5.0 IMPLEMENTATION PLAN

The Implementation Plan presented below was created through the collaborative efforts of the Kangaroo Lake Association (KLA) Planning Committee, ecologist/planners from Onterra, and WDNR staff. It represents the path the KLA will follow in order to meet their lake management goals. The goals detailed within the plan are realistic and based upon the findings of the studies completed in conjunction with this planning project and the needs of the Kangaroo Lake stakeholders as portrayed by the members of the Planning Committee, the returned stakeholder surveys, and numerous communications between Planning Committee members and the lake stakeholders. This was truly a team-based effort and could not have been undertaken without the efforts of KLA board and planning committee members. Continued volunteer involvement in the KLA and Kangaroo Lake's management will be essential for ongoing protection and enhancement of Kangaroo Lake. The Implementation Plan is a living document in that it will be under constant review and adjustment depending on the condition of the lake, the availability of funds, level of volunteer involvement, and the needs of the stakeholders.

Management Goal 1: Maintain current water quality conditions

Management Action:	Continue monitoring of Kangaroo Lake's water quality through the WDNR Citizens Lake Monitoring Network (CLMN).
Timeframe:	Continuation of current effort
Facilitator:	Cindy Wienkers or current CLMN volunteer
Description:	Monitoring water quality is an import aspect of every lake management planning activity. Collection of water quality data at regular intervals aids in the management of the lake by building a database that can be used for long-term trend analysis. As discussed in the Water Quality Section (Section 3.1), Kangaroo Lake's water quality is rated as *excellent* for a shallow lowland drainage lake in Wisconsin with low nutrient and algal levels and high water clarity. Continued monitoring will allow for early detection of potential negative trends and may lead to the reason as to why the trend is developing. The Citizen Lake Monitoring Network (CLMN) is a WDNR program in which volunteers are trained to collect water quality information on their lake. Volunteers from the KLA have been measuring Secchi disk transparency in Kangaroo Lake annually since 1992 and collecting samples for chlorophyll-*a* and total phosphorus annually since 1993 and 1994, respectively. The KLA recognizes the importance of continuing this monitoring effort which will supply them with valuable data about their lake. When a change in the collection volunteer occurs, Mary Gansberg (920.662.5489) or the appropriate WDNR/UW-Extension staff will need to be contacted to ensure the proper training occurs and the necessary sampling materials are received by the new volunteer. It is also important to note that as a part of this program, the data

collected are automatically added to the WDNR database and available through their Surface Water Integrated Monitoring System (SWIMS) by the volunteer.

Action Steps:

1. Cindy Wienkers or KLA Board of Directors appoints/recruits new volunteer(s) as needed.
2. New volunteer(s) contact Mary Gansberg (920.662.5489) with the WDNR as needed.
3. Volunteer(s) reports results to WDNR SWIMS database.

Management Action: Continue monitoring of Peil Creek water quality through the WDNR Water Action Volunteers (WAV) Program.

Timeframe: Continuation of current effort

Facilitator: Lucy Klug or current WAV volunteer

Description: The WAV Program is a collaborative effort between the WDNR and University of Wisconsin – Extension which utilizes citizen volunteers to monitor rivers and streams across Wisconsin. Like the CLMN program discussed previously, regular data collection on Wisconsin's rivers and streams allows for the early detection of potential problems. Peil Creek, which is mainly fed via groundwater springs, is the primary tributary to Kangaroo Lake which empties into the north basin.

Volunteers from the KLA have been collecting water quality data from Peil Creek annually since 2010. Water quality parameters measured monthly between spring and fall include: dissolved oxygen, streamflow, transparency, temperature, and pH. Total phosphorus concentrations are also periodically measured. Continued monitoring of Peil Creek will provide resource managers with valuable information on not only the health of the stream but the health of Kangaroo Lake as well.

Like water quality monitoring in Kangaroo Lake, the KLA recognizes the importance of continuing the monitoring effort in Peil Creek. When a change in the collection volunteer occurs, the statewide WDNR and UW-Extension WAV Program contacts (see information below) will need to be contacted to ensure the proper training occurs and the necessary sampling materials are received by the new volunteer. It is also important to note that as a part of this program, the data collected are automatically added to the WDNR database and available through their Surface Water Integrated Monitoring System (SWIMS) by the volunteer.

Action Steps:

1. Lucy Klug or KLA Board of Directors appoints/recruits new volunteer(s) as needed.

2. New volunteer(s) contact UW-Extension statewide WAV Program Coordinator Peggy Compton (608.342.1633), WDNR statewide WAV Program Coordinator Ilana Haimes (608.266.3599), and/or current regional coordinator (Matt Peter) with the Ridges Sanctuary (920.839.2802) as needed.
3. Volunteer(s) reports results to WDNR SWIMS database.

Management Action: Preserve natural and restore highly developed shoreland areas on Kangaroo Lake to improve habitat, reduce erosion, and protect water quality.

