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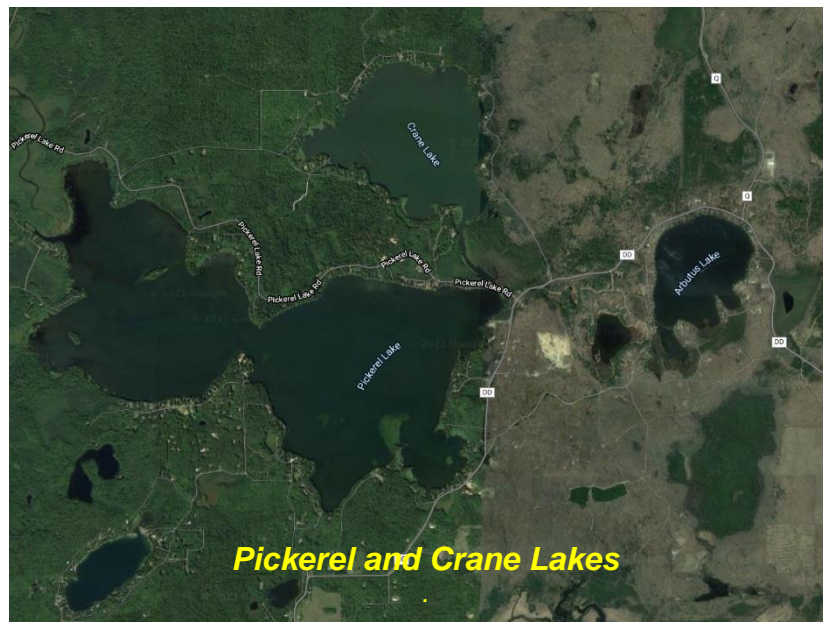
# **The Pickerel/Crane Lakes Adaptive Management Plan**

**(Towns of Nashville and Ainsworth,  
Forest and Langlade Counties, Wisconsin)**

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**This document is a product of a WDNR Lake Planning Grant awarded to:**

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## CHAPTER 1

# What Is the Pickerel/Crane Lakes Adaptive Management Plan?

The *Pickerel/Crane Lakes Adaptive Management Plan* results from a large-scale project funded by a Wisconsin Department of Natural Resources (WDNR) Lake Planning Grant. The project was submitted by Pickerel/Crane Protection & Rehabilitation District (hereby referred to as the PCPRD). White Water Associates, Inc., an independent ecological consulting firm and environmental laboratory, served as a consultant to the PCPRD.

Project participants have adopted the concept of “adaptive management” in their approach to Pickerel/Crane Lakes Stewardship. Simply stated, adaptive management uses findings from planned monitoring activities to inform future management actions and periodic refinement of management plans. An adaptive management plan accommodates new findings by integrating this information into successive iterations of the comprehensive plan. The plan will therefore be a dynamic entity, evolving and improving to fit the needs of Pickerel/Crane Lakes Stewardship Program and the PCPRD. A central premise of adaptive management is that scientific knowledge about natural ecosystems is uncertain and incomplete. It follows that a practical management plan allows for ongoing adjustments in management designed to “adapt” to changing conditions and new information or understanding. Monitoring the outcomes of plan implementation is essential to the process of adaptive management. It is the goal of the Pickerel/Crane Lakes Stewardship Program and the PCPRD that future monitoring will focus on practical indicators of the environment.

It is appropriate that the PCPRD is the lead organization in the implementation of this plan. The PCPRD is comprised of people who care very much about Pickerel and Crane Lakes. Successful implementation of the plan depends on a coalition of participants, each carrying out appropriate tasks and communicating needs and findings to other team members. Future projects and ongoing monitoring results will inspire updates to the plan. The overall vision of the PCPRD is a healthy, sustainable lakes. This adaptive plan is an important tool to realize that vision.

The Pickerel/Crane Lakes Adaptive Management Plan is not the first plan to guide stewardship of the lakes. The PCPRD was formed in 1987. They organized a lake district with the goal of spreading awareness to their fellow property owners and to best work to “preservation and rehabilitation of Pickerel/Crane Lakes for present and future generations.”



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Besides this introductory chapter, this plan is organized in six additional chapters. Chapter 2 describes the audience for the *Pickereel/Crane Lakes Adaptive Management Plan*. Chapter 3 addresses why there should be a plan and discusses adaptive management and the underlying assumptions of the approach. Chapter 4 details how the plan was created, including the methodology used. Chapter 5 presents the findings from efforts to gather existing and new information about Pickereel/Crane Lakes and its environs by providing summaries of information in eleven subsections. Chapter 6 (*What Goals Guide the Plan?*) presents the desired future condition and goals established by the PCPRD and the plan writers. Chapter 7 (*What Objectives and Actions Move Us Toward the Goals?*) offers a logical menu of practical management actions ready to be adopted and adapted by those interested in taking an active role in caring for Pickereel/Crane Lakes and its surroundings. Twelve appendices complete this document. Appendix A contains the *Literature Cited*. Appendix B1 contains the *Pickereel Lake Aquatic Plant Management Plan* and Appendix B2 contains the *Crane Lake Aquatic Management Plan*. Appendix C1 contains the *Pickereel Lake Review of Water Quality* and Appendix C2 contains the *Crane Lake Review of Water Quality*. Appendix D1 includes the *Pickereel Lake Shoreland and Shallows Habitat Monitoring Report*. Appendix D2 *Crane Lake Shoreland and Shallows Habitat Monitoring Report*. Appendix E1 is the *Pickereel Lake Fisheries Report*. Appendix E2 encompasses the *Crane Lake Fisheries Report*. Appendix F1 presents the *Pickereel Lake Aquatic Invasive Survey*. Appendix F2 is a description of the *Crane Lake Aquatic Invasive Survey*. Finally, Appendix G reviews the *Lake User Survey* for Pickereel/Crane Lakes.

## CHAPTER 2

### Who Is the Audience for the Adaptive Management Plan?

The title of Chapter 3 poses the question: “Why Have the *Pickereel/Crane Lakes Adaptive Management Plan*?” The short answer is “Because we care!” We believe that people working together in the stewardship of these lakes can make a difference. We can protect and restore healthy ecosystems if we take a long-term, strategic approach. That approach is presented in this adaptive plan. It is an adaptive plan in the sense that it will grow and evolve. Implemented actions will be monitored. The plan will be evaluated. It will be reviewed and refined as years go by – as new generations take up their stewardship responsibility.

People who care about Pickereel and Crane Lakes and associated watershed are the most direct audience for this plan. They will be the implementers and evaluators. They will be the reviewers and future plan writers. Many of them live in or near the watershed. These are the “grassroots” – the constituency most connected to Pickereel and Crane Lakes. People who care are also those who live beyond the watershed boundaries. Some of these people visit the lakes for recreation and enjoyment. But the audience also includes foundations and other funding agencies, resource and regulatory agencies concerned with environmental quality, and other citizens that are working on their watersheds.

For those in the “grassroots” camp, this plan is intended to provide a practical approach to carrying out protection and restoration of Pickereel and Crane Lakes. The plan does not have all the answers (it doesn’t even have all the questions). It does not recommend every conceivable rehabilitation or protection action. But the plan provides plenty with which to get started and it leaves room for ideas and contributions from others. Our recipe mixes a pinch of the theoretical with a cupful of the practical. Those of you who are “hands-on” have plenty to do.

The mixed audience of this plan challenges the authors to present a plan that is scientifically grounded and technically oriented, but at the same time accessible and understandable by the public who will in large part be responsible for its implementation. Although scientists are the primary authors of the plan, the writing is aimed at non-scientists. We define terms where clarity is needed and cite other literature for those interested in the source of a statement, or in learning more about the topic. The PCPRD has interacted with the plan writers throughout the process and reviewed draft components of the plan. The PCPRD has encouraged our practical approach so that applications of the plan are conspicuous.

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We will end this chapter with our strongest management recommendation:

***Approach lake and watershed management with humility.***

Lake and watershed ecosystems are enormously complex. Our understanding of how they work is not complete. This is even truer when aquatic invasive species are part of the mix. Our ability to predict outcomes from specific actions is uncertain. New discoveries are made every day that have important implications for future watershed management. We may never know all we need, but that fact can't stop us from starting work on the lakes today. The fact that ecosystems are inherently resilient is to our great advantage. They are able to rebound from disturbance and repair themselves from injury. In fact, some of today's best watershed managers state that "...successful restoration usually has less to do with skillful manipulation of ecosystems than it does with staying out of nature's way" (Williams et al. 1997). This plan is intended to complement nature's own processes.

## CHAPTER 3

# Why Have the Pickerel/Crane Lakes Adaptive Management Plan?

Why create the *Pickerel/Crane Lakes Adaptive Management Plan*? The gut-level answer (“because we care”) was offered in Chapter 2, but the question deserves more thoughtful reflection – the focus of this chapter. This requires consideration of environment, economy, history, and culture. This chapter also defines some important terms and presents the process and underlying assumptions.

### Part 1 - Why Should We Care?

The health of a watershed and the health of local economies like those that exist in the Pickerel/Crane Lakes watershed are highly integrated. A sustainable economy depends on a healthy environment. In fact, all social and economic benefits are based on the biological and physical properties of watersheds (Williams et al. 1997). Our economy should be viewed as being nested inside our environment (Lanoo 1996).

This link between a healthy environment and the economy is true at several scales. For example, most property owners on Pickerel and Crane Lakes have invested in an ecosystem. The reasons that they have purchased the property are linked to the quality of the environment. The economic value of their investment is linked to the health of lake and surroundings. If ecological health declines, so does the value of the property.

At a slightly larger scale, this same principal linking the environment and economy applies to municipalities. The larger human community is caretaker of many ecosystems including Pickerel and Crane Lakes. The long-term economic health of the municipality is tied to the health of the lakes and streams in the area. This applies to the Towns of Nashville and Ainsworth, Forest and Langlade Counties, and (at a larger scale) to the State of Wisconsin.

The PCPRD and this plan aspire to cultivate a deep connection to the lake and its surroundings. It is the people of the watershed that will make the management plan work. Lake and watershed stewardship must be a cultural imperative. In some ways, watershed restoration is about cultural restoration – rejuvenating citizens’ civic responsibility to care for the environment in which they live. This is what Aldo Leopold referred to as “*...the oldest task in human history: to live on a piece of land without spoiling it*” (Leopold 1948).

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People need to feel vital by working to improve, beautify, or build. Sometimes that need is expressed by gardening or volunteering. The PCPRD and this plan aim to harness that energy and apply it to protection and restoration actions focused on Pickerel and Crane Lakes and the watershed. Education, rehabilitation, and protection become outlets for this creative energy.

Why should you care about creating and implementing a practical resource plan? Because we realize the economy and the economic options available to citizens in the watershed are tied to a healthy environment. We are all connected to the lakes and the landscape in some way. Because we feel a civic responsibility to care for the lake. Because we realize Pickerel and Crane Lakes potentially affects other lakes. Because we can feel vital by doing meaningful work in the watershed. Future generations depend on us to convey healthy lakes to them.

The adaptive management plan will be successful if it educates citizens and inspires meaningful stewardship work for the lakes. It needs to make provision for different kinds of approaches and different kinds of people who want to be part of the process. It has to be strategic and integrated so that various actions complement one another, and are consistent with natural processes. The plan should help avoid management actions that work at cross-purposes or whose outcomes are risky or undesirable.

## **Part 2 - What Is an Adaptive Management Plan?**

An adaptive management process (Walters 1986) is an appropriate model to use in lake and watershed management. In adaptive management, a plan is made and implemented based on the best available information and well-defined goals and objectives. Outcomes of management actions are monitored to determine whether they are effective in meeting objectives. Based on this evaluation, the plan is adapted (modified) in a process of continuous learning and refining.

Adaptive management concedes and confronts a truth that resource managers are sometimes reluctant to acknowledge – uncertainty. Because natural systems are so diverse, so complex, and so variable, almost all management actions will have uncertain outcomes. An adaptive management approach essentially takes a position that says, “We will make our best attempt and get better as we go along. We’ll listen to what the natural system tells us.” In adaptive management, monitoring is crucial. Adaptive management uses information from monitoring to continually evaluate and refine management practices. Monitoring measures the success of restoration or management. Well-designed monitoring should indicate how effectively management measures are working and give us new insights into ecosystem structure and function. Monitoring should provide needed information to adapt management goals. As stated by Aldo Leopold (1953):

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*The last word in ignorance is the man who says of an animal or plant, “What good is it?” If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering.”*

The *Pickerel/Crane Lakes Adaptive Management Plan* can be implemented through five kinds of management actions: protection, rehabilitation, enhancement, education, and research. Research actions have a special subset called “monitoring actions” that serve all of the management actions. Each kind of action is summarized in the following bullets.

- Protection actions are used when high quality areas or ecosystem elements are identified and need to be safeguarded. Since aspects of Pickerel and Crane Lakes and surroundings are quite pristine, much adaptive management could fall under this kind of action. There are numerous forms that protection actions can take including protecting water quality, conservation easements, buffer zones to prevent runoff into the lake, and more.
- Rehabilitation actions are those that manipulate site-specific elements of ecosystems in order to repair some past impact. Examples include planting lakeside natural vegetation in areas of erosion, placing fish structure where large woody material has been removed from the lake, or healing an area of active erosion. Individual rehabilitation actions contribute to overall lake and watershed restoration.
- Enhancement actions are intended to improve some function or value of the ecosystem. In some cases, these actions are meant to benefit human users of the lake (for example, enhancing recreation values by planting fish or creating new fish habitat).
- Education actions are those activities that promote lake stewardship and inform people about natural ecosystems. This management plan is an education piece. These actions also include interpretive kiosks, website, or incorporation of lake biology in curriculum of area schools. Every person that visits the lakes represents an educational opportunity.
- Research actions are employed to learn about the system being managed. Often we know very little about the plants, animals, habitats, ecosystems, and processes that our management actions are affecting. Research actions on water quality began at Pickerel and Crane Lakes years ago with basic water quality measures and are ongoing today. More recently, surveys for aquatic plants have contributed to our understanding of the lakes. Monitoring actions (a subset of research actions) are those that serve to evaluate the outcomes of protection, rehabilitation, enhancement, and education actions. Monitoring actions guide future management.

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One word of caution is warranted. Our society typically thinks a long-term planning horizon is twelve months. Unfortunately, this is out of synchrony with the way an ecosystem functions. An ecological clock ticks off time in years, decades, centuries, and even millennia. Lake and watershed management and restoration must be viewed from this perspective. In fact, the final outcomes of some of the good work put in place today might not be apparent until a new generation of lake stewards is on the scene.

### **Part 3 - What Are the Plan's Underlying Assumptions?**

As an adaptive plan, a basic assumption is that the management actions will change over time under the influence of stakeholders. Through iterative refinement, the plan will more closely reflect the needs of the lakes and the people who care about them. This plan has assumed a desired condition of sustainable lake health. The plan attempts to reflect the collective vision of the people and organizations that are concerned with the lakes and surroundings. The PCPRD, Forest County Land & Water Conservation Department, the WDNR, and those living and recreating in the Pickerel/Crane Lakes watershed are among these stakeholders. The plan also attempts to reflect and foster the intrinsic characteristics and potential of the lakes themselves.

The Forest County Land & Water Conservation Department and the Langlade Land Conservation Department provide a variety of land information and related services including: natural resource and water quality protection data, AIS information and assistance, geographic information, rural addressing, Public Land Survey System and surveying data, property ownership and tax assessment info and mapping products. These offices can provide important assistance in subsequent phases of Pickerel/Crane Lakes Stewardship.

At a larger geographic scale, the WDNR published the *Headwaters Basin Integrated Management Plan* (WDNR et al. 2002) that provides a snapshot of current conditions of resources in the larger drainage basin that includes Pickerel and Crane Lakes. The Plan outlines nineteen issues of concern to the basin, including control of exotic species, shoreline development, resource inventory and monitoring, habitat loss, user conflicts, and protection of endangered, special concern, or unique species.

The integrating features of this adaptive management plan are Pickerel and Crane Lakes and the surrounding watershed. The plan assumes that proper planning in the beginning of the process will save time and money throughout the life of the program and that this can be accomplished by managing the causes rather than (or at least, in addition to) managing the symptoms of any impairments.



