ILM

TRUSTED CARE OF LAND & WATER

ISLAND LAKE
LAKE MANAGEMENT PLAN
2023-2027

Updated 10/5/22

Acknowledgements

This project was made possible by the Lake County Stormwater Management Commission (LCSMC) Watershed Management Assistant Grant (WMAG). We want to thank the Village of Island Lake and Lake Committee Board for providing information regarding current and past management activities, and to the stakeholders who responded to the community survey.

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Introduction

Lake Overview and History

Island Lake is located within the Village of Island Lake, Illinois (Figure 1). The lake is 84.8 acres in size with an estimated average water depth of 5.3 feet (Table 1). According to the Lake County Health Department – Environmental Services (LCHD-ES), the lake was originally a gravel pit, after which a dam was installed in the 1930's (Photo 2). Mutton Creek runs through the lake, where it turns into Cotton Creek after the spillway and eventually empties into the Fox River. The lake is surrounded by residential housing and several public parks. Various water quality issues have been identified in Island Lake over the years. This plan seeks to synthesize community concerns and management goals to create a set of actionable items to improve water quality in Island Lake over 5 years.

Figure 1. 2018 Satellite image of Island Lake. Source: Google Earth.

Parameter	
Surface Area (acres)	84.8
Maximum Depth (feet)	9.8
Average Depth (feet)	5.3
Volume (acre-feet)	433.3
Shoreline Length (linear feet)	4.6
Lake Elev. (feet above sea level)	750.14
Watershed Area (acres)	5969.9
Avg. Water Residence Time (days)	54.7

Table 1. Island Lake morphometric information. Adapted from 2021 Summary Report, LCHD-ES.

Photo 1. Inlet channel, Mutton Creek.

Photo 2. Island Lake outlet spillway.

A bathymetric survey was done in 1995 (Figure 2) and depth data was collected during 2021 (Figure 3), although not as an official bathymetric survey. The lake surface area in the updated map includes the small northwest bay and the southwest bay, increasing the lake area from 75.6 acres (1995) to 84.8 acres (2021). The estimated lake volume in 2021 is 433.3 acre-feet, relative to the 400.6 acre-feet estimated in 1995, due to the increase in included area. Interestingly, in 2021, the lake appeared to be a foot or two shallower than in 1995. This could be due to a combination of lower water levels in 2021 and sediment accumulation since 1995.

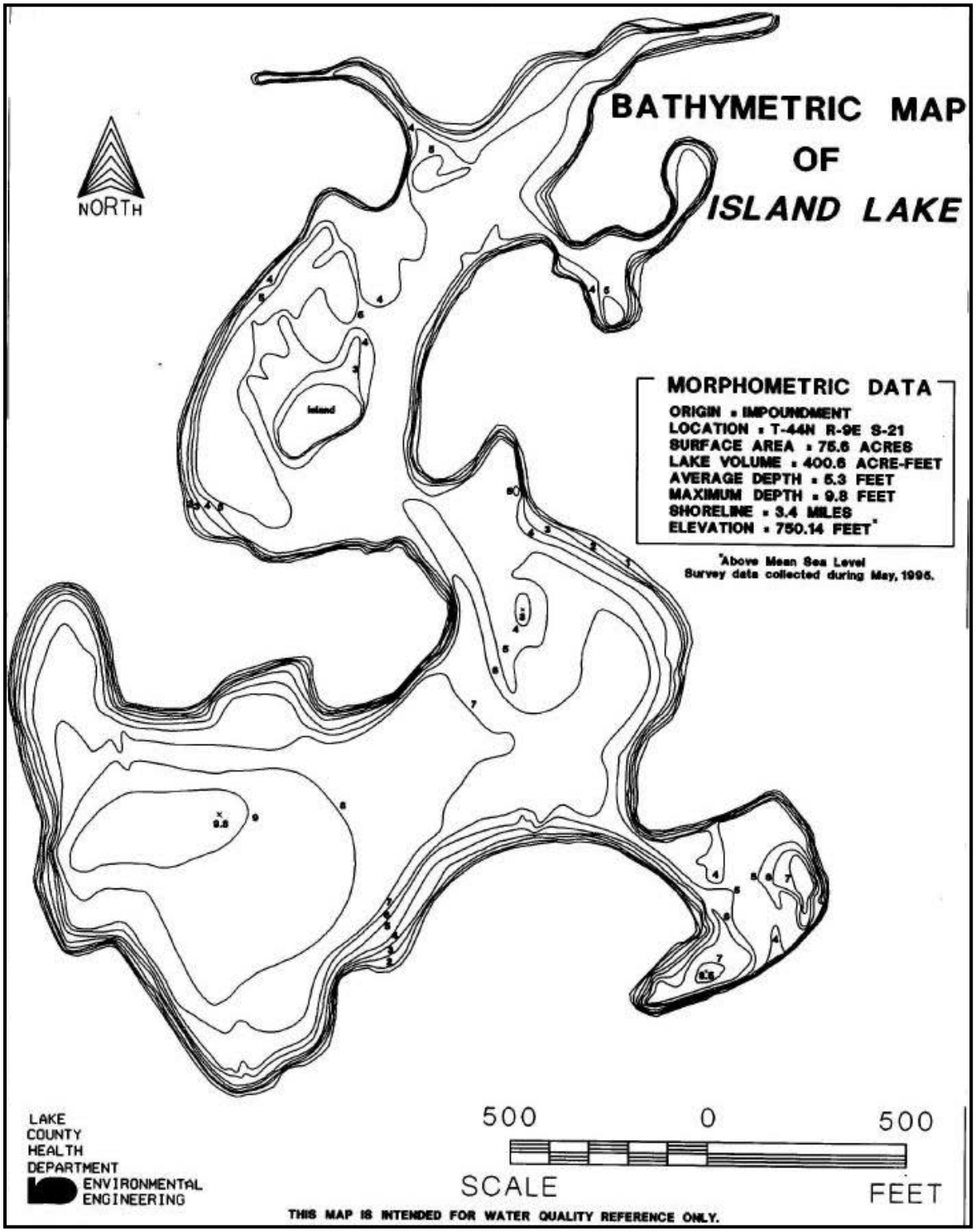

Figure 2. Bathymetric map of Island Lake, 1995. LCHD-ES.

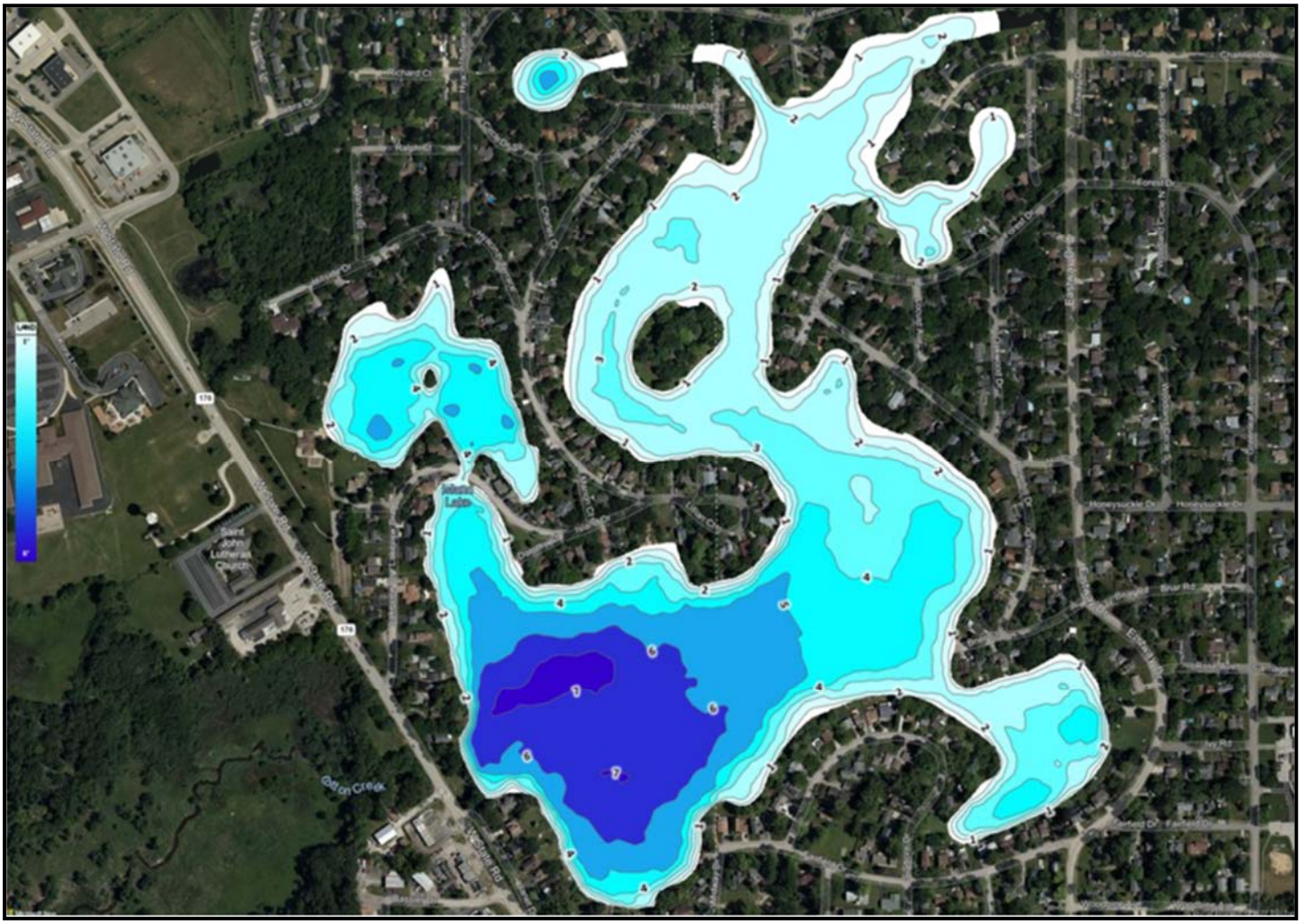

Figure 3. Unofficial bathymetric map of Island Lake, 2021. LCHD-ES.

Current Lake Conditions

Island Lake is periodically assessed by LCHD-ES for various water quality parameters. The last two assessments occurred in 2013 and 2021. This report includes relevant findings from those assessments. Other reports were also utilized for the creation of the management plan. A table of reports referenced in this document are listed in Appendix A. More detailed explanations of sampling methods and additional results can be found in those reports. ILM staff surveyed the lake in June 2022 to evaluate lake conditions and correlate current conditions with past surveys. Adittionally, representatives with the Village of Island Lake supplied details on past and current management activities.

Watershed Conditions

Island Lake's watershed is 5,970 acres, according to the 2021 LCHD-ES Report (Figure 4). Island Lake receives water from Mutton Creek, which enters the lake from the northeast. This large watershed leads to a retention time of approximately 54.7 days. Almost 40% of the watershed is covered in forest, grassland, wetlands, or water (2,347 acres). Keeping wetlands and natural areas intact is important for filtering excess nutrients. Agriculture comprises 29% of the watershed (1730.4 acres). Developed land, including residential, commercial, industrial, transportation, governmental and utilities, make up the remaining area. The 9 Lakes Watershed-Based Plan estimated an annual pollutant load of 18,044.9 lbs/yr of nitrogen and 1,513.8 lbs/yr of phosphorus flows into Island Lake from land used for

crops, grain, and grazing. An estimated 3,182.2 lbs/yr of nitrogen and 332.8 lbs/yr of phosphorus are estimated to come from residential sources. The Plan estimated Island Lake total phosphorus (TP) inputs would have to be reduced to 1,151 lbs/yr to meet the IEPA water quality standard concentration of 0.05 mg/l TP. The current TP influx to Island Lake is estimated to be 3,409 lbs/yr, with 2,745.4 lbs contributed by land sources. If there was a 66% reduction in annual TP influxes from the watershed, the 9 Lakes Watershed-Based Plan suggested that the 1,151 lbs/year target could theoretically be achieved. Such a reduction, however, would involve many large systemic changes throughout the watershed over decades and substantial water quality improvement may not be achieved in the near future from such reductions.

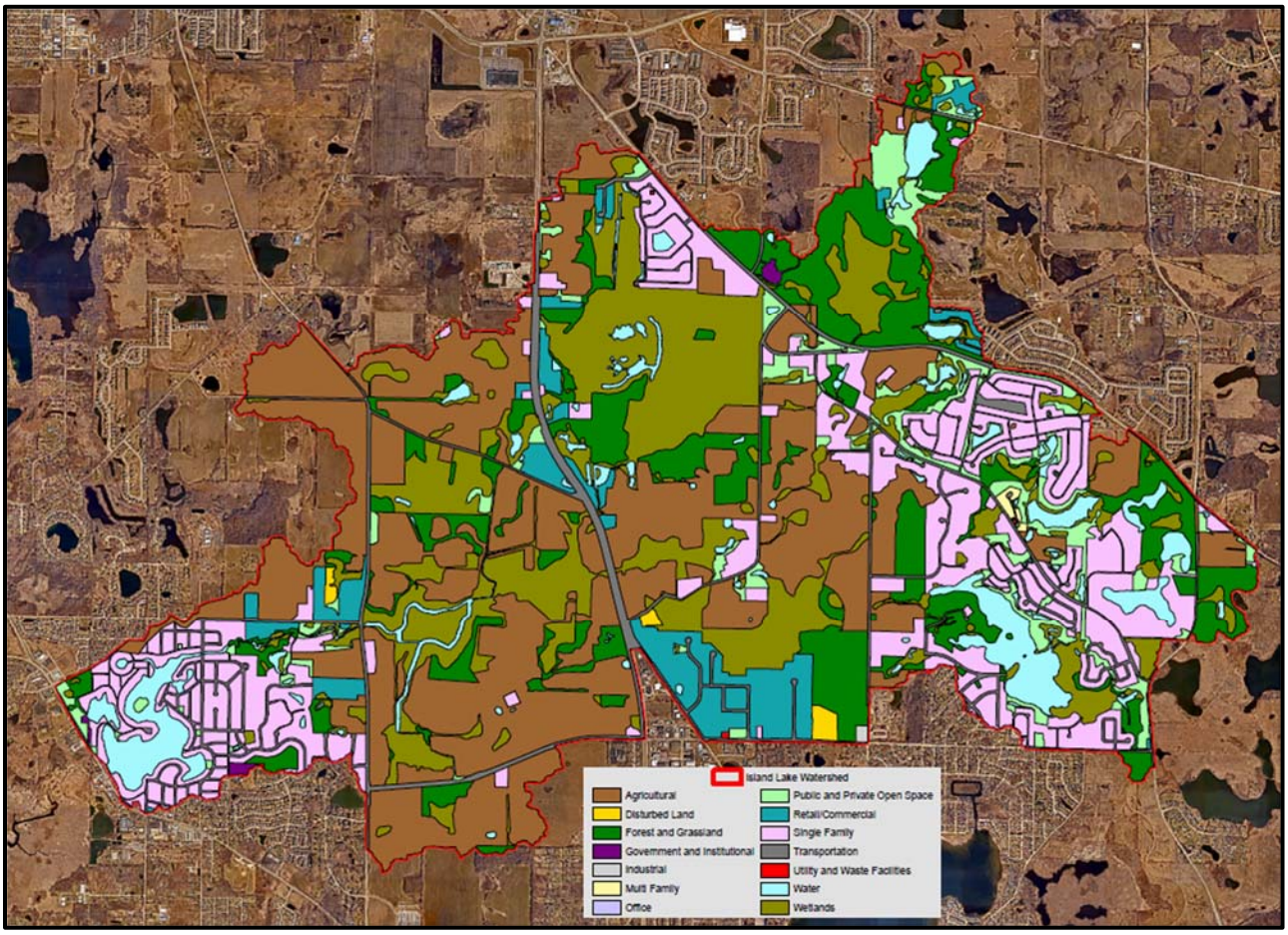

Figure 4. Island Lake watershed boundary and land use, 2021. **LCHD-ES.**

In-Lake Nutrients

Phosphorus

Phosphorus is a vital nutrient for regulating plant growth. It comes from various sources, including fertilizer runoff, soil erosion, and waste. When excessive concentrations build up in a waterbody, phosphorus can lead to nuisance aquatic plant and algae growth and degrade the ecological health of the system. Additionally, increases in toxic cyanobacteria blooms have been linked to nutrient pollution, and excess plant growth caused by high nutrient concentrations can lead to a hazardous depletion in dissolved oxygen levels when plants die off and decompose.

IEPA and LCHD-ES surveys identified Island Lake to be impaired by excess phosphorus concentrations.

Nitrogen

Nitrogen is another nutrient that regulates plant growth and can be a pollutant in excess quantities. Agricultural runoff from manure and fertilizer is a common source of nitrogen pollution.

The LCDH-ES surveys did not find excessive levels of nitrogen in the lake.

Trophic State Index

The Trophic State Index (TSI) indicates the productivity of a lake (Figure 5). In general, lower productivity in lakes is desirable for aesthetics, as there is less nuisance aquatic plant and algae growth. More productive “eutrophic” lakes can support more fish, but these fish tend to be more adapted to lower oxygen and lower quality conditions that occur with excess nutrient buildup. The TSI is calculated by accounting for phosphorus concentrations, chlorophyll concentrations and transparency of the water. A lake with low phosphorus and chlorophyll levels and high water clarity is considered oligotrophic and has a TSI of less than 40. Such lakes tend to have little aquatic plant or algae growth. Lakes with elevated levels of nutrients and a TSI greater than 50 are considered eutrophic and have high productivity.

In 2021, LCHD-ES estimated the TSI of Island Lake to be 77.1, placing it in the “hypereutrophic”, or “extremely high productivity” range. Such lakes are likely to experience severe algae blooms and impaired recreation.

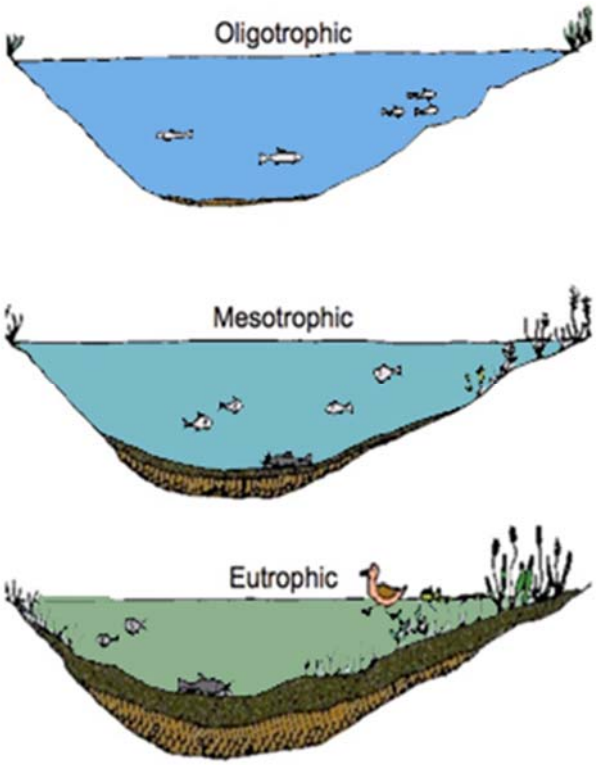

Figure 5. Varying states of lake productivity.

Chlorides

Road salts are applied in the winter to keep roads safe, but the salt can cause harm to freshwater systems when it washes off roads in the spring. Chloride accumulates in a watershed, so reducing applications to the safest level for traffic and utilizing best management practices, such as applying a brine, are important to reducing the rate of accumulation.

Chloride concentrations averaged 129 mg/l in Island Lake during the 2021 LCDH-ES survey. In 2013, it averaged 85 mg/l, showing an increase in chloride over the past decade.

Total Suspended Solids

Water clarity is an indicator of water quality in a lake. Lakes with low water clarity are considered turbid. Planktonic algae growth as well as suspended sediment can lead to low water clarity. The measure of suspended material in the water is measured as total suspended solids (TSS). Sediment can enter a lake when it erodes upstream and is carried

in stormwater. Sediment can also be resuspended in shallow lakes by winds and waves. Bottom-feeding fish such as carp can also turn up sediment while they forage. High TSS levels often indicate poor water quality, as high suspended sediment typically means other pollutants are also being carried in the stormwater.

Island Lake is on the IEPA Section 303(d) list of impaired waterways for elevated levels of total suspended solids and was also classified as impaired by LCHD-ES during their 2021 sampling period.

Secchi disk readings are a measure of water clarity and are considered a low-cost tool to track the health of a water body. A painted disk is lowered in the water until it is no longer visible, and that depth is recorded as the secchi reading. Clearer water generally means lower levels of nuisance algae growth or suspended sediment. A reading of over 4.0 feet is recommended for recreational lakes. The average secchi reading in Island Lake was 2.5 feet in 2021, as measured by Lake County. In almost all years since monitoring began in 1981, Island Lake has averaged less than 3.0 feet of clarity.

Vegetation

Aquatic Plants

In 2019, LCHD-ES found three native aquatic plant species in Island Lake: Coontail (*Ceratophyllum demersum), Elodea (Elodea* canadensis), and leafy pondweed (*Potamogeton foliosus).* While not sampled during the July 2021 survey, the invasive species Eurasian watermilfoil (EWM) *(Miriophyllum spicatum)* and curlyleaf pondweed *(Potamogeton crispus*) are known to be present (Photos 3 - 4). In June 2022, ILM found horned pondweed (*Zannichellia palustris*) during a site visit (Photo 5). Common duckweed (*Lemna minor*) and watermeal (*Wolffia spp.*) are small, floating plants and were also present in 2022 (Photo 6).