Timeframe: Initiate 2018

Facilitator: KLA Board of Directors

Description: The 2016 Shoreland Condition Assessment found that the immediate shoreland zone of Kangaroo Lake's south basin had a higher degree of development when compared to the north basin. Approximately 50% (3.5 miles) of the immediate shoreland zone within the south basin contained little to no development, delineated as either *natural/undeveloped* or *developed-natural*, while approximately 29% (2.1 miles) contained a higher degree of development categorized as *developed-unnatural* or *urbanized*. Approximately 21% (1.5 miles) of the shoreland zone within the south basin contained rip-rap or seawalls.

In the north basin, approximately 91% (3.8 miles) of shoreland were delineated as *natural/undeveloped* or *developed-natural* while 6% (0.3 miles) was delineated as *developed-unnatural*. The only rip-rap observed in the north basin was along the County Highway E causeway which is approximately 0.25 miles in length or 6% of the shoreland zone within the north basin. In total, approximately 66% (7.4 miles) of Kangaroo Lake's shoreland contained little to no development, 21% (2.4 miles) contained a higher degree of development, and 13% (1.5 miles) contained a moderate degree of development.

It is important that the owners of properties with little development are informed on the benefits their shoreland is providing to Kangaroo Lake in terms of maintaining the lake's water quality and habitat, and that these shorelands remain in a natural or semi-natural state into the future. It is equally important that the owners of properties with developed shorelands become educated on the lack of benefits and possible harm their shoreland has to Kangaroo Lake's water quality and contribution to habitat loss.

As is discussed further in this section, the KLA in partnership with the Nature Conservancy has been active in improving shoreland habitat by increasing coarse woody habitat within the south basin of

the lake through the WDNR's Fish Sticks Program. The KLA would like to continue improving shoreland habitat in Kangaroo Lake, particularly in the south basin. The KLA board of directors will work with the appropriate entities such as the Nature Conservancy, Door County Soil and Water Conservation Department, and the WDNR to research grant programs and other pertinent information that will aid the KLA in preserving and restoring the shoreland areas of these lakes.

The KLA could reach out to Erin Hanson (920.746.2214) with the Door County Soil and Water Conservation Department to research grant programs, shoreland restoration/preservation techniques, and other pertinent information that will aid in the KLA. Because property owners may have little experience with or be uncertain about restoring a shoreland to its natural state, properties with restoration on their shorelands could serve as demonstration sites. Other lakeside property owners could have the opportunity to view a shoreland that has been restored to a more natural state, and learn about the maintenance, labor, and cost-sharing opportunities associated with these projects.

The WDNR's Healthy Lakes Initiative Grants allow partial cost coverage for native plantings in transition areas. This reimbursable grant program is intended for relatively straightforward and simple projects. More advanced projects that require advanced engineering design may seek alternative funding opportunities, potentially through the county and the WDNR Lake Protection Grant Program. However, for a larger project that may include a number of properties, it may be more appropriate to seek funding through a WDNR Lake Protection Grant. While more funding can be provided through a Lake Protection Grant and there are no limits to where that funding is utilized (e.g. technical, installation, etc.); however, the grant does require that the restored shorelines remain undeveloped in perpetuity.

Action Steps:

1. The KLA Board of Directors gathers appropriate information from entities listed above.
2. The KLA provides property owners with the necessary informational resources to protect or restore their shoreland should they be interested. Interested property owners may contact the KLA and the Door County Soil and Water Conservation office for more information on shoreland restoration plans, financial assistance, and benefits of implementation.

Management Action: Preserve natural land cover within the Kangaroo Lake watershed beyond the immediate shoreland zone.

Timeframe: Continuation of current effort

Facilitator: KLA Board of Directors

Description: As is discussed within the Watershed Section (Section 3.2), changes in land use beyond the shoreland zone within a lake's watershed can impact water quality. Nearly 60% of Kangaroo Lake's surficial watershed is developed, with the majority of this development comprised of pasture/grasslands and lesser portions comprised of row crop agriculture, rural residential areas, and medium density urban areas. Given this higher level of development, modeling of Kangaroo Lake's watershed predicted an in-lake growing season total phosphorus concentration of 52 µg/L – 248% higher than the measured growing season mean concentration of 13 µg/L. As is discussed in the Watershed Section, the large discrepancy between predicted and measured total phosphorus in Kangaroo Lake is largely due to the fast-draining soils and underlying geology within Kangaroo Lake's watershed.

The majority of soils within Kangaroo Lake's watershed are classified as *well drained*, indicating that the majority of the precipitation which falls within the lake's watershed likely percolates quickly into the ground rather than flowing across the surface and into the lake as the watershed modeling assumes. The lake's high concentration of calcium and magnesium are also indications that the lake receives significant sources of groundwater. Peil Creek is largely groundwater-fed, originating from groundwater springs north of Kangaroo Lake.