## CHAPTER 4

# How Was the Pickerel/Crane Lakes Management Plan Made?

In this chapter, we describe the methods that were employed to accomplish various project tasks and objectives. A team of scientists (White Water) in consultation with the PCPRD prepared this adaptive management plan. The methods that were used followed closely the goals, objectives, and tasks that were described in the grant proposal submitted to the WDNR. We describe these methods in this section under descriptive paragraph headings.

The effort included gathering, reviewing, and summarizing existing information pertaining to Pickerel and Crane Lakes biota and water quality. Existing information is found in many repositories and forms including anecdotal accounts of residents, resource agency reports and memos, municipal planning and zoning documents, scientific reports, old and new photographs, best guesses of knowledgeable people, and government land office records. Not all of the existing information is of equivalent value in the planning process. Some is not verifiable and the methods by which it was collected are unknown.

***Watershed*** – The watershed analysis included delineating the Pickerel and Crane Lakes watershed area and mapping land cover/use and soils of the watershed. This information is discussed further in the Pickerel and Crane Lakes *Aquatic Plant Management Plans* (Appendices B1 and B2). We used existing layers of geographic information available from the WDNR and other sources and manipulated these data using geographical information system technology.

***Aquatic Plants*** - Aquatic plant surveys were conducted on Pickerel and Crane Lakes in 2019 using a point-intercept protocol. Data were analyzed and summarized. The data allow calculation of ecological metrics such as number of sites where a plant species is found, relative percent frequency of species occurrence, frequency of occurrence within vegetated areas, frequency of occurrence at all sites, and maximum depth at which plants are found. The data also allow calculation of metrics such as total number of points sampled, total number of sites with vegetation, total number of sites shallower than maximum depth of plants, frequency of occurrence at sites shallower than maximum depth of plants, Floristic Quality Index, maximum depth of plants, average number of all species per site, average number of native species per site, and species richness. These data and the subsequent analyses were used in creating the *Aquatic Plant Management Plans*.

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***Aquatic Plant Management Plan*** - An important component of this project was our objective to prepare *Aquatic Plant Management Plans* (APMPs) for Pickerel and Crane Lakes. This involved interpreting and summarizing the aquatic plant data for inclusion in the plans. We created an APMP for each lake that include goals, objectives, historical plant management, monitoring, evaluation, plant community, nuisance species, AIS, management actions, and recommendations. The APMPs are included as Appendices B1 and B2 of this adaptive management plan.

***Water Quality*** - One of our objectives was to gather, consolidate, assess, and manage information about Pickerel and Crane Lakes water quality and potential risks to water quality. Four tasks were applied to achieving this objective: (1) collect and review existing limnological information about the lakes, (2) analyze and summarize water quality data, (3) assess the existing regimen of water quality sampling on the lakes and determine appropriateness to lake conditions, and (4) revise (if needed) the water quality sampling regimen for Pickerel and Crane Lakes as dictated by current information needs. This water quality data provides insight into lake health and is a useful starting point for adaptive lake management. The review of Pickerel and Crane Lakes water quality can be found in Appendices C1 and C2.

A previous plan prepared for the PCPRD developed baseline information pertaining to Pickerel and Crane Lakes water quality by applying the water quality-planning tool known as the *Wisconsin Lake Modeling Suite* (WiLMS). The model is comprised of four parts: the model setup, phosphorus prediction, internal loading and trophic response (Hassett et al. 2003). Because this model is very dependent on watershed cover types and because watershed cover has changed very little, we did not repeat this effort.

***Littoral and Riparian Zones*** – In 2016, the WDNR developed a protocol called *Lake Shoreland and Shallows Habitat Monitoring* (WDNR, 2016). It is a standard methodology for surveying, assessing, and mapping habitat in lakeshore areas, including the riparian buffer, bank, and littoral zones. This information will be useful to local and regional resource managers, community stakeholders, and others interested in protecting and enhancing lakes and streams. Part of the shallow water habitat survey includes documenting woody habitat. White Water biologists conducted an assessment of Pickerel and Crane Lakes using the protocol and detailed reports for each lake can be found in Appendices D1 and D2.

***Fisheries*** - As part of the adaptive management plan, White Water biologists gathered and summarized information about Pickerel and Crane Lakes fisheries. This objective was fulfilled by reviewing WDNR fisheries reports and communicating with the area WDNR fisheries

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biologist and the Director of the Mole Lake Fisheries. White Water biologists summarized this information for inclusion in this adaptive management plan (Appendices E1 and E2).

***Educational Outreach*** - A planning objective was to support the educational program efforts were related to Pickerel/Crane Lakes and other management elements. Toward this end, White Water staff was available for phone consultation with members of the PCPRD and other stakeholders. We presented at meetings of the PCPRD. We endeavored to increase support, capacity, and involvement of the PCPRD and other stakeholders in long-term stewardship of Pickerel and Crane Lakes through communication of project progress and findings. White Water staff was not able to provide a floating workshop due to COVID restrictions.

***Aquatic Invasive Species Survey*** – As part of the lake study and planning process, White Water biologists gathered and summarized information about aquatic invasive species (AIS) found in Pickerel and Crane Lakes. In order to verify if AIS were present in study area, biologists followed the *Aquatic Invasive Species Early Detection Monitoring Standard Operating Procedure* (WDNR, 2014). This procedure outlines several types of monitoring techniques, including: boat landing searches, sample site searches, targeted searches, waterflea tows and/or a Ponar dredge, and meander search. The results are presented in Appendices F1 and F2.

***Lake User Survey*** – PCPRD, in consultation with White Water staff and WDNR, prepared a lake user survey. The PCPRD distributed the survey and analyzed the returned data. These results are presented as Appendix G of this document.

***Adaptive Management Plan*** – A final project objective called for the creation of this initial adaptive management plan for Pickerel and Crane Lakes that will help ensure high quality lake management and will serve as a firm foundation for future iterations of the plan. The adaptive management plan integrates the aquatic plant management plans with other information about Pickerel and Crane Lakes and the associated watershed. This objective was guided by two basic tasks. The first task was to develop management recommendations for Pickerel and Crane Lakes. These recommendations include topics such as water quality, fish habitat, special species habitat (rare plants and animals), special attributes, non-native species, and ecological threats. The second task was to prepare a practical written plan, grounded in science that includes sections on implementation, monitoring, and adaptive management. The plan will lay the basis for its expansion in future phases. It will identify where more information is required. White Water scientists carried out tasks under this objective.

## **CHAPTER 5**

# **What is the State of Pickerel and Crane Lakes and the Watershed?**

An understanding of the features and conditions of Pickerel and Crane Lakes and the surrounding landscape is the foundation for strategies that seek to protect and restore the biological health of the area. We have sought information useful to devising the lake's adaptive management plan. Future project phases will collect and incorporate additional information.

This chapter is intended to teach us about Pickerel and Crane Lakes. What is each lake like? What is the surrounding landscape? What organisms live here? How healthy are the lakes? How have humans contributed (or detracted) from that health? Do threats to watershed health exist? This chapter identifies and organizes existing information and reports on new findings.

If you are new to Pickerel and Crane Lakes, this chapter will make you familiar with existing features and conditions and provide some insight as to why things are the way they are. If you are a life-long resident of the Pickerel/Crane Lakes area, you may be familiar with parts of the discussion in this chapter. You may have things to contribute or correct. This would be a welcome response. Become engaged! Improve the understanding of the watershed by adding your knowledge in future iterations of this plan.

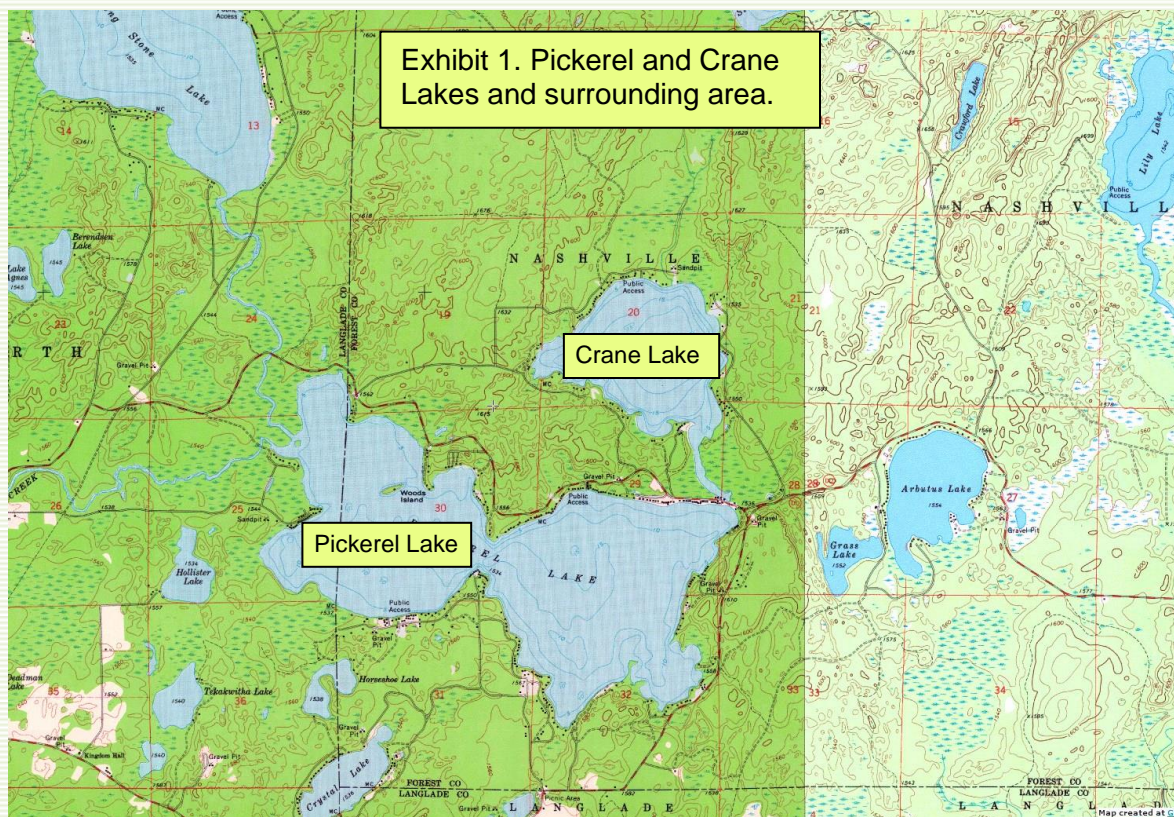
We present Chapter 5 in ten Parts, each part reflecting the following topics: the lake and surroundings; aquatic plants; water quality; littoral and riparian zones; fisheries; wildlife; non-native invasive species; special attributes; environmental threats, and the lake user survey. Various appendices are referenced from the text.

### **Part 1. Pickerel and Crane Lakes and the Surrounding Area**

Pickerel and Crane Lakes are located two miles north of Pickerel, Wisconsin in Langlade and Forest Counties. Other lakes are in this landscape and form an interconnected water landscape. Pickerel and Crane Lakes have value and function in this larger landscape.

Pickerel Lake has a 10.26 mile shoreline with 1,272 acres of surface area. Crane Lake has a 4.78 mile shoreline with 355 acres of surface area. There is a boat ramp on the north side of Crane Lake. Pickerel Lake has two boat landings. One is on the north side off Pickerel Lake Road and the other is at South Shore Drive. The lakes are developed with permanent homes and cottages, although areas of more natural riparian area also exist. Exhibit 1 shows the Pickerel/Crane Lakes area.





## Part 2. Aquatic Plants and Aquatic Plant Management Plans

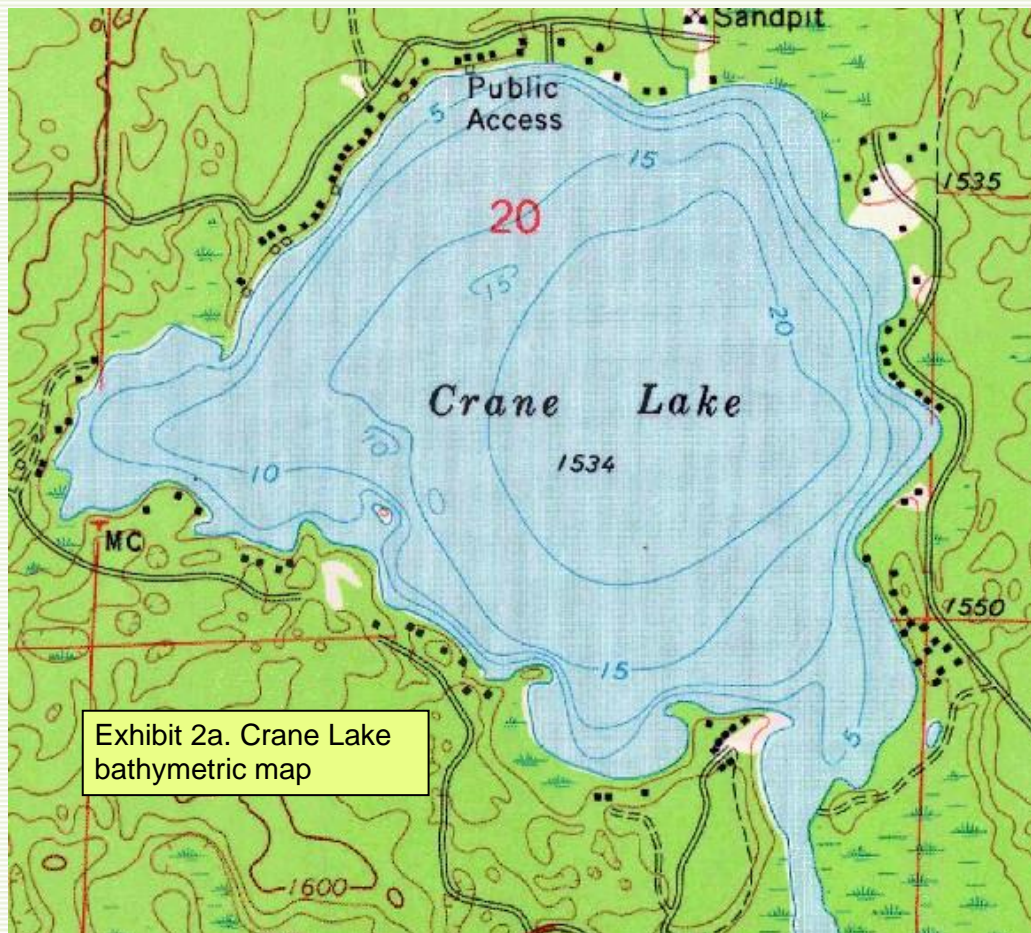
Aquatic plant management on Pickerel Lake began with the discovery of Eurasian water-milfoil (*Myriophyllum spicatum*) in 2006. The WDNR verified the milfoil to be a hybrid species (*Myriophyllum spicatum* x *sibericum*). In 2009, Onterra staff located several Eurasian water-milfoil plants in Crane Lake. The APMPs (Appendices B1 and B2) provide more thorough descriptions of plant management in the lakes.

Point-intercept aquatic plant surveys were conducted on Pickerel and Crane Lakes in 2006 and 2019. The 2019 aquatic plant survey documented 25 species in Crane Lake and 27 species in Pickerel Lake. The aquatic plant community is diverse and has high floristic quality. The Pickerel and Crane Lakes plant communities are healthy and diverse. In 2019, White Water biologists observed purple loosestrife (an non-native, invasive plant) at one location on Crane Lake. These topics are discussed in more detail in the Pickerel and Crane Lakes APMPs.

### Part 3. Pickerel and Crane Lakes Water Quality

The water body identification code (WBIC) for Pickerel Lake is 388100 and Crane Lake is 388500. Pickerel Lake has a maximum depth is 19 feet and Crane Lake has a maximum depth of 25 feet. Exhibits 2a and 2b show depth maps for each lake. The water quality data from Pickerel and Crane Lakes support a mildly eutrophic classification (WDNR 2021; Exhibit 3).

Existing water quality data has been collected since 1990 for Crane and 1992 for Pickerel Lake by the WDNR and Citizen Lake Monitoring Network (CLMN) volunteers. White Water biologists took water samples in 2019. Water quality information is briefly summarized below, but more fully described in Appendix C1 and C2.