During the 2021 LCHD-ES survey, aquatic vegetation was present at only 12% of the sampled sites (Figure 6). Additionally, almost all sites with plants had less than 10% rake density, meaning the aquatic vegetation was not dense within the water column. The native plant floristic quality index (native FQI) is a parameter to quantify the quality of a plant community. A higher FQI indicates a more diverse and higher quality native plant community. Island Lake had an FQI of 5.7 in 2021, ranking it as 159th out of 175 sampled lakes in Lake County.

Photo 3. Eurasian watermilfoil.

Photo 4. Curlyleaf pondweed, 2022 site visit.

Photo 5. Horned pondweed.

Photo 6. Filamentous algae, common duckweed and watermeal.

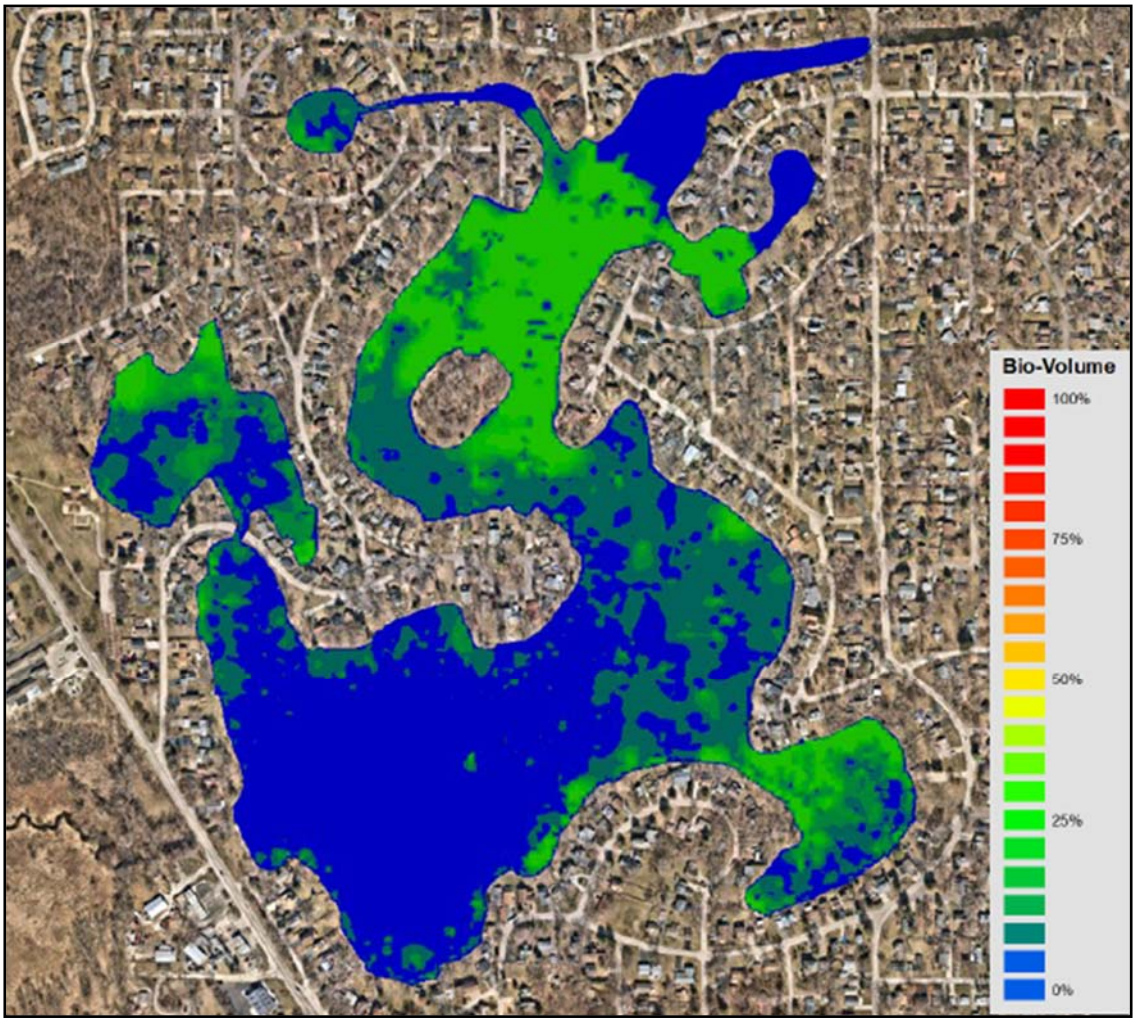

Figure 6. Aquatic vegetation biovolume, 2021. LCHD-ES.

Algae

As with most lakes, filamentous green algae is found in Island Lake where sunlight penetrates to the lakebed. Island Lake also has frequent blue-green algae blooms during the warmer months. Blue-green algae is also known as planktonic algae or cyanobacteria. Blue-green algae tends to originate by growing at the lakebed, but then migrate up and down the water column in response to sunlight and other environmental conditions. This can lead to the entire water column appearing green or a “paint film” of green scum forming on the surface. These organisms are actually cyanobacteria, bacteria that can photosynthesize, as opposed to green algae, which is phytoplankton. Cyanobacteria can produce odor compounds, which creates a foul smell and can potentially release toxins that can harm humans and wildlife when ingested. Such events are known as harmful algal blooms (HABs)

Current Aquatic Plant and Algae Management Activities

Aquatic vegetation and algae are managed in Island Lake through herbicide and algaecide applications during the growing season. In 2021, visits were done on a weekly basis from lake April through August. Ideally, LCHD-ES recommends that herbicide applications for submerged vegetation should occur in early spring, as curlyleaf pondweed and EWM exit dormancy and begin growing earlier than most native species. Herbicide treatments earlier in the growing season allow the non-native species to be controlled and the native plants to flourish. The duckweed and watermeal growth in the lake may require several applications during the growing season, as they can be difficult to control. Treatments for algae occur as well, but blue-green algae tend to have periods of exponential population growth, making control difficult when growing conditions are optimal (warm water and nutrient-rich).

In the four bays around Island Lake, aerators have been installed. These can help reduce duckweed and watermeal growth, as the floating plants grow best in still water. Aeration can also help reduce nuisance algae growth when the system is properly sized. This is because nutrients are bound in sediment, but when dissolved oxygen falls below 1 mg/l at the lakebed, anoxic conditions lead to changes in chemical reactions and increased nutrient release from the sediment. Aerators can help mix the water column, increasing DO levels at the sediment-water interface and reducing nutrient release.

The Village of Island Lake has educational materials for homeowners regarding HABs (Appendix D). LCHD collects samples to test for the toxin microsystin approximately every 2 weeks from Memorial Day through Labor Day. The Illinois EPA may respond to a reported bloom as well. The IEPA recommends the public report a suspected bloom though their Bloom Reporting Form: https://survey123.arcgis.com/share/b33f92a9519d4709a5ca1ba09e036018. They also recommend posting signs to make the public aware of suspected blooms and recommend people and pets stay out of the water when a bloom is occurring. They do not recommend treating a bloom, since it can potentially cause cells to release toxins when they die.

Emergent and Terrestrial Plants

The majority of Island Lake’s shoreline is privately owned and managed. Residents have cultivated or planted emergent vegetation, including irises and spatterdock (Photos 7 & 8). A small portion of the shoreline is unmanaged woodland (Photo 9), but most is maintained with turfgrass to the water’s edge (Photo 10) or a narrow buffer strip of unmown vegetation.

Photo 7. Emergent vegetation and rip rap.

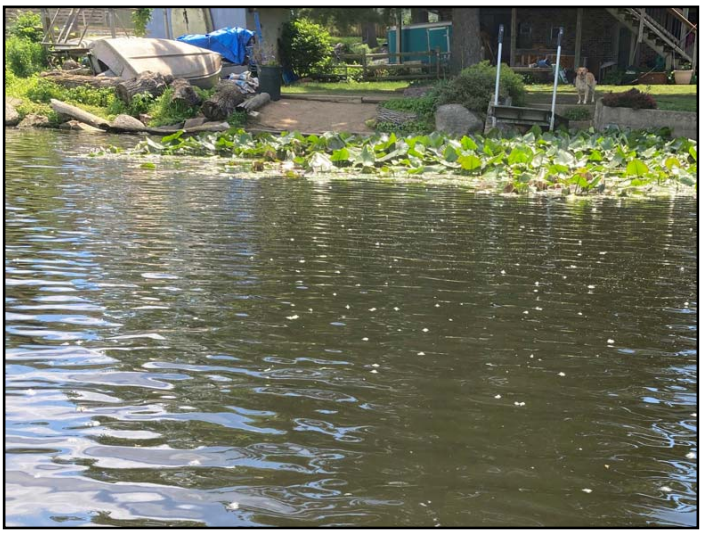

Photo 8. Spatterdock along shoreline.

Photo 9. Shoreline with unmanaged woodland.

Photo 10. Maintained turfgrass.

Shoreline Erosion

During 2021, the lakeshore was assessed by LCHD-ES, both for erosion and buffer condition. In the assessment, 11% of the shoreline was experiencing some form of erosion (slight to severe). Only 10.1% of the shoreline was classified by “good” buffer condition, which is defined by unmown grasses and forbs, trees and shrubs covering ≥ 70% within 25 feet of the shore and < 5% impervious surfaces. “Poor” buffer condition is composed of < 50% unmown grasses and forbs, trees and shrubs and ≥ 50% impervious surface within 25 feet of the shore.

To characterize what areas might be prioritized for shoreline restoration, ILM combined the factors of erosion and buffer condition to group shoreline conditions into four categories (Figure 7). The areas of lowest priority have no erosion and good buffer condition (dark green in Figure 7). Areas with medium-low priority had no or slight erosion and good or fair buffer condition (light green), and medium-high priority reaches have no or slight erosion and fair to poor buffer condition (yellow). The areas of highest priority had slight to severe erosion and fair to poor buffer condition (red). Photos of the shoreline were taken during the 2022 visit to document different examples of shoreline conditions occurring in the lake (Photos 11 - 20). The photo lettering corresponds with the letters on the map in Figure 7.

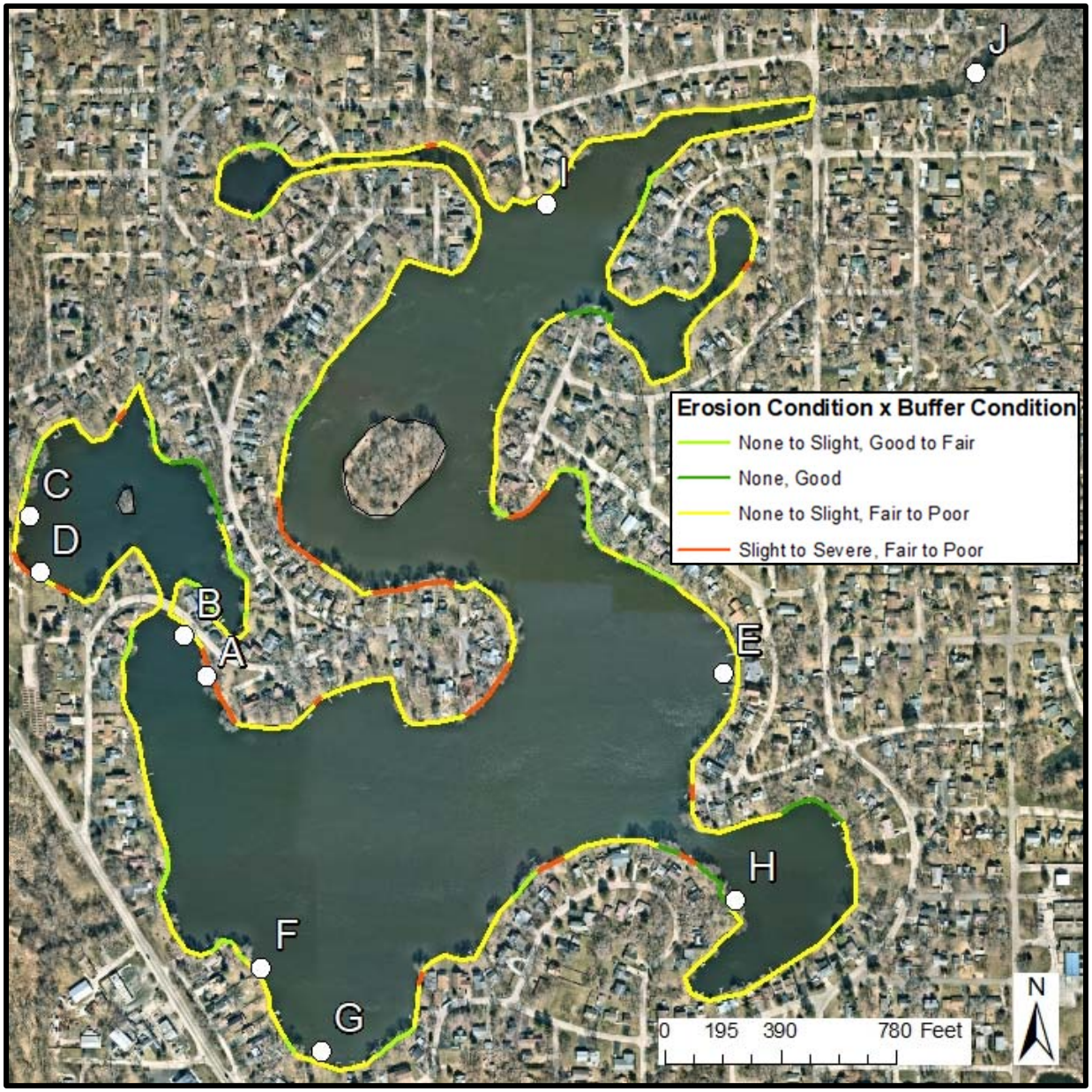

Figure 7. Island Lake shoreline condition. **Letters correspond with photos on following page. *LCHD.***

The shoreline along the western edge of Dorothy Beach Park had the highest degree of erosion observed in the public parks and has low quality buffer condition (Photos 11 & 12), making it a good potential candidate for a shoreline stabilization demonstration area. The other parks have potential for buffer improvement, including Park Beach where the mown turf grass to the water's edge is likely encouraging the dozens of geese seen on the grass (Photo 19). Channel Park has a seawall and grass mown to the edge as well (Photo 20).

The privately-owned shorelines around the lake present a variety of different stabilization techniques. Some have seawalls (Photo 14), others have rip rap, and some have a combination of both (Photos 15 - 17). In general, installing rip rap is preferred over seawalls when conditions permit, as stone can adjust to a settling shoreline and the uneven surface is better at dissipating wave energy. As seen in Photo 18, erosion can occur around the sides of a seawall, leading to shoreline subsidence behind the seawall. More recently, there has been a shift to recommend damaged seawalls be repaired with "biotechnical stabilization". This technique involves installing a combination of structural materials (e.g., rip rap, gabions) and vegetation. The goal is to provide more ecological benefit and improve the long-term stability of the site with the deep roots of established native vegetation. Several homes around the lake are employing this method (Photo 13).

Photo 11. Undercut bank experiencing erosion.

Photo 12. Shoreline stabilized with rock.

Photo 13. Rip rap interplanted with vegetation.

Photo 14. Turfgrass, with and without retaining wall.

Photo 15. Rip rap in front of seawall.

Photo 16. Seawall replaced with stone.

Photo 17. Shoreline repair with rock.

Photo 18. Erosion behind seawall.

Photo 19. Turfgrass mowed to water's edge.

Photo 20. Seawall along Channel Park.

Fisheries

Fishing is a common recreational activity on Island Lake. According to the recorded catches on the angler app "Fishbrain", the most common species caught are largemouth bass, bluegill and black crappie. Anglers also reported catching northern pike, yellow perch, channel catfish, spotted bass, pumpkinseed, striped bass, yellow bullhead, black bullhead, and yellow bass. The most recent Illinois Department of Natural Resources (IDNR) fishery survey occurred in 2014. The IDNR used electrofishing to survey and the most abundant fish seen were bluegill, common carp, and largemouth bass. Other fish caught during the IDNR survey were green sunfish, black bullhead, channel catfish, warmouth, and yellow perch.

Common carp overabundance was identified as an impairment to water quality in Island Lake by the IDNR. Due to this, Island Lake hosts an annual carp removal derby called "Carpfest", with prizes awarded for various categories. Additionally, the Village hires a contractor or the IDNR to perform electrofishing to remove carp, when funding permits. This typically results in the removal of several hundred pounds of common carp at a time. In fall of 2021 over 100 large carp were removed by the DNR during electrofishing.

Island Lake has slot and creel regulations (Figure 8), as recommended by the IDNR to support a healthy fishery. The regulations encourage carp removal and have fines for people violating the regulations. The lake is stocked when funding permits. In 2022. Island Lake was stocked with 500 8-10" channel catfish, 400 3-5" bluegill, and 60 lbs of shiners.

ISLAND LAKE SLOT AND DAILY CREEL REGULATIONS

PER ORDINANCE # 1473-13

The following size, slot and daily creel regulations apply to harvesting fish from the waters of Island Lake:

SPECIES	DAILY LIMIT	SIZE
NORTHERN PIKE	1 (ONE)	MINIMUM 24"
MUSKELLUNGE	CATCH AND RELEASE	CATCH AND RELEASE
LARGEMOUTH BASS	2 (TWO)	14"-18" PROTECTED SLOT
LARGEMOUTH BASS 14"-18" PROTECTED SLOT-TWO FISH LIMIT-ONLY ONE OVER 18"		
SMALLMOUTH BASS	CATCH AND RELEASE	CATCH AND RELEASE
BLUEGILL	15 (FIFTEEN)	MINIMUM 7"
CRAPPIE (ALL TYPES)	10 (TEN)	MINIMUM 9"
PERCH	10 (TEN)	MINIMUM 8"
WALLEYE	2 (TWO)	MINIMUM 16"
CATFISH (ALL TYPES)	3 (THREE)	MINIMUM 15"

HARVESTING OF CARP FROM ISLAND LAKE IS ENCOURAGED

A PERSON FOUND TO BE IN VIOLATION OF THIS CHAPTER SHALL BE SUBJECT TO THE FOLLOWING MINIMUM FINES: $100 for the 1st Offense- $250 for the 2nd Offense and $750 for the 3rd Offense and each offense thereafter.

Figure 8. Island Lake slot and daily creel regulations.

Wildlife

During the 2022 visit in early June, dozens of Canada geese were seen around the lake, including goslings (Photos 21 & 22). The geese were mainly seen on the shoreline of properties with easy access to the lake, such as those with beaches, low docks, or turfgrass mown to the water's edge. Some properties had short fencing installed or low wires strung along the shoreline to deter goose presence. This can deter geese to some extent, although they typically become accustomed to moving around the wires over time.

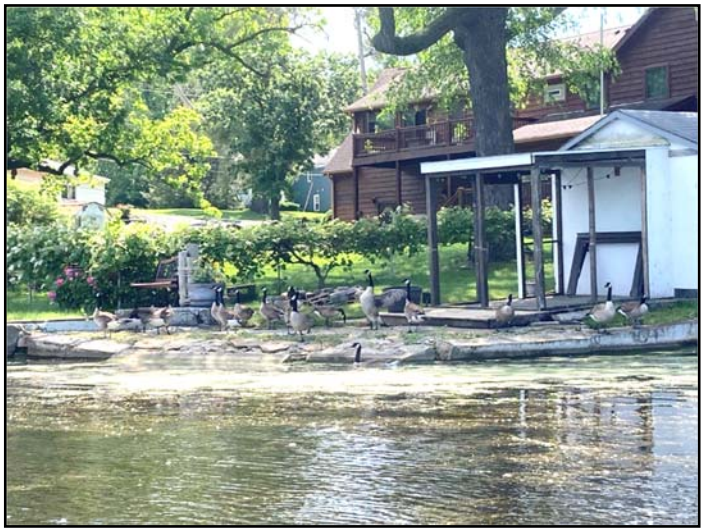

Photo 21. Geese congregating on shore.

Photo 22. Goose droppings on Dorothy Beach.

Recreation

Island Lake has several public parks and beaches around the shoreline. Island Lake hosts the annual "Carpfest" even annually on the lake. Many stakeholders' fish from shore or in boats, and kayaks and other boaters use the lake recreationally. A public boat launch is available at Eastway Park. All boats are required to be registered with the Village and the IDNR. In 2022, 486 boats were registered for use on Island Lake (Figure 9). Of those, slightly more than half were non- motorized (kayak, canoe, paddle/peddle). Over 90% of boats were registered to residents, highlighting that Island Lake residents are the main group using the lake.

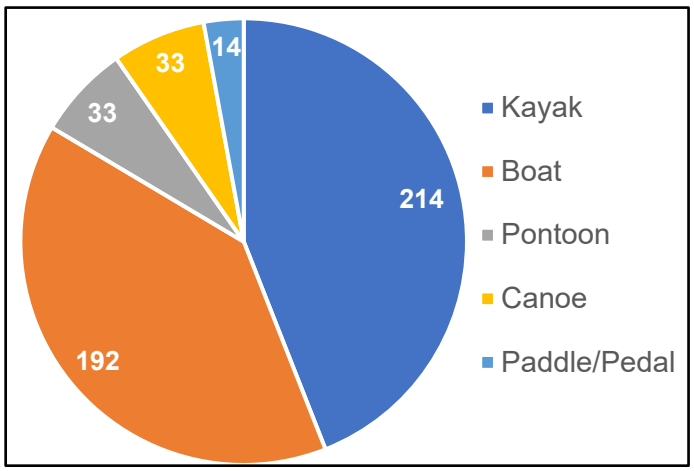

Figure 9. Registered boat types, 2022.