The KLA recognizes the importance of protection natural lands within Kangaroo Lake's watershed beyond the immediate shoreland zone of Kangaroo Lake. The KLA has worked with the Nature Conservancy, the Door County Land Trust, and private landowners to protect land surrounding Piel Creek and the north basin of Kangaroo Lake. In the mid-1990s, the Nature Conservancy purchased 117 acres of land around the north basin and transferred 57 acres to the Door County Land Trust for long-term protection. And in 2005, the Nature Conservancy purchased 42 acres of land surrounding the headwater springs which feed Piel Creek and Kangaroo Lake. In total, the Nature Conservancy manages 367 acres of land around Kangaroo Lake. The KLA continues to work with the Nature Conservancy in an effort to protect the north basin of Kangaroo Lake and protect water quality and habitat in Piel Creek.

As of this writing, approximately 7% of the land within Kangaroo Lake's surficial watershed is under some type of protection either

through the Nature Conservancy, the Door County Land Trust, or Door County (Map 12). The KLA should continue to work with agencies such as the Nature Conservancy in an effort to protect additional land adjacent to Peil Creek and immediately surrounding Kangaroo Lake.

Some valuable resources for land owners within Kangaroo Lake's watershed who want to protect their land for future generations can be found below:

- The Nature Conservancy website: (www.nature.org)
- Door County Land Trust website: (www.doorcountylandtrust.org)
- Door County Soil and Water Conservation Department website: (http://www.vilasconservation.com/who_we_are.html)
- Kangaroo Lake Association website: (www.kangaroolake.org)

Action Steps:

1. See description above.

Management Goal 2: Control Existing Aquatic Invasive Species and Prevent New Introductions and Spread from Kangaroo Lake

Management Action: Conduct periodic, lake-wide professional vegetation monitoring in the south basin of Kangaroo Lake.

Timeframe: Initiate in 2020

Facilitator: KLA Board of Directors

Description: This management action discusses continued monitoring of EWM and native aquatic plants within the south basin of Kangaroo Lake. Continued monitoring of EWM within the north basin is discussed in the subsequent management action. As is discussed within the Aquatic Plant Section (Section 3.4), the whole-lake point-intercept surveys completed on Kangaroo Lake in 2016 found that the EWM population in the south basin is relatively small with a littoral frequency of occurrence 2.1%. Comparison of the 2016 data with data from 2006, 2008, and 2010 collected by KLA volunteers showed that the littoral frequency of occurrence of EWM within the south basin declined by 66% from 2010 to 2016.

During the planning meetings with the KLA Planning Committee, the ongoing research on EWM management in Wisconsin being completed by the US Army Corps of Engineers, WDNR, and private consultants was presented. The KLA Planning Committee was able to put the EWM population in Kangaroo Lake into perspective when compared to other Wisconsin Lakes and agreed that herbicide

applications to control the EWM population in Kangaroo Lake were not warranted at this time.

However, the KLA would like to continue their active role in monitoring Kangaroo Lake's EWM population over time so that they can act quickly in the event the population expands. The stakeholder survey indicated that Kangaroo Lake stakeholders are highly supportive of actively managing the lake's EWM population with 97% indicating *definitely yes* or *probably yes* when asked if they believe EWM control is needed on Kangaroo Lake (Figure 5.0-1).

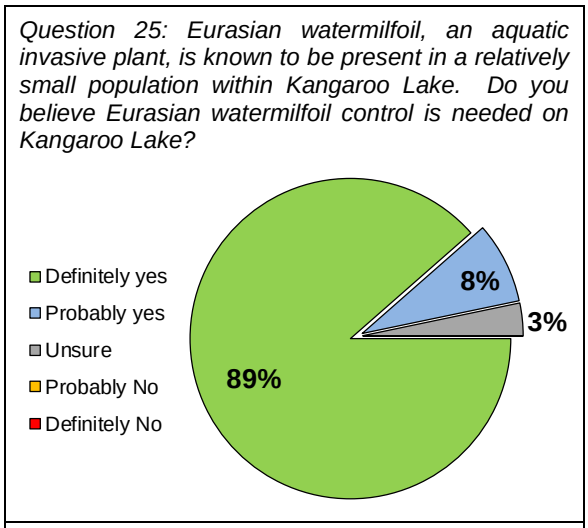

Figure 5.0-1. Kangaroo Lake 2016 stakeholder response to question 25.

Eurasian watermilfoil has been present in Kangaroo Lake for over 20 years, and the fact that its population remains small indicates that the habitat in Kangaroo Lake may not be ideal for this invasive plant. Much of the substrate in Kangaroo Lake is comprised of marl and sand, substrates that are relatively low in nutrients. In addition, marl tends to bind-up phosphorus and make it unavailable for biological use. While it is believed it is unlikely that the EWM population will expand to levels which will impart negative ecological and/or recreational impacts to Kangaroo Lake, the KLA would like to continue monitoring the EWM population over time.