Temperature and dissolved oxygen samples show stratification in Crane Lake in the ice-free season but in Pickerel Lake there is only slight stratification depending on the date. Water clarity is good, with an average summer Secchi reading of 6 feet in 2020 for Crane Lake and a Secchi reading of 9 feet in 2020 for Pickerel Lake. The trophic state is mildly eutrophic for both lakes. Such lakes (Exhibit 3) typically have an intermediate amount of nutrients. The deepest levels become devoid of oxygen in late summer and limit coldwater fish. Water quality in Crane Lake can be classified as “fair to good” with respect to phosphorus concentrations and “very good” for Pickerel Lake. Chlorophyll *a* (a measure of the amount of algae in a lake) was below nuisance levels and well below Wisconsin natural lakes in both lakes. Nitrogen, chloride, sulfate, calcium, hardness, conductivity, magnesium, sodium, and potassium would all be considered low. Alkalinity (a measure of a lake’s buffering capacity against acid rain) was also low. The pH is slightly alkaline in both lakes.



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### **Exhibit 3. Trophic Status**

***Trophic state** of a lake is an indicator of water quality. Lakes are typically divided into three categories of trophic state: oligotrophic, eutrophic, and mesotrophic.*

***Oligotrophic** lakes are clear, deep, and free of weeds or large algal blooms. They are low in nutrients and do not support large fish populations, but they can develop a food web capable of sustaining a desirable fishery.*

***Eutrophic** lakes are high in nutrients and support large biomass (plants and animals). They are usually either weedy or subject to large algal blooms or both. Eutrophic lakes can support large fish populations, but are also susceptible to oxygen depletion. Small, shallow, eutrophic lakes are especially vulnerable to winterkill.*

***Mesotrophic** lakes are intermediate between the oligotrophic and eutrophic. The deepest levels become devoid of oxygen in late summer and limit coldwater fish. Anoxic conditions at the water-sediment interface causes phosphorus to be released from the sediments.*

*Over long periods of time, lakes go through natural aging from oligotrophic through mesotrophic to eutrophic. As part of this process, they begin to fill in. This aging process can be sped up by introductions of sediments and nutrients. (Shaw et al., 2004).*

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The *Wisconsin Lake Modeling Suite (WiLMS)* was used as a lake water quality planning and education tool for Pickerel/Crane Lakes. WiLMS is a computer program into which the user enters information about the lake (e.g., surface area, depth, and nutrient measures) and the watershed (e.g., acreage and cover types). The model also has information about average rainfall, aerial deposition of materials, and cover type characteristics that it uses to help predict nutrient (phosphorus) loading scenarios to the lake. WiLMS predicted that most of the phosphorus delivered to Pickerel/Crane Lakes comes from wetland cover, the most common cover type in the watershed. A WiLMS assessment was analyzed in the 2009 *Pickerel and Crane Lakes Comprehensive Management Plan*. There hasn't been much change in the watershed surrounding Pickerel and Crane Lake so an assessment was not repeated for this plan.

### **Part 4. Pickerel and Crane Lakes Littoral Zones and Riparian Areas**

The littoral zone is a critical part in maintaining a healthy lake ecosystem. This zone can be generally defined as the area nearest to a lake's shore in which it is usually shallowest, warmest and where sunlight can penetrate to the bottom. These factors usually allow for aquatic plants to grow. Aquatic plants provide habitat for invertebrates and fish in lakes. They also provide a food

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source for wildlife species, dampen the impact of waves, and absorb nutrients that would otherwise be used by algae. Bottom substrates also play an important role in the littoral zone. Substrates can include bedrock, cobble, sand, muck and woody material. These substrates provide habitat for invertebrates, amphibians, crustaceans and fish. Not all substrates are suitable for aquatic plant growth.

The shoreline development index (SDI) is a metric used to indicate the amount of potentially productive littoral zone habitat relative to the overall acreage of the lake. The shoreline development index is a quantitative expression derived from the shape of a lake. It is defined as the ratio of the shoreline length to the length of the circumference of a circle of the same area as the lake. A perfectly round lake would have an SDI of 1. Increasing irregularity of shoreline development in the form of embayment's and projections of the shore is shown by SDIs greater than 1. For example, fjord lakes with extremely irregularly shaped shorelines can have SDIs exceeding 5. The Shoreline Development Indices for Crane and Pickerel Lakes are 1.8 and 2.1, respectively. These values indicate that Crane and Pickerel Lakes have relatively smaller amounts of potentially productive littoral zone habitat compared to lakes with more convoluted shorelines. Based on the 2019 aquatic plant survey, Crane Lake's littoral zone is about 35% of its surface area. The littoral zone of Pickerel Lake (in spite of the lake's rather low SDI) is 95% of its surface area due to its shallow bathymetry and relatively clear water. This productive area drives the productivity of fish in both lakes and is the reason the lakes can support good fisheries and wildlife like common loons and other fish eating animals. Pickerel Lake is an exceptionally productive lake with respect to rooted aquatic vegetation.

Riparian zones make up the area where aquatic and terrestrial ecosystems converge. The riparian area is a structurally diverse and naturally dynamic ecosystem. It is an area where humans put homes, beaches, and other structures and is quite sensitive to these human-caused changes. Like the littoral zone, the riparian zone provides shelter and food sources for wildlife, and improves water quality by retarding runoff, reducing erosion and absorbing pollutants. Because of this great importance, riparian areas are protected by the Wisconsin Administrative Code. It requires at least 35 feet of land inland from the ordinary high water mark (OHW) be a vegetative buffer zone (State of Wisconsin Legislature).

In 2016, the WDNR formulated a protocol called *Lake Shoreland and Shallows Habitat Monitoring* (WDNR, 2016). It provides a standard methodology for surveying, assessing, and mapping habitat in lakeshore areas, including the riparian buffer, bank, and littoral zone. White Water biologists applied this methodology to assess the shoreland and shallow water habitat of Pickerel/Crane Lakes. Part of the shallow water habitat survey included documenting woody habitat (critical fish and invertebrate habitat). Reports of the findings for each lake can be found in Appendices D1 and D2. This information will be useful to stakeholders to identify areas on the lakes that would benefit by protection or restoration. On a broader scale, local and regional resource managers, community leaders, and others interested in protecting and enhancing Wisconsin's lakes and rivers will make strategic planning use of these data sets. Exhibit 4 provides some characteristics and functions of the lake shoreline and suggests ways to maintain this important habitat.

#### **Exhibit 4. Lake shoreline characteristics, functions, and protection & restoration strategy**

##### ***How can healthy shorelines benefit a lake?***

- *Help maintain clean water & water quality*
- *Prevent soil erosion*
- *Provide wildlife with habitat & food.*

##### ***What does a healthy shoreline look like?***

- *Lots of native vegetation*
- *Varying heights of trees, shrubs, & plants*
- *Down dead trees*
- *Signs of wildlife*

##### ***How can you maintain a healthy shoreline?***

- *Minimize runoff pollution (for example, fertilizers, pesticides, leaky septic systems)*
- *Protect and encourage native plants.*

## **Part 5. Pickerel and Crane Lakes Fisheries**

There is considerable historic fisheries data for Pickerel and Crane Lakes. Over the years, various fish surveys have been conducted on the lakes and the results have been used to determine fisheries management for the lakes. Fish species present in the lakes have been: panfish, yellow perch, black crappie, largemouth bass, northern pike, and walleye. Fish stocking in lakes has consisted mainly of walleye. The most recent WDNR fishery surveys were conducted using electrofishing gear on Crane and Pickerel Lakes and took place in 2020 and 2019, respectively. More detailed information about the Pickerel/Crane Lakes fishery is provided in Appendices E1 and E2.

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## Part 6. Pickerel and Crane Lakes Wildlife

For many reasons, lakes attract a variety of wildlife species. Some of these species require a lake as a prime habitat component. Some live in or near the lake permanently. Others species visit only at times in order to obtain crucial resources. Lakes provide food in the form of plants, insects, fishes, and other organisms. Lakes provide breeding and nesting sites. Lakes provide shelter and protection. Some of the wildlife species that use lakes are common (for example, green frogs, painted turtles, tree swallows, belted kingfishers, mink, and muskrats). In contrast, other lake-dependent wildlife species are relatively rare (for example, common loons, bald eagles, and osprey). In this section, we focus on two species (common loon and bald eagle) that in many ways represent the quintessential image of a northern Wisconsin lake. These species, when present also provide a strong indication of a healthy lake.

The common loon (*Gavia immer*) has one of the most distinct plumages of North American birds. It is a large bird with spotted black and white body, and a black/iridescent green head. The loon has many distinct calls for guarding territories, communicating with other loons, and warding off threats. Loons spend most of their life in the water. Unlike most birds, loons have solid bones allowing them to dive as deep as 250 feet in search of food (MNDNR 2017). With legs positioned fairly far back on their body, loons are good swimmers. The position of the legs, however, means that walking on land is difficult. Perhaps because of their awkwardness on land, loon nests are built close to shore (Cornell 2017). Loon nests are made of grasses, rushes, and twigs. Loons often place their nests on a small island or isolated point in an attempt to avoid predators. They sometimes will use artificial nest platforms. Loons are quite territorial during the breeding and nesting period. A small lake (12-125 acres) can accommodate only a single pair of breeding loons. Larger lakes may have more than one pair, with each pair occupying a bay or different section of the lake (Loon Pres. Comm. 2018). LoonWatch, a program of the Sigurd Olson Environmental Institute, has hundreds of volunteers monitoring loon nests and territories throughout Wisconsin. In 2010, volunteers observed approximately 4,000 adult loons and 600 chicks throughout Wisconsin. The PCPRD should consider implementing some volunteer observations of loons or participation in the LoonWatch program.

The bald eagle (*Haliaeetus leucocephalus*) is listed as a Special Concern species in Wisconsin, and is federally protected by the Bald & Golden Eagle Act (WDNR 2013). Bald eagles live near water and eat small animals, carrion, and fish (preferring fish). They are believed to mate for life. Eagles create their nests in tall trees, using sticks and other debris. Eagle territories can be 1 to 2 square miles. In Wisconsin, bald eagle nest and territory surveys are conducted by plane. In 2017, there were 1,590 known bald eagle nest territories occupied by

breeding adults, the highest number ever recorded (NHI 2021). The Wisconsin Natural Heritage Inventory (NHI) assesses the rarity of species by using State and Global ranks. The State and Global ranks of the bald eagle can be described as: “Apparently secure in Wisconsin, with many occurrences (Breeding and Non-breeding),” and “Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.”

Other rare species and communities exist near Pickerel and Crane Lakes. The Wisconsin Natural Heritage Inventory (NHI) lists these rare species and communities and Exhibit 5 shows those found in the same township(s) as Pickerel and Crane Lakes. Some respondents to the lake user survey provided sightings of wildlife on or near Pickerel/Crane Lakes. Animals included beaver, river otter, trumpeter swans, pied-billed grebes, sculpin, wolf, bobcat, blue heron, common loon, muskrat, and fisher.

**Exhibit 5. Rare Species & Communities located near Pickerel and Crane Lakes.**

<i>Common Name</i>	<i>Scientific Name</i>	<i>State Status*</i>	<i>Group Name</i>
Little Goblin Moonwort	<i>Botrychium mormo</i>	END	Plant
Yellow Rail	<i>Coturnicops noveboracensis</i>	THR	Bird
Woodland Jumping Mouse	<i>Napaeozapus inisignis</i>	SC/N	Mammal
Northern Sedge Meadow	Northern sedge meadow	NA	
Northern Wet-mesic Forest	Northern Wet-mesic Forest	NA	
West Virginia White	<i>Pieris virginiensis</i>	SC/FL	Butterfly
Poor Fen	Poor Fen	NA	
Torrey’s Bulrush	<i>Schoenoplectus torreyi</i>	SC	Plant

\* **END**=Endangered; **THR**=Threatened; **SC**=Special Concern; **SC/P**=fully protected; **SC/N**=no laws regulating use, possession or harvesting; **SC/H**=take regulated by establishment of open/closed seasons; **SC/FL**=federally protected as endangered or threatened, but not so designated by DNR; **SC/M**=fully protected by federal and state laws under Migratory Bird Act (WDNR 2021).

## Part 7. Pickerel and Crane Lakes Aquatic Invasive Species

According to the WDNR website, five invasive species have been documented in Pickerel Lake: Banded mystery snail (2009), Chinese mystery snail (2011), Eurasian water-milfoil (2006), Hybrid Eurasian/Northern water-milfoil (2006), and rusty crayfish (2011). According to the same source, Crane Lake has four documented aquatic invasive species: Banded mystery snail (2011), Chinese mystery snail (2014), Eurasian water-milfoil (2011), and Hybrid Eurasian/Northern water-milfoil (2009). In 2019, White Water Associates biologists monitored Pickerel and Crane Lakes for aquatic invasive species in June and May, respectively. Results are

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presented in Appendices F1 and F2. The banded mystery snail, Chinese mystery snail, Eurasian water-milfoil, and rusty crayfish were documented during the June 2019 Pickerel Lake survey. During the May 2019 Crane Lake survey, banded mystery snail, Chinese mystery snail, and purple loosestrife were documented. Eurasian water-milfoil was found during the aquatic plant survey. The hybrid Eurasian/Northern water-milfoil was not distinguished from the Eurasian water-milfoil during that work. The University of Wisconsin-Madison’s Aquatic Invasive Species Smart Prevention program classifies Pickerel and Crane Lakes as “suitable” for zebra mussels, based on calcium and conductivity levels (UW-Madison). This means that particular care should be exercised to avoid introduction of zebra mussels to the lakes. The AIS information is more fully interpreted in Appendices C1, C2, F1, and F2.

## **Part 8. Pickerel and Crane Lakes Area Special Attributes**

An objective for future iterations of the Pickerel/Crane Lakes Adaptive Management Plan will be to develop a description of specific environmental, cultural, and aesthetic attributes along with an assessment of the threats to the quality of these attributes. Environmental quality attributes can be organized in three categories: (1) environmental (ecological), (2) cultural and (3) aesthetic (Redding, 1973). Some resources may display all three conditions and others may contain only one. More complete definitions (Redding, 1973) of the three categories are as follows:

1. Environmental (ecological) attributes are components of the environment and the interactions among all its living and nonliving components that directly or indirectly sustain dynamic, diverse, and viable ecosystems. Included are functional and structural aspects of the environment.
2. Cultural attributes are evidence of past and present habitation that can be used to reconstruct or preserve human lifeways. Included are structures, sites, artifacts, and environments.
3. Aesthetic attributes are perceptual stimuli that provide diverse and pleasant surroundings for human annulment and appreciation. Included are sights, sounds, scents, tastes, and tactile impressions.

The first two attributes (ecological and cultural) are more tangible than the third but aesthetic attributes are important when it comes to how people feel about a feature and are compelled to protect a feature or otherwise act as stewards. The importance of preserving aesthetic resources is emphatically expressed in the National Environmental Policy Act 1969 that requires the “Federal Government to use all practicable means ..... (to) .... assure for all

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Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings... and to... preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice” (NEPA Sec. 101 (b) (2, 4)). Aesthetic quality is a subjective attribute. Something that has high aesthetic value for one person may not receive the same consideration from another. Some hold high aesthetic value in a manicured lawn where others prefer a more natural ground cover. Aldo Leopold (1948) expresses his love for nature and its beauty and the need for a land ethic to protect natural beauty and “quality of life.”

As has been outlined in various parts of this Adaptive Management Plan, Pickerel and Crane Lakes are high quality ecosystems with respect to water quality, aquatic plants, fish community, and wildlife habitat. These attributes combine to engender a high aesthetic quality. The next part outlines some of the potential environmental threats to this high quality.

## **Part 9. Environmental Threats to Pickerel and Crane Lakes**

As outlined in the previous part, the Pickerel/Crane Lakes watershed ecosystem has numerous attributes of high ecological and aesthetic significance. These attributes combine to help make the area a unique and special place. Pickerel and Crane Lakes, however, are subject to environmental threats from a variety of sources. We outline some of these threats in this part of the adaptive management plan. In addition, respondents to the lake user survey (see Part 10) provided several specific perceived threats to the lake (see Exhibit 6).

***Recreational pressure*** – Pickerel and Crane Lakes are well-used fishing and recreational lake for people from near and far. An expanding base of admirers will result in increasing recreational pressures. Increased traffic in and out of the lake increases opportunities for AIS, fuel spills, and other pollution. The user survey revealed that 27% of respondents use their boats on Pickerel/Crane Lakes and other water bodies in Wisconsin indicating a potential for transfer of AIS but the majority use steps to clean their boats.