The lake has five public beaches – Brier Beach (Photo 26), Park Beach (Photo 28), South Shore Beach (Photo 24), Dorothy Beach (Photo 30), and Veterans Park Beach (23). The beaches are not staffed by lifeguards but do have posted rules and swim advisories for high bacteria levels (Photo 31). Lake County monitors Brier, Park, and South Shore Beach twice a month for *E. coli* between Memorial Day and Labor Day. McHenry County monitors Dorothy Beach and Veterans Park Beach every two weeks as well during the same time frame. Beach advisories for elevated *E. coli* levels are posted on the county websites:

- Lake County - https://www.lakecountyil.gov/2385/Beach-Advisory
- McHenry County - https://www.mchenrycountyil.gov/county-government/departments-a-i/health-department/environmental-health/public-beaches

The Village of Island Lake website has links to the Illinois Department of Public Health website for each beach, showing the status: https://villageofislandlake.com/parks-beaches/. In addition to the beaches, the Village also maintains Channel Park, Lakeview Park and the Big Island (Photos 27 & 29).

Photo 23. Veterans Park Beach.

Photo 24. South Shore Beach.

Photo 25. Eastway Park and boat launch.

Photo 26. Brier Beach.

Photo 27. Channel Park.

Photo 28. Park Beach.

Photo 29. Big Island.

Photo 30. Dorothy Beach with posted swim advisory.

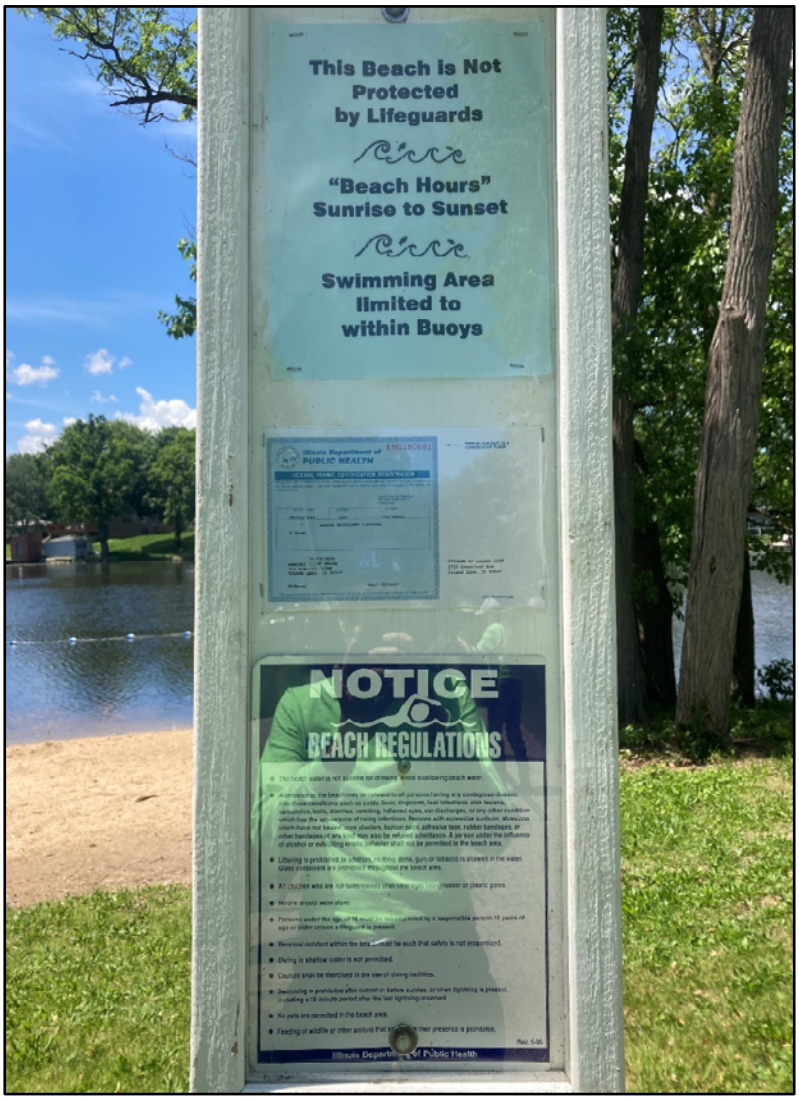

Photo 31. Posted beach regulations.

Community Organization

Island Lake is located within the Village of Island Lake. The Village manages the lake through budgets approved by the Lake Committee Board Members. Additional fundraising occurs through the Carpfest carp derby. The village is also exploring options to raise funds directly for specific management activities.

Community Survey Results

A community survey was conducted in the spring of 2022, with 82 respondents. The first half of the survey discussed lake management. A summary of responses is presented here, with raw data presented in Appendix C.

The first question in the survey asked respondents to "select the lake activities that you or your family participate in on Island Lake" (Figure 10). The top four chosen options were "Enjoying the views" (72%), "Kayaking/ canoeing/ paddleboard" (59%), "Fishing", and "Swimming" (both at 45%). These responses encompass a broad variety of uses and highlight how different management strategies may be needed to meet community needs. For example, aquatic vegetation may provide habitat for fish, but topped out plants on the surface can impact aesthetics or impede boating.

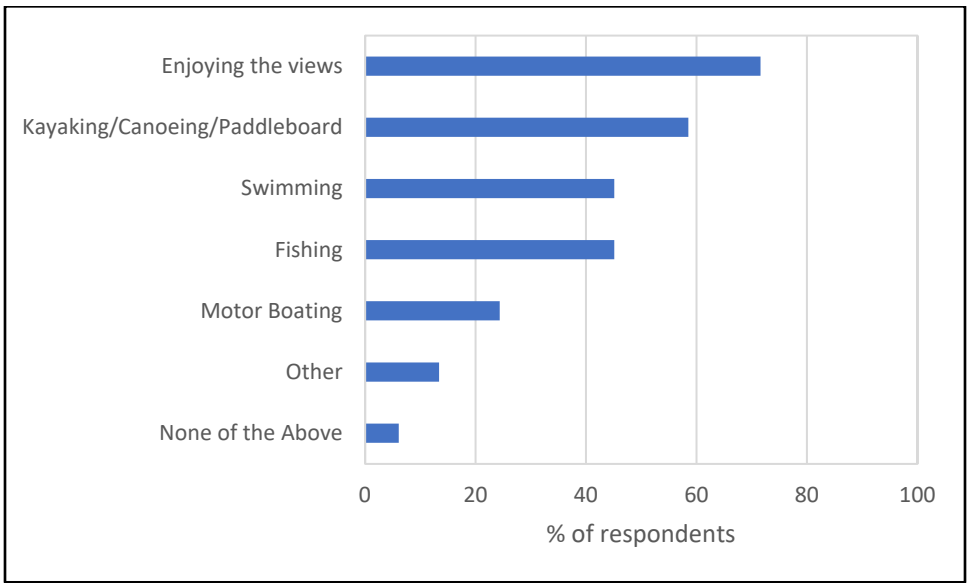

Figure 10. Responses to Question 1: "Please select the lake activities you and your family participate in on Island Lake."

The second question was "How often do you engage in the lake activities on Island Lake?" (Figure 11). The top response was "a few times a week" (30%). Almost 20% of respondents answered that they "almost never" engage with lake activities, but an equal number responded that they engage every day. Overall, 71% of respondents chose one of the options indicating they interact with lake activities at least once a month.

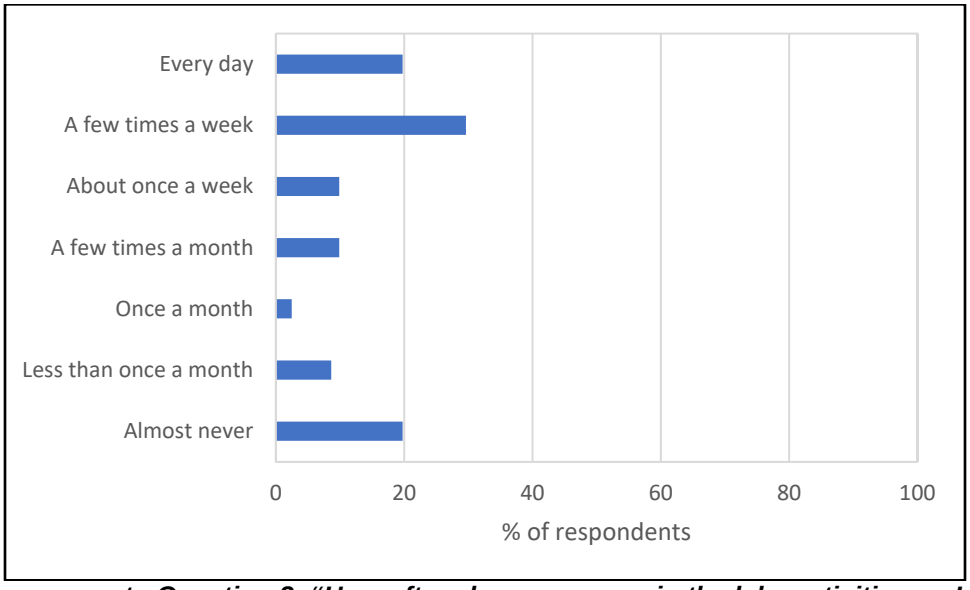

Figure 11. Responses to Question 2: "How often do you engage in the lake activities on Island Lake?"

Questions 3 and 4 asked respondents to choose their top two priority issues for lake management in Island Lake (Figure 12). 50% chose water quality as their top management priority, followed by invasive aquatic plants. These two issues were also the top selections for the second priority. Sediment buildup was listed as the second highest priority by 12% of respondents but all other listed issues received less than 10% of the vote.

Comments were written after these questions. Several people mentioned concerns about the low water quality and the potential safety concerns for swimmers or pets.

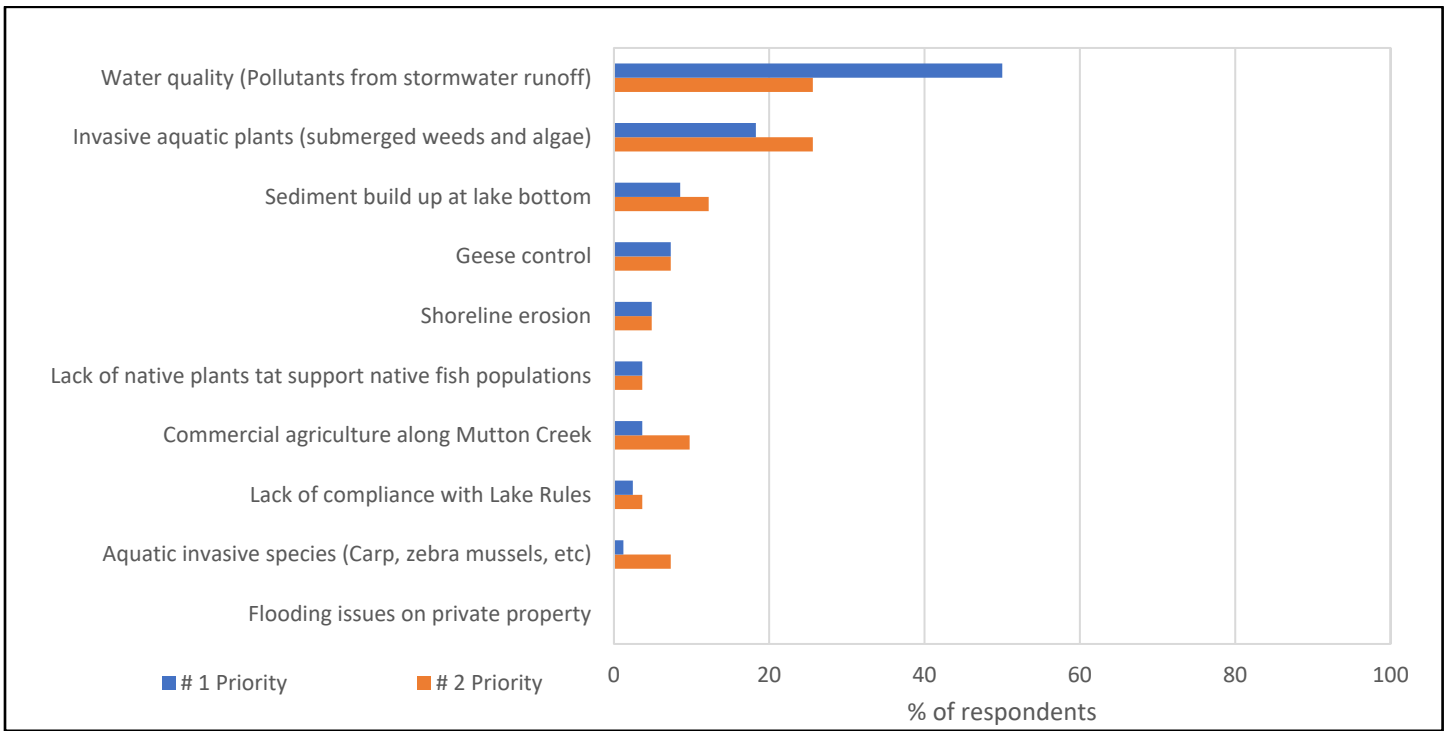

Figure 12. Responses to Questions 3 & 4: "Please select your #1 and # 2 top priority issue with Island Lake that needs to be addressed by lake management.

Question 5 asked respondents to select the lake management topics they were interested in learning about (Figure 13). Almost 70% selected that they would like to learn more about Island Lake's long-term lake management plan. Learning about factors contributing to poor water quality, and ways residents can improve water quality were also common selections.

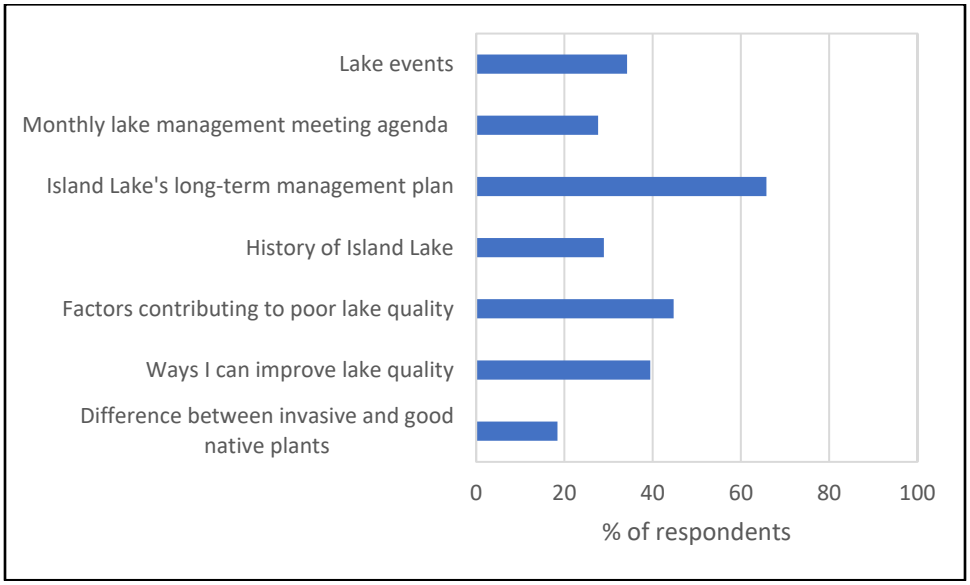

Figure 13. Responses to Question 5 "Please select the Lake Management topics you are interested in learning more about."

The main takeaways from this survey show that the stakeholders around Island Lake are invested in improving water quality in Island Lake. Many of the commenters voiced concerns about pollutant runoff in the watershed and how that could be impacting water quality. While addressing water quality throughout the watershed is not within the scope of this lake management plan, the responses show that stakeholders are aware of the challenges that come with managing water quality in such a large watershed and are prepared to help implement systemic changes to improve the ecological health throughout the system.

Concerns, Potential Solutions, & Alternatives

Various management concerns and potential objectives have been identified for Island Lake. In the *2021 Island Lake Summary Report* (LCHD-ES), the main management recommendations were:

- LCHD encourages the homeowners to participate in the Volunteer Lake Monitoring Program.
- Follow best management practices for salt and de-icing of roads, sidewalks, and driveways in the watershed. Consider the benefit of attending Lake County's De-Icing workshops.
- Develop a Lake Management Plan that incorporates aquatic plant management. Island Lake should have at least 20% plant coverage. It is recommended to have a strategic plan related to lakes and lake management that can include their rules and regulations on how they manage the lakes.
- Become familiar with the appearance of harmful algal blooms and report any blooms to the LCHD-ES by calling 847-837-8030. Also, educate lake users about the appearance of harmful algal blooms so that blooms can be reported to LCHD.
- Add Coarse Woody Habitat to increase fish habitat.
- Follow IDNR recommendations for fisheries. Carp are major impact on water quality in Island Lake; decreasing water clarity, increasing total phosphorus concentrations and making it difficult to plants to grow. Contact the IDNR for an updated fish survey.
- Consider installing a carp exclosure to promote aquatic plant growth in Island Lake. The littoral area around the island would be a good place to try and get aquatic plant growth. Carp impact aquatic plant growth since they can make water too turbid for a healthy plant community. Mitigate shoreline exhibiting erosion and improve shoreline buffer.
- Investigate drainage areas in the watershed that might contribute high nutrient loads to see if any best management practices can be implemented to reduce nutrient loads.

The *9 Lakes Watershed-Based Plan* was published in 2014. There are many watershed-based BMPs recommended to reduce nutrient loading in the watershed. The two site-specific BMPs recommended within Island Lake are shoreline protection and shoreline buffer strips.

The IEPA placed Island Lake on the list of impaired waters for excess phosphorus and total suspended solids. In 2021, LCHD-ES identified impairments in total phosphorus, pH, low dissolved oxygen, total suspended solids, native plants, and non-native animals. The community survey identified the main management issues residents are focused on. Poor water quality is the greatest concern, particularly with regards to nutrient/ pollutant runoff in the watershed. Aquatic plant and algae management was also identified as a main concern by residents and LCHD-ES. The perceived potential hazards of HABs or *E. coli* are hindering residents' ability to safely use the lake.

An important consideration when setting goals it to understand what can realistically be achieved given real world limitations. For Island Lake, there will always be some degree of plant and algae growth given the high-nutrient conditions. Therefore, focusing on reducing the types of algae growth that lead to HABs and working to cultivate a healthy native aquatic plant community are likely to lead to overall better lake health and a safer environment for recreation in the long-term.

Accounting for the different suggestions, priorities, and achievable outcomes led to the creation of 3 main management goals for this lake management plan:

Goal 1: Improve the quality of the aquatic plant community
Goal 2: Reduce the frequency of harmful algal blooms (HABs)
Goal 3: Reduce the influx of pollutants into Island Lake from the watershed

Broad management categories to address the goals are listed in Table 2. The main goal(s) addressed by possible management actions within each management category are indicated. It should be understood that not all presented management actions can be implemented in Island Lake, due to various environmental or practical constraints. Considering as many management actions as possible, however, allows for the best combination of strategies to be chosen to reach the goals and improve the health of the lake. This process also allows to readjust management strategies as needed. The remainder of this section elaborates the different possible management actions listed in Table 2 and considerations related to their implementation.

Main Goal Addressed				
Goal 1: Improve aquatic plant community quality	Goal 2: Reduce HABs	Goal 3: Reduce watershed pollutant inputs	Management Category	Possible Management Action
●			Aquatic Vegetation and Algae Management	Herbicide application
●				Physical removal
●	●			Desirable aquatic species establishment
●				Aquatic invasive species education
●				Aquatic vegetation monitoring
	●			Algae monitoring and management
	●	●	Shoreline Management	Vegetative stabilization practices
		●		Retaining wall maintenance and repair
		●		Biotechnical stabilization practices
		●		Buffer maintenance
		●		Improving lake access for recreation
	●	●	Watershed Pollution Management	Community nutrient and BMP education
	●	●		Public BMP installations
	●	●		Mutton Creek pollution reduction
		●		Salt application reduction
	●	●		Goose control
		●		*E. coli* reduction
	●	●	In-Situ Water Quality Management	Water quality monitoring
	●			Aeration
	●			Sediment removal
	●			Nutrient deactivation
●	●	●		Strengthen partnerships
●	●		Fishery Management	Fish survey
●	●			Stocking plan
●	●			Harvest limits
●				Fish habitat improvements
●	●			Carp control

Table 2. Management strategies and potential management activities for Island Lake.

Aquatic Vegetation and Algae Management

A robust aquatic vegetative community is vital to the health of a lake. Plants help stabilize sediment, reducing turbidity, and absorbing excess nutrients, which reduces the severity of nuisance algae blooms. In a high-nutrient, hypereutrophic lake like Island Lake, a “swimming pool” aesthetic consisting of no vegetation or algae growth is not sustainable. A useful analogy is to think of the lake as a large, fertilized lawn. Something will try to always grow there, because it has a constant source of nutrients and water to feed rapid growth. Plants can be controlled through herbicide or cutting, but algae can then take those available nutrients and multiply exponentially, resulting in an algae bloom. A proper aquatic management plan, however, can help balance the aesthetic desire for minimizing plant growth with the benefits of plants sequestering nutrients and stabilizing sediment.

In Island Lake, the relatively shallow depth should allow for aquatic vegetation to grow throughout most of the lake. The carp population is likely impacting the ability for plants to establish, as cloudy water reduces light penetration and carp uproot vegetation while foraging. Therefore, aquatic plant management should be paired with carp control practices.

Herbicide Application

Aquatic herbicides are frequently used to control invasive aquatic vegetation. Table 3 lists common aquatic herbicides and considerations in their use. Experienced applicators are needed to get the best results, as the environmental conditions can significantly impact effectiveness. Past treatments have focused on minimizing aquatic plant and algae growth, but the high nutrient concentrations within the lake have made this approach unsustainable in the long term. Therefore, managing aquatic vegetation to encourage 20-40% coverage by native species is recommended. This can help reduce the excess available nutrients available in the lake for nuisance algae growth and also help stabilize sediment.

The two non-native aquatic plants present in Island Lake are Eurasian watermilfoil and curlyleaf pondweed. What can make these species detrimental to aquatic plant communities is they tend to emerge from dormancy earlier than most native species. This gives them additional time to outgrow and outcompete native species, eventually establishing dense monocultures. This early growth period can be exploited by lake managers by applying an early spring herbicide to control these non-native plants while minimizing damage to native plants, which may not have begun to grow yet.