The KLA will actively monitor the EWM population in the south basin by having professional whole-lake point-intercept surveys completed once every five years. Like the whole-lake point-intercept survey completed in 2016, these surveys allow for a quantitative measure of EWM within the lake (littoral frequency of occurrence). In addition, information regarding the south basin's native aquatic plant community can also be gathered to assess its overall health. The data collected during these surveys can be compared to data collected previously to determine if the occurrence of EWM or any native aquatic plant species has changed over time. If the EWM population is found to have increased significantly, feasible management strategies can be discussed and developed.

In addition to completing a whole-lake point-intercept survey, an

emergent and floating-leaf aquatic plant mapping survey would be completed on the south basin once every 10 years. The details of this survey are discussed in detail in a subsequent management action.

Action Steps:

1. Retain qualified professional to complete whole-lake point-intercept survey on Kangaroo Lake's south basin in 2021 and once every five years thereafter.
2. Work with qualified professional to develop EWM management strategy if warranted.
3. Update management plan to reflect changes in EWM management/monitoring needs and those of the lake ecosystem.

Management Action: Continue annual monitoring and hand-removal of EWM within the north basin of Kangaroo Lake.

Timeframe: Continuation of current effort

Facilitator: Kari Hagenow (The Nature Conservancy) and KLA Board of Directors

Description: Largely free of development, the north basin of Kangaroo Lake is an important component for the overall health of the Kangaroo Lake ecosystem in terms of habitat and water quality as well as providing lake users with recreational opportunities in a more natural setting. The surveys completed in 2016 and 2017 found that the north basin is largely free of EWM, and apart from a few single plants the population is mainly concentrated in a 1.0-acre colony adjacent to the causeway in the southern area of the basin (Maps 10 and 11).

The Kangaroo Lake Planning Committee indicated that the EWM in the north basin has largely been restricted to this area of the north basin for some time and has yet to spread elsewhere within the basin. It was discussed at the planning meetings that given EWM's capacity for rapid spread and the fact it has been present in Kangaroo Lake for over 20 years, its absence in most of the north basin may be an indication that the habitat is unsuitable for this invasive plant. The substrate within the north basin was found to be comprised primarily of flocculent, low-nutrient marl deposits. Overall, the north basin supports a low occurrence of native submersed aquatic plants with the exception of the macroalgae *Chara*.

While it is unlikely that EWM will expand significantly beyond its current levels in the north basin, the KLA would like to continue annual monitoring and hand-harvesting of EWM within the north basin by partnering with Kari Hagenow, the Nature Conservancy's Door Peninsula Land Steward & Door County Invasive Species Team Coordinator. The KLA should continue to work with Kari to coordinate volunteer efforts to map and hand-remove EWM from the north basin.

These hand-removal efforts should largely be focused on smaller occurrences of EWM found within the basin, such as single plants and clumps. The 1.0-acre colony of dominant EWM mapped along the causeway is likely too large and dense for manual hand-harvesting to be effective. A potential management strategy for controlling this colony of EWM is discussed in the next management action. The continued annual monitoring of EWM within the north basin will provide insight into the dynamics of this population, while continued hand-removal of newly discovered plants will decrease the probability that this plant will spread in the north basin and protect the ecology of this sensitive area.

Action Steps:

1. The KLA works with Kari Hagenow (Nature Conservancy Door Peninsula Land Steward and Door County Invasive Species Team Coordinator 920.743.8695 ext. 306) to coordinate the annual monitoring and volunteer-based hand-removal of EWM within the north basin of Kangaroo Lake.

Management Action: Investigate feasibility of implementing diver-assisted suction harvesting (DASH) system to control dominant colony of EWM in north basin of Kangaroo Lake.

Timeframe: Initiate in 2018

Facilitator: KLA Board of Directors

Description: As is discussed in the previous management action, the EWM population within the north basin of Kangaroo Lake is largely concentrated in a 1.0-acre colony adjacent to the causeway (Maps 10 and 11). The EWM within this colony is dense and was delineated with density ratings of *highly dominant* in 2016 and *dominant* in 2017. The KLA currently works with Kari Hagenow with the Nature Conservancy to monitor and manually hand-remove EWM within the north basin each year. However, it is believed the size and density of the EWM colony adjacent to the causeway would require effort beyond volunteer manual hand-removal to successfully control.

At the planning meetings, it was discussed that given the colony's size and location near the causeway's culverts where water movement is higher, an herbicide application would likely not be successful at controlling this colony. However, this colony may be a successful candidate for control using the Diver Assisted Suction Harvesting (DASH) system.

The DASH system has been found to be effective at removing these smaller, dense colonies of EWM. During this process, a scuba diver manually extracts the invasive plants (including the roots) and then feeds the removed plants into a vacuum tube that transports the plants to a bin or bag on a boat. They do not simply vacuum the area to

remove the plants as that would result in the removal of sediment and non-target native plants which would be considered suction dredging (requires elaborate permitting). A mechanical harvesting permit from the WDNR is needed (fee of $30 per acre) to use the DASH system.