***Development pressure*** – Pickerel and Crane Lakes have some areas of residential development as well as areas with predominantly natural vegetation and broad riparian areas. In some areas of the lake, old-style lawns, cropped short and in close proximity to the shore indicate a need for educational effort to inform residents about more ecologically friendly waterfront vegetation. Likewise, well-intended activities meant to “clean up” the shoreline or shallow water of the lake diminish the habitat quality for invertebrates and fish and could be addressed with some targeted education. Inadequate septic systems potentially contribute nutrients and pathogens to the lakes.



**Water quality inputs** – The water quality and aquatic ecosystem functioning of Pickerel and Crane Lakes is affected by all inputs of water (groundwater, precipitation, streams, and overland runoff). All of these sources have potential to carry pollutants to the lakes. Pickerel and Crane Lakes have good to fair water quality and a long record of water quality monitoring. Nevertheless, non-point source pollution (see next paragraph) represent an important threat to Pickerel and Crane Lakes water quality. Crane Lake is currently designated as a 303d Impaired Water due to high levels of algae.

**Non-point source pollution** – Surface runoff from the land, roadways, parking lots and other surfaces flows into Pickerel and Crane Lakes. This runoff carries with it sediment, nutrients (for example, from fertilizers) and contaminants (for example, oils, salts, herbicides) that can have detrimental effects on the lakes. Known as non-point source pollution (because it does not emanate from a discrete point like an effluent pipe from an industrial site), this kind of runoff can come from lawns, agricultural fields, clear-cuts, and impervious surfaces (for example, roads and paved parking lots). Sometimes the impact is physical, such as sediment covering gravel spawning areas. Sometimes it is chemical such as excess phosphorus from lawn fertilizers that might invoke an algal bloom. This type of pollution can be best controlled through education and protection of riparian buffers (natural vegetation near the waterways that absorb the pollutants before they reach the water). Pickerel Lake currently receives water pumped from Crystal Lake. This action is intended to mitigate high water conditions for homeowners on Crystal Lake. When this pumping is going on, non-point source pollution that has been delivered to Crystal Lake could come to Pickerel Lake via the discharge pipe. Aquatic invasive species (see next paragraph) could come via this route as well.

#### **Exhibit 6. Threats to Pickerel & Crane Lakes identified by the lake user survey.**

Respondents to Pickerel/Crane Lakes User Survey identified threats, including

- Eurasian water-milfoil and other AIS
- Potential contamination from lands upstream of the lake
- Increased human activities (boating, fishing, guiding) & boating safety
- Fertilizer/chemical runoff
- Shoreland disturbance
- Shoreline erosion
- Shoreland disturbance & vegetation removal
- Septic tank inspection & compliance
- Lack of shoreline buffers
- Groundwater contamination
- Increased development of homes
- Decrease in fishery
- Fuel spills
- High speed boating and jet skis

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***Aquatic invasive species*** – Non-native plant and animal species have become important concerns for aquatic, wetland, and terrestrial ecosystems. As more populations of aquatic plant and animal invasive species become established in lakes and streams in the region, the likelihood of additional AIS coming to Pickerel and Crane Lakes increases. When it comes to non-native aquatic plant invaders, the best defense against establishment is a healthy and diverse native plant community as presently exists in the lakes. Effective education and diligent monitoring are important factors in avoiding establishment of new AIS. Once established, an AIS plant species might simply become part of the plant community and not cause demonstrative negative impact. Alternatively, an AIS plant might go through a period of rampant growth and cause recreational or ecological harm.

***Riparian ecosystem integrity*** – Healthy riparian areas (the naturally vegetated land near the water) provide numerous important functions and values to Pickerel and Crane Lakes. For example, they serve as habitat for many species, contribute important habitat to the lake (e.g., large wood), filter out non-point source pollution from entering the lake, and armor the shores against erosion. Educating riparian owners around the lakes as to the importance of riparian areas is crucial to the maintenance of these critical areas.

***Littoral zone ecosystem quality*** – Much of the productivity of a lake comes from the shallow water areas known as the littoral zone. This is where plants grow, invertebrates live, fishes spawn, and aquatic birds and mammals spend much of their time. The presence of good aquatic vegetation, diverse substrate, and dead woody material (logs and branches) is crucial to this littoral zone ecosystem. Sometimes the human temptation is to “clean up” these areas, but in fact this process diminishes the habitat quality greatly. As mentioned above, removing native aquatic vegetation runs the risk of providing space (habitat) for non-native invasive plants to establish. It is important to educate landowners and others about how to protect the littoral zone from degradation. Piers and swimming areas impact the littoral zone as well, but can coexist with a quality shallow water habitat if kept to a reasonable level.

***Habitat degradation of nearby aquatic and wetland habitats (ponds, streams)*** – The wetland habitats, streams, small lakes, and ponds in the vicinity of the lakes all contribute to the high quality of the lake. These smaller ecosystems can be overlooked in terms of their importance and therefore deserve some special attention. One of the first protective measures to take is to identify where these features are and characterize their size and ecological composition. This informs future protection and restoration efforts.

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## **Part 10. Lake User Survey**

In order to maintain the high quality condition of Pickerel/Crane Lakes, input from the public is needed. This input helps us to understand the needs, knowledge base, concerns and desires of people who use Pickerel/Crane Lakes. In this regard, a lake user survey was created and distributed to Pickerel/Crane Lakes landowners. The results of this survey are available as Appendix G of this document.

## CHAPTER 6

# What Goals Guide the Pickerel/Crane Lakes Adaptive Management Plan?

“Protect the Best and Restore the Rest” has become the credo of successful watershed managers across the country. This simple phrase acknowledges that watershed management is more than identifying the worst areas and trying to rehabilitate them. It recognizes that of equal or greater importance is identifying those areas that are of high or moderate quality in the watershed and establishing mechanisms to maintain that quality. “Protect the Best and Restore the Rest” also implies the importance of identifying imminent threats to watershed health and working to eliminate them. This simple principal is founded on the restoration ecology fact that the most certain way to successfully restore the structure and function of part of a broken watershed ecosystem is to rely on intact areas of the watershed to serve as the donors of healthy “parts” (such as aquatic insect species or good quality water). “Protecting the Best” allows us to “Restore the Rest” more effectively and economically. But, protecting the best is prerequisite.

The primary goal of the *Pickerel/Crane Lakes Adaptive Management Plan* is to perpetuate the quality of Pickerel and Crane Lakes and the associated watershed ecosystem into the future. Sometimes this will mean protecting what is good and sometimes it may mean restoring some feature that has been degraded. Restoration is reestablishment of the structure and function of an ecosystem including its natural diversity (Cairns 1988; National Research Council 1992). It implies rehabilitating and protecting sufficient components of the ecosystem so that it functions in a more or less natural way, provides habitat for native plants and animals, and supports reasonable human uses.

The *Pickerel/Crane Lakes Adaptive Management Plan* offers several supporting goals. In an adaptive plan, new goals can be adopted as the plan evolves. We conclude this chapter by presenting these goals organized under topical headings.

**Restoration** – Apply rehabilitation, protection, and education actions under the direction of specific objectives and identified specific areas in the Pickerel/Crane Lakes watershed.

**Research** – Gather information that is useful in planning and monitoring restoration actions and devising education programs.

**Monitoring** – Establish a monitoring system in the Pickerel/Crane Lakes watershed that will provide data that reveals the quality of the system and establishes methods to evaluate the effectiveness of management efforts.

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***Cultural Climate*** – Encourage a cultural and political atmosphere that allows and promotes good stewardship including cooperation between citizens, businesses, public agencies, and municipalities.

***Sustainable Economy*** – Foster an environment that promotes a sustainable economy, provides a diversity of economic options for the residents of the watershed, and does not diminish opportunities for future generations of watershed residents.

***Recreation*** – Promote a sustainable recreation for Pickerel and Crane Lakes where all citizens (now and in the future) can enjoy the opportunities of the natural and human-sustained environment while respecting the environment and the rights of fellow citizens.

***Program Maintenance*** – Foster a stewardship culture that engages people to donate time, talent, and money sufficient to support the implementation and periodic update of the *Pickerel/Crane Lakes Adaptive Management Plan*.

In the final chapter of this plan, we present possible objectives and actions that will serve to move toward these goals. This is not an exhaustive treatment, but a starting point, integrated with monitoring so that adaptive management can take place in subsequent years.

## **CHAPTER 7**

### **What Objectives and Actions Move Us Toward Our Goals?**

The Pickerel/Crane Lakes watershed is healthy, diverse, and productive. Our challenge through this adaptive management plan is to perpetuate that condition into the future. The challenge will be met by a capable set of program partners that are prepared to devote themselves to Pickerel/Pickerel/Crane Lakes Stewardship. These partners include the members of the PCPRD, the Forest County Land and Water Conservation Department, Langlade Land Conservation Department, the WDNR, the Sokaogon Chippewa Community Mole Lake Band of Lake Superior Chippewa, and the ecological scientists of White Water Associates, Inc., the WDNR, and others who care about Pickerel and Crane Lakes.

Abraham Lincoln is attributed with the following wisdom: “If I had an hour to cut down a tree, I’d spend the first 45 minutes sharpening my ax.” Planning and preparation are important for any task, but especially when working with a system as complex as a lake or watershed. The vision and goals described in the previous chapter provide the basis for developing objectives and actions to achieve the desired future for the Pickerel/Crane Lakes watershed. In keeping with the spirit of an adaptive management plan, we present several actions and associated objectives that can be undertaken as human and financial resources allow in subsequent phases of the program. Desired outcomes of each action are also stated. The actions, objectives, and outcomes each need to be further developed so that appropriate methodology and accurate estimates of required effort can be described. The PCPRD is in control of the plan. The plan is flexible and allows the insertion of new actions at any point along the path of lake management. The pace of implementation of the plan is also flexible and will be influenced by availability of volunteer time, grant monies, and other factors.

## Recommended Actions for the Pickerel/Crane Lakes Adaptive Management Plan

**Action (Education):** Work with WDNR and the Mole Lake Band of Lake Superior Chippewa to understand and manage the Pickerel and Crane Lakes fisheries.

**Objective:** To support scientific and effective maintenance of quality fisheries.

**Outcome:** Document meetings and other contacts made to responsible agencies and others.

**Status:** Action included in *Adaptive Management Plan*.

**Action (Education):** Develop and maintain kiosk and/or other education structures at the boat landings so that it continues to provide information on the threats of aquatic invasive species introductions to Pickerel and Crane Lakes and outlines how such introductions can be minimized. This material should also identify the importance of carrying AIS from Pickerel and Crane Lakes to other water bodies. Continue to update the current educational information and advertise the PCPRD website.

**Objective:** Educate users of Pickerel and Crane Lakes and ultimately prevent new introductions of aquatic invasive species.

**Outcome:** Creates more informed and responsible recreational users of Pickerel and Crane Lakes. PCPRD should document that updated educational material is maintained.

**Status:** Action included in *Adaptive Management Plan*.

**Action (Research):** Conduct a third point-intercept plan survey in 2024 (5 years after most recent survey). Analyze and compare data to the 2006 and 2019 survey to determine changes in the aquatic plant community.

**Objective:** To understand the diversity and abundance of the aquatic plant community in Pickerel/Crane Lakes and understand how this community changes over time.

**Outcome:** Update *Aquatic Plant Management Plans* for the lakes.

**Status:** Action included in *Adaptive Management Plan* and would be conducted in a future phase of the stewardship effort.



## Recommended Actions for the Pickerel/Crane Lakes Adaptive Management Plan

**Action (Research):** Conduct annual assessments of Pickerel and Crane Lakes for aquatic invasive species.

**Objective:** To provide an early warning of new introductions of aquatic invasive species to allow rehabilitation actions to occur when populations are still small.

**Outcome:** Document the number and timing of surveys and maintain record of findings.

**Status:** More specific guidance provided in the *Aquatic Plant Management Plan*.

**Action (Research):** Develop a 5-year Fisheries Management Plan (working in collaboration with the WDNR and Mole Lake Fisheries).

**Objective:** To (1) educate lake users and others on the current state of the fishery and on fish management goals and plans, the value of these areas and the importance of good stewardship to their maintenance and (2) fully participate in fish management related issues in the lake.

**Monitoring:** PCPRD promotes and oversees activity.

**Status:** Anticipated to begin in 2021.

**Action (Education):** Establish an award or recognition of riparian owners that protect or rehabilitate “natural shoreline” habitat on their property (both riparian area and littoral zone). This could be recognized by the PCPRD along with an article about the ecological benefits of natural shorelines.

**Objective:** To encourage good shoreline stewardship by riparian owners and improve the riparian area quality of Pickerel and Crane Lakes.

**Outcome:** Monitor by general awareness of landowners and changes in shoreline maintenance behaviors.

**Status:** Action included in *Adaptive Management Plan*.

**Action (Education):** Encourage landowners with good volunteer practices to mentor others.

**Objective:** To encourage good shoreline stewardship by riparian owners and improve the riparian area quality of Pickerel and Crane Lakes.

**Outcome:** Monitor by general awareness of landowners and changes in shoreline maintenance behaviors.

**Status:** Action included in *Adaptive Management Plan*.

## Recommended Actions for the Pickerel/Crane Lakes Adaptive Management Plan

**Action (Education):** Investigate WDNR programs such as “Fish Stix” to educate and provide direction and funding for habitat improvements.

**Objective:** To encourage good shallow water stewardship by lake users and improve the littoral zone quality of Pickerel and Crane Lakes.

**Outcome:** Monitor by general awareness of landowners and changes shallow water habitat.

**Status:** Action included in *Adaptive Management Plan*.

**Action (Education):** Create periodic updates of the adaptive management plan.

**Objective:** To incorporate most up-to-date information regarding Pickerel and Crane Lakes and application of best stewardship practices.

**Outcome:** Up-to-date management plan is available for ongoing implementation and stewardship of Pickerel and Crane Lakes.

**Status:** Action included in *Adaptive Management Plan*. This document is the first version of the adaptive management plan.

**Action (Protection):** Develop a storm water and shoreland habitat plan.

**Objective:** To maintain and improve the health of Pickerel and Crane Lakes.

**Outcome:** Will be a future component of the Pickerel/Crane Lakes Adaptive Management Plan.

**Status:** Action included in *Adaptive Management Plan* and would be conducted in a future phases of the Pickerel/Pickerel/Crane Lakes Stewardship effort.

**Action (Protection):** Investigate the WDNR Healthy Lakes grant opportunities for funding assistance on specific projects. Local partners like qualified lake associations, lake districts, and counties may apply for Healthy Lakes funding on behalf of lakeshore property owners, or they may choose to integrate the Healthy Lakes initiative into their lake management, comprehensive planning, and shoreland zoning ordinance efforts.

(<https://healthylakeswi.com/about/>)

**Objective:** To maintain and improve the health of Pickerel and Crane Lakes.

**Outcome:** Will assist in beneficial projects on the Lake.

**Status:** Action included in *Adaptive Management Plan*.

## Recommended Actions for the Pickerel/Crane Lakes Adaptive Management Plan

**Action (Protection):** Adopt and implement the *Aquatic Plant Management Plan* prepared as result of the current project.

**Objective:** To protect and maintain a high quality aquatic plant community in Pickerel and Crane Lakes, and reduce opportunities for introduction of aquatic invasive plant species.

**Outcome:** A healthy, diverse Pickerel and Crane Lakes aquatic plant communities and a human community that is actively engaged in monitoring and protecting native aquatic plants.

**Status:** Action included *Adaptive Management Plan*. The *Aquatic Plant Management Plan* is intended for adoption in 2021.

Future phases of the Pickerel/Crane Lakes Stewardship will build on the foundation established in this *Adaptive Management Plan*. Additional aspects of the Pickerel/Crane Lakes watershed ecosystem will be explored. Future phases will include revisions to the lake management plan, and the aquatic plant management plan.

Pickerel and Crane Lakes and the surrounding watershed serve its human residents well. Nevertheless, in order for future generations to enjoy all that the watershed can provide, this adaptive plan should be embraced, developed, and implemented. It may seem slow at first, but considerable momentum already exists because of the hard work that has already occurred.