Annual management of non-native species can reduce the seed bank over time and decrease their pervasiveness in the lake, allowing for management to shift to physical removal or spot application of small nuisance areas. Application rates and products used will shift over time to best fit the species present and their density.

Hebicide		Considerations
Examples of Trade Names	Active Ingredient	
ProcellaCOR	Florpyrauxifen-benzyl	Manufacture guarantee on Eurasian watermilfoil control for 3 years, dependent on treatment area Does not control curlyleaf pondweed Can be costly in large applications
Sonar, Avast!	Fluridone	Controls plants as they sprout, reducing visibility Helps reduce algae blooms following die-off, as nutrients remain in sediment Contains irrigation restrictions Requires long contact time in water Can be applied at a rate that leaves native plants less affected
Reward	Diquat	Generally less expensive alternative Algae blooms may occur following die-back, as decaying plants release nutrients Will impact non-target native species Less effective in cloudy water Contains irrigation restrictions
Aquathol K, Chinook	Dipotassium salt of Endothall	Algae blooms may occur following die-back, as decaying plants release nutrients Can impact non-target native species
Aqua-Kleen, Navigate, Weedar 64	2,4-D	Widely used and inexpensive Can be relatively slow to be taken up by plants and can migrate out of the treatment area Dicot-specific herbicide
Clipper	Flumioxazin	One of the few herbicides approved to treat duckweek/watermeal Contact herbicide, best when sprayed directly on plants, but higher concentrations can be applied in water

Table 3. Common herbicides used in aquatic vegetation management.

Florpyrauxifen-benzyl is a relatively new aquatic herbicide that is specifically formulated to control Eurasian watermilfoil*. It does not control curlyleaf pondweed.* The product is formulated to be quickly taken up by plants, meaning it does not remain in the environment for an extended period of time following application. This makes it a desirable alternative to use in ecologically sensitive areas. The manufacture has a 3-year guarantee for applications covering 10 acres or more in size.

Fluridone can be applied in early spring. It prevents photosynthesis in plants as they emerge to keep populations at lower densities. It can control Eurasian watermilfoil and curlyleaf pondweed and can be applied at lower rates that will not impact native species like sago pondweed to the same degree. Pelletized versions can be applied so the product will remain in the lake following periods of higher flow, allowing it to continue releasing the active ingredient where designed.

Diquat is a contact herbicide that provides broad-spectrum aquatic plant control, which can make it difficult to only control non-native species. Diquat does not control horned pondweed. Diquat loses effectiveness in cloudy water as it will bind with sediment and may need to be combined with another product to improve results.

Endothall is another common broad-spectrum aquatic herbicide and would control all aquatic vegetation in the lake. This product does not have irrigation restrictions, like Reward or Sonar. This product could be applied to control EWM and curlyleaf pondweed and is more effective in turbid water than diquat.

2-4 D is a common, inexpensive herbicide that can be applied at rates to control dicots like EWM, but it has minimal effect on monocots like curlyleaf. EWM also has shown the ability to become resistant to treatment with this chemical, so plants should be monitored for resistance.

Flumioxazin is one of the few products formulated to treat duckweed and clipper. Effectiveness is reduced in lakes with high pH (like Island Lake). As with most products, herbicide resistance can occur if consecutive treatments with the same herbicide occur. Herbicide groups or formulations should be alternated for aquatic weed control to delay resistance.

Physical Removal

Physical removal of aquatic vegetation provides immediate improvement to aesthetics, as the plants are physically removed from the lake. This method has the added benefit of removing the nutrients stored within the plants. The strategy of growing and harvesting plants to remove nutrients or contaminants from a site is known as bioremediation. In a waterbody as large as Island Lake, however, removing vegetation is not likely to lead to a substantial decrease in nutrient concentrations.

Photo 32. Mechanical removal of coontail.

Hand-Raking or Weed Harvesting

Manual removal is desired over chemical management when there are concerns about impacts to native aquatic plant populations. While hand raking can work as a small-scale management strategy (e.g., within a swimming area) it is very time-intensive to control these species in large lakes. Additionally, Eurasian watermilfoil can spread by fragments that break off, and curlyleaf pondweed can re-sprout from small buds on the stems, called turions. Therefore, caution should be taken during removal to ensure complete removal of plants.

The same principle applies for weed harvesters, where a machine cuts and collects plants (Photo 32). Plant pieces can break off and regrow in other parts of the lake, so care needs to be taken to remove as much material as possible. Weed harvesters are often used in high-traffic channels to improve boat access. The aquatic plants do return over time, so much like turfgrass, the plants may need to be "mowed" multiple times throughout the summer.

Diver-Assisted Suction Harvesting

Diver-assisted suction harvesting (DASH) involves a person in the water removing plants through a suction hose, with the plants being collected in bags. This harvesting technique is potentially more effective than raking or cutting, as the goal is to remove the roots as well. This method is preferred when targeted removal of only invasive plants is desired, as the divers can maneuver through native plants and selectively harvest non-native species. Removing the extensive beds of curlyleaf pondweed currently present in Island Lake would likely be cost-prohibitive. Once the density of curlyleaf pondweed is significantly reduced, however, DASH harvesting small populations as they appear can be effective for removing only invasive species, while keeping native aquatic vegetation in place.

Desirable Aquatic Species Establishment

Island Lake had three native aquatic plant species present in 2021, with three additional species seen in 2022. In Lake County, some of the lakes with the highest diversity of native aquatic plants have almost 30 species present. Having a higher diversity of species can provide different habitat and resources to wildlife and compete with invasive species to reduce their dominance in a lake. For this reason, native aquatic vegetation can be introduced back into a lake by planting species not currently found in the lake. Care needs to be taken to ensure non-native species are not inadvertently being transported with the new plants.

Alternatively to introducing new plants, areas can be set aside where native plants are not treated or harvested. LCHD-ES recommends establishing these areas where no aquatic herbicide will occur as "sanctuaries" to allow native plants to grow. Such reintroductions would need to be paired with fencing to protect plants from carp or waterfowl while they establish.

Aquatic Invasive Species Education

The "Transport Zero" campaign has been administered through the Illinois DNR, Illinois-Indiana Sea Grant and Prairie Research Institute to help educate recreational water users about preventing the spread of invasive species. While Eurasian watermilfoil, zebra mussels, and other non-native invasive species have been accidentally introduced to many of the lakes in the surrounding area, it is important to continue encouraging boaters to thoroughly clean their

boats when moving between waterbodies. Island Lake is known to contain zebra mussels, Eurasian watermilfoil, and curlyleaf pondweed. All are non-native, invasive species can be spread between waterbodies if stuck to a boat.

There are other potential invasive species that have been found in the Midwest, such as hydrilla and starry stonewort. Cleaning boats is one of the simplest and most important steps in preventing their spread. Signs to explain the process of and the importance of cleaning boats should be maintained and updated at the Eastway boat launch and any other boating access points on the lake.

Providing a faucet and hose near the boat launch could allow people to rinse of equipment before transporting it from the lake.

Aquatic Vegetation Monitoring

As recommended in the 2021 LCHD-ES Summary Report, performing periodic aquatic vegetation surveys allows the managers to track and control the spread of invasive species. Since curlyleaf pondweed and EWM are present in the lake, the survey should occur when they are growing, but also after native plants typically emerge. Therefore, June or July would be appropriate times to conduct a survey.

Algae Management

Island Lake experiences algae blooms in the summer, particularly in the form of blue-green planktonic cyanobacteria. This is likely due to the elevated level of nutrients found in the lake. Green and blue-green algae can mar aesthetics, but because blue-green algae can lead to harmful algae blooms, lake managers try to take proactive approaches to keep large blue-green algae blooms from occurring.

Algaecide Application

Because blue-green algae can grow throughout the water column, treatments need to be carefully applied, as a large volume of decaying algae can quickly use up oxygen and lead to fish kills. In general, once a blue-green algae bloom is occurring, doing a full-scale treatment is not recommended. Therefore, prevention or proactive treatment is considered a more effective management strategy than reactive treatment.

Ultrasonic Algae Control

Ultrasonic algae control is an emerging technology that is purported to control planktonic algae by disrupting the algae cell wall by emitting a low-energy ultrasonic wave through the water. This prevents the cells from controlling their buoyancy, ultimately setting to the lakebed and dying. There have been some case studies where positive results were seen, but the technology is relatively untested. The ultrasonic waves need to be unobstructed throughout the waterbody, so it would not likely be practical in a lake with may bays, islands, and a curved shoreline like Island Lake.

HAB Education

Certain species of blue-green algae have the ability to produce toxins that can harm swimmers or wildlife. This phenomenon is known as a harmful algal bloom (HAB). HABs were documented in Island Lake in 2021 and 2022. The phenomenon that causes blue-green algae to release toxins is not entirely understood. A blue-green algae bloom might be safe one day and producing toxins the next. Since the toxicity of an algae bloom cannot be assessed without testing, the general philosophy of “when in doubt, stay out” applies to waterbodies experiencing a heavy planktonic algae bloom. Installing and maintaining educational signs at public beaches to help residents identify and report a possible HAB is recommended. The Village has also published educational materials to help residents identify a HAB and best practices for safety around algae blooms. This is important to ensuring safety of residents and should be continued.

While cyanobacteria can produce many different compounds, the most widely-known toxin is “microsystin”. This toxin can be tested through laboratory analysis or with field test strips. These tests should be done during the summer months to monitor the frequency of HABs and can be a useful monitoring tool.

Monitoring Algae Blooms

Algae growth can be visually assessed during regularly-scheduled visits during the growing season. During those visits, algae can be collected for identification under a microscope to help determine what application rates are needed for control. When a blue-green algae bloom is occurring, water can be collected and tested with Microsystin test strips to determine if the algae is producing toxins. There are also new technologies that can be installed to monitor algae growth remotely. A sensor is installed on a buoy and data is sent to the cloud, which can be accessed remotely. The sensors track increases in chlorophyll *a* and color compounds produced by blue-green algae. When the beginning of the exponential growth phase is detected, it may be possible to proactively treat a smaller amount of algae and prevent a heavy bloom and toxic conditions. This technology is relatively new, however, and is still generally considered experimental.

Shoreline Management

Island Lake's shoreline is stabilized with retaining walls, which can lead to increased wave energy rebounding back into the lake and resuspending sediment. Walls can also increase flooding, as water can only move straight up a vertical wall instead of also spreading out with a low-sloped shoreline during storms. The Village of Island Lake manages shoreline at the parks and beaches, but most of the shoreline is privately owned.

Vegetative Stabilization Practices

Vegetated buffers have the benefit of reducing shoreline erosion, as well as intercepting nutrient runoff during rain events. Along shoreline reaches with minimal erosion and a relatively flat slope, native vegetation can often be established as a buffer without much structural work (Photo 33). For Island Lake, the main considerations to maintaining a native shoreline are the fluctuations in water level during rain events, as the lake is in a floodplain, and high water velocities that may occur during elevated flow events. Therefore, the shoreline should be planted with deep-rooted species that can withstand inundation and flowing water for several days.

Photo 33. Lake Glenview shoreline in Glenview, IL.

To establish a native buffer, the existing turfgrass is typically killed with an herbicide. Then seed can be sown directly into the bed. If there is a fair amount of exposed soil, a straw erosion mat or other equivalent product should be secured over the seeds to prevent erosion or bird predation while the plants establish. For restoring larger buffer areas, seeds are typically used, but small plants can be planted in high-traffic locations to quickly establish plants for the community to enjoy. The seed mix can be selected to contain lower growing, species, allowing for views of the lake. Native species also tend to be relatively balanced in their rate of spread, so one species is not likely to dominate the landscape.

There is a vast array of aesthetically attractive native species that can be planted along shorelines and in frequently inundated wetland areas. The general types of vegetation that are planted include:

- Emergent species for water depths greater than 1 foot, such as American lotus (*Nelumbo lutea,* Photo 34), white water lily (*Nymphaea odorata*), or pickerelweed (*Pontederia cordata,* Photo 35). These species have the added benefit of absorbing wave energy and reducing their impact on the shoreline.
- Shoreline species for less than 1 foot of water depth, including bur-reed species (*Sparganium spp.*), blue flag iris (*Iris versicolor*, Photo 36), or arrowhead (*Sagittaria spp.*)
- Upland species with deep roots to stabilize the shoreline, which typically consist of native grasses and forbs (Figure 14).

Any species planted in the water will need to be protected from carp and geese during establishment. Plantings are often surrounded by staked fencing to prevent these nuisance animals from uprooting plants before they establish. These native species occupy space where cattails or *Phragmites* would otherwise establish. They tend to be lower growing, allowing for unobstructed view of the lake. Native species also provide better habitat for wildlife. In Island Lake, emergent species may be difficult to grow if carp are present in high numbers, meaning carp control should occur prior to attempting to establish emergent vegetation. Native buffers typically take 2-3 years to fully establish, during which time the restored area should be monitored, with weeds promptly removed and bare areas seeded.

Photo 34. Lotus and lilies.

Photo 35. Pickerelweed.

Photo 36. Blue Flag iris.

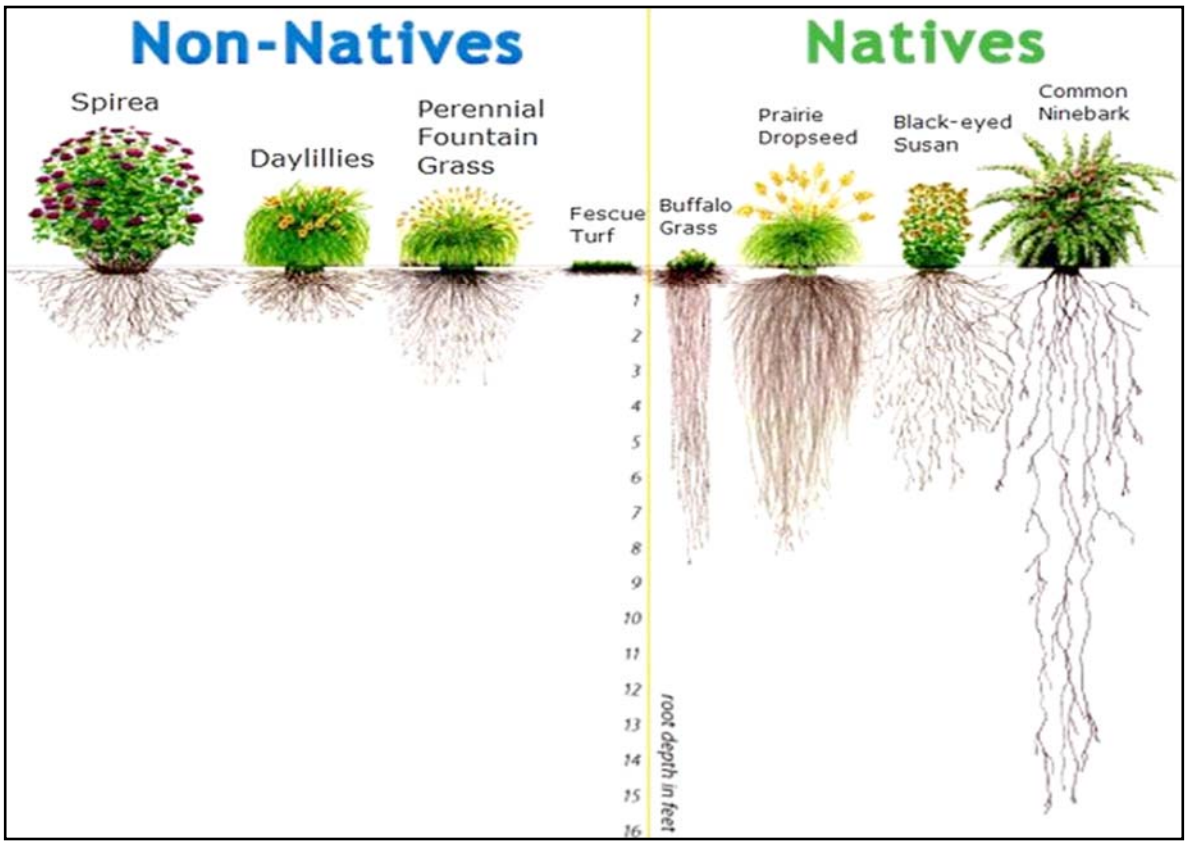

Figure 14. Non-native vs. native species root depths.

Retaining Wall Maintenance and Repair

Some reaches stabilized with seawall are experiencing degradation. Seawall repair is expensive, as erosion at the base of the wall is difficult to access. As an alternative, if there are shallow regions in front of the wall, emergent aquatic vegetation can be planted to reduce the impact of wave energy and slow the erosion of the wall. Another option could be to establish a native vegetative buffer immediately behind the wall. Deep-rooted vegetation behind the wall will reduce soil erosion. Permits can also be obtained to stabilize a seawall with rip rap placed in front of the wall, to prevent failure.

Biotechnical Stabilization

More recently, there has been a shift to recommend damaged seawalls be repaired with “biotechnical stabilization”. This technique involves installing a combination of structural materials and vegetation. The goal is to provide more ecological benefit and improve the long-term stability of the site through the roots of established vegetation. Several homes around the lake are employing this method (Photo 13).

Coir logs or rip rap are two common structures used to initially stabilize a shoreline:

Coir Logs

Coir logs are a biodegradable material packed in netting and shaped into a log. This is placed at the base of the shoreline to reduce water velocity on the shoreline. Native vegetation is then planted up the rest of the slope (Figure 15, Photos 37 & 38). These “logs” offer biodegradable shoreline protection and easy installation, but they are not effective in high water velocity areas and are moderately expensive.

Photo 37. Before - Eroding streambank.

Photo 38. After – Stabilized with coir logs.

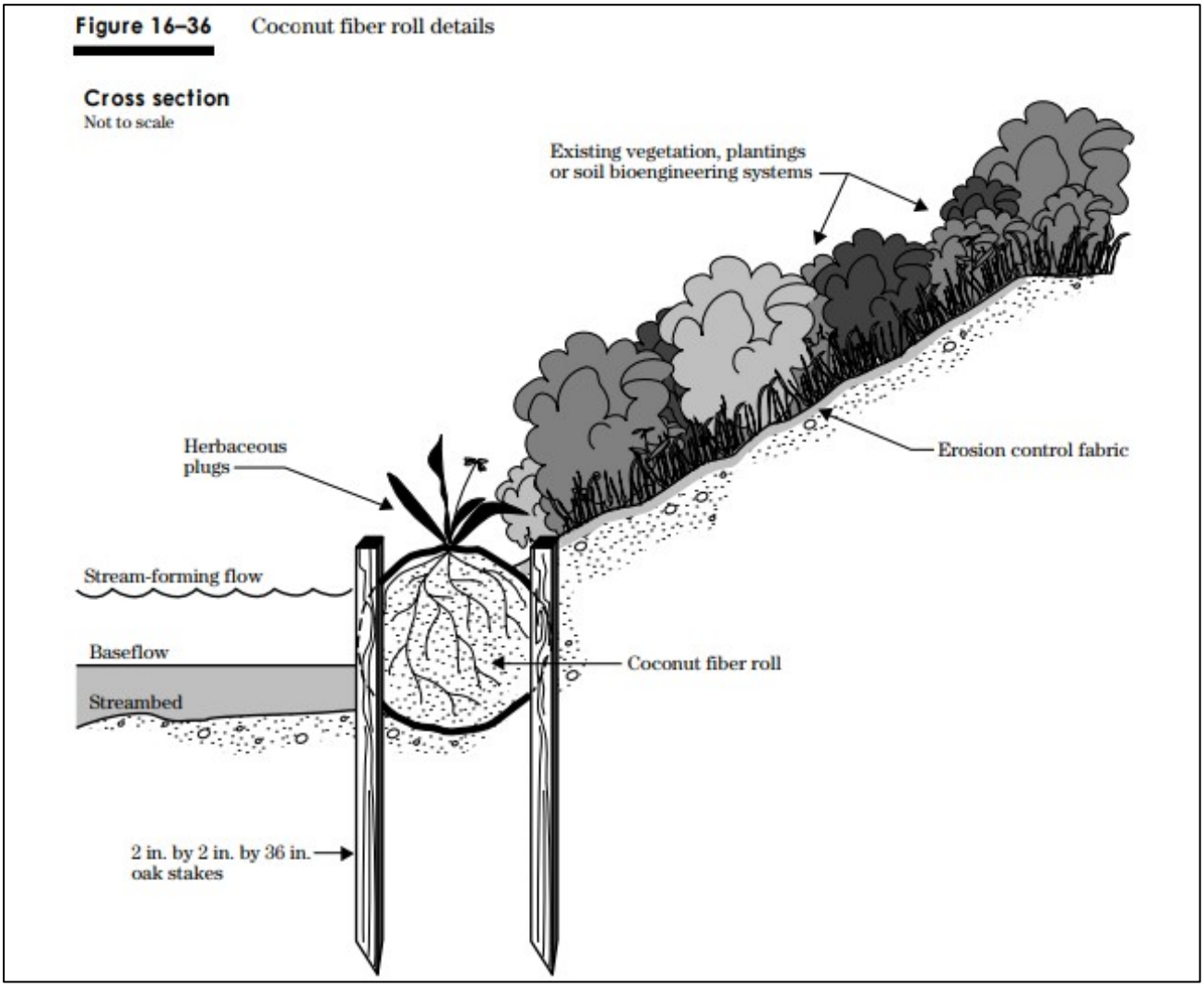

Figure 15. Coir log and vegetative stabilization*. *USDA-NRCS EFH Chapter 16.