The DASH system is said to be more efficient than manual removal alone as the diver does not have to go to the surface to deliver the pulled plants to someone on a boat. The DASH system also is theorized to cause less fragmentation, as the plants are immediately transported to the surface using the vacuum technology. However, the costs of conducting hand-harvesting with one of these firms is more expensive than just hiring trained divers and/or snorkelers.

The cost of implementing DASH on Kangaroo Lake may be lower given the proximity of the colony to the causeway. Rather than taking time to transfer removed EWM plants to a boat and then to a land-based vehicle for disposal, it may be possible to directly transfer the removed EWM plants to a vehicle parked on the causeway. If possible, this reduced transfer time would be a cost savings for the DASH effort.

During the planning meetings, the KLA Planning Committee indicated that they would like to investigate the feasibility of utilizing professional DASH harvesting on the north basin of Kangaroo Lake to remove the 1.0-acre colony of dominant EWM. The KLA will want to reach out to firms which conduct DASH harvesting (contacts listed below) to determine if this type of harvesting would be feasible in the north basin and what it would cost. If DASH is a feasible option, the KLA will reach out to the Town of Baileys Harbor to see if they would be willing to partner and offer financial assistance in this endeavor.

Companies that offer DASH Services in Wisconsin

Many Waters, LLC
Barb Gajewski
skih2o@hotmail.com

Ecowaterways
Patricia Dalman
pdalman@ecowaterway.com

Lakefront Restoration and Diving
Tyler Bowe
tsblakefrontrestorationanddiving@yahoo.com

Aquatic Plant Management, LLC
Andrew McFerrin

andrew@aquaticplantmanagement.com

Diver Assisted Suction Harvesting, LLC
Al Pahnke
diveral@sbcglobal.net
jefflong@new.rr.com

Action Steps:

1. KLA contacts firms which offer DASH services to determine if this type of harvesting is applicable and obtain cost estimates. The KLA should inquire about transferring removed EWM directly to vehicle on the causeway as a cost-savings measure.
2. Depending on feasibility and cost, KLA determine if they would like to move forward with harvesting of colony in north basin.
3. If the KLA elects to move forward with DASH in the north basin, retain qualified professional to map EWM prior to and following harvesting to determine efficacy and develop future strategy.
4. The KLA will reach out to the Town of Baileys Harbor for cost-sharing assistance on a potential DASH project.

Management Action: Investigate implementing annual, volunteer-based monitoring of Kangaroo Lake's zebra mussel population following established WDNR/UW-Extension protocols.

Timeframe: Initiate 2018

Facilitator: KLA Board of Directors

Description: The non-native, invasive zebra mussel was discovered in Kangaroo Lake in 2008. As is discussed within the Aquatic Invasive Species in Kangaroo Lake Section (Section 3.5), zebra mussels have been shown to alter lake water quality and ecosystem function in addition to becoming a recreational nuisance. Unfortunately, there is currently no method for eradicating zebra mussels from a lake once they become established. However, the KLA should focus on educating lake users on how to prevent the spread of zebra mussels from Kangaroo Lake to other waterbodies.

While the KLA understands that eradication of zebra mussels from Kangaroo Lake is not possible, they would like to investigate initiating a monitoring program to track zebra mussel abundance over time. There have been anecdotal reports from lake users that the population has been increasing and the KLA would like to determine if these reports are valid. Monitoring zebra mussel abundance over time will also provide resource managers with information on how the population is changing and if any changes in water quality could be correlated with changes in zebra mussel abundance.

The UW-Extension's publication Aquatic Invasive Species Monitoring Manual – Citizens Lake Monitoring Network (2014)

includes a chapter on how volunteers can monitor established zebra mussel populations in their lake. This monitoring method involves deploying substrate samplers in areas of the lake where zebra mussels have been found. The substrate samplers are made of four square plates ranging from 12 to 6 inches in size and are spaced apart in a pyramid shape with the smallest plate at the top and the largest plate at the bottom. Two samplers are suspended mid-depth in the water at each sampling location. Both samplers are deployed in the lake from May through September. One sampler is analyzed once per month over the growing season while the other remains in the water for the entire season and is removed and analyzed in September.

The samplers are analyzed by counting the number of zebra mussels that have attached to the plates of the sampler to obtain an estimate of density. A subsample of the zebra mussels is also measured for length. The data are reported on a recording sheet provided by the UW-Extension and the KLA will report these data to the UW-Extension each year. A detailed description of this monitoring methodology, data analysis, and reporting can be found in the UW-Extension publication mentioned previously.

Action Steps:

1. KLA holds discussions on whether they would like to pursue monitoring of the zebra mussel population in Kangaroo Lake.
2. If the KLA elects to move forward with zebra mussel monitoring, they need to recruit volunteers to complete the annual monitoring.
3. Volunteer monitors should contact Paul Skawinski (715.346.4853), the statewide CLMN coordinator, to obtain zebra mussel substrate samplers, other necessary equipment, and training.
4. Volunteers conduct annual monitoring and report results to WDNR on annual basis.
5. KLA recruits new volunteer(s) as needed and assures proper training for monitoring is provided.

