating Facilities (RBF) grant funding could be applied for by the KLMD if the decision is made to purchase any mechanical cutting and removal equipment or a harvester. RBF grants can be applied for at any time, but require a request be made in person in front of a five member Waterways Commission Advisory Board which generally convenes quarterly each year. Initial investigations completed by the KLMD into the availability of RBF grants to purchase a harvester for Kirby Lake suggest this grant funding may not be available for Kirby Lake management, but additional follow-up should be made. More information about the RBF grant is available at http://dnr.wi.gov/Aid/RBF.html.

A WDNR Mechanical/Manual Aquatic Plant Control Permit is necessary to implement the management actions in this Addendum. Application Form 3200-113 is available on line at http://dnr.wi.gov/lakes/plants/forms/3200113_fillExt.pdf.

Physical removal of aquatic plants, that which is done by hand with no motorized mechanical assistance, can be done legally without a permit according to Guidelines found in NR 109 (Appendix A).