Rip Rap

Rip rap consists of loose stone placed strategically on the shoreline to reduce erosion (Figure 16). Native vegetation can them be placed above the stone to allow for a more natural transition to the water and increase ecological value (Photo 39). Rip rap is a common method for decreasing water velocity and protecting slopes from erosion. Additionally, it is easy to install and maintain. The rocks are loose, allowing them to continually conform to a changing shoreline. Rip rap is more expensive to install then solely vegetated slopes, does not provide habitat enhancement, and there is the possibility of increased erosion at the outside edges of the rip rap installation.

Photo 39. Buffer demonstration area in Round Lake.

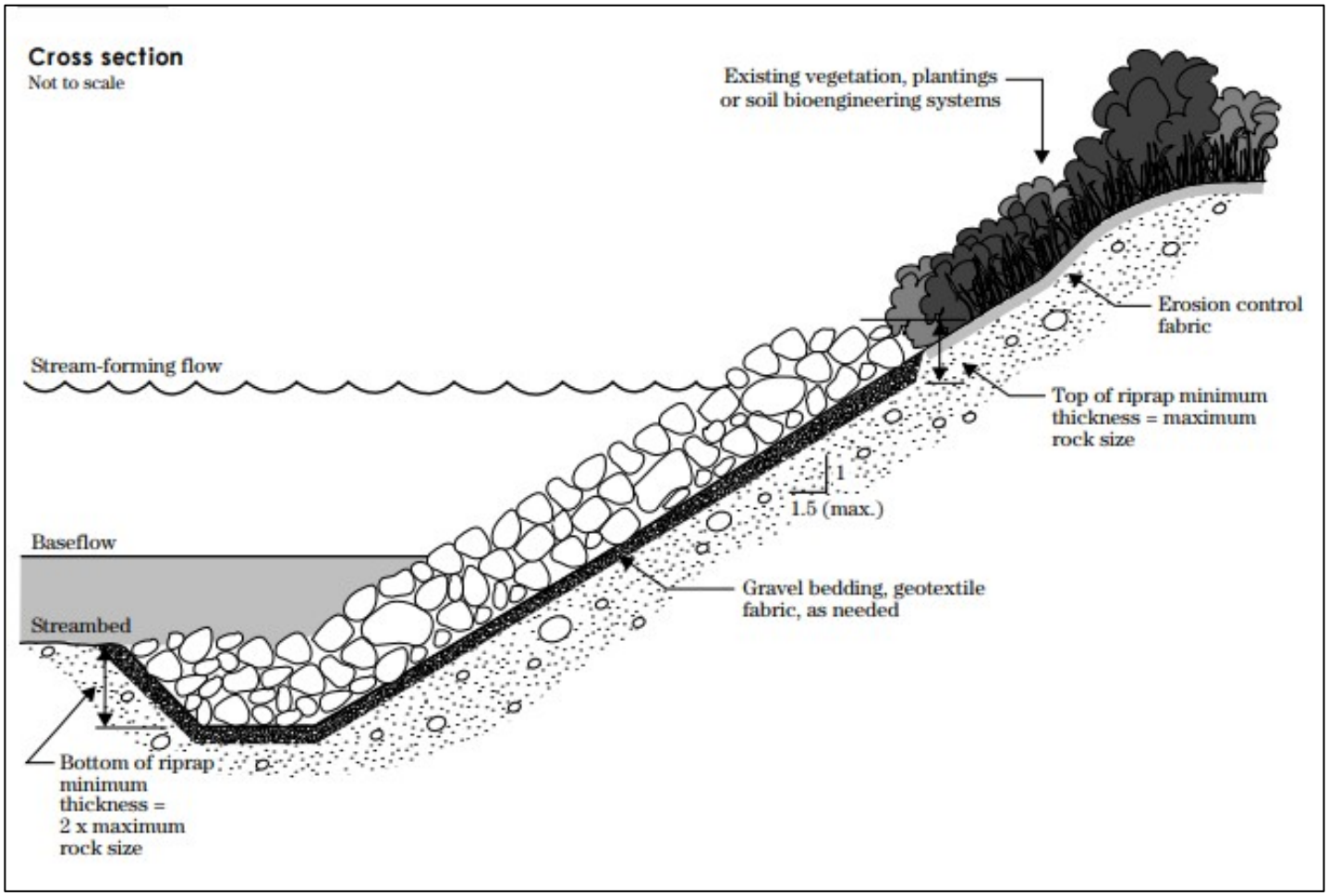

Figure 16. Rip rap and vegetative stabilization*. *USDA-NRCS EFH Chapter 16.

Buffer Maintenance

Once a vegetative buffer is planted, the area will need to be actively managed to ensure invasive species do not establish populations and degrade the ecological health of the area. Typically, 3-4 visits are required throughout a growing season to target species that emerge at different times or are more susceptible to treatment at different points in the year. If a buffer is managed properly from the start, the cost to install and maintain the area over ten years can be one-fifth the cost of managing the same area for turfgrass (https://archive.epa.gov/greenacres/web/html/chap2.html).

Herbicide Application

Different invasive species require distinct strategies to control their spread:

Invasive Shrub Herbicide: European buckthorn and Japanese honeysuckle are two non-native, invasive shrubs common in Illinois. These species are most effectively controlled by cutting back plants and applying a treatment of herbicide to the cut stump. Large plants are typically targeted first, as these produce the most berries. If the lake freezes over, restoration technicians can access plants from the lake side, making it easy to see and remove plants. Sometimes, volunteer days are planned where community members can cut the plants, followed with stump treatment by licensed applicators. This allows for a reduction in costs and promotes community investment.

Narrowleaf Cattail, Phragmites or Reed Canary Grass Herbicide: These are all common, aggressive, non-native species found in wetlands and lake edges. Cattails are most effectively controlled by an herbicide application before seed-set in late summer. There are several herbicides approved for application around water. Cattails provide shoreline stabilization, so some presence can be beneficial, but they also encroach on shallow areas of lakes over

time. Therefore, cattail stands should be monitored and controlled if they are taking over areas of the lake where open water is desired. *Phragmites* and reed canary grass are both considered invasive species. These species should be controlled wherever they occur, although any treated areas should be restored with native vegetation to reduce reestablishment of these invasive species from the seedbank.

Improving Lake Access for Recreation

When installing a native buffer or allowing nearshore aquatic vegetation to grow, a common complaint can be that it impedes access to the shoreline for fishing or other recreational activities like launching kayaks and canoes. Often, native vegetation can become trampled over time, as people create different access paths. Walking along a steep shore can also increase erosion and be a safety hazard due to slipping or shoreline collapse. For this reason, establishing designated areas for these activities to occur can ensure the long-term success of plantings.

Installing fishing rocks or overlooks are one option to allow for safe access to the lake when fishing from shore (Photo 40). Some communities will install a pier to fish from as well. The aquatic vegetation can be controlled around the access point to prevent lures from becoming stuck, allowing aquatic vegetation in other areas to remain intact.

Photo 40. Overlook within native plantings.

Installing a canoe and kayak launch has similar positives. It allows people to safely launch their unmotorized watercraft without impacting the shoreline. The Village is currently exploring funding to install a non-motorized crat launch at Easting Bay or Veterans Park, possibly in part with IDNR grant funding.

Watershed Pollution Management

Pollutant inputs from terrestrial sources should be reduced to the greatest extent possible. Pollutants of greatest concern identified for Island Lake by the IEPA are phosphorus and total suspended solids. Best management practices (BMPs) are techniques that can help citizens and municipalities protect lakes and streams from polluted runoff. BMPs include practices such as ensuring new developments are not impacting waterways and leading to erosion, preventing pollution though practices such as reducing the use of or prohibiting harmful pollutants, retrofitting existing developments to better reduce pollutant runoff, performing inspections on septic systems, and conducting maintenance on existing BMPs to maintain functionality.

Community Nutrient and BMP Education

A major contributor of watershed nutrient pollution in developed communities is lawn fertilizer and grass clipping runoff. Single family housing covers 27.6% of the Island Lake watershed. Reducing these sources of pollution to the greatest extent possible is vital to the long-term success of water quality improvement actions. There are many watershed groups in Lake County with experience promoting successful pollution reduction strategies through community outreach and education. Such practices include:

- Implement phosphorus-free fertilizer practices. The Village of Island Lake already has an ordinance in place prohibiting the application of chemical fertilizers containing phosphorus and applying fertilizer within 20 feet of waterways
- Provide educational material for homeowners regarding best lawncare practices (Photo 41)

Photo 41. Example of educational material mailed to residents in a watershed.

Perhaps one of the most important educational opportunities for stakeholders is to help reframe what a "healthy" lake will look like. Island Lake will likely be impacted by elevated nutrient levels for the foreseeable future. Embracing a robust, diverse aquatic plant community can improve water quality and enhance habitat for fish and wildlife.

Public BMP Installations

Best management practice (BMP) installations showcase the possibilities for reducing stormwater pollution. These installations are site-specific and should be accompanied with educational signs to help community members understand their benefit. Common examples of BMPs include installing native buffer or living shoreline installations, creating a rain garden, installing a bioswale where water flows during rain events, or encouraging residents to install rain barrels to store rainwater and reduce flooding.

To educate and encourage homeowners on the benefits of native shoreline installations, the Village of Island Lake is considering installing a buffer demonstration area. Two parks were identified as possible candidates – Dorothy Beach Park and Channel Park.

- Channel Park could be stabilized with solely native vegetation behind the existing seawall, covering roughly 5,500 square feet if the buffer is 25 feet in width (Figure 17).
- Dorothy Beach Park contains two different portions that could be stabilized using different methods. The 1,000 square foot stretch along the road already has rip rap stabilization. Native vegetation could be installed above the stone and emergent vegetation planted in the lake in front of the rock to dissipate wave energy. Any plants installed in the water should be protected from carp and geese herbivory with netting. The 2,800 square feet between the beach and rip rap has a steep bank and undercut slope, as well as dense tree coverage (Figure 18). This area could be stabilized with biotechnical methods, likely rip rap due to the slope. Invasive shrubs and trees should then be removed and the bank planted with native plants to help stabilize the bank.

Figure 17. Potential native buffer installation demonstration area at Channel Park.

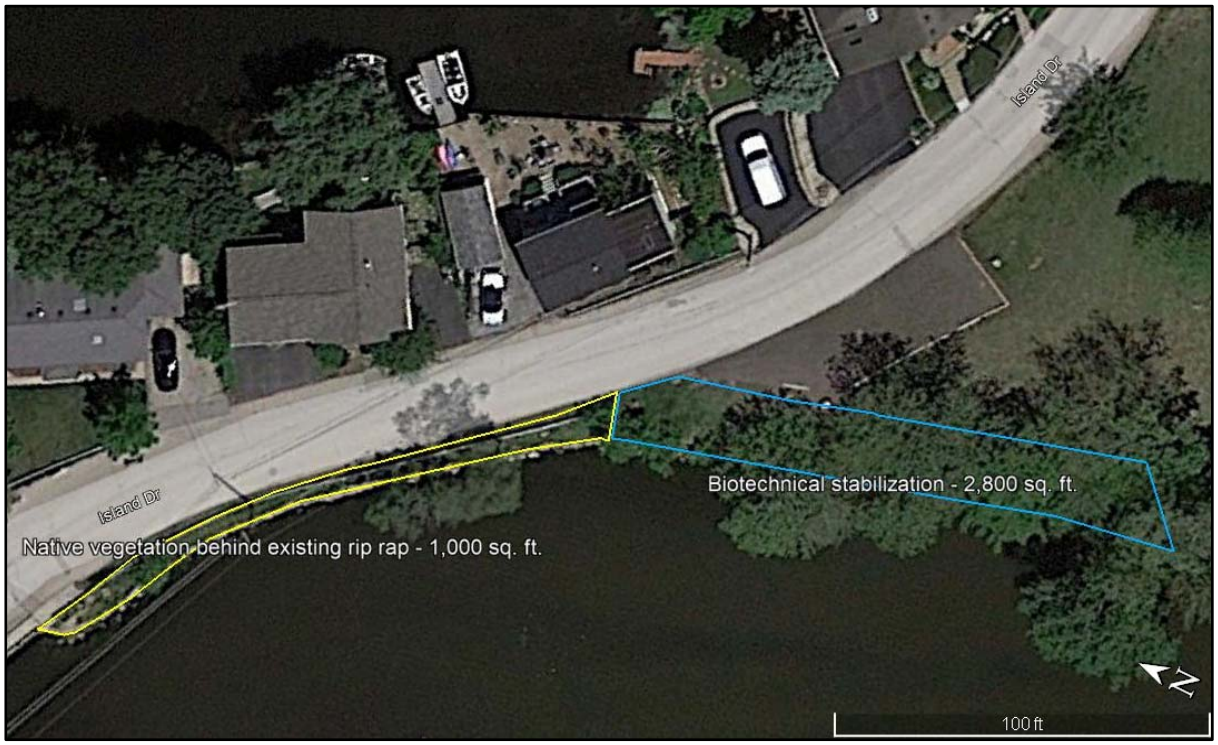

Figure 18. Potential shoreline stabilization installation demonstration area at Dorothy Beach.

Mutton Creek Pollution Loading Reduction

2022 Sediment Reduction Study

The stretch of Mutton Creek west of Darrell Road was evaluated in 2022 for potential projects to reduce sediment loading into Island Lake. This study recommended regrading, reshaping, and stabilizing certain reaches to reduce erosion. Sediment removal from certain portions of the creek, culvert repair, and vegetation maintenance were also recommended. The full report can be found at https://villageofislandlake.com/wp-content/uploads/2022/08/Mutton-Creek-Assessment-Baxter-Woodman-220297.30_.pdf.

Watershed Nutrient Loading Study

Many stakeholder survey respondents expressed concern about the potential contribution of agricultural runoff to excess nutrient loading in the watershed. Particularly, several people brought up livestock facilities in the area. Looking at satellite imagery, most agricultural facilities in the watershed appear to be implementing various BMPs, including buffer strips and manure settling ponds. These are important steps to reducing watershed pollution and are implemented by the Illinois Department of Agriculture. The 9 Lakes Watershed-Based Plan did identify "Crop/Grain/Grazing" land as contributing the highest degree of pollutants to the watershed, but that category also covers the greatest area in the watershed, so it understandably would be the greatest contributor. While this project did not include watershed evaluation, performing a watershed nutrient loading study could help identify any major sources of pollution. Such a study could be designed by a hired firm and coordinated with the County or other watershed group.

Salt Application Reduction

Road salt application during the winter - whether by municipalities on roads or private property owners on sidewalks, driveways, and parking lots - is quickly becoming one of the emerging pollutant issues in Illinois watersheds. Salt dissolves in water and washes into lakes and streams during the spring melt. LCHD-ES works with the "Salt Smart" Collaborative (www.saltsmart.org) to educate residents, road agencies, and private contractors to ensure salt is being applied in the more effective manner, to reduce pollution into lakes. Attending training seminars and evaluating salt-application procedures is recommended.

Goose Control

Canada geese present a nuisance on many lakes. They are aggressive when nesting and their feces can pollute waterways with both bacteria and excess nutrients. While some presence is natural, large flocks of geese should be discouraged from remaining on and around the lake for extended periods of time. The main ways to discourage goose presence include reducing habitat, harassing geese, removing them through hunting, and reducing preferred food sources.

Shoreline Barriers or Buffers

Geese prefer entering waterbodies when the transition between upland and water consists of short vegetation. Turf grass encourages this behavior, as geese eat grass as well. Planting taller vegetation along the shoreline discourages them from using that portion of shoreline to access the water. See the "vegetative stabilization practices" subheading in the "Shoreline Stabilization" section for further details on planting native vegetation along the shore.

Often, shoreline owners place physical barriers along the shoreline to deter geese from accessing water at that point. Common methods include installing a low fence or stringing a line 12 inches or less from the ground, which the geese cannot step over or go under. This is typically a temporary solution, as geese will eventually become accustomed to the deterrent and find ways around it. For this reason, thick vegetation is typically considered the best long-term solution to goose presence.

Goose Harassment and/or Removal

Goose harassment or removal can take different forms:

- Installing objects that make geese uneasy, such as shiny objects or false predators. These objects need to be regularly moved, however, or geese will become desensitized to them.
- Hiring a company to bring a dog to chase geese off properties on a very regular basis
- Regularly spraying grass with a product that makes the grass taste bitter to geese, so they won't graze on lawns
- Hiring a certified professional to "addle" goose eggs. This involves oiling so they are no longer viable. This can reduce the population of geese in an area over time. This could be an effective strategy for control on the Big Island, as geese tend to prefer nesting on islands where there are fewer predators.
- Setting up hunting availability on the lake. This can be difficult to do on a lake that is used by the public like Island Lake, as there is an increased safety risk.

Anti-feeding Campaign

Feeding waterfowl is generally detrimental to their health, as birds are not adapted to eat large quantities of human food, especially items like bread. Signs are posted around Island Lake explaining the hazards associated to feeding wildlife (Photo 42). These signs are a good example of providing context behind a rule. Additionally, in spring of 2022, avian influenza was spreading wildly among waterfowl populations in the Midwest. Wildlife managers were trying hard to discourage people from feeding waterfowl, as large aggregations of birds have a much higher chance of spreading the disease among birds.

Photo 42. "Do not feed wildlife" sign.

E. coli Reduction

Harmful bacteria are found in animal waste, with *E. coli* presence in water being an indicator of fecal contamination. Signs to encourage pet waste removal can be placed at parks around the lake, as well as bag dispensers and trash cans. These programs help keep fecal contamination from entering the lake. Upstream parks in the watershed could also have such signs installed.

At the parks, goose dropping should be regularly shoveled up off of beaches and placed in trash cans. If droppings aren't removed the bacteria in the droppings will wash into the water during rain events, increasing the potential for elevated *E. coli* levels at beaches.

In-Situ Water Quality Management

Water Quality Monitoring

LCHD-ES performs water quality monitoring every 5-10 years on Island Lake. These surveys provide valuable information to inform management decisions. Supplementing with water quality sampling on the off years can better help visualize changes in the lake. Some water quality metrics, such as secchi depth or lake level, can be measured by volunteers. Other factors involve more complicated sampling procedures and provide more accurate information when collected by trained scientists. Some examples of recommended parameters to collect include nutrient concentrations in the lake, temperature and oxygen levels, and other relevant data like total suspended solids or chloride levels. The frequency of sampling can occur on a range of time scales and is usually budget dependent. Some managers will collect data once during the height of summer, while others will do so monthly during the growing season. An ecological consulting firm can best help design a meaningful water quality monitoring program to optimize visit frequency and what parameters to collect based on funding. Appendix B presents a possible sampling strategy.

As mentioned in the subsection regarding Algae Management, there are also technologies available to monitor water quality with in-situ sensors. The data is wirelessly transmitted to allow for remote, instantaneous access to data. "AlgaeTracker" was mentioned to track algae growth, but other sensors can be installed if there are specific concerns.

The cost of installing such sensors has decreased dramatically in recent years, making it a more appealing option for monitoring changing water quality throughout the seasons.

Volunteer Water Quality and Lake Level Monitoring

Many park districts sponsor community events, allowing residents to donate their time for events such as a lake cleanup or to perform volunteer water quality monitoring. Any stakeholders showing interest in lake management activities should be encouraged to apply their strengths to help in whatever way they can. This could be by organizing a community event, monitoring water clarity, or many other beneficial activities.

The Volunteer Lake Monitoring Program (VLMP) was managed by the IEPA but was suspended in 2019. One of the main aspects of this program involved trained volunteers submitting secchi disk readings. Volunteers can still participate in this program through contacting LCHD-ES. These citizen science programs should be encouraged. Other opportunities for lake users to provide data include creel surveys, where anglers are surveyed regarding details of the fish they are catching or reporting the lake levels. All collected data can help the agencies make informed management recommendations. Creating a website and simple form to submit data and posting signs with information on how to report the data at the collection location can encourage community engagement.

Photo 43. VLMP sign, Big Island.

Aeration

Currently, aeration equipment is installed in the four bays around the lake (Figure 19). Some areas have diffusers installed while other locations have surface aerators. Surface aeration is appropriate in shallower water, as the agitation can help mix the water. Typically, bottom diffusors are more efficient in deeper areas (6+ feet) and fountains or agitators are better suited for shallower waters. The best-suited equipment depends on the brand and desired outcome.

Since the bays tend to become stagnant, installing aeration is an option to help reduce duckweed buildup. Additionally, adequate mixing can improve DO levels at the sediment-water interface, reducing nutrient release from the sediment. For aeration the be effective, however, the installation needs to be appropriately sized and use the proper equipment for the water depth. Aeration equipment should not be resuspending sediment and creating more turbid water conditions. Connecting with an aeration professional to calculate and specify what is needed for each bay will ensure the aeration system is appropriately designed to achieve the desired outcome of less duckweed and algae growth.