Management Action: Initiate aquatic invasive species rapid response plan upon discovery of new infestation.

Timeframe: Initiate upon invasive species discovery

Facilitator: KLA Board of Directors

Description: In the event that a new aquatic invasive species such as curly-leaf pondweed is located by Kangaroo Lake users, the areas should be marked with a small buoy or GPS and the KLA should contact resource managers (Nature Conservancy, WDNR) immediately. The areas marked would serve as focus areas for professional ecologists and those areas would be surveyed by professionals during the plant's peak growth phase. The results of this initial survey would then be used to develop control strategies. Curly-leaf pondweed populations are found in nearby Lake Michigan and Clark Lake. The

KLA should educate their membership at their annual meetings on how to identify this invasive plant so that they can recognize potential occurrences while recreating on Kangaroo Lake.

Action Steps:

1. KLA Board of Directors contact The Nature Conservancy or WDNR upon discovery of new aquatic invasive species in Kangaroo Lake.

Management Goal 3: Protect and Enhance Native Aquatic Plant Communities in Kangaroo Lake

Management Action: Protect and enhance the hardstem bulrush (*Schoenoplectus acutus*) population in the south basin of Kangaroo Lake.

Timeframe: Continuation of current effort

Facilitator: Paul Mahlberg, Sherrill Eichler, and the KLA Board of Directors

Description: As is presented in the Aquatic Plant Section (Section 3.4), anecdotal reports from long-term residents indicate that the south basin of Kangaroo Lake historically supported a larger population of hardstem bulrush. It is estimated that there was potentially up to 175 acres of hardstem bulrush in the south basin in the early to mid-20th century. However, since the mid-20th century the hardstem population has been in decline with approximately 13 acres remaining in 2017, representing a 93% reduction in acreage from historical levels.

The cause of the hardstem bulrush decline within the south basin over the second half of the 20th century is not known, but it may be due to a combination of factors including the alteration of the lake's natural water levels, shoreland development, and increased watercraft traffic. Recognizing the importance hardstem bulrush communities provide to the lake in terms of habitat and sediment/shoreland stabilization, the KLA has already undertaken a number of efforts to protect what remains of the hardstem bulrush population and also restore areas of hardstem bulrush that were lost.

These efforts include the implementation of a mandatory slow-no-wake zone in the southern area of the lake and a voluntary 500-foot slow-no-wake from the shoreline areas elsewhere around the lake and from the island. In addition, the KLA has also undertaken projects to reintroduce hardstem bulrush to areas where it once occurred historically. Most recently, the KLA was awarded a WDNR small scale planning grant in 2014 to aid in funding a project aimed at planting seedling and cuttings of hardstem bulrush plants from 2014-2017 in various locations around the lake and determining what site-specific conditions are present that result in successful restoration.

Their study found that hardstem bulrush rhizomes (cuttings) had successful establishment when planting occurred in May to mid-June

in near-shore areas of water of approximately one inch of water or less with a substrate of marl, sand, or gravel (Mahlberg and Eichler 2016). The KLA would like to continue their investigations into the establishment of hardstem bulrush plants in the south basin of Kangaroo Lake.

To continue this hardstem bulrush reestablishment project, the KLA will investigate creating an online website or database which lists current lake riparians who are participating in the program and to provide information for property owners who may be interested. Participants can also provide monitoring data about their plantings which will provide information on whether or not the plantings are expanding and the success/failure of long-term reestablishment. As is discussed further in this section, the KLA will continue to educate KLA property owners on the importance of the hardstem bulrush population and how to protect it. In addition, the subsequent management action discusses future professional monitoring of the hardstem bulrush population in the south basin.

Action Steps:

1. Paul Mahlberg works with KLA Board of Directors to develop website or database to track participants and status of planted hardstem bulrush populations.
2. KLA utilizes information gathered from ongoing monitoring of planted hardstem bulrush populations to determine optimal conditions for reestablishment.

Management Action: Conduct periodic, professional monitoring of the emergent and floating-leaf aquatic plant communities within the south basin of Kangaroo Lake.

Timeframe: Initiate in 2025

Facilitator: KLA Board of Directors

Description: In addition to completing whole-lake point-intercept surveys on the south basin every five years, it is recommended that an emergent and floating-leaf aquatic plant community mapping survey be completed in the south basin once every 10 years. Like in 2016, the aim of this survey would be to accurately map areas of emergent (e.g. hardstem bulrush) and floating-leaf (e.g. white water lily) plant populations. Given the decline in the hardstem bulrush population in particular within the south basin, this survey would provide further insight into the dynamics of the hardstem bulrush population and identify areas that may need additional protection.

Action Steps:

1. Retain qualified professional to complete emergent and floating-leaf aquatic plant community survey on Kangaroo Lake's south basin in 2026 and once every 10 years thereafter.

2. Work with qualified professional to develop protection/restoration strategies if warranted.
3. Update management plan to reflect changes in emergent/floating leaf aquatic plant management/monitoring needs and those of the lake ecosystem.