## **Appendix A**

### **Literature Cited**

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## Literature Cited

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**Appendices B1 and B2**  
**Pickereel/Crane Lakes Aquatic Plant Management Plans**

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**Appendices C1 and C2**  
**Pickereel/Crane Lakes Review of Water Quality**

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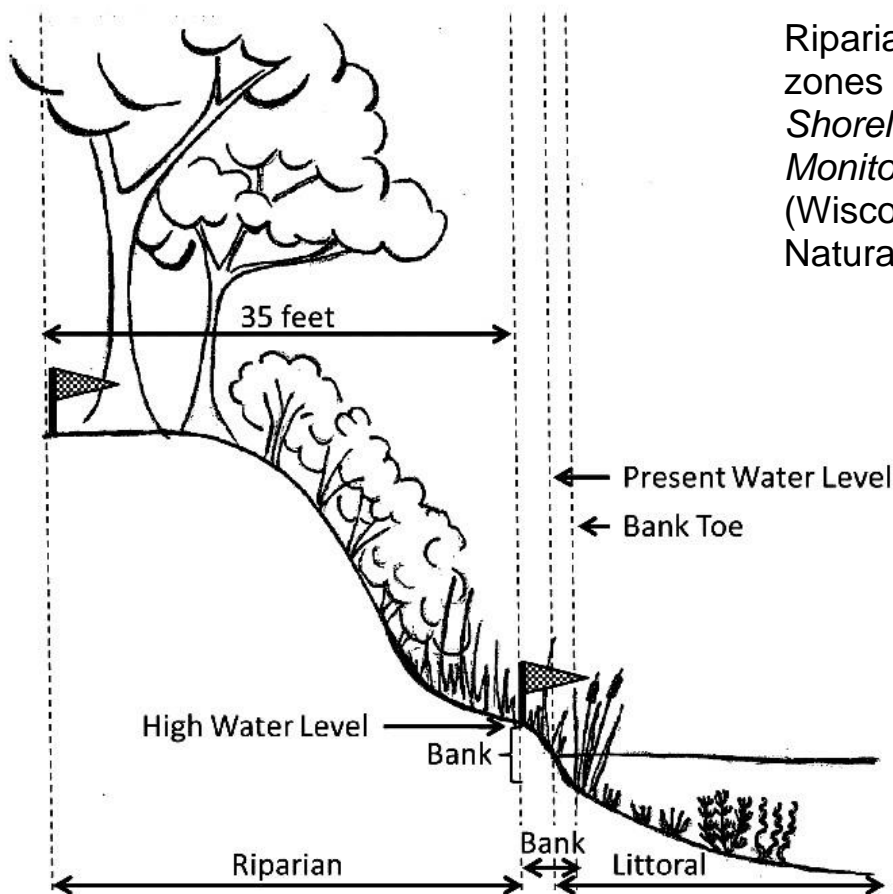
**Appendices D1 and D2**  
**Pickereel/Crane Lakes Shoreland and Shallows Habitat**  
**Monitoring Reports**

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# Pickerel Lake (Forest/Langlade County, Wisconsin)

## Shoreland and Shallows Habitat Monitoring Report

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Riparian, bank, and littoral zones covered by the *Shoreland & Shallows Habitat Monitoring Field Protocol* (Wisconsin Department of Natural Resources 2016)



Date: March 2020

## INTRODUCTION

White Water Associates, Inc. is retained by the Pickerel/Crane Protection & Rehabilitation District (PCPRD) as a consultant for the *Pickerel/Crane Lakes Stewardship Program*. A recent Wisconsin Department of Natural Resources (WDNR) lake planning grant to the PITLC included an assessment of the shoreland area and shallows habitat for Pickerel Lake (Forest and Langlade Counties, Wisconsin). The assessment was conducted using the *Lake Shoreland and Shallows Habitat Monitoring Field Protocol* (WDNR 2016)<sup>1</sup>. This protocol provides a standard methodology for surveying, assessing, and mapping habitat in lakeshore areas, including the riparian buffer, bank, and littoral zone (WDNR 2016). This information will be useful to local and regional resource managers, communities, and others interested in protecting and enhancing Wisconsin's lakes and rivers (WDNR 2016).

## METHODS

There are three principal components to the shoreland and shallows habitat monitoring: (1) obtain georeferenced photos of the entire lake shoreline area, (2) assess the riparian, bank, and littoral habitat by ownership parcel, and (3) count and map all pieces of large woody material in water less than 2 feet deep. In this section, we describe each of these components.

The photographic component of the monitoring documented shoreland habitat conditions around the lake at the time of the survey. Results may be referred to in future years (WDNR 2016). Digital photos were taken with the intent to slightly overlap, thus capturing the entire shoreline. The survey crew used the boat to circumnavigate the lake at a distance of approximately 50 feet perpendicular from shore where conditions permitted. This standardized relative position on the lake allowed the photos to include the water's edge and understory vegetation 35 feet inland. A digital camera with an internal GPS was used to capture the photos. Exhibit 1 provides an example photograph. In the laboratory, photos were processed, georeferenced, and provided as part of the data package to the WDNR.

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<sup>1</sup> Wisconsin Department of Natural Resources. May 27, 2016. *Draft Lake Shoreland & Shallows Habitat Monitoring Field Protocol*. WDNR 2016.



**Exhibit 1. Photo of the water's edge and understory vegetation on Pickerel Lake (White Water Associates, Inc., 2019)**

The shoreline habitat assessment was conducted for every ownership parcel on the lake. To facilitate this effort, parcel data was obtained March 2018 via the Wisconsin Statewide Parcel Map, which can be found at <https://maps.sco.wisc.edu/Parcels/>. Parcel IDs and shoreline lengths were derived from these spatial data files. Parcel IDs and parcel lines, together with a “riparian buffer” line at 35 feet from the shoreline, were layered onto aerial photography maps saved as a georeferenced image file viewed on the Avenza Maps application on an Apple® iPad Pro 9.7 equipped with GPS for offline navigation. The GPS function of the iPad allowed the survey crew to know their position relative to the shoreline and specific parcels. Data sheets were prepared that included parcel ID numbers and frontage feet of each parcel (an example data sheet is shown in Exhibit 2). Exhibit 2 also shows the categories that were documented for each parcel. Back in the laboratory, data recorded on field data sheets were input to a Microsoft Office Excel spreadsheet and later conveyed to the WDNR as part of the data package to be included in a publicly available database.

The woody habitat component of the assessment was conducted on a separate circumnavigation of the lake. Before starting, a Secchi depth was measured. The protocol specifies that if the Secchi depth is less than two feet, no woody habitat survey will be conducted due to poor visibility (WDNR 2016). In addition to the Secchi depth, lake water level was documented relative to the lake's *high water level* (HWL). As the lake was circumnavigated, large wood was enumerated. The protocol defines "large wood" as wood greater than 4 inches in diameter somewhere along its length and at least 5 feet long. Eligible large wood was that which was located between the high water level and the 2 foot depth contour and the large wood section must be in the water or below the high water level. Tree "branchiness" ranking was recorded as "0" (no branches), "1" (few branches), or "2" (tree trunk with full crown). Additional details on eligible large wood are provided in the protocol document (WDNR 2016). A hand held GPS was used to document each eligible piece of large wood. A datasheet entry corresponded to each large wood piece. An example datasheet is provided as Exhibit 3.

## **FINDINGS**

The data and photos for the assessment of shoreland area and shallows habitat for Pickerel Lake have been delivered to the WDNR. Any user can view the results in the Wisconsin Department of Natural Resources Lakes and AIS Mapping Tool found at: <https://dnr.wi.gov/lakes/viewer/>. In this section we summarize a few of the data and provide some example maps that illustrate the findings from the assessment.

The assessment was conducted on May 29, 2019. At the time of the survey there were 303 ownership parcels on Pickerel Lake. The shoreline perimeter of Pickerel Lake including islands is 11.07 miles. Exhibit 4 summarizes some of the Pickerel Lake data. Exhibits 5 through 13 provide maps of findings on Pickerel Lake. Any interested party can access the data in the database and create maps of this type or maps specific to detailed areas of shoreland and shallow water habitat.

In general, the assessment shows the shoreland and shallow water habitat of Pickerel Lake are high quality. There is excellent tree canopy coverage as well as shrub and herbaceous coverage. That being said, there is evidence of human influence in the riparian buffer zone and bank zone. The number of large wood pieces per mile of shoreline is fairly low.



## **LAKE STRATEGY**

Pickerel Lake is highly developed and this is documented in Exhibit 4. There are parcels that could undertake restoration to ameliorate possible runoff, erosion issues, and other issues. These areas can be identified by investigating the 2019 monitoring data in maps and tables in this report as well as in the WDNR database (link given previously). The Healthy Lakes program in Wisconsin provides simple, practical, and inexpensive best practices that improve habitat and water quality on lakeshore property (see <https://healthylakeswi.com/> for additional information and guidance on funding projects). Pickerel Lake large woody habitat is somewhat sparse and could be augmented with the “fish sticks” best practice.

## Habitat Assessment Data Sheet (one per parcel)

Date \_\_\_\_\_ Lake name \_\_\_\_\_ WBIC \_\_\_\_\_  
Parcel ID \_\_\_\_\_ Observers \_\_\_\_\_

### RIPARIAN BUFFER ZONE

#### Percent Cover

	Percent	
Canopy	<input type="text"/>	(0-100)
Shrub <input type="checkbox"/> Herbaceous <input type="checkbox"/>	<input type="text"/>	
Shrub/Herbaceous	<input type="text"/>	
Impervious surface	<input type="text"/>	
Manicured lawn	<input type="text"/>	
Agriculture	<input type="text"/>	
Other (e.g. duff, soil, mulch)	<input type="text"/>	

sum=100

description: \_\_\_\_\_

#### Human Structures

	Number
Buildings	<input type="text"/>
Boats on shore	<input type="text"/>
Fire pits	<input type="text"/>
Other	<input type="text"/>

description: \_\_\_\_\_

#### Runoff Concerns

In Riparian or Entire Parcel	Present in Riparian	Present out of Riparian
Point source	<input type="checkbox"/>	<input type="checkbox"/>
Channelized water flow/gully	<input type="checkbox"/>	<input type="checkbox"/>
Stair/trail/road to lake	<input type="checkbox"/>	<input type="checkbox"/>
Lawn/soil sloping to lake	<input type="checkbox"/>	<input type="checkbox"/>
Bare soil	<input type="checkbox"/>	<input type="checkbox"/>
Sand/silt deposits	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

description: \_\_\_\_\_

Notes: \_\_\_\_\_

### BANK ZONE

	Length (ft)
Vertical sea wall	<input type="text"/>
Rip rap	<input type="text"/>
Other erosion control structures	<input type="text"/>
Artificial beach	<input type="text"/>
Bank erosion > 1 ft face	<input type="text"/>
Bank erosion < 1 ft face	<input type="text"/>

### LITTORAL ZONE

#### Human Structures

	Number
Piers	<input type="text"/>
Boat lifts	<input type="text"/>
Swim rafts/water trampolines	<input type="text"/>
Boathouses (over water)	<input type="text"/>
Marinas	<input type="text"/>
Other	<input type="text"/>

description: \_\_\_\_\_

#### Aquatic Plants

	Present
Emergents	<input type="checkbox"/>
Floating	<input type="checkbox"/>
Plant Removal	<input type="checkbox"/>

### If Applicable (low water level):

#### EXPOSED LAKE BED ZONE

	Present
Plants	
Canopy	<input type="checkbox"/>
Shrubs	<input type="checkbox"/>
Herbaceous	<input type="checkbox"/>
Disturbed	
Plants (mowed or removed)	<input type="checkbox"/>
Sediment (tilled or dug)	<input type="checkbox"/>

Exhibit 2. Example habitat assessment data sheet.

### Exhibit 3. Coarse woody habitat inventory data sheet.

Date \_\_\_\_\_ Lake name \_\_\_\_\_ WBIC \_\_\_\_\_

Observers \_\_\_\_\_

Present water level is ☐ Below ☐ At ☐ Above the High Water Level

Secchi depth \_\_\_\_\_ ft

ID	Branch	Touch	In	ID	Branch	Touch	In	ID	Branch	Touch	In	ID	Branch	Touch	In
		Shore	Water			Shore	Water			Shore	Water			Shore	Water
1				26				51				76			
2				27				52				77			
3				28				53				78			
4				29				54				79			
5				30				55				80			
6				31				56				81			
7				32				57				82			
8				33				58				83			
9				34				59				84			
10				35				60				85			
11				36				61				86			
12				37				62				87			
13				38				63				88			
14				39				64				89			
15				40				65				90			
16				41				66				91			
17				42				67				92			
18				43				68				93			
19				44				69				94			
20				45				70				95			
21				46				71				96			
22				47				72				97			
23				48				73				98			
24				49				74				99			
25				50				75				100			

Branch: 0 = no branches, 1 = a few branches, 2 = full tree crown

Touch Shore: 0 = entirely below High Water Level (HWL), 1 = crosses HWL

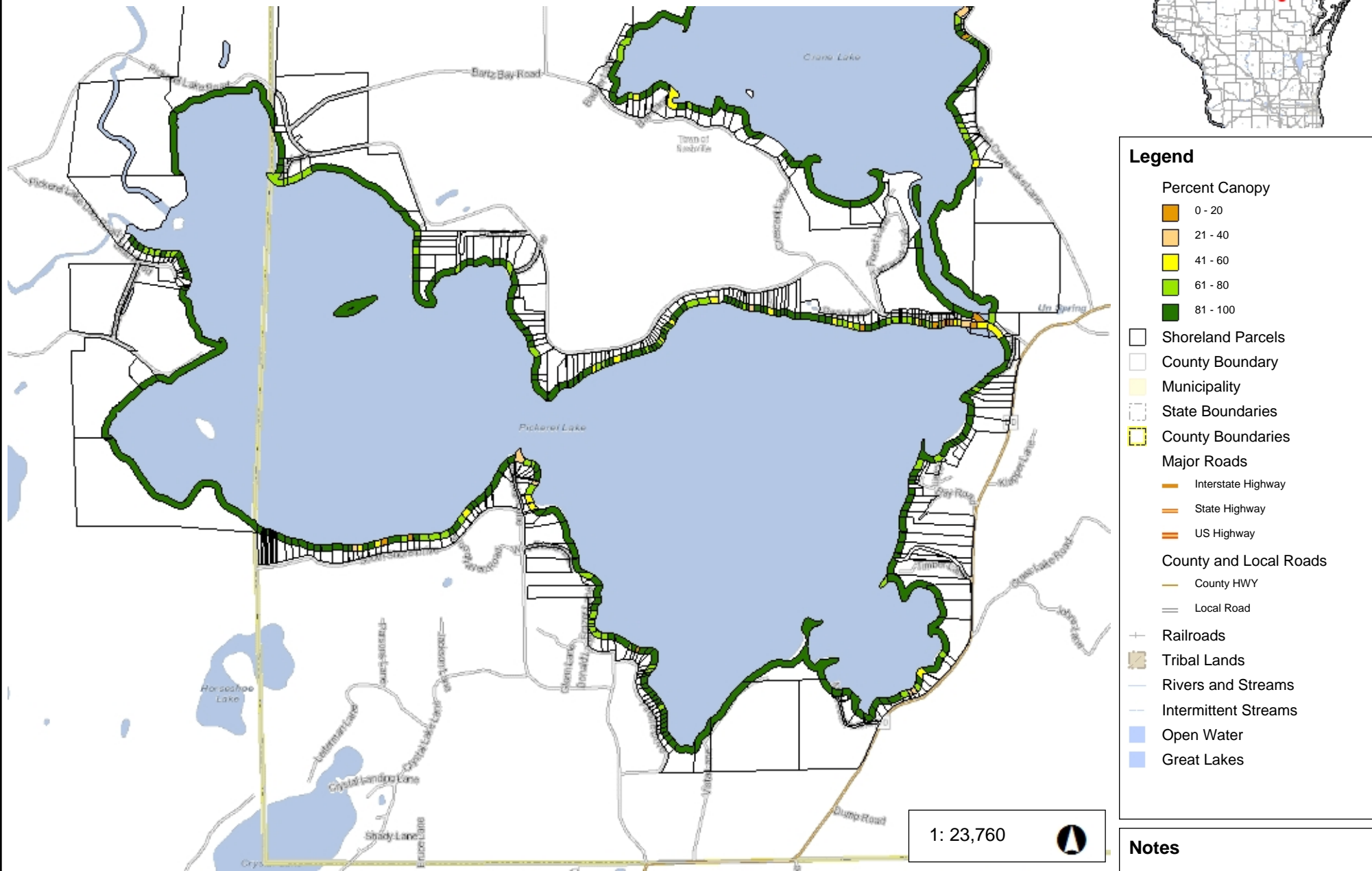
In Water: 0 = less than 5 ft of log is currently underwater, 1 = at least 5 ft of log is currently underwater

Exhibit 4. Summary of shoreland and shallow water habitat for Pickrel Lake.