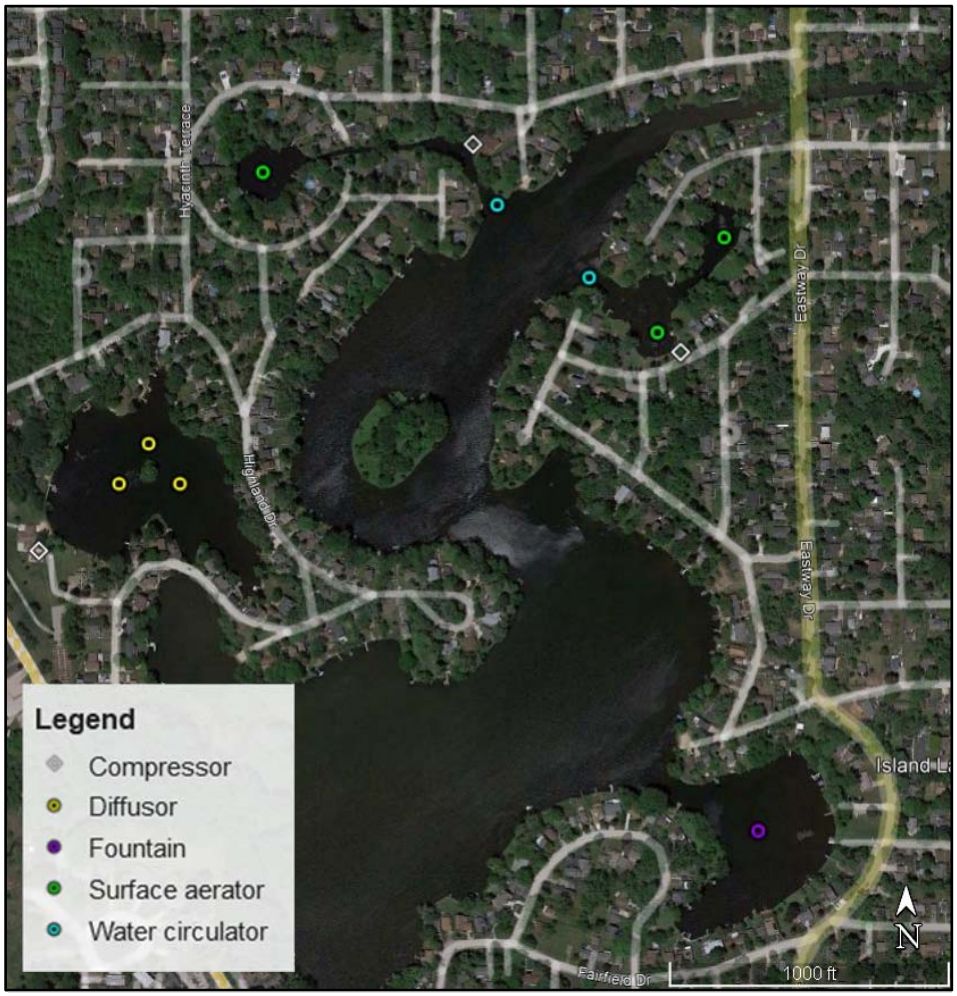

Figure 19. Current aeration map (2022).

Sediment Removal

Stormwater carries sediment and is part of the natural function of a stream. When the stream flows into a deep, wide area, the water slows in velocity. This allows suspended particles to settle out, which can lead to detrimental levels of sedimentation in impoundments like Island Lake. The degree and rate of sediment accumulation in Island Lake is currently unknown. LCHD-ES did a simple bathymetric survey while collecting data in 2021 and the water depths appeared to be 1-2 feet shallower than the 1995 bathymetric survey. If this reduction in depth is due to sediment accumulation, dredging may need to be considered to improve lake health.

The expense of removing sediment to return an entire lake to its original depth, however, can be cost prohibitive. Large areas of land are also required to dewater sediment that is removed. From a maintenance perspective, some lake managers remove excess sediment around inlets, allowing for those areas to continue acting as sediment traps. Sediment accumulation in the frequently excavated areas reduces the rate of sediment accumulation in the rest of the lake.

Bathymetric & Sediment Survey

Performing an updated bathymetric survey and doing a survey to estimate sedimentation can allow for lake managers to determine how much silt has accumulated in the lake and when performed at intervals, the rate of accumulation can also be determined. An entire lake survey could be done, or smaller areas can be surveyed where sediment is

impacting function. These surveys involve collecting sediment thickness points along transects on the lake to quantify volumes of material. The quality of the sediment can also be determined, such as particle size, nutrient levels, and if contaminants are present.

Dredging

Dredging is the method employed to remove excess sediment and nutrient accumulation.

In addition to removing nutrients, dredging can lead to other ecological benefits within a lake. Reducing the amount of soft sediment can improve habitat for certain fish species that prefer firm substrate to spawn. Additionally, dredging can reduce the presence of seeds from various undesirable aquatic weeds.

A critical component of dredging to consider is the method for removal and how sediment will be treated and disposed of. One option would be to mechanically fill barges or dumpsters to be hauled offsite immediately (Photo 44). This would not be practical on a large scale, as the cost to pay for hauling material would likely be prohibitive.

Photo 44. Mechanical dredging.

Another method of dredging is hydraulic removal. With hydraulic removal, a cutterhead is used to suction up a slurry of sediment and water to a dewatering bag for smaller projects (Photo 45) or dewatering facility. Hydraulic dredging can remove material faster than mechanical dredging depending on the equipment but requires space for the material to dry out. For large scale projects like a whole-lake dredge, a large dewatering basin is usually built, which would require several acres of space.

Photo 45. Sediment dewatering bag.

The processes through which nutrients are released from sediment are complex and dependent on various environmental factors. For example, low dissolved oxygen levels alter biotic processes, leading to increased rates of nutrient release from the sediment. Under certain conditions, even low levels of nutrients can lead to increases in nuisance vegetative growth. While dredging these lakes will likely lead to an overall decrease in nutrients in the sediment, reducing sediment volume alone is not a guarantee of a reduction of nuisance algae and plant growth. As found in the *9 Lakes Watershed-Based Plan*, the nutrient inputs from the watershed alone are more than enough to cause nuisance algae growth in Island Lake, so many different approaches needed to restore water quality in the lake. Reductions in nutrient inputs from upstream sources (such as agricultural runoff) and monitoring biological conditions within the lake (i.e., ensuring adequate dissolved oxygen levels, limiting carp presence) are also vital for reducing nutrient loading.

Dredging would be an extensive endeavor for this lake and more study should be undertaken into the extent of accumulation and the degree to which it is impacting water quality and lake function prior to moving forward on considering sediment removal.

Bacteria and Enzymes

There are products formulated with certain beneficial bacteria and enzymes that can help break down organic material in sediment. These bacteria need an oxygenated environment to survive, meaning aeration is recommended in their use. They do not break down inorganic particles, so research into the sediment composition should be done prior to considering application of these products. Additionally, real-world applications have had variations in the success rate

at reducing sediment volume. Therefore, this product is recommended mainly on an experimental basis before considering whole lake programs.

Nutrient Deactivation

Nutrient deactivation in a lake is the process of applying a product that binds with reactive phosphorous in the water, making it unavailable for algae growth. Due to the relatively high turnover of water in Island Lake, such products may not provide long-lasting results, as new water will quickly replace the treated water.

Below are some products available on the market that can bind with phosphorus:

- **Phoslock** - Phoslock is a relatively new product, which is more frequently applied to drinking reservoirs to reduce the risk of cyanobacteria growth in the lake. This product consists of an activated clay that binds with reactive phosphorous in the water column as it is applied. The clay then sinks to the sediment, where it continues to bind with phosphorous as it is released from the sediment.
- **Aluminum Sulfate** - Aluminum sulfate, or "alum" applications are a more traditional method for reducing available phosphorous in the water column and increasing water clarity. This product, however, does not remain active in water for long and would not provide phosphorous reduction after application for sediment that is resuspended by carp, erosion, or other activities. Alum must be applied by trained applicators, as the reaction that occurs can be hazardous to aquatic life if not monitored closely.
- **EutroSORB** – EutroSORB acts in a comparable manner to the other products listed, binding with reactive phosphorus. This product also comes in large "bricks" that can be placed in flowing water. Phosphorus in the water binds with the compound in the bricks as it flows over.

Studies have found these products to be effective for reducing phosphorus, but as mentioned above, the rate of phosphorus influx from the watershed will reduce the long term effectiveness. Portions of the lake with low connectivity to the main body of the lake, however, likely experience less turnover. Therefore, a trial could be conducted in the bay with the small island to see if these low-flow areas an achieve reductions in TP and nuisance algae growth.

Strengthen Partnerships and Revenue Streams

While there are many potential management strategies to improve the ecological health of Island Lake, it can be difficult to make lasting changes without a stable funding source and a shared vision between the community and the managing body. Strengthening partnerships and establishing sustainable revenue streams, while not a direct lake management activity, will help ensure the coordinated and long-lasting success of implemented management activities. Continuing to grow and foster community engagement is vital to obtaining stakeholder buy-in and to recruit passionate individuals to join leadership efforts. Before attempting any large management projects, the Village of Island Lake should ensure strong partnerships with stakeholders and residents exist to maintain momentum and achieve long-term goals.

Regular Website and Newsletter Updates

The Village of Island Lake maintains a website with a page for lake news and events. The website also has a page for residents to access beach conditions. The Lake Committee post meeting minutes on the website as well. The Village also manages a Facebook page to disseminate information, including lake updates. The lake committee posts meeting minutes and algae treatments on the website. These actions should be continued.

Fishery Management

Fishery Surveys

The most recent IDNR fishery survey was in 2014. Requesting an updated survey from the IDNR approximately every ten years is recommended to assess the relative health of the fishery. A private firm could also be contracted to perform the survey. A survey can help determine indicators such as if the size distribution of fish is healthy (i.e., not too many small, stunted fish), if there are any threatened or endangered species present, or if stocked fish are successfully reproducing. Some lake managers even perform annual surveys to reassess harvest limits and stocking

guidelines. A fish survey can also determine if there are high abundances of ecologically damaging fish like common carp and whether additional control measures are needed.

Stocking Plans

The Village stocks fish according to IDNR guidelines. These guidelines should be updated with guidance from the IDNR or the stocking company when an updated survey occurs.

Harvest Limits

The Village of Island Lake maintains harvest limits. These limits should be re-evaluated after each fishery survey with the help of a fishery manager to promote a balanced fishery.

Fish Habitat Improvements

In 2021, 18 fish cribs were installed around the lake to provide shelter for fish. If the next fish survey does not find sufficient levels of spawning success, it could be that the lakebed has inadequate spawning conditions, such as low oxygen levels or soft sediment. Most fish prefer a firm substrate, so that the eggs do not sink into the sediment (Photo 46). If that is the case, restorative options such as installing aeration or dredging out accumulated silt in shallow spawning areas may need to be considered to improve fishery health.

Photo 46. Bluegill nests along the shore of a pond.

Carp Control

Common carp are present in Island Lake. Common carp were introduced by European settlers and are considered one of the most ecologically damaging species to aquatic systems. Carp forage in sediment and resuspend sediment and uproot plants as they do so. They also spawn and bask in shallow areas, resuspending more sediment. Carp lay hundreds of thousands of eggs each year and are able to survive low water quality conditions better than many native fish species. For this reason, carp can easily come to dominate a lake and prevent the resurgence of native species through maintaining poor water quality.

Rotenone

A chemically based strategy for removing unwanted fish species is to use rotenone. This product will kill *all* fish in a waterbody. Because Island Lake is connected to other waterways, particularly to wetlands and lakes upstream, carp re-establishment is essentially guaranteed, so rotenone would not be an effective long-term management strategy.

Seining or Electroshocking

While more time consuming, seining or electrofishing can be done to target only carp. These methods are unlikely to remove all fish but can keep biomasses at lower levels, so they are less damaging to the lake ecosystem. Typically, bait is left in a certain area of the lake. Fish congregate by the bait and then a seine net is used to gather the fish and remove them. This could be done multiple times per year.

Exclusion Fencing

Common carp uproot aquatic vegetation and resuspend sediment when foraging. The suspended sediment makes the water cloudy, reducing light penetration and further reducing plant growth. Additionally, resuspended sediment contains nutrients and often leads to algae blooms. This is likely a contributing factor to the severe planktonic algae growth seen during the summer months. Fencing off areas to prevent carp from entering can allow plants to re-establish, improving water clarity, stabilizing sediment, and reducing algae growth.

In the 2000's, Lake Wingra in Wisconsin undertook and effort to drastically reduce common carp presence. They started with a square exclosure in 2007 and residents were so impressed with the results that carp removal was expanded to the entire lake over time (Figure 20). Lake Wingra had similar issues as Island Lake, being a shallow, hypereutrophic lake experiencing nuisance planktonic algae growth and little aquatic vegetation. After removal, the lake saw an increase in clarity and a resurgence in aquatic vegetation growth. While there was a reduction in nuisance algae growth, the increase in aquatic vegetation, particularly Eurasian watermilfoil, meant the community had to more actively manage the vegetation by mechanically harvesting channels. Because both Lake Wingra and Island Lake are hypereutrophic, setting realistic expectations for balancing algae and plant growth will help improve community satisfaction with results. The Lake Wingra case study can be found at the North American Lake Management Society Website: https://www.nalms.org/wp-content/uploads/2018/09/33-3-8.pdf

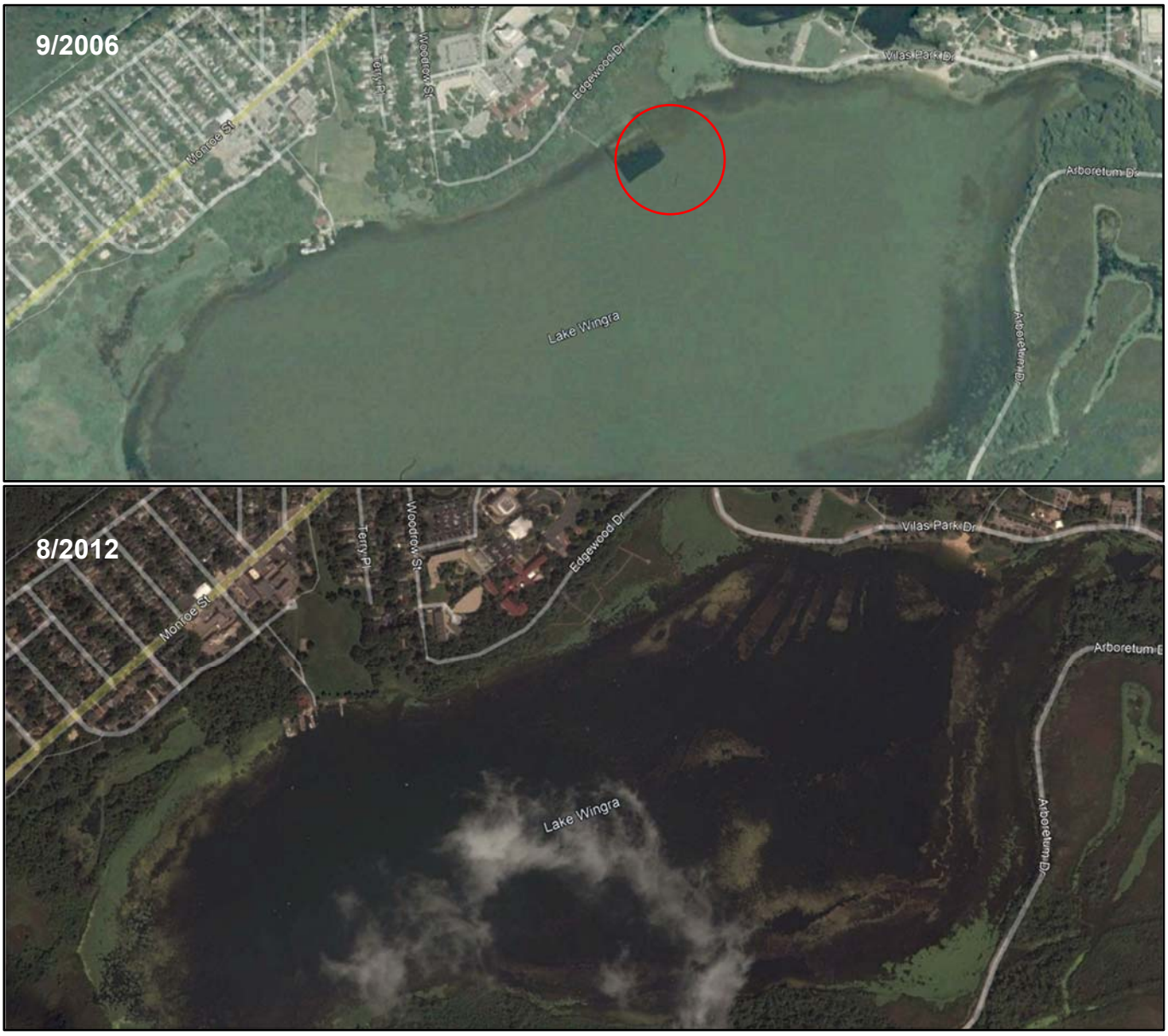

Figure 20. Satellite images of Lake Wingra, Madison, Wisconsin before carp control (9/2006) and after (8/2012). Experimental carp exclosure at north end of lake circled in top photo. Source: Google Earth.

Carp Roundup & Encouraging Removal

The Village of Island Lake hosts and annual carp roundup derby called "Carpfest" to encourage their removal from Island Lake. This should be continued as long as carp remain prevalent in the lake. If carp control is achieved for

many years and the health of the fishery improves, this derby could be switched to focus on largemouth bass or other prevalent species. The fishing regulations state “Harvesting of carp from Island Lake is encouraged.” This should be continued.

Goals, Objectives, & Actions

Establishing clear goals and objectives is necessary for developing appropriate management strategies. Goals must align with the agreed upon vision for the lake as well as the needs of stakeholders in the community. Achievable goals consider the feasibility of reaching the desired outcome when considering budgetary, environmental, legal, and time constraints.

As outlined in the previous section, the management goals for Island Lake are:

Goal 1: Improve the quality of the aquatic plant community
Goal 2: Reduce the frequency of harmful algal blooms (HABs)
Goal 3: Reduce the influx of pollutants into Island Lake from the watershed

Below, each goal is listed with measurable objectives and actions to achieve each objective. The objectives are proposed to be achieved by the fifth year of following the management plan. Ultimately, reassessing what objectives are achieved after five years will allow for new objectives to be set. Long-term improvement to the ecological health of Island Lake will likely take decades of watershed improvements and adaptive management. A management timeline with additional details follows.

This management plan is structured to provide recommendations at three budgetary levels – within the current annual operating budget of approximately $62,000, budget increase of approximately $20,000, and additional larger-scale projects that would likely require outside funding through grants or partnerships with homeowners and other stakeholders. This management plan is designed as a dynamic document and the timeline and objectives can and should be altered as funding sources develop or community focus changes.

Goal 1: Improve the quality of the aquatic plant community

Objective 1.1: Achieve 20-40% native aquatic plant coverage in the lake
- Action: Apply early spring aquatic herbicide at rates to target invasive aquatic plants (EWM and curlyleaf pondweed)
- Action: Apply spot treatments or mechanical removal in high traffic areas. Avoid treatments in the 25% of the lake set aside as a “Plant sanctuary”
- Action: Install carp exclusion netting around Big Island and/or Dorothy Beach to help native vegetation rebound
- Action: Continue aquatic invasive species education to limit the instruction of new species to the lake
- Action: Perform aquatic vegetation surveys to determine progress towards objective and make management adjustments

Objective 1.2: Reduce common carp population to 20% (relative to 2014 survey levels)
- Action: Obtain an updated fishery survey from the IDNR (~every ten years) or from a private firm ~ every 5 years and use results to measure achievement of objective
- Action: Use fishery survey results to create an updated stocking plan for the lake to maintain a healthy fishery
- Action: Update the fishing harvest limits based on fishery survey results
- Action: Continue to host “Carpfest”
- Action: Pursue aggressive carp removal though electrofishing and/or seining

Goal 2: Reduce the frequency of harmful algal blooms (HABs)

Objective 2.1: Reduce the frequency of HABs by 50% (relative to 2021 LCHD-ES records)
- Action: Perform algae management when appropriate

Action: Microsystin monitoring to measure progress towards meeting objective

Objective 2.2: Reduce "poor" buffer condition to 50% (relative to 2021 LCHD-ES records)
Action: Install Dorothy Beach Park shoreline stabilization demonstration
Action: Install Channel Park Buffer demonstration
Action: Maintain demonstration areas after installation
Action: Install fishing rock access points at parks
Action: Install non-motorized watercraft launch
Action: Develop shoreline and yard naturalization resources for homeowners

Objective 2.3: Reduce in-lake total phosphorus concentrations by 20% (relative to 2021 LCHD-ES records)
Action: Reassess aeration plan for bays and make recommended changes
Action: Perform water quality monitoring for relevant parameters
Action: Update bathymetric map, conduct sediment survey
Action: Nutrient deactivation trial in small island bay
Action: Goose egg addling on islands and around shore

Goal 3: Reduce the influx of pollutants into Island Lake from the watershed

Objective 3.1: Less than one E. coli *closure per beach per year*
Action: Physically remove goose droppings at parks
Action: Apply flight control at parks to reduce goose presence
Action: Continue education to discourage feeding waterfowl

Objective 3.2: Reduce total suspended solids at inlet by 10% over 5 years
Action: Conduct watershed survey on sources of nutrients and sediment and to determine baseline levels for assessing success
Action: Implement Mutton Creek restoration objectives
Action: Strengthen partnerships throughout the watershed
Action: Continue to adjust road salt application methods to follow BMPs

Management Timeline

The proposed management timeline presented in Table 4 is designed to help meet goals by the dates set in the objectives (assuming year 1 is 2023). While many of these actions will be done on an as-needed basis, this timeline sets general expectations for what events might occur in a given year. Following the table is a more detailed breakdown of each action by year and budgetary level. The numbers preceding each action corresponds to the objective it addresses. Table 5 follows the timeline breakdown, condensing the estimated costs within a given year for the different objectives and cost brackets.