Management Goal 4: Assure and Enhance the Communication and Outreach of the Kangaroo Lake Association with Lake Stakeholders

Management Action: Promote stakeholder involvement, inform stakeholders on various lake issues, as well as the quality of life on Kangaroo Lake.

Timeframe: Continuation of current effort

Facilitator: KLA Board of Directors

Description: Education represents an effective tool to address lake issues like shoreline development, invasive species, water quality, lawn fertilizers, as well as other concerns such as community involvement and boating safety. The KLA will continue its effort to promote lake preservation and enhancement through a variety of educational efforts.

Currently, the KLA publishes three hardcopy newsletter issues per year. These newsletters provide members with association-related information including current projects and updates, meeting times, and educational topics. In addition, the KLA also maintains a website (www.kangaroolake.org) which provides lake users with information about the KLA and current and past projects, facts and figures about Kangaroo Lake, lake-related news, boating information, meeting times and other events, and a host of lake-related links.

In the 2016 stakeholder survey, 97% of respondents indicated that the KLA has kept them *fairly* or *highly* informed regarding issues with Kangaroo Lake and its management and indicates that the KLA's current methods of outreach to lake users are highly effective. In an effort to reach even more Kangaroo Lake users, the KLA planning committee expressed interest in creating a page on the social media platform Facebook. The creation of a KLA Facebook page would serve as an additional avenue for the distribution of information pertaining to Kangaroo Lake. A Facebook page would allow the KLA to provide its members and non-members alike with real-time information.

Education of lake stakeholders on all matters is important, and a list of educational topics that were discussed during the planning meetings can be found below. These topics can be included within the association's newsletter, website, future Facebook page, or distributed as separate educational materials. The KLA has

historically invited lake-related speakers to discuss lake topics at their annual meetings and they intend to continue to do so in the future in an effort to educate their membership on responsible lake stewardship. The KLA should also reach out to professionals from the Nature Conservancy (Door County), WDNR, UW-Extension, Door County Soil and Water Conservation Department, etc. to obtain educational pieces for their newsletter or to invite guest speakers to the annual meeting. The KLA may also provide new members with an informational pamphlet on Kangaroo Lake on aquatic invasive species prevention and responsible boating practices. The KLA will also reach out to owners of rental properties on the lake in an effort to educate renters on responsible boating practices.

Example Educational Topics

- Aquatic invasive species identification and prevention
- Boating regulations and responsible use on a shallow lake
- Current science on Eurasian watermilfoil management in Wisconsin, including herbicide treatments, dynamics of populations over time, and the importance of continued monitoring (Michelle Nault, WDNR Water Resources Management Specialist as possible guest speaker)
- Shoreline restoration and protection
- Importance of maintain coarse woody habitat (CWH) and current efforts being undertaken to improve CWH on Kangaroo Lake
- Effect lawn fertilizers/herbicides have on the lake
- Pier regulations and responsible placement to minimize habitat disturbance
- Importance of maintaining a healthy native aquatic plant community including hardstem bulrush populations
- Respect to and maintaining a safe distance from wildlife within the lake
- Water quality monitoring updates from Kangaroo Lake
- Actions to reduce likelihood of swimmer's itch
- Fishing rules and regulations
- Catch-and-release fishing
- Septic system maintenance

Action Steps:

1. KLA continues to provide Kangaroo Lake-related information through the association's newsletter, website, and meetings.
2. KLA Board of Directors will investigate the creation of a KLA Facebook page.

Management Action: Enhance the KLA's involvement with other entities that manage aspects of Kangaroo Lake.

Timeframe: Continuation of current effort

Facilitator: KLA Board of Directors

Description: The waters of Wisconsin belong to everyone and, therefore, this goal of protecting and enhancing these shared resources is also held by other agencies and entities. It is important that the KLA actively engage with all management entities to enhance the association's understanding of the common management goals and to participate in the development of these goals. This also helps all management entities understand the actions that others are taking to reduce the duplication of efforts. While not an inclusive list, the primary management units regarding Kangaroo Lake are the WDNR (fisheries, AIS, and lake management personnel), The Nature Conservancy, the Town of Baileys Harbor, the Town of Jacksonport, and the Door County Soil and Water Conservation Department. Each entity is specifically addressed in the table on the next page.