Date of Survey: May 29, 2019	Miles of shoreline: 11.07	
Number of ownership parcels: 303	Mean parcel frontage feet: 193	
Riparian Buffer Zone	# of parcels	% of parcels
Impervious surfaces	258	85
Manicured lawn	218	72
Agriculture	0	0
Other (duff, soil, mulch)	209	69
Human structures (buildings, boats on shore, fire pit, other)	236	78
Broad runoff concerns (incl. point source; channelized water flow; straight stair, trail, or road to lake; lawn or soil sloping; bare soil; sand/silt deposits; other erosion). Note: Exhibit 10 is less inclusive.	258	85
Bank Zone	# of parcels	% of parcels
Concerns in the bank zone (e.g., vertical sea wall, rip rap, other erosion control structures, artificial beach, active erosion)	149	49
Littoral Zone	# of parcels	% of parcels
Human structures in littoral zone (e.g., piers, boat lifts, swim rafts, water trampolines, boat houses over water, marinas, other)	233	77
Emergent and/or floating aquatic plants	67	22
Evidence of aquatic plant removal	0	0
Large Wood Habitat		
Total Number of large wood pieces	487	
Number of large wood pieces per mile of shoreline	44.0	



## Exhibit 5. Pickerel Lake Riparian Coverage - % Canopy - 2019



0.8 0 0.38 0.8 Miles

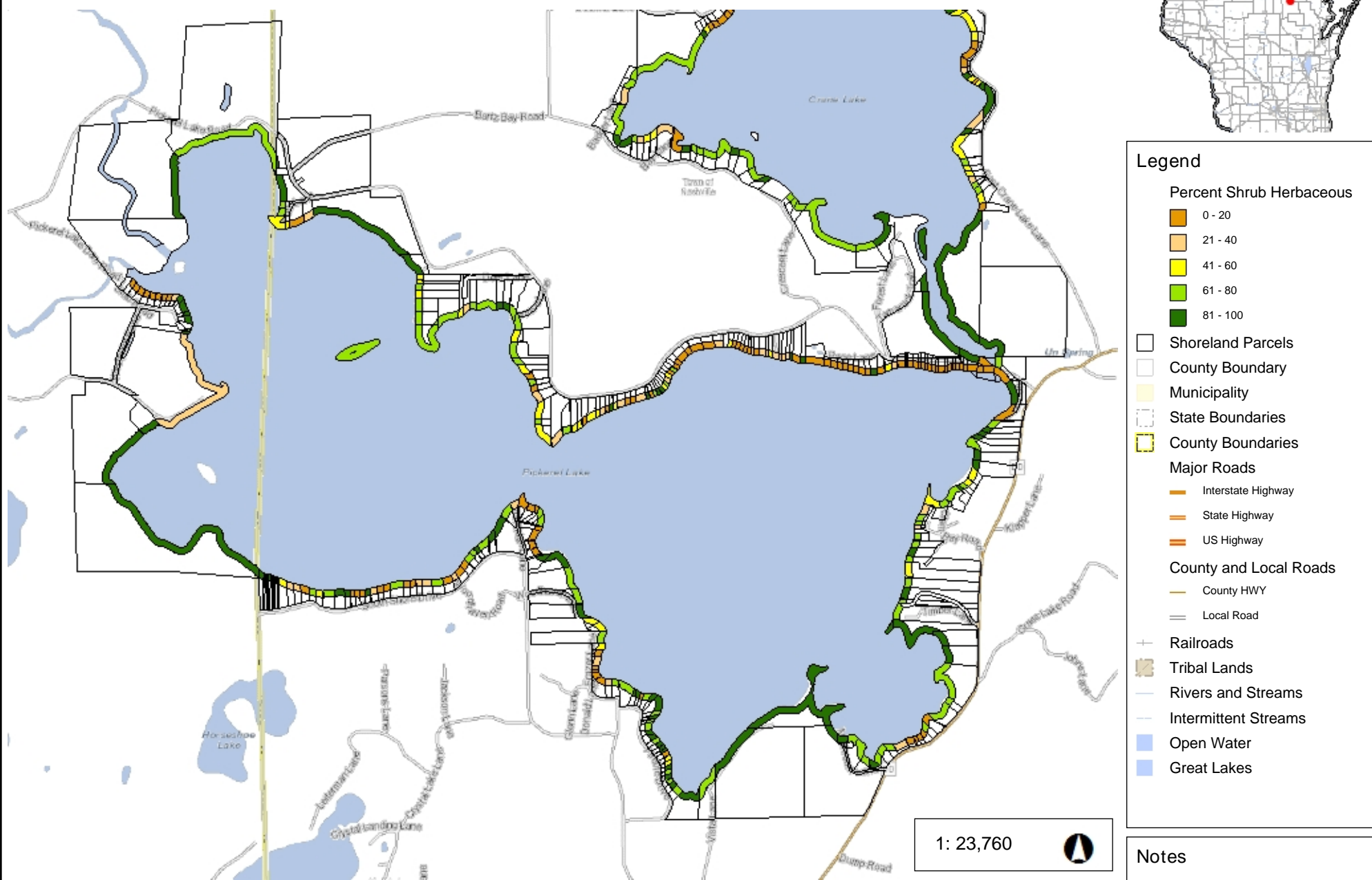
NAD\_1983\_HARN\_Wisconsin\_TM  
© Latitude Geographics Group Ltd.

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### Notes



## Exhibit 6. Pickerel Lake Riparian Coverage - % Shrub Herbaceous - 2019



0.8 0 0.38 0.8 Miles

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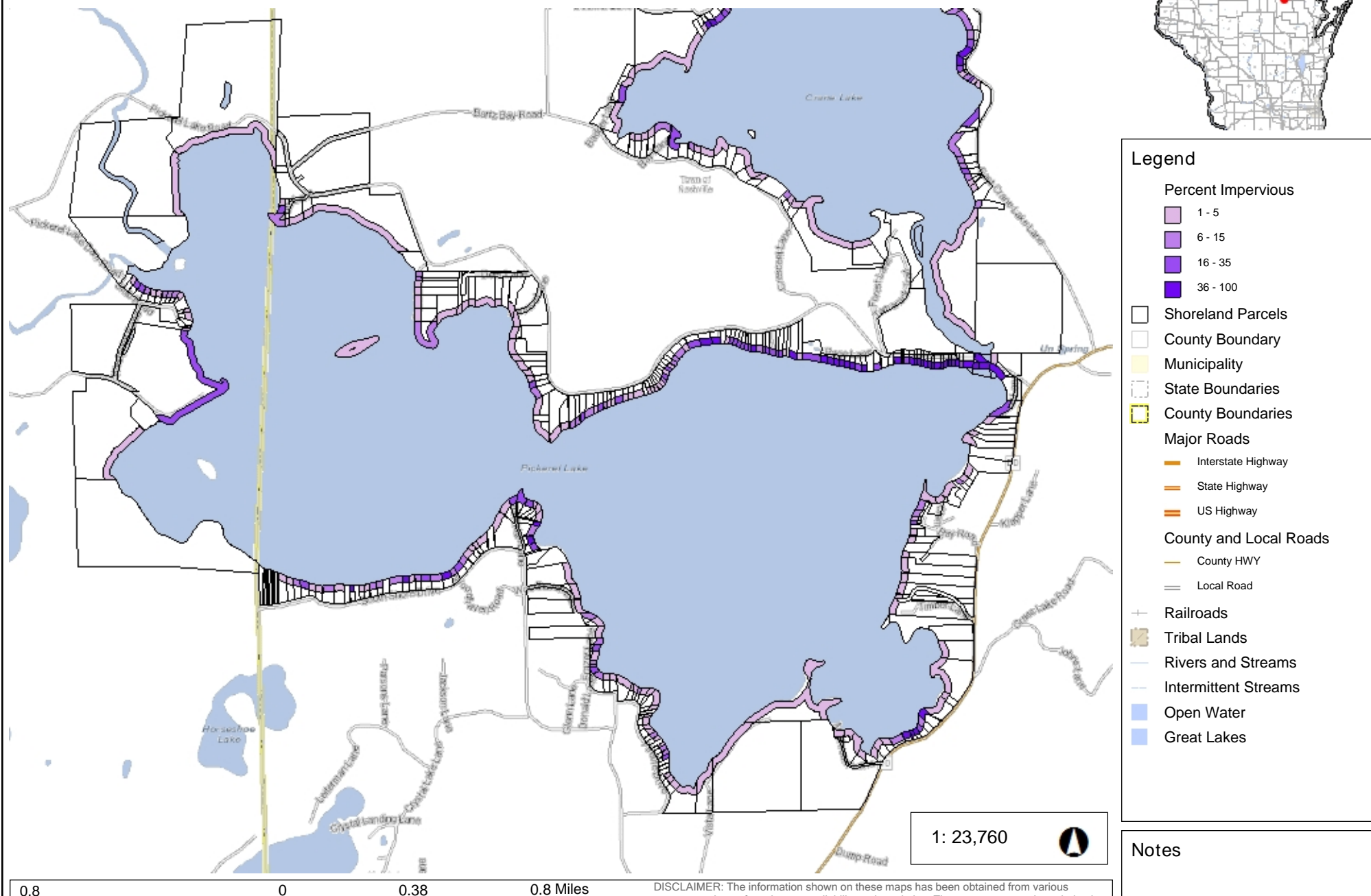
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Notes





## Exhibit 7. Pickerel Lake Riparian Coverage - % Impervious - 2019



### Legend

#### Percent Impervious

- 1 - 5
- 6 - 15
- 16 - 35
- 36 - 100

- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries
- County Boundaries

#### Major Roads

- Interstate Highway
- State Highway
- US Highway

#### County and Local Roads

- County HWY
- Local Road

- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Open Water
- Great Lakes

### Notes

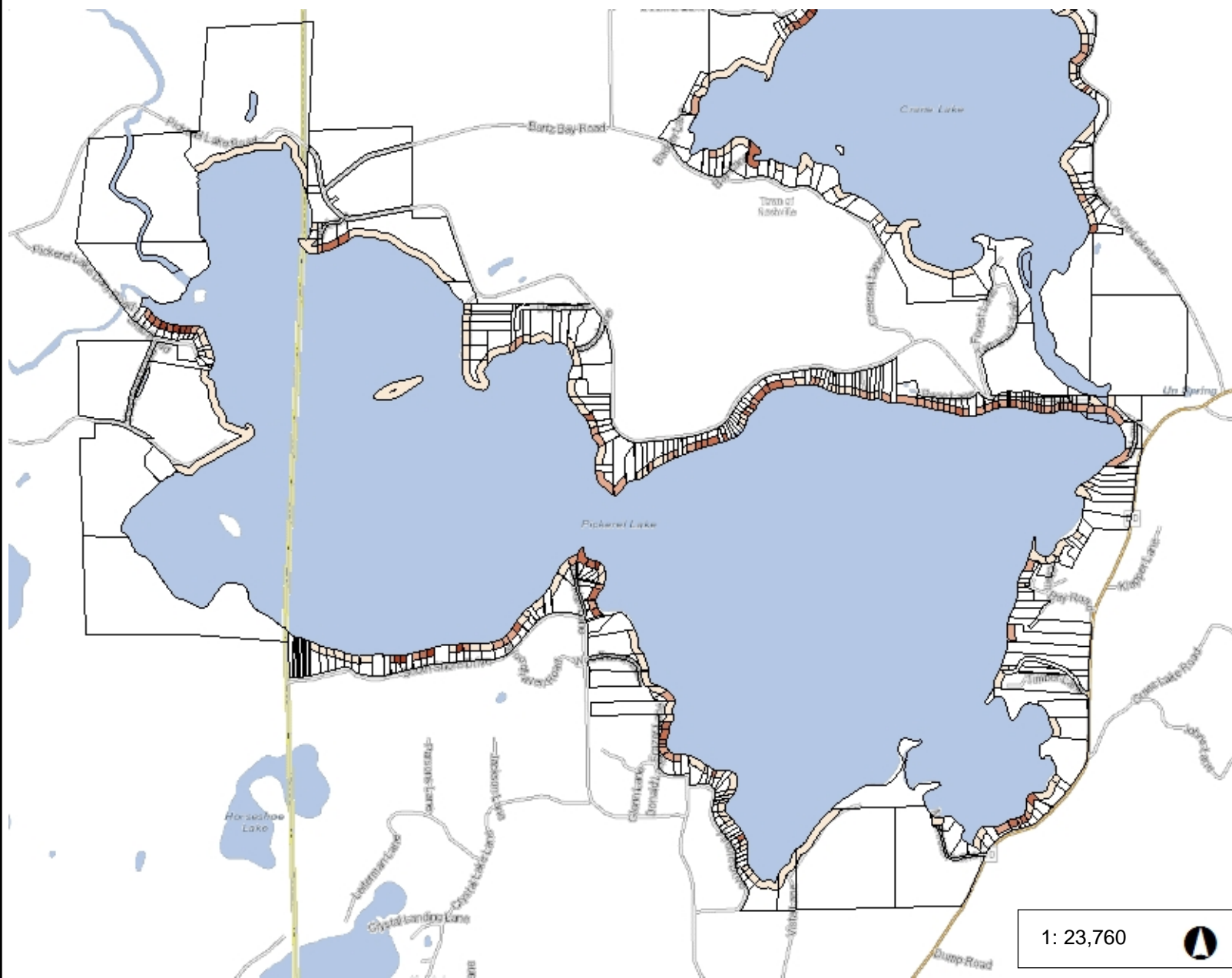
0.8 0 0.38 0.8 Miles

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## Exhibit 8. Pickerel Lake Riparian Coverage - % Manicured Lawn - 2019



### Legend

#### Percent Manicured Lawn

- 1 - 25
- 26 - 50
- 51 - 75
- 76 - 100

- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries
- County Boundaries

#### Major Roads

- Interstate Highway
- State Highway
- US Highway

#### County and Local Roads

- County HWY
- Local Road

- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Open Water
- Great Lakes

1: 23,760



0.8 0 0.38 0.8 Miles

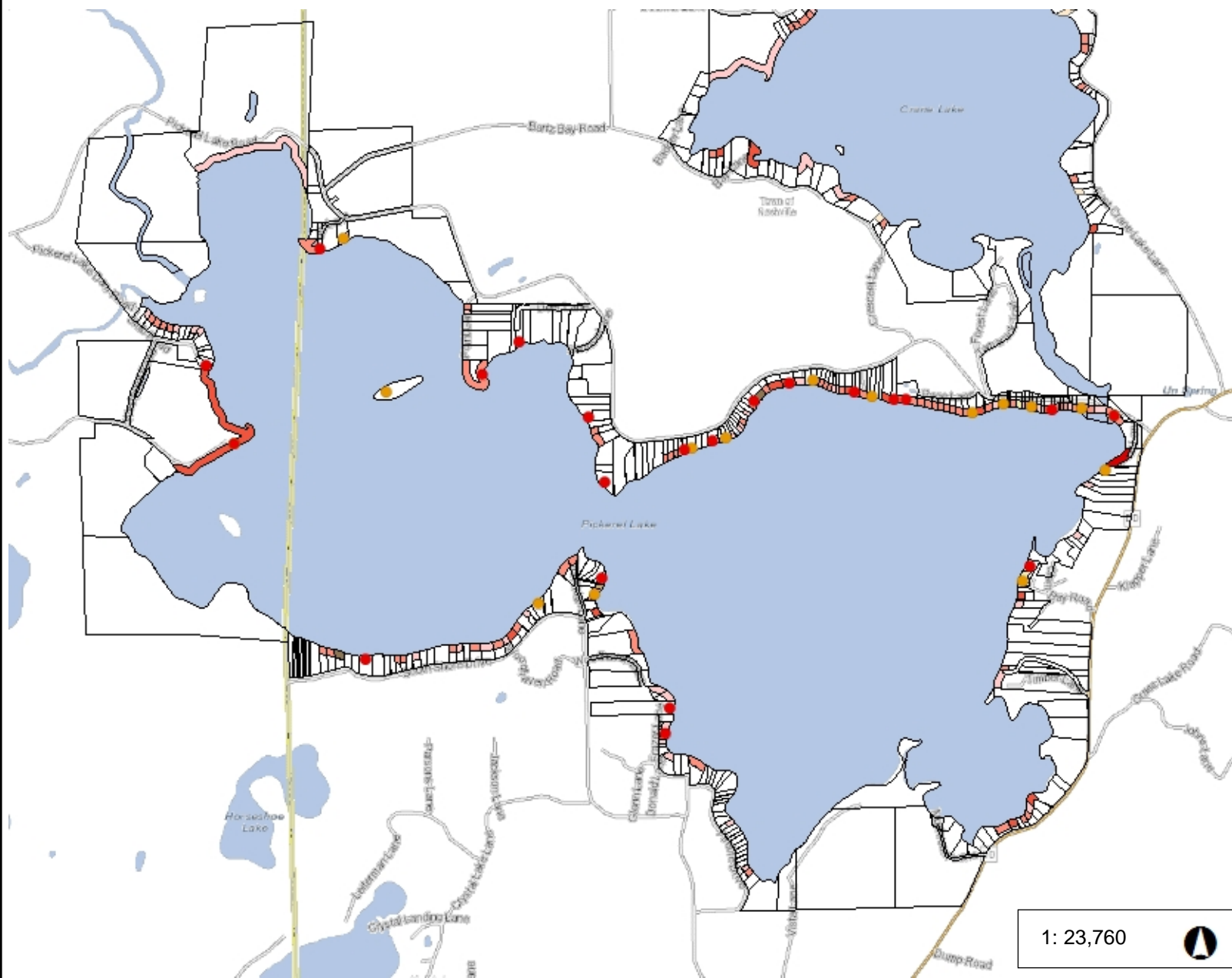
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### Notes