Main Goal Addressed	Objective	Recommended Management Action	Year 1	2	3	4	5
Goal 1: Improve the quality of the aquatic plant community	1.1 Achieve 20-40% native aquatic plant coverage	Early spring herbicide at rates to target invasive vegetation					
		Spot treatments or mechanical harvest in high-traffic areas					
		Carp exclusion netting around Big Island and/or Dorothy Beach					
		Continue aquatic invasive species education					
		Aquatic vegetation survey					
	1.2 Reduce common carp population to 20% of 2014 survey levels	Updated fish survey					
		Update fish stocking plan, follow stocking guidelines					
		Update fish harvest limits					
		Host “Carpfest”					
		Carp removal through electrofishing and/or seining					
Goal 2: Reduce frequency of HABs	2.1 Reduce the frequency of HABs by 50%	Algae management when appropriate					
		Microsystin monitoring					
	2.2 Reduce “poor” buffer condition to 50%	Install Dorothy Park shoreline stabilization demonstration					
		Install Channel Park buffer demonstration					
		Maintain demonstration areas					
		Install fishing rock access points					
		Install non-motorized watercraft launch					
		Develop shoreline/yard naturalization resources for homeowners					
	2.3 Reduce in-lake total phosphorus by 20%	Reassess aeration plan for bays and make recommended changes					
		Perform water quality monitoring for relevant parameters					
		Update bathymetric survey, conduct sediment survey					
		Nutrient deactivation trial in small island bay					
		Goose egg addling on islands & shore					
Goal 3: Reduce watershed pollutant inputs	3.1 Less than one *e. coli* beach closure per beach each year	Physically remove goose droppings at parks					
		Apply flight control at parks to reduce goose presence					
		Continue education to discourage feeding waterfowl					
	3.2 Reduce total suspended solids at lake inlet by 10%	Conduct watershed survey on nutrient loading					
		Implement Baxter-Woodman stabilization recommendations					
		Strengthen watershed partnerships					
		Continue road salt application adjustments to follow BMPs					

Table 4. Proposed management timeline. Dark blue cells can be pursued with existing budget ($61,000/year), Medium blue cells are recommended with increased revenue (~ $20,000/year) and light blue cells would likely require outside funding sources, such as grants and partnerships.

Annual and As-needed Management Activities

Within Existing Budget (Approximate cost: $60,900 per year)

1.1

- Apply an *early spring* (~April) herbicide to the lake, targeting EWM and curlyleaf pondweed.
  - Recommended products are Fluridone (e.g., applying Sonar One in April/May at a low rate [<15 ppb] to control EWM and curlyleaf but not eliminate native species. Test concentrations and reapply as needed to maintain concentrations. Has irrigation restrictions), or Endothall (e.g. apply Aquathol Super K once EWM and curlyleaf are visible at recommended rates to control them).
  - Establish "no treatment" zones around 20-30% of the lake where native plants are encouraged to grow (Figure 21). Ideally, these areas would not be treated or harvested. The lake is shallow enough that plants could likely grow in any area, so the boundaries shown in Figure 21 can be altered depending on community needs.
  - *Approximate cost: $28,100 for Fluridone application, depending on concentration*.
- Apply spot herbicide treatments or perform mechanical removal around high-traffic areas as needed to allow for boat access and fishing.
  - *Approximate cost: $2,000 - $3,000 per acre of herbicide. $1,800 - $3,000 per day of mechanical removal, depending on haul off (Budget estimate: $6,000)*
- Continue invasive species outreach and education, particularly around boat launches. Illinois-Indiana Sea Grant has available educational resources and can help with updating signage.
  - *Approximate cost: In-kind*

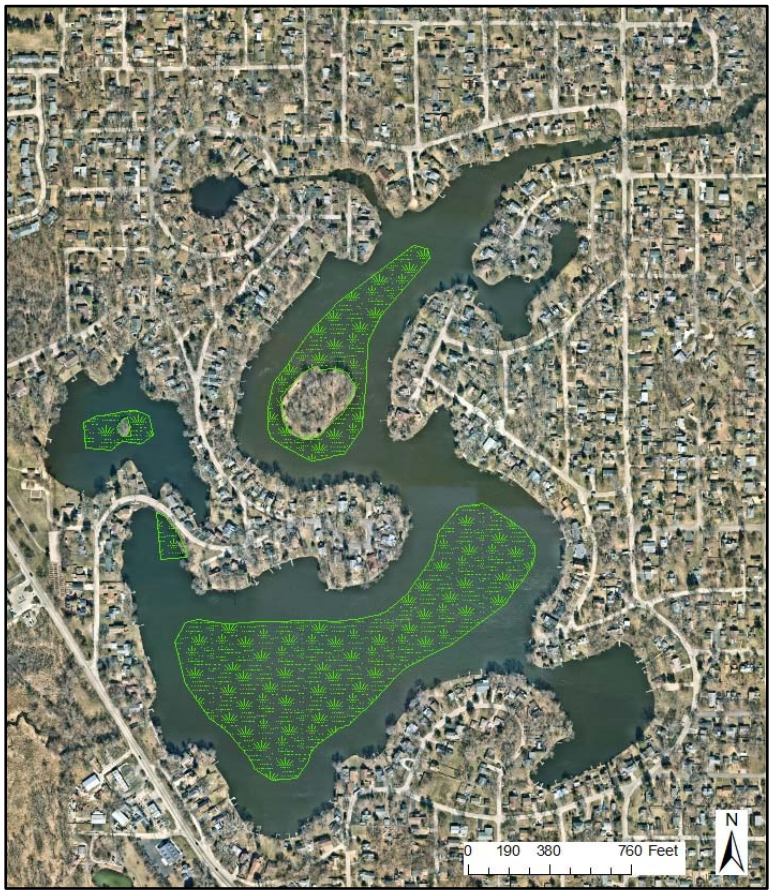

Figure 21. Recommended "Plant sanctuary" locations in Island Lake. *Avoid treatment of native plants within the shaded region.*

1.2

- Continue to stock fish as recommended by IDNR. Update stocking plan once an updated fishery survey is completed
  - *Approximate cost: $2,300 per year to stock fish, depending on amount/ species*
- Continue hosting "Carpfest" derby to remove carp.
  - *Approximate cost: $500 per year*

2.1

- Continue to monitor algae during regularly scheduled visits. Record the dates blue-green algae blooms are occurring and if funding permits. Continue coordinating with LCHD and IEPA to perform testing or install a remote monitoring device to track algae growth. Proactive treatment may be possible prior to a heavy bloom, but can be difficult and hazardous to aquatic life to control once algae is in the stage of exponential growth.
  - If management activities reduce the frequency of algae blooms, funds can be shifted to other activities

- *Approximate cost: $2,800 per visit (assumed treating 1/3 of lake). (Budget estimate: $20,000 per year, assuming 7 visits*

- Hire a firm (could potentially be done by existing algae manager) to identify and/or test blue-green algae for microsystin concentrations. Testing could occur at regular intervals throughout the growing season (e.g., bi-weekly) or when blooms are seen. Continue education to remind residents to stay out of water when a bloom is occurring.
  - Testing was performed by the IEPA and LCHD-ES in 2022. Continuing to partner with agencies can reduce costs.
  - *Approximate cost: $0-200 per test, depending on type (lab vs test strip), frequency, who does the sampling (volunteer vs single visit) [budget estimate: $1,000 per year]*

2.3

- Continue to perform goose egg addling on islands or other areas where geese are known to nest to help reduce nutrient and *E. coli* pollution in the lake
  - Typically includes 3 visits spaced 3 weeks apart during nesting season
  - *Approximate cost: $1,000 -$2,000 per visit, depending on number of expected nests (budget estimate: $3,000 per year)*

3.1

- Continue outreach to discourage waterfowl through signage, online education
  - *Approximate cost: In-kind*

3.2

- Continue working within watershed to strengthen partnerships to reduce nutrient pollution runoff
  - *Approximate cost: In-kind*

- Continue educating and adjusting road salt application practices to reduce chloride pollution
  - Attend Lake County de-icing workshops and encourage best use practices from private landowners, particularly parking lots and driveways
  - *Approximate cost: In-kind*

With Increased Revenue (Approximate cost: $37,350+ per year)

2.1

- Perform water quality testing to monitor changes in pollutant loading over time
  - See Appendix B for potential water quality testing schedule
  - *Approximate cost: $2,000 per visit, depending on testing, number of sites, etc. (budget estimate $6,000 per year)*

3.1

- Remove goose droppings from beaches to reduce *E. coli* pollution in water
  - Shovel or rake up droppings on a regular schedule throughout the growing season and disposed of in the trash or compost. This can be performed by volunteers
  - *Approximate cost: $300 per week (budget estimate $4,500 per year)*

- Apply Flight Control or similar product on turfgrass at parks to discourage goose presence
  - Reapply after rain
  - *Approximate cost: $670 per acre per treatment for grass applications (budget estimate: $3,350 per year for 5 visits)*

Grants and Partnerships (Approximate cost: $5,000 - $15,000+)

1.2

- Hire a professional to aggressively target carp and remove them from the lake. Recommended methods include electrofishing or netting. Netting can be done by setting up multiple bait locations around the lake. Volunteers can maintain the bait to help involve the community. After a period of time (4-5 days), nets are set up around the fish and then raised while feeding to trap them and remove them. Fish are then euthanized and can be recycled for organic fertilizer. This process is then repeated 3-4 times throughout the summer. As density decreases in subsequent years, number of visits can decrease.
  - Example of a carp removal plan in action: https://vimeo.com/373428875/8a76cc9539
  - *Approximate cost: $5,000 for a day of electrofishing. $5,000- $15,000 per year for netting (budget cost: $15,000 for year 1, decreasing annually to $5,000 in years 3 - 5)*

Year-Specific Management Activities

Year 1

Within Existing Budget (Approximate Cost: $0)

2.3

- Reassess aeration plan for bays with manufacturer or installer to ensure proper sizing for achieving desired results (less duckweed, sufficient DO etc.).
  - Consider horizontal mixers, potentially dock mounted, for smaller backwaters to discourage duckweed accumulation
  - *Approximate cost: In-kind for evaluation and building a plan with vendor*

With Increased Revenue (Approximate Cost: $6,800)

1.1

- Install carp exclusion netting near shoreline of Dorothy Park and/or the Big Island to allow native aquatic vegetation to reestablish
  - Figure 22 shows possible locations (Dorothy Beach: ~300 LF, Big Island: ~ 300 LF)
  - Carp should be seined or electro fished out from inside fenced off area once installed
  - Netting can be removed in 2+ years, once carp are sufficiently controlled and plants have spread beyond the netting
  - *Approximate cost: $1,800 for 300 LF exclosure, plus $2,000 to fish out carp, repair net and remove carp as needed*

Figure 22. Two carp exclosure placement options.

- Obtain an aquatic vegetation survey to determine the effectiveness of treatments at reducing invasive vegetation. This could be done by the aquatic plant management contractor during a visit or by a third party.
  - *Approximate cost: $500+ depending on intensity of survey, if done during management visit etc. (budget estimate: $1,000)*

2.2

- Develop shoreline /yard naturalization resources for homeowners to encourage buffer improvement
  - Educational materials can include information about nutrient pollution reduction, reduced geese presence, protecting shoreline from erosion etc.
  - County and state agencies have materials available to help reduce costs
  - *Approximate cost: free - $2,000 + depending on scope of materials*

Grants and Partnerships (Approximate cost: $27,100)

2.2

- Install Channel Park natural shoreline buffer demonstration (Figure 17)
  - Prepare 220’ x 25’ area along the seawall by killing existing grass with herbicide and planting into dead grass with native seed mix or plugs (small plants)
  - Species mix can be determined with help of contractor based on site conditions (soil type, sunlight, water etc.)
  - Plants should be watered while establishing and be protected from geese with fencing surrounding the plants

- *Approximate cost: $12,100, including turf herbicide, planting 2,400 plugs on 12" center and low-profile prairie seed*

2.3

- Perform a nutrient deactivation trial in the small island bay to assess potential benefit and longevity of a lake-wide treatment
  - Assess TP levels prior to and after application to measure success
  - Apply initial treatment and 1-2 follow-ups as needed during the summer to reduce nuisance algae growth
  - If successful, consider funding options to expand throughout lake
  - *Approximate cost: $4,000 - $7,000 per treatment, depending on products, rates used (budget estimate: $15,000 for 3 visits)*

Year 2

Within Existing Budget (Approximate cost: $0)

1.2

- Obtain updated fishery survey
  - *Approximate cost: in-kind (done by IDNR or during carp shocking)*

With Increased Revenue (Approximate cost: $4,680)

2.2

- Manage native buffer at Channel Park for invasive species with 3-4 stewardship visits during the growing season
  - *Approximate cost: $670 per visit (budget estimate: $2,680 per year, with 4 visits per year)*

- Continue developing shoreline /yard naturalization resources for homeowners to encourage buffer improvement
  - Educational materials can include information about nutrient pollution reduction, reduced geese presence, protecting shoreline from erosion etc.
  - Incorporate results from Channel Park restoration as a case study County and state agencies have materials available to help reduce costs
  - *Approximate cost: free - $2,000 + depending on scope of materials*

Grants and Partnerships (Approximate cost: $75,000)

2.2

- Install a non-motorized watercraft launch at a park on Island Lake, potentially Easting Bay or Veterans Park
  - Discuss potential grant or cost share options with state and local agencies for funding
  - *Approximate cost: $10,000*

2.3

- Implement recommended aeration changes in at least one bay to assess improvement. If successful at meeting goals (less duckweed or higher dissolved oxygen), explore fundraising opportunities to reach installation goals
  - For lake-bed aeration plans, Kasco offers the Aire-Guard Cabinet Technology System, allowing for up to 12 diffusors to be run from the same cabinet.
  - Approximate cost: $4,000 - $12,00 per horizonal mixer. $15,000 + for 6 diffusors (budget estimate: $50,000)

- If Year 1 trial was successful, continue in other bays or re-applying in small island bay
  - Assess TP levels prior to and after application to measure success
  - Apply initial treatment and 1-2 follow-ups as needed during the summer to reduce nuisance algae growth
  - *Approximate cost: $4,000 - $7,000 per treatment, depending on products, rates used, size of treatment area (budget estimate: $15,000 for 3 visits)*

Year 3

Within Existing Budget (Approximate cost: $1,000)

1.2

- Obtain and implement updated fishery management recommendations, including harvest limits and stocking.
  - Update Island Lake slot and daily creel guidelines online, in print, and on signs around lake
  - Approximate cost: $150 per sign [budget estimate $1,000]

With Increased Revenue (Approximate cost: $3,680)

1.1

- Obtain an aquatic vegetation survey to determine the effectiveness of treatments at reducing invasive vegetation. This could be done by the aquatic plant management contractor during a visit or by a third party.
  - Approximate cost: $500+ depending on intensity of survey, if done during management visit etc. (budget estimate: $1,000)

2.2

- Manage native buffer at Channel Park for invasive species with 3-4 stewardship visits during the growing season
  - *Approximate cost: $670 per visit (budget estimate $2,680 per year)*

Grants and Partnerships (Approximate cost: $40,000)

2.2

- Stabilize shoreline along Dorothy Beach Park with biotechnical stabilization where needed and native vegetation (Figure 18).
  - Pre-treat area to remove turfgrass and invasive species prior to restoration. Stabilize shoreline with rip rap or coir logs as conditions permit and stabilize upslope with native vegetation. Consider planting emergent plants in the water to dissipate wave energy.
  - Engineering and permitting may be required for stabilization depending on methods employed.
  - Start discussion with contractor or engineer in Year 2 to create scope
  - Approximate cost: $15,000 +

2.3

- Update bathymetric survey and perform sediment survey to determine degree of sedimentation in the lake and whether further actions, like dredging, may be required.
  - *Approximate cost: $4,500-$10,000 (dependent on density of sediment sampling grid)*

3.2

- With coordination from county or state agencies, conduct a watershed study on nutrient loading to better determine possible actions that can be taken within the watershed to reduce the rate of sediment and nutrient runoff.
  - Approximate cost: $15,000 +

Year 4

With Increased Revenue (Approximate cost: $4,800)

2.2

- Manage native buffer at Channel Park and Dorothy Beach Park for invasive species with 3-4 stewardship visits during the growing season
    - Approximate cost: $1,200 per visit [budget estimate $4,800 per year)

Grants and Partnerships (Approximate cost: $19,500)

2.2

- Install fishing rock access points at parks around the shore where erosion is a concern, particularly at Dorothy Beach Park
    - *Approximate cost: $6,500 + per access point, depending on shoreline conditions (Budget estimate: $19,500 for 3)*

Year 5

With Increased Revenue (Approximate cost: $5,800)

1.1

- Obtain an aquatic vegetation survey to determine the effectiveness of treatments at reducing invasive vegetation. This could be done by the aquatic plant management contractor during a visit or by a third party.
  - Approximate cost: $500+ depending on intensity of survey, if done during management visit etc. [budget estimate $1,000)

2.2

- Manage native buffer at Channel Park and Dorothy Beach Park for invasive species with 3-4 stewardship visits during the growing season
  - Approximate cost: $1,200 per visit [budget estimate $4,800 per year)

Grants and Partnerships (Approximate cost: $230,000+)

3.2

- Implement Baxter-Woodman upstream stabilization measures to reduce sedimentation into the lake
  - Additional funding may be possible though coordination with state and county environmental agencies
  - Approximate cost: $230,000 for construction of sections A, B & C, per “Village Creek Assessment”

Existing Budget	Year 1	Year 2	Year 3	Year 4	Year 5
	$60,900	$60,900	$61,900	$60,900	$60,900
1.1 Early spring herbicide	$28,100	$28,100	$28,100	$28,100	$28,100
1.1 Spot treatment herbicide	$6,000	$6,000	$6,000	$6,000	$6,000
1.1 Invasive species ed.	$0	$0	$0	$0	$0
1.2 Continue fish stocking	$2,300	$2,300	$2,300	$2,300	$2,300
1.2 Updated fish survey	-	$0	-	-	-
1.2 Update harvest limits	-	-	$1,000	-	-
1.2 Continue hosting Carpfest	$500	$500	$500	$500	$500
2.1 Algae management	$20,000	$20,000	$20,000	$20,000	$20,000
2.1 Microsystin monitoring	$1,000	$1,000	$1,000	$1,000	$1,000
2.3 Goose egg addling	$3,000	$3,000	$3,000	$3,000	$3,000
2.3 Reassess aeration plan	$0	-	-	-	-
3.1 Continue waterfowl ed.	$0	$0	$0	$0	$0
3.2 Strengthen partnerships	$0	$0	$0	$0	$0
3.2 Salt application ed.	$0	$0	$0	$0	$0

Increased Budget	Year 1	Year 2	Year 3	Year 4	Year 5
	$20,650	$18,530	$17,530	$18,650	$19,650
1.1 Carp exclusion netting	$3,800	-	-	-	-
1.1 Aquatic vegetation survey	$1,000	-	$1,000		$1,000
2.2 Manage demonstration areas	-	$2,680	$2,680	$4,800	$4,800
2.2 Shoreline naturalization resources	$2,000	$2,000	-	-	-
2.3 In-lake water quality monitoring	$6,000	$6,000	$6,000	$6,000	$6,000
3.1 Goose dropping removal	$4,500	$4,500	$4,500	$4,500	$4,500
3.1 Flight control application	$3,350	$3,350	$3,350	$3,350	$3,350

Partnerships and Grants	Year 1	Year 2	Year 3	Year 4	Year 5
	$42,100	$85,000	$45,000	$24,500	$235,000
1.2 Carp removal	$15,000	$10,000	$5,000	$5,000	$5,000
2.2 Channel Park Demonstration	$12,100	-	-	-	-
2.2 Dorothy Park Stabilization	-	-	$15,000	-	-
2.2 Install fishing rocks	-	-	-	$19,500	-
2.2 Non-motorized watercraft launch	-	$10,000	-	-	-
2.3 Implement aeration plan	-	$50,000	-	-	-
2.3 Bathymetric/ Sediment Survey	-	-	$10,000	-	-
2.3 Nutrient deactivation trial	$15,000	$15,000	-	-	-
3.2 Watershed survey	-	-	$15,000	-	-
3.2 Streambank stabilization	-	-	-	-	$230,000

Table 5. Estimated minimum budget for Lake Management Plan.

Evaluation & Moving Forward

The Island Lake Management Plan was designed as a dynamic document, which can be adjusted as management priorities change.

Potential Grant Opportunities

Grants are an important way fund management activity for larger projects. Most grantors encourage partnerships and lean towards funding projects that benefit multiple stakeholders. Working with the local watershed group can be one way to take a partnership approach to a project. The grants identified as most applicable to Island Lake and therefore the most likely to be successfully applied to are listed in Table 6. While these grants are best suited for directly improving water quality for Island Lake, there are many other grant opportunities available, which may indirectly improve water quality. Contacting local management groups can help identify additional opportunities that may fit with a desired project.

Source	Grant	Project Amount and Match	Purpose	Eligibility
Illinois Environmental Protection Agency (IEPA)	Green Infrastructure Grant Opportunity (GIGO)	$75,000 - $2.5 million, Minimum 25% match (15% for underserved communities)	Install stormwater management technique or practice employed with the primary goal to preserve, restore, mimic, or enhance natural hydrology	Watershed groups, land conservancies, private institutions, nonprofits organizations, units of government (County, municipal, township or state), universities or colleges. Must be GATA certified.
LCSMC	WMB (Watershed Management Board) Cost Share Projects	$20,000-$50,000, 50%/50% match	projects that reduce flood damage, improve water quality and/or protect natural resources.	HOA's, nonprofits, local units of government
USFWS	North American Wetlands Conservation Act – Small Grants	Up to $100,000, At least 1:1 matching funds	Long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats for the benefits of all wetlands associated migratory birds	Tribal, State, or local unit of gov't, nongovernmental organization, or individual
National Fish and Wildlife Foundation	5 Star Wetland and Urban Waters Restoration Grant Program	$10,000-$40,000	Environmental education and training for students, conservation corps, youth groups, citizen groups, corporations, landowners, and government agencies through projects that restore wetlands and streams.	Non-profit 501(c) orgs, state gov't agencies, local & municipal gov'ts, Indian tribes, educational institutions
IEPA	Section 319(h) Nonpoint Source Pollution Control Financial Assistance Program	Up to 60% of eligible project costs; minimum 40% local match requirement in cash and/or in-kind services. No set limit on awards.	Any entity that has legal status to accept funds from the state of Illinois, incl. state & local gov'ts, nonprofit orgs, citizen & environmental groups, individuals, businesses.	Funds may be used for the development, update, and implementation of watershed-based management plans including the development of information/education programs and for the installation of best management practices.
IEPA	Illinois Clean Lakes Program	Phase 1: $75,000 Phase 2: $300,000 *When funding appropriated*	Owners/managers of lakes that have public access.	Two types of grants are awarded: Phase I identifies problems and sources of pollution. Phase II grants support implementation or procedures recommended in the Phase I report to improve water quality.
ComEd	Green Region Program	Up to $10,000 50% match requirement	Public agencies w/in ComEd's service territory	Open space planning, acquisition, or improvements for local parks, natural areas, and recreation resources.