Action Steps:

1. See the following table guidelines on the next page.

Partner	Contact	Role	Contact Frequency	Contact Basis
Town of Baileys Harbor	Donald Sitte - Town Chairman yn3water@live.com 920.421.0481	The majority of Kangaroo Lake falls within the Town of Baileys Harbor	Once per year or more as needed. May check website for updates (www.townofbaileysharbor.com)	Town staff may be contacted regarding ordinance reviews or questions and for information on community events.
Town of Jacksonport	Randy Halstead halsteadfarms@aol.com 920.559.0646	Part of Kangaroo Lake falls within the Town of Jacksonport	Once per year or more as needed. May check website for updates (www.jacksonport.org)	Town staff may be contacted regarding ordinance reviews or questions and for information on community events.
The Nature Conservancy	Kari Hagenow khagenow@tnc.org 920.743.8695	Door Peninsula Land Steward	Kari Hagenow is currently serving as the Vice-President for the KLA, a member of the KLA Planning Committee, and takes an active role in AIS monitoring and control; therefore, contact with her will be frequent.	Kari may be contacted for questions relating to general lake ecology, AIS identification and management, shoreland restoration, and many other lake-related topics as needed.
Door County Soil and Water Conservation	Erin Hanson - Department Head swcd@co.door.wi.us 920-746.2214	Oversees conservation for land and water projects in Door County	As needed.	Can provide assistance with the preparation of conservation and construction plans for landowners to address conservation and environmental needs of their land and land use. Can provide assistance with shoreland restorations and habitat improvements.
Wisconsin Department of Natural Resources	Mary Gansberg - Lakes Coordinator mary.gansberg@wisconsin.gov 920.662.5489	Oversees management plans, grants, Citizen Lake Monitoring Network, and all lake activities	Once per year or as needed.	Keep updated on lake management activities.
	Scott Hansen - Fisheries Biologist scott.hansen@wisconsin.gov 920.746.2864	Manages the fishery for Kangaroo Lake	Once per year or as needed.	Scheduled surveys, survey results, coarse woody habitat implementation, volunteer opportunities for improving the fishery.
	Paul Skawinski - Citizens Lake Monitoring Network Contact - Statewide paul.skawinski@uwsp.edu 715.346.4853	Provides training and assistance on CLMN monitoring, methods, and data entry.	Once per year or as needed.	Arrange for training of new volunteers as needed.
Wisconsin Lakes	General Staff 800.542.5253	Facilitates education, networking, an assistance on all matters involving Wisconsin lakes	As needed. May check website often for updates (www.wiscosinlakes.org)	KLA members may attend Wisconsin Lakes' annual conference to keep up-to-date on lake issues. Wisconsin Lakes reps ca assist on grant issues, AIS training, habitat enhancement techniques, etc.

Management Goal 5: Enhance the Fishery of Kangaroo Lake

Management Action: Develop a Kangaroo Lake Fisheries Committee to work with WDNR fisheries managers to enhance the fishery of Kangaroo Lake.

Timeframe: Continuation of current effort.

Facilitator: KLA Board of Directors

Description: While respondents to the 2016 stakeholder survey listed fishing as a relatively low priority activity for owning property on Kangaroo Lake behind relaxing/entertaining, nature viewing, canoeing/kayaking, swimming, and motor boating, the fishery of Kangaroo Lake is still a concern to the KLA. During the planning meetings, the Planning Committee expressed concerns regarding current fisheries management and steps they could take to enhance the lake's fishery. Many discussion points were raised including changes to harvest regulations, walleye stocking, shift of the fish community from walleye-dominated to panfish-dominated, spawning habitat enhancement, and the effect of migratory birds (e.g. cormorants) on the fishery.

Understanding the limitations and stresses on the Kangaroo Lake ecosystem is the first step in developing a realistic solution to angler concerns. From there, realistic goals and actions may be developed. Part of this process involves the education of Kangaroo Lake property owners on the fishery by distributing information to lake residents through the association's newsletter, website, etc. Residents need to understand the importance of conserving aquatic habitat (e.g. bulrush colonies and coarse woody habitat).

The KLA is already taking an active role to enhance fish habitat in Kangaroo Lake with the addition of coarse woody habitat through the WDNR Fish Sticks Program. Over the past four years including 2018, the KLA has placed 101 trees (35-55 feet in length) along the shore in the south basin of the lake and has plans to continue coarse woody habitat improvement in the future if funding can be obtained. The KLA is actively trying to recruit new property owners that would be willing to have these trees placed along their property. As is discussed within the Shoreland Condition Section (Section 3.3), one of the most important functions and benefits coarse woody habitat provides enhanced habitat for fish. In addition, coarse woody habitat provides shoreland erosion control, reduces sediment resuspension, and provides habitat for other aquatic life such as macroinvertebrates.

In addition to improving coarse woody habitat, the KLA would like to investigate if any other habitat enhancements can be made to improve the lake's fishery. To accomplish this, the KLA will appoint a Fisheries Committee which will be tasked with working with WDNR fisheries biologists to enhance the lake's fishery. Kangaroo

Lake is currently overseen by WDNR fisheries biologist Scott Hansen. The Fisheries Committee will contact Scott Hansen annually or as needed to gather information on the current management of Kangaroo Lake's fishery, survey studies that are occurring on the lake, and how the KLA can further work to enhance the fishery. The Fisheries Committee can also create educational pieces discussing Kangaroo Lake's fishery for the association's newsletter, website, etc. Scott can also be invited to speak about the lake's fishery at the KLA's annual meeting.

Action Steps:

1. See description above.