## Exhibit 9. Pickerel Lake Bank Erosion and Modifications - 2019



### Legend

- Bank Erosion >1ft
- Bank Erosion <1ft
- Vertical Sea Wall
  - 1 - 50 ft
  - 51 - 100 ft
  - 101 - 200 ft
  - 200 + ft
- Rip Rap
  - 1 - 50 ft
  - 51 - 100 ft
  - 101 - 200 ft
  - 200+ ft
- Other Bank Modifications
  - 10 - 50 ft
  - 51 - 100 ft
  - 101 - 200 ft
  - 200+ ft
- Artificial Beach
  - 0 - 50 ft
  - 51 - 100 ft
  - 101 - 200 ft
  - 200+ ft
- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries

1: 23,760



### Notes

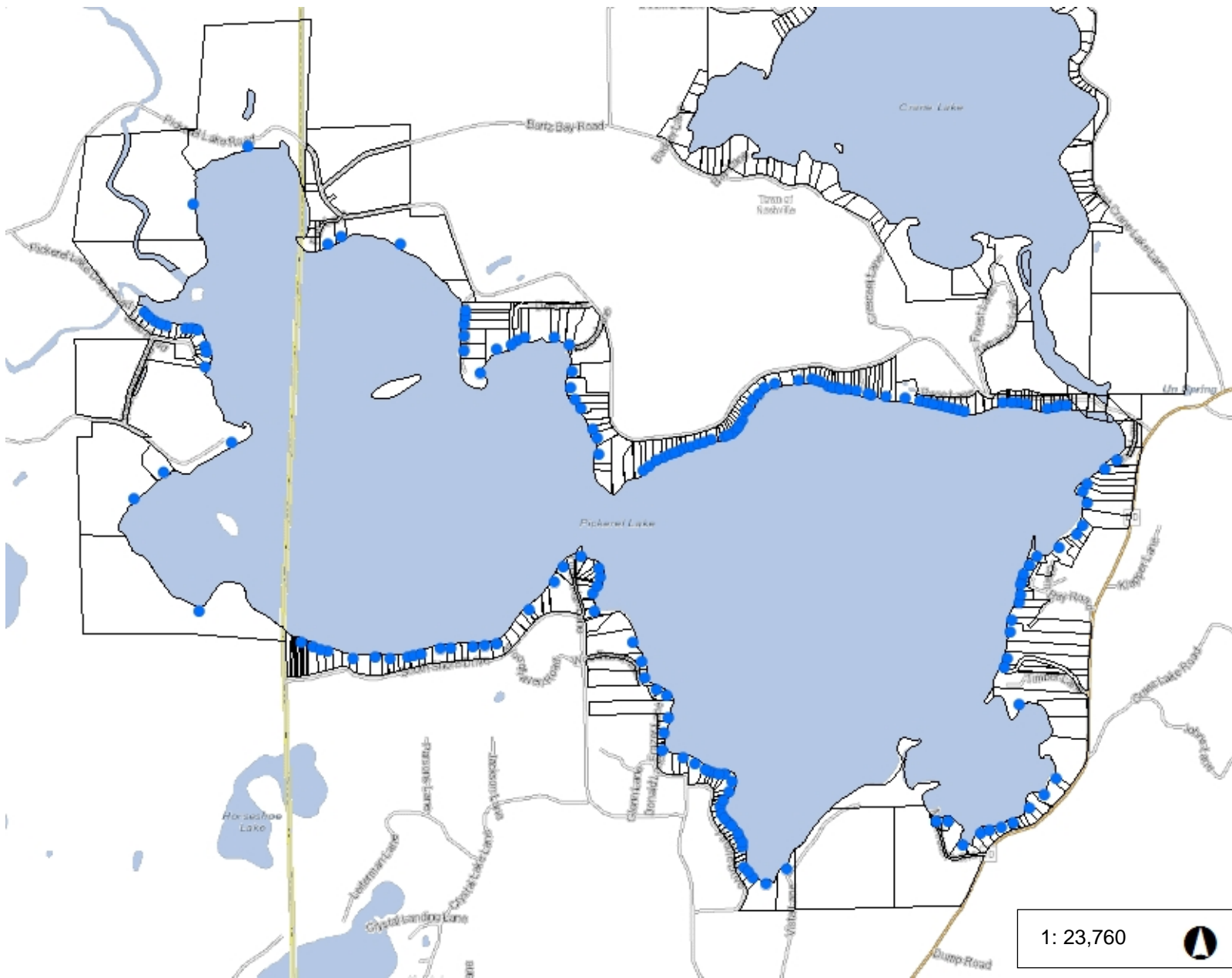
0.8 0 0.38 0.8 Miles

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## Exhibit 10. Pickerel Lake Runoff Concerns (Channelized Flow and Point Source) - 2019



### Legend

- Channelized Flow
- Point Source
- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries
- County Boundaries
- Major Roads**
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads**
  - County HWY
  - Local Road
- + Railroads
- ▨ Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Open Water
- Great Lakes

1: 23,760



0.8 0 0.38 0.8 Miles

NAD\_1983\_HARN\_Wisconsin\_TM  
© Latitude Geographics Group Ltd.

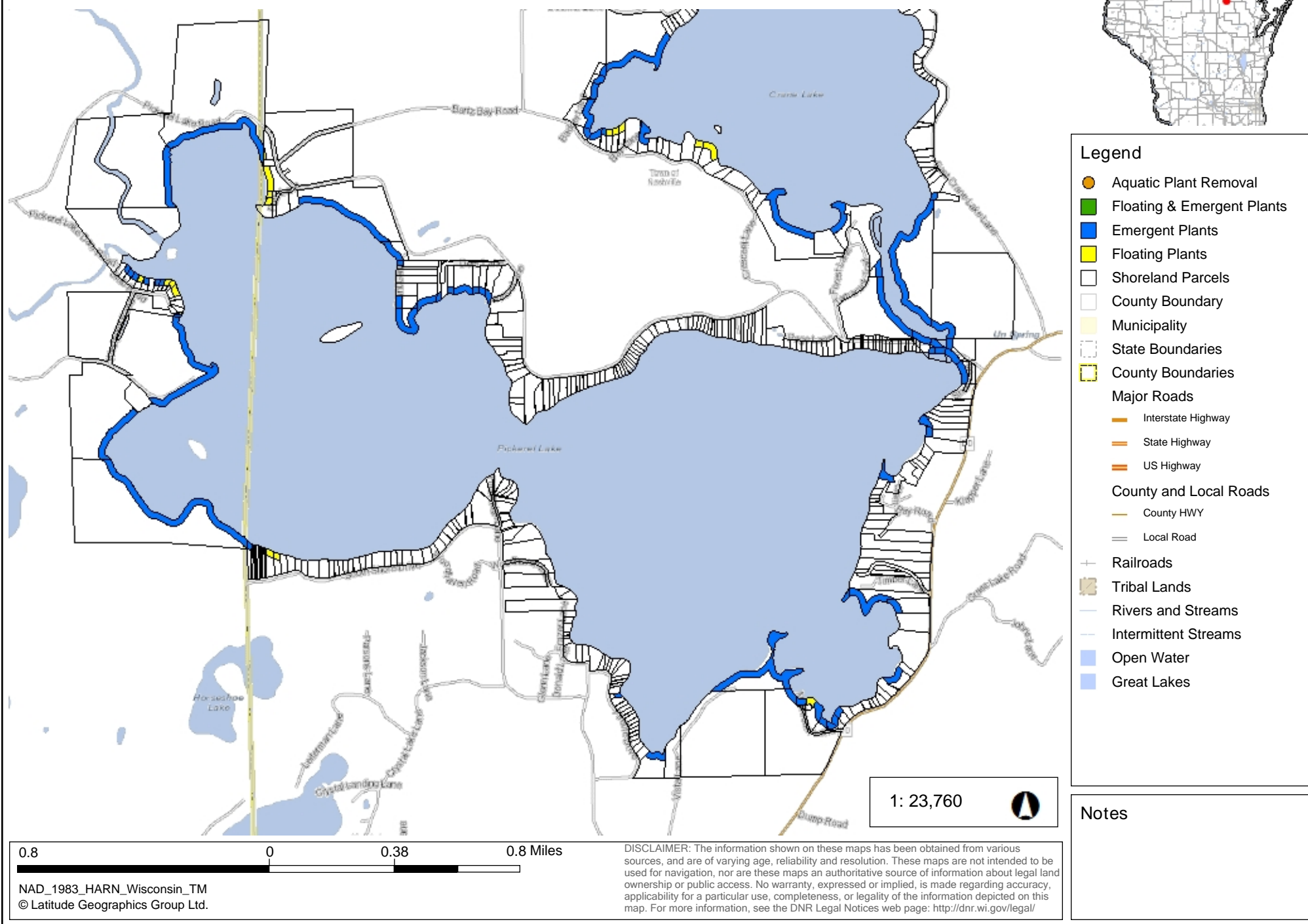
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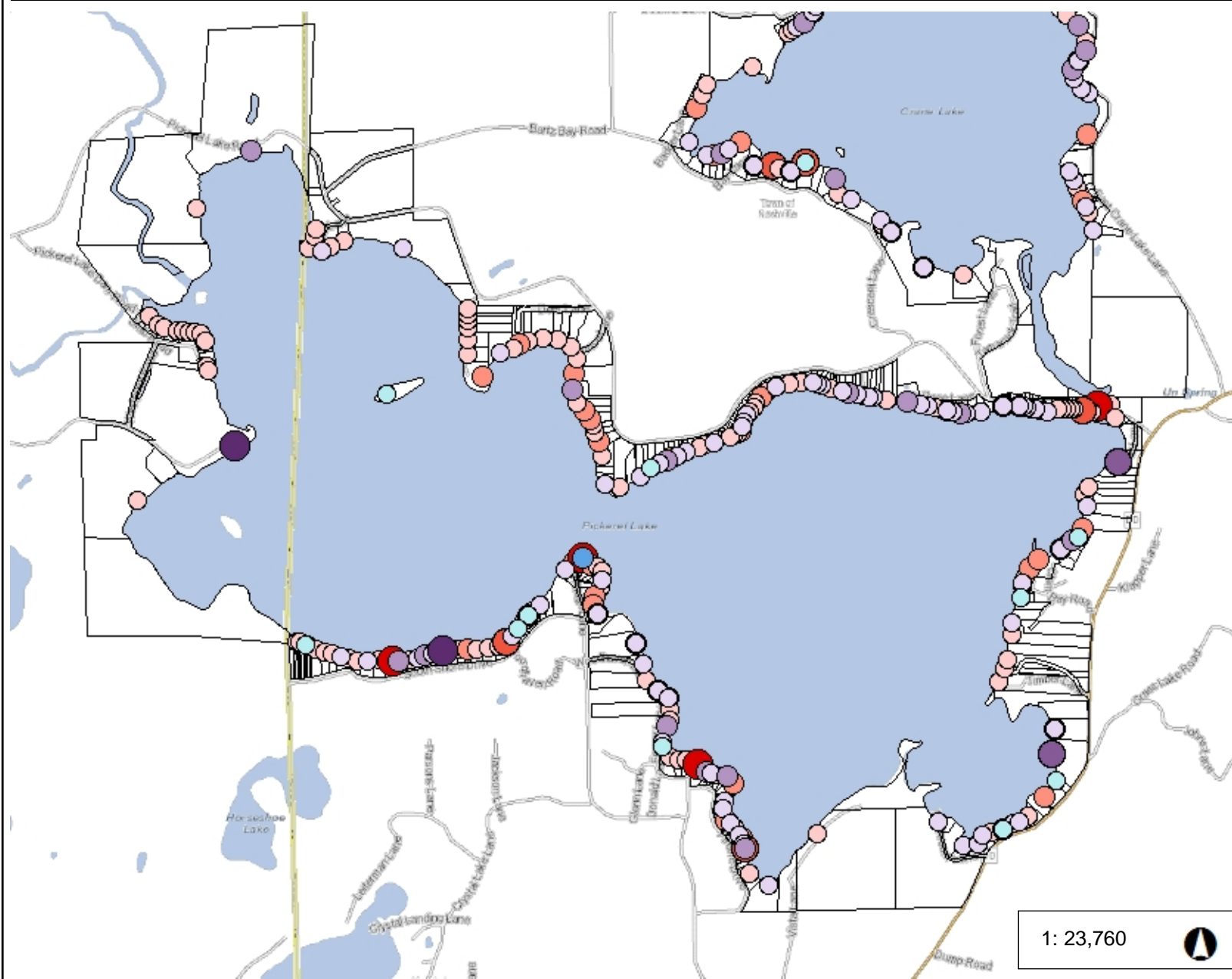
### Notes





## Exhibit 11. Pickerel Lake Littoral Zone - Aquatic Plants - 2019





1: 23,760



0.8    0    0.38    0.8 Miles

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### Legend

## Swim Rafts

1

2

3 - 5

6+

## Boat Lifts

1

2

3 - 5

6+

Piers

1

2

3 - 5

6+

## Boat Houses

1

2

3 - 5

6+

Marinas

1

2

3 - 5

6+

☐ Shoreland Parcels

## Notes





## Exhibit 13. Pickerel Lake Woody Habitat - 2019



### Legend

- WH Branchiness**
  - No branches
  - Few branches
  - Full tree crown
- WH Touching Shore**
- WH In Water**
- Shoreland Parcels**
- County Boundary**
- Municipality**
- State Boundaries**
- County Boundaries**
- Major Roads**
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads**
  - County HWY
  - Local Road
- Railroads**
- Tribal Lands**
- Rivers and Streams**
- Intermittent Streams**
- Open Water**
- Great Lakes**