Table 6. Potential funding opportunities for management activities.

The Illinois Environmental Protection Agency offers two grants appropriate for lake communities. The Green Infrastructure Grant Opportunity (IGOG) funds projects that deal with stormwater and flooding. The 319 (h) funds projects that improve water quality by addressing sources of non-point source pollution. It should be noted that both require pre-registration through the Grant Accountability and Transparency Act (GATA) and these requirements are significant. Some of the GATA pre-registration requirements include the DUNS #, FEIN, and SAMS Cage Code. Because of the complexity of applying for these grants, partnering with LCSMC is recommended if considering a 319 grant. LCSMC will manage all aspects of grant writing and project management for a 10% fee. LCSMC does not manage IGOG grants. There are also programmatic and fiscal and administrative risk assessments, and any requirements that they generate, including development of a 'fraud awareness program''. There are also in-progress and post project reporting requirements. Groups that aren't already GATA-ready can partner with an organization that is already GATA-ready. Local soil and water conservation districts, counties, municipalities, etc. are good possibilities. Depending on their staffing levels, Lake County SMC will sometimes manage IEPA grant writing and reporting for an HOA for an administration fee.

Appendix A – Referenced Reports

Date	Report Type	Author	Summary
2003	Summary Report	LCHD-ES	2003 Summary Report of Island Lake
2013	Summary Report	LCHD-ES	2013 Island Lake Summary Report
2014	Watershed Plan	CMAP	9 Lakes Watershed-Based Plan
2014	Summary Report	IDNR	2014 Island Lake Survey – June 13th, 2014
2021	Summary Report	LCHD-ES	2021 Island Lake Summary Report
2022	Assessment	Baxter & Woodman	Village Creek Assessment Report

Appendix B – Example Water Quality Testing Parameters

Test water quality parameters at least three times per year (May, July, September) using standard sampling methods and lab analyses. Field parameters to be tested at the four in-lake sites include dissolved oxygen profile, depth, pH profile, secchi depth, temperature profile, alkalinity, conductivity, suspended sediment, algae, weeds. Chemical and biological parameters to be tested from one site in the lake include BOD, COD, chloride, nitrogen ammonia, nitrogen nitrate/nitrite, total Kjeldahl nitrogen, orthophosphorus, total phosphorus, total suspended solids, total dissolved solids, total volatile solids, chlorophyll *a*, *e. coli*, phytoplankton, and zooplankton. Provide written reports to include the data obtained and a detail annual report interpreting the results and their implications for lake management.

Appendix C – Survey Results

Q1

Please select the lake activities that you or your family participate in on Island Lake.

Answered: 82
Skipped: 0

ANSWER CHOICES	RESPONSES
None of the above	6.10% 5
Responses Other (please specify)	13.41% 11
Motor Boating	24.39% 20
Fishing	45.12% 37
Swimming	45.12% 37
Kayaking /Canoeing /Paddle Board	58.54% 48
Enjoying the Views	71.95% 59
Total Respondents: 82	

Can't, its too dirty. Would love to swim or fish though.
4/19/2022 5:52 AM
New to the area and hope to kayak soon.
4/18/2022 12:52 PM
We moved here last summer and the lake was green
4/17/2022 8:21 PM
Being able to be in water all warmer months without adverse affects on skin
4/17/2022 7:52 PM
Walking my dogs around the lake and letting them swim
4/17/2022 5:10 PM
Walking
4/17/2022 3:38 PM
Would like to do some of these but haven't yet
4/17/2022 2:56 PM
I used to swim with my kids when they were little. Not so much anymore.
4/17/2022 1:13 PM
Would like to swim if cleaner
4/16/2022 1:07 PM
Ice skating
4/10/2022 10:29 AM
Spending time at the beach. Playing in the sand & water with my toddler
4/8/2022 6:00 PM

Q2

How often do you engage in the lake activities on Island Lake?

Answered: 81
Skipped: 1

ANSWER CHOICES	RESPONSES
Almost Never	19.75% 16
Every day	19.75% 16
A few times a week	29.63% 24
About once a week	9.88% 8
A few times a month	9.88% 8
Once a month	2.47% 2
Less than once a month	8.64% 7
TOTAL	81

Q3

Please select your #1 top priority issue with Island Lake (the lake) that needs to be addressed by Lake Management: (select one)

Answered: 82
Skipped: 0

ANSWER CHOICES	RESPONSES
Water Quality (Pollutants from Stormwater Runoff)	50.00% 41
Invasive Aquatic Plants (Submerged Weeds and Algae)	18.29% 15
Sediment Build Up at Lake Bottom	8.54% 7
Geese Control	7.32% 6
Shoreline Erosion	4.88% 4
Lack of Native Plants that Support Native Fish Populations	3.66% 3
Commercial Agriculture along Mutton Creek	3.66% 3
Lack of Compliance with Lake Rules	2.44% 2
Aquatic Invasive Species (Carp, Zebra Mussels, etc.)	1.22% 1
Flooding Issues on Private Property	0.00% 0
TOTAL	82

Comments(18)

The green crap that builds up and makes it disgusting to go swimming.
4/20/2022 4:38 PM

I moved to this town because of the lake and how many beaches are in the neighborhood. The beaches are not sanitary enough to swim in and the sand is filled with sand bees.
4/20/2022 6:24 AM

No way to access and use the lake. Would love to be able to rent a paddle board or kayak.
4/19/2022 8:06 AM

It's also green, can barely use it, would love to use it more!
4/19/2022 5:52 AM

For sure, water quality for swimming. I used to swim in the lake when I was younger. But I get itchy thinking about it now with my kids.
4/18/2022 9:03 AM

Water quality for swimming.
4/18/2022 6:49 AM

Flesh eating bacteria

4/17/2022 9:49 PM
My concern is everything that makes this lake not swimmable. We moved here for the lake and I wont let my kids in at.
4/17/2022 8:21 PM
Seems that the Mutton Creek action should be a priority as well as holding nearby company (compost or fertilizer?) accountable and then fiscally responsible for mitigating their pollution that turns the lake a fluorescent green color 2-3 months of year - then remaining issues can resolve next, some simultaneously and others as one offs.
4/17/2022 7:52 PM
To much algae
4/17/2022 6:28 PM
I would rather see sidewalks for walking and riding down 176 from River all the way to Wauconda
4/17/2022 5:29 PM
Most of the summer the lake is unusable due to water quality. I know a large part of this is runoff from neighboring farms. But it needs to stop.
4/17/2022 5:10 PM
Geese Control, Water Quality, Runoff from the farm, Duck weed from the creek down from the farm. Cow shit from the farm!!!
4/17/2022 3:41 PM
Toxins in the lake. Afraid to swim in it - and worried about pets dying from drinking water that has developed toxic algae.
4/17/2022 3:38 PM
The algae that covers the top of the water.
4/17/2022 1:26 PM
Reality people. These projects cost an awful lot of money. There is a significant population that is/would be unwilling to spend more than their already high taxes. I have had 2 stints on the lake management commission. Lots of ideas with little to no available funding.
4/17/2022 1:17 PM
I live on lakes nw side small indentation that accumulates a lot of green algae gross looking unhealthy stuff with south wind
4/11/2022 8:32 AM
I would love to be able to actually swim in our lake, but there is so much toxic algae it seems like a health hazard to even come in contact with the water. It seems like all of the choices above are a subset of water quality which, if improved, could allow for more active use of the lake.
4/8/2022 3:16 PM

Q4

Please select your #2 priority issue with Island Lake (the lake) that needs to be addressed by Lake Management: (select one)

Answered: 82
Skipped: 0

ANSWER CHOICES	RESPONSES
Invasive Aquatic Plants (Submerged Weeds and Algae)	25.61% 21
Water Quality (pollutants from Stormwater Runoff)	25.61% 21
Sediment Accumulation at Lake Bottom	12.20% 10
Commercial Agriculture along Mutton Creek	9.76% 8
Goose Control	7.32% 6
Aquatic Invasive Species (Carp, Zebra Mussels, etc.)	7.32% 6
Shoreline Erosion	4.88% 4
Lack of Native Plants that Support Native Fish Populations	3.66% 3
Lack of Compliance with Lake Rules	3.66% 3
Flooding Issues on Private Property	0.00% 0
TOTAL	82

Comments(7)

Everyone complaining and expecting the lake to be clear water. It is a small lake and will never reach the ridiculous expectations of the villagers.
4/19/2022 8:06 AM
Lack of aeration causing buildup of slime and stench in the warm months
4/18/2022 8:57 PM
Parking for those that don’t live within walking distance
4/18/2022 12:00 AM
Nasty always closed because of blue algae
4/17/2022 9:49 PM
I would rather see sidewalks for walking and riding down 176 from River all the way to Wauconda
4/17/2022 5:29 PM
Algal blooms are supported by the prevalence of invasive species of plants. Perhaps oxygenators or bubblers would help?
4/17/2022 5:10 PM
Some of the most significant issues can be traced back to stormwater runoff. Nitrogen, Phosphorous, road salt all create major issues with a body of water such as Island Lake. This (manmade) lake is classified as super eutrophic. An enourmous

amount of sediment load leads to the many water quality issues. All of these issues combined (lack of depth, black organic bottom, nutrient load, summer oxygen depletion etc...) Whatever direction is chosen, please have realistic expectations. Those who live around and very near the lake are of course highly concerned, those who, for example, live in Walnut Glen probably dont even know that the lake exists. These residents will most likely scream if they have to expend funds on a project that may come of this. When we dredged the lake in the late 80's there was community "buy in", but the only additional subdivision was the beginning of the Fox River Shores. I can probably write another couple of chapters .....
4/17/2022 1:17 PM

Q5

Please select the Lake Management topics you are interested in learning more about. (select all that apply)

Answered: 76
Skipped: 6

ANSWER CHOICES	RESPONSES
Difference between invasive and good native plants	18.42% 14
Ways I can improve the Lake Quality	39.47% 30
Factors contributing to Poor Lake Quality	44.74% 34
History of Island Lake	28.95% 22
Island Lake's Long-term Lake Management Plan	65.79% 50
Monthly Lake Management Meeting Agenda and Minutes	27.63% 21
Lake Events	34.21% 26

Total Respondents: 76

Q6

Anything else we should know as it relates to the lake and what you want to see improve? (Write in)

Answered: 27

Skipped: 55

If you live on the lake there is no way to find out it’s toxic and closed unless you visit the county beach website or go to village beach and see that it’s closed. It would be nice to have a text/email notification that it’s unsafe.

4/21/2022 6:27 AM

I just want it to be safe to swim in. It would be awesome If we had kayak or canoe rentals!

4/20/2022 6:24 AM

Dredge the canals and the streams that feed into the lake. The run off from the organic poop farm and green oaks farm storm run off should also be looked into. Finally, how about family day at the lake, teach kids to fish, etc. Thank you

4/19/2022 7:31 PM

Love the quiet and serenity our lake offers, especially for non-motorized watercrafts

4/19/2022 4:03 PM

Thank you for trying,and thank you for this survey.

4/19/2022 5:52 AM

A cleaner lake so I can take the kids swimming

4/19/2022 12:16 AM

Would be nice for residents to be able to enjoy non-motorized boating without costly stickers

4/18/2022 8:57 PM

MAINTENANCE OF THE COTTON CREEK. The lake runs off into the creek, the creek is flooding beyond the marsh. Maintenance needs to happen on the creek to ensure it’s dumping into the rivier

4/18/2022 7:22 AM

Notifications about when the lake is sprayed so my kids don’t swim until it is safe again.

4/18/2022 6:49 AM

There are months that the lake is green & doesn't appear safe to swim. My 19 & 20 yr Olds took swim lessons at Briar & Veterans beaches. We didn't seem to have the water quality issues then that we do now.

4/17/2022 8:51 PM

Sick of the algae. Makes lake unusable for many months.

4/17/2022 6:28 PM

Can we establish cleaner and better marked beaches? Perhaps a short pier as well?

4/17/2022 5:10 PM

Wish the minutes of the meetings were on village web site for those that can't make meetings are posted.

4/17/2022 3:41 PM

Yes - would like to submit the idea of running a pilot to test the efficacy of using ultrasonic algae control.

4/17/2022 3:38 PM

1-day free fishing access pass for the lake. Updated beaches. Section for dogs to swim and play!

4/17/2022 2:56 PM

BE REALISTIC IN YOUR GOALS!!!!

4/17/2022 1:17 PM

Everyone in Island Lake needs to understand they are in the watershed...not just the people living on the lake shore. They need to understand what they put on their lawns in Westridge ends up in the lake.

4/17/2022 1:13 PM

Having a beach the kids can enjoy similar to Wauconda

4/17/2022 12:26 PM

Fish management info

4/11/2022 8:32 AM

Enforce the not feed the waterfowl law. Asking someone to not feed the geese is not stopping them from feeding the geese

4/10/2022 10:08 AM

Improve the beach house and create an easier process for residents to reserve it for gatherings.

4/9/2022 9:00 AM

I just want to know my kid won’t get sick if he touches the lake water or mutton creek . There’s lots of goose poop, dead fish & concerning algae

4/8/2022 6:00 PM

Should be allowed to put small fence along shore for pet and/or child safety.

4/8/2022 3:27 PM
I live on the lake and want to build a fence near the water for the safety of kids and dog, but fence rules don't allow it due to setback requirements. This makes no sense to me that a pool has to be fenced for safety, but I can't take the same precautions for the giant pool in my backyard (the lake) ??
4/8/2022 3:16 PM
Higher horse power for boats.
4/8/2022 1:50 PM
I think if we try to incorporate more activities with the lake like cardboard boat race scene just as a suggestion could generate more revenue for the village as far as influx of people. also a lot of winter activities could be done on the ice as well.
4/8/2022 1:50 PM
Lake management is not a priority to me. This is not an issue that I want the most money/ time spent on by village.
4/4/2022 7:06 PM

Q7

Please select the Park Activities that you or your family engage in at Island Lake Parks: (select up to 3)

Answered: 72
Skipped: 10

ANSWER CHOICES	RESPONSES
Walking / Hiking / Running	73.61% 53
Picnic	34.72% 25
Sledding	27.78% 20
Playgrounds for ages 5-12	26.39% 19
Playgrounds for ages 0-4	19.44% 14
Responses Other (please specify)	15.28% 11
Playgrounds for ages 13+	11.11% 8
Basketball	6.94% 5
Baseball	5.56% 4
Soccer	2.78% 2
Volleyball	0.00% 0

Total Respondents: 72

big open spaces for a small group of teens to practice football and lacrosse drills
4/19/2022 4:05 PM
Pet park / designated area with rules for clean up
4/17/2022 7:56 PM
Events by the helicopter
4/17/2022 5:30 PM
Beach parks
4/17/2022 4:22 PM
concerts
4/17/2022 3:42 PM
Pokémon Go
4/17/2022 3:41 PM
Boat ramp
4/17/2022 2:28 PM

I expect a clean, well maintained park/infrastructure system. This includes streets, stormwater, drinking water, street trees, sidewalks etc.....
4/17/2022 1:23 PM
Ice skating
4/9/2022 6:07 PM
Concert in the Park
4/9/2022 9:57 AM
carnivals
4/8/2022 1:54 PM

Q8

How often do you engage in the PARK ACTIVITIES you selected above?

Answered: 77
Skipped: 5

ANSWER CHOICES	RESPONSES
Less than once a month	28.57% 22
A few times a week	25.97% 20
About once a week	19.48% 15
A few times a month	14.29% 11
Once a month	9.09% 7
Every day	2.60% 2
TOTAL	77

Q9

Please select the TOP 3 issue that needs to be addressed when it comes to managing the Parks of Island Lake - choose up to 3.

Answered: 80
Skipped: 2

ANSWER CHOICES	RESPONSES
Lack of Activities for Adults	28.75% 23
Unkept Landscaping	22.50% 18
Playground Equipment Condition	22.50% 18
Bathroom Conditions	21.25% 17
Lack of Activities for Kids	20.00% 16
Responses Other (please specify)	20.00% 16
Littering	17.50% 14
Lack of Lighting	13.75% 11
Animal waste	13.75% 11
Graffiti and Vandalism	12.50% 10
Overflowing Trash Cans	7.50% 6
Building Conditions	5.00% 4
Lack of Signage	3.75% 3
Handicap Accessibility	3.75%

3
The baseball fields not being made available to wauconda bulldogs/lyaa and instead being rented to travel teams
5/17/2022 11:33 PM
None
4/20/2022 4:39 PM
Out of control, mean kids without parents at parks
4/19/2022 8:08 AM

We think the parks are in ok condition, we struggle more with loitering teens causing trouble at the parks than the condition of the parks.
4/19/2022 5:54 AM
People with mobility challenges would have difficulty in our playground areas
4/18/2022 9:03 PM
More walking paths would be lovely.
4/18/2022 12:54 PM
Just moved here so not able to evaluate any of the above as we're still getting settled
4/17/2022 7:56 PM
Yoga, meditation type activities for adults would be fun
4/17/2022 3:41 PM
In recent years there has been a significant reduction in park maintenance and oversight.
4/17/2022 1:23 PM
Lack of activities for dogs
4/11/2022 7:23 PM
None
4/10/2022 6:11 PM
More walking paths and improving the existing path at Converse Park
4/9/2022 9:05 AM
Goose poop
4/8/2022 3:28 PM
Goose poop
4/8/2022 3:18 PM
Don't frequent the parks enough to answer this question
4/8/2022 1:52 PM
Vandalism
4/2/2022 8:25 AM

The beaches need serious work—new sand, landscaping, seaweed raking, etc
5/17/2022 11:33 PM
I would LOVE a bike bath that connects to the moraine hills bike path. I used to ride every day when I lived in McHenry. It's the number 1 thing that makes me not want to stay in Island Lake. Also Grek park is the PERFECT place to build a nice park. So much open space. We walk there multiple times a week to play on the swings there.
4/20/2022 6:28 AM
A park designated for multi generational fitness, with outdoor gym equipment, such as a fitness strider, etc
4/19/2022 7:36 PM
Would love more activities at the village hall. The kids soccer program was ok. Would love better or additional options
4/19/2022 8:08 AM
Better playgrounds especially for toddlers castle park toddler area is very small
4/19/2022 12:19 AM
Would love to see more activities for families. We often look to Wauconda Park District or Mchenry because they have more classes and variety. Like soccer for kids, swimming lessons, adult cooking classes, hiking trails and sidewalks.
4/18/2022 9:08 AM
Pickleball courts would be a wonderful addition without many options in the area
4/17/2022 6:54 PM
Don't only focus on converse park. How about investing in the parks located throughout our neighborhoods, especially along the lake!
4/17/2022 6:15 PM
An off leash dog park just for residents would be great! The lowland area next to the wood chip pile, green space near the village hall, or even tearing down that boarded up house on Southern Terrace would be a great location.
4/17/2022 5:12 PM
Make sure that any changes/improvements can be maintained (long term). Follow many of the significant OSLAD grant restrictions that we must abide by.
4/17/2022 1:23 PM
More parks with varying accessibility for ALL kids
4/17/2022 12:27 PM
I would love to see the playground outside the village fall redone. 1, the older kids take over the park and 2, it's in terrible shape and feels very unsafe.
4/12/2022 12:19 PM
None
4/10/2022 6:11 PM
I have noticed the improvements at Converse. That's a good start. I think focusing on the beach area at Veterans Park (adding more amenities) and making it easier to reserve the beach house would be great.
4/9/2022 9:05 AM
the mound of dirt and debris left from grudging the creek at the Channel Dr park/playground is an eyesore.
4/8/2022 6:01 PM
I would like to see the parks with lake access become private to residents.
4/8/2022 3:18 PM
We are an active family but never use the parks because there is nothing to do in them. Tennis courts, walking paths would be nice but need to be maintained. The rock retaining walls at a few parks looked nice for a short time but quickly turned into a weedy eyesore.
4/8/2022 2:21 PM
More playground equipment at Veterans Park.
4/8/2022 1:54 PM
Would like new updated play area for kids at Converse. Many of other 'parks' have very limited access. Would love to see pool or at least splash pad for the kids.
4/4/2022 7:12 PM

Appendix D – Island Lake HAB Flyer, 2022

Public Notice
from the Village of Island Lake

When in doubt, Stay out!

Blue green algae (cyanobacteria) is a natural occurrence in many lakes across the country—especially with higher temperatures and increased precipitation. According to the United States Environmental Protection Agency, **"**Harmful algal blooms are a major environmental problem in all
50 states."

Lake County Health Department recommends the following:

- *Don't swim.*
- *Minimize contact with lake water.*
- *Do not let pets play or drink from the water.*

The best way to stay safe is to stay out of the affected water and keep children and pets away. *Never use the affected water for drinking, cooking, or bathing. If you are in contact with affected water, wash off thoroughly with soap and clean source of water.*

Skin irritation or rash is the most commonly reported health effect from HAB exposure. Other symptoms range from diarrhea, cramps, vomiting, fainting, numbness, dizziness and tingling. The most severe reactions occur when large amounts of water are swallowed.

Fish caught in affected waters pose unknown health risks and may have an undesirable taste. If you choose to eat them, remove all fat, skin, and organs before cooking, because toxins are more likely to collect in these tissues.

For more information about blue green algae, visit:

- US Environmental Protection Agency:
  https://www.epa.gov/cyanohabs
- Illinois Department of Health:

http://dph.illinois.gov/topics-services/environmental-health-protection/toxicology/habs

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