### Notes

0.8 0 0.38 0.8 Miles

NAD\_1983\_HARN\_Wisconsin\_TM  
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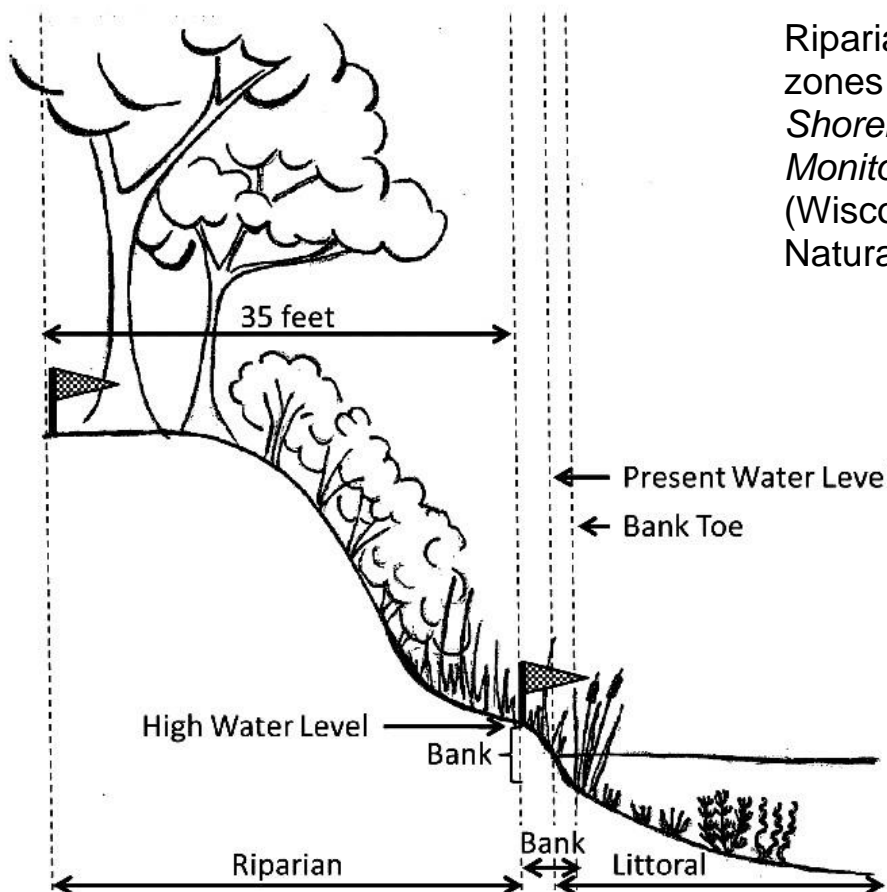
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# Crane Lake (Forest County, Wisconsin)

## Shoreland and Shallows Habitat Monitoring Report

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Riparian, bank, and littoral zones covered by the *Shoreland & Shallows Habitat Monitoring Field Protocol* (Wisconsin Department of Natural Resources 2016)



Date: March 2020

## INTRODUCTION

White Water Associates, Inc. is retained by the Pickerel/Crane Protection & Rehabilitation District (PCPRD) as a consultant for the *Pickerel/Crane Lakes Stewardship Program*. A recent Wisconsin Department of Natural Resources (WDNR) lake planning grant to the PITLC included an assessment of the shoreland area and shallows habitat for Crane Lake (Forest County, Wisconsin). The assessment was conducted using the *Lake Shoreland and Shallows Habitat Monitoring Field Protocol* (WDNR 2016)<sup>1</sup>. This protocol provides a standard methodology for surveying, assessing, and mapping habitat in lakeshore areas, including the riparian buffer, bank, and littoral zone (WDNR 2016). This information will be useful to local and regional resource managers, community stakeholders, and others interested in protecting and enhancing Wisconsin's lakes and rivers (WDNR 2016).

## METHODS

There are three principal components to the shoreland and shallows habitat monitoring: (1) obtain georeferenced photos of the entire lake shoreline area, (2) assess the riparian, bank, and littoral habitat by ownership parcel, and (3) count and map all pieces of large woody material in water less than 2 feet deep. In this section, we describe each of these components.

The photographic component of the monitoring documented shoreland habitat conditions around the lake at the time of the survey. Results may be referred to in future years (WDNR 2016). Digital photos were taken with the intent to slightly overlap, thus capturing the entire shoreline. The survey crew used the boat to circumnavigate the lake at a distance of approximately 50 feet perpendicular from shore where conditions permitted. This standardized relative position on the lake allowed the photos to include the water's edge and understory vegetation 35 feet inland. A digital camera with an internal GPS was used to capture the photos. Exhibit 1 provides an example photograph. In the laboratory, photos were processed, georeferenced, and provided as part of the data package to the WDNR.

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<sup>1</sup> Wisconsin Department of Natural Resources. May 27, 2016. *Draft Lake Shoreland & Shallows Habitat Monitoring Field Protocol*. WDNR 2016.



The shoreline habitat assessment was conducted for every ownership parcel on the lake. To facilitate this effort, parcel data was obtained March 2018 via the Wisconsin Statewide Parcel Map, which can be found at <https://maps.sco.wisc.edu/Parcels/>. Parcel IDs and shoreline lengths were derived from these spatial data files. Parcel IDs and parcel lines, together with a “riparian buffer” line at 35 feet from the shoreline, were layered onto aerial photography maps saved as a georeferenced image file viewed on the Avenza Maps application on an Apple® iPad Pro 9.7 equipped with GPS for offline navigation. The GPS function of the iPad allowed the survey crew to know their position relative to the shoreline and specific parcels. Data sheets were prepared that included parcel ID numbers and frontage feet of each parcel (an example data sheet is shown in Exhibit 2). Exhibit 2 also shows the categories that were documented for each parcel. Back in the laboratory, data recorded on field data sheets were input to a Microsoft Office Excel spreadsheet and later conveyed to the WDNR as part of the data package to be included in a publicly available database.



The woody habitat component of the assessment was conducted on a separate circumnavigation of the lake. Before starting, a Secchi depth was measured. The protocol specifies that if the Secchi depth is less than two feet, no woody habitat survey will be conducted due to poor visibility (WDNR 2016). In addition to the Secchi depth, lake water level was documented relative to the lake's *high water level* (HWL). As the lake was circumnavigated, large wood was enumerated. The protocol defines "large wood" as wood greater than 4 inches in diameter somewhere along its length and at least 5 feet long. Eligible large wood was that which was located between the high water level and the 2 foot depth contour and the large wood section must be in the water or below the high water level. Tree "branchiness" ranking was recorded as "0" (no branches), "1" (few branches), or "2" (tree trunk with full crown). Additional details on eligible large wood are provided in the protocol document (WDNR 2016). A GPS was used to document each eligible piece of large wood. A datasheet entry corresponded to each large wood piece. An example datasheet is provided as Exhibit 3.

## **FINDINGS**

The data and photos for the assessment of shoreland area and shallows habitat for Crane Lake have been delivered to the WDNR. Any user can view the results in the Wisconsin Department of Natural Resources Lakes and AIS Mapping Tool found at: <https://dnr.wi.gov/lakes/viewer/>. In this section we summarize a few of the data and provide some example maps that illustrate the findings from the assessment.

The assessment was conducted on June 5, 2019. At the time of the survey there were 114 ownership parcels on Crane Lake. The shoreline perimeter including islands of Crane Lake is 4.84 miles. Exhibit 4 summarizes some of the Crane Lake data. Exhibits 5 through 13 provide maps of findings on Crane Lake. Any interested party can access the data in the database and create maps of this type or maps specific to detailed areas of shoreland and shallow water habitat.

In general, the assessment shows evidence of human influence in the riparian buffer zone and bank zone. Improvements could be undertaken to remedy some of the issues in these areas. The number of large wood pieces per mile of shoreline is fairly low.

## **LAKE STRATEGY**

Crane Lake is highly developed and this is documented in Exhibit 4. There are parcels that could undertake restoration to ameliorate possible runoff, erosion, and other issues. These areas can be identified by investigating the 2019 monitoring data in maps and tables in this report as well as in the WDNR database (link given previously). The Healthy Lakes program in Wisconsin provides simple, practical, and inexpensive best practices that improve habitat and water quality on lakeshore property (see <https://healthylakeswi.com/> for additional information and guidance on funding projects). Pickerel Lake large woody habitat is somewhat sparse and could be augmented with the “fish sticks” best practice.



## Habitat Assessment Data Sheet (one per parcel)

Date \_\_\_\_\_ Lake name \_\_\_\_\_ WBIC \_\_\_\_\_  
Parcel ID \_\_\_\_\_ Observers \_\_\_\_\_

### RIPARIAN BUFFER ZONE

#### Percent Cover

	Percent	
Canopy	<input type="text"/>	(0-100)
Shrub <input type="checkbox"/> Herbaceous <input type="checkbox"/>	<input type="text"/>	
Shrub/Herbaceous	<input type="text"/>	
Impervious surface	<input type="text"/>	
Manicured lawn	<input type="text"/>	
Agriculture	<input type="text"/>	
Other (e.g. duff, soil, mulch)	<input type="text"/>	

sum=100

description: \_\_\_\_\_

#### Human Structures

	Number
Buildings	<input type="text"/>
Boats on shore	<input type="text"/>
Fire pits	<input type="text"/>
Other	<input type="text"/>

description: \_\_\_\_\_

#### Runoff Concerns

In Riparian or Entire Parcel	Present in Riparian	Present out of Riparian
Point source	<input type="checkbox"/>	<input type="checkbox"/>
Channelized water flow/gully	<input type="checkbox"/>	<input type="checkbox"/>
Stair/trail/road to lake	<input type="checkbox"/>	<input type="checkbox"/>
Lawn/soil sloping to lake	<input type="checkbox"/>	<input type="checkbox"/>
Bare soil	<input type="checkbox"/>	<input type="checkbox"/>
Sand/silt deposits	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

description: \_\_\_\_\_

Notes: \_\_\_\_\_

### BANK ZONE

	Length (ft)
Vertical sea wall	<input type="text"/>
Rip rap	<input type="text"/>
Other erosion control structures	<input type="text"/>
Artificial beach	<input type="text"/>
Bank erosion > 1 ft face	<input type="text"/>
Bank erosion < 1 ft face	<input type="text"/>

### LITTORAL ZONE

#### Human Structures

	Number
Piers	<input type="text"/>
Boat lifts	<input type="text"/>
Swim rafts/water trampolines	<input type="text"/>
Boathouses (over water)	<input type="text"/>
Marinas	<input type="text"/>
Other	<input type="text"/>

description: \_\_\_\_\_

#### Aquatic Plants

	Present
Emergents	<input type="checkbox"/>
Floating	<input type="checkbox"/>
Plant Removal	<input type="checkbox"/>

### If Applicable (low water level):

#### EXPOSED LAKE BED ZONE

	Present
Plants	
Canopy	<input type="checkbox"/>
Shrubs	<input type="checkbox"/>
Herbaceous	<input type="checkbox"/>
Disturbed	
Plants (mowed or removed)	<input type="checkbox"/>
Sediment (tilled or dug)	<input type="checkbox"/>

Exhibit 2. Example habitat assessment data sheet.

Exhibit 3. Coarse woody habitat inventory data sheet.

Date \_\_\_\_\_ Lake name \_\_\_\_\_ WBIC \_\_\_\_\_

Observers \_\_\_\_\_

Present water level is ☐ Below ☐ At ☐ Above the High Water Level

Secchi depth \_\_\_\_\_ ft

ID	Branch	Touch	In	ID	Branch	Touch	In	ID	Branch	Touch	In	ID	Branch	Touch	In
		Shore	Water			Shore	Water			Shore	Water			Shore	Water
1				26				51				76			
2				27				52				77			
3				28				53				78			
4				29				54				79			
5				30				55				80			
6				31				56				81			
7				32				57				82			
8				33				58				83			
9				34				59				84			
10				35				60				85			
11				36				61				86			
12				37				62				87			
13				38				63				88			
14				39				64				89			
15				40				65				90			
16				41				66				91			
17				42				67				92			
18				43				68				93			
19				44				69				94			
20				45				70				95			
21				46				71				96			
22				47				72				97			
23				48				73				98			
24				49				74				99			
25				50				75				100			

Branch: 0 = no branches, 1 = a few branches, 2 = full tree crown

Touch Shore: 0 = entirely below High Water Level (HWL), 1 = crosses HWL

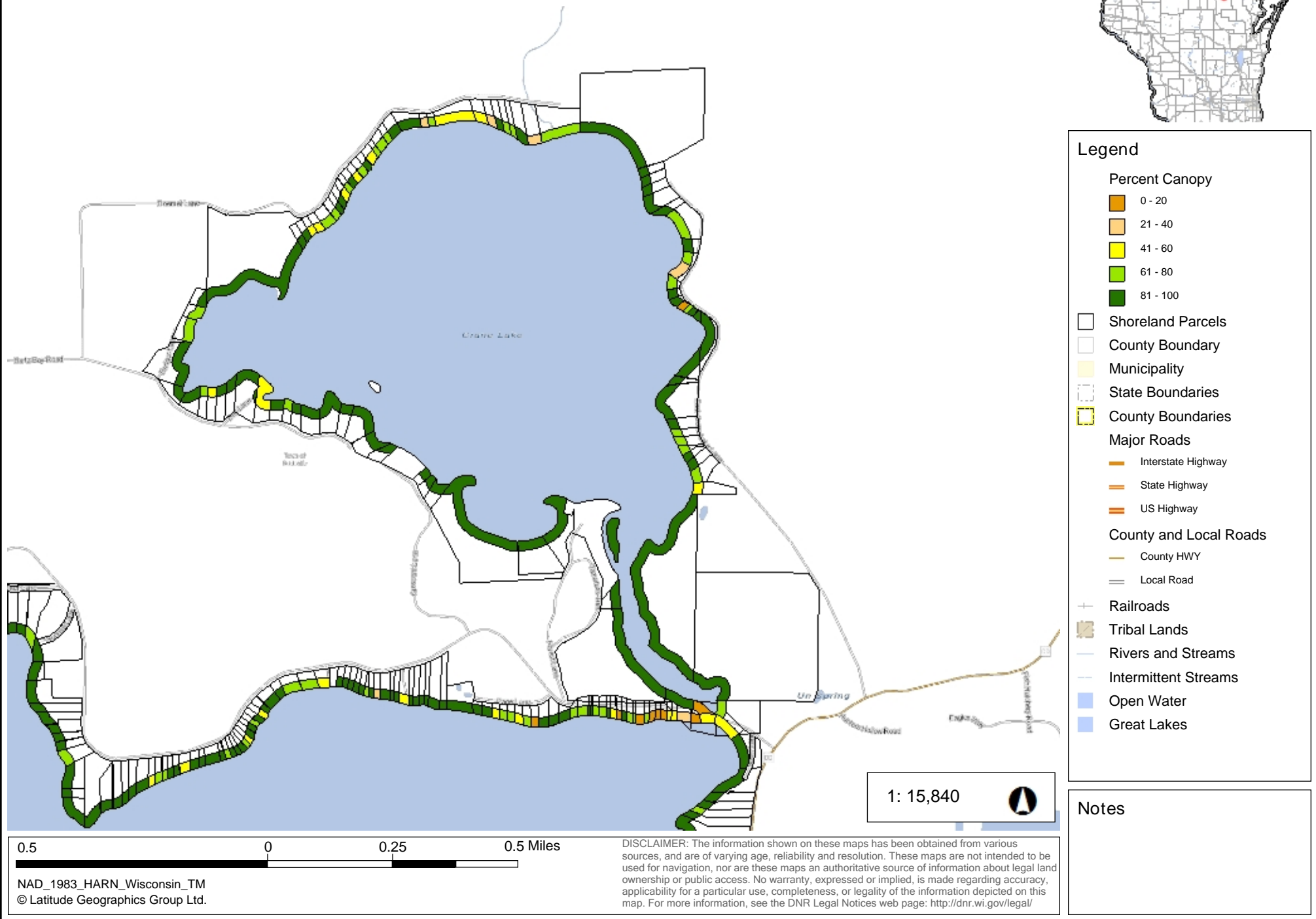
In Water: 0 = less than 5 ft of log is currently underwater, 1 = at least 5 ft of log is currently underwater

Exhibit 4. Summary of shoreland and shallow water habitat for Crane Lake.

Date of Survey: June 5, 2019	Miles of shoreline: 4.84	
Number of ownership parcels: 114	Mean parcel frontage feet: 224	
Riparian Buffer Zone	# of parcels	% of parcels
Impervious surfaces	92	81
Manicured lawn	82	72
Agriculture	0	0
Other (duff, soil, mulch)	82	72
Human structures (buildings, boats on shore, fire pit, other)	88	77
Broad runoff concerns (incl. point source; channelized water flow; straight stair, trail, or road to lake; lawn or soil sloping; bare soil; sand/silt deposits; other erosion). Note: Exhibit 10 is less inclusive.	90	79
Bank Zone	# of parcels	% of parcels
Concerns in the bank zone (e.g., vertical sea wall, rip rap, other erosion control structures, artificial beach, active erosion)	37	32
Littoral Zone	# of parcels	% of parcels
Human structures in littoral zone (e.g., piers, boat lifts, swim rafts, water trampolines, boat houses over water, marinas, other)	84	74
Emergent and/or floating aquatic plants	32	28
Evidence of aquatic plant removal	0	0
Large Wood Habitat		
Total Number of large wood pieces	196	
Number of large wood pieces per mile of shoreline	40.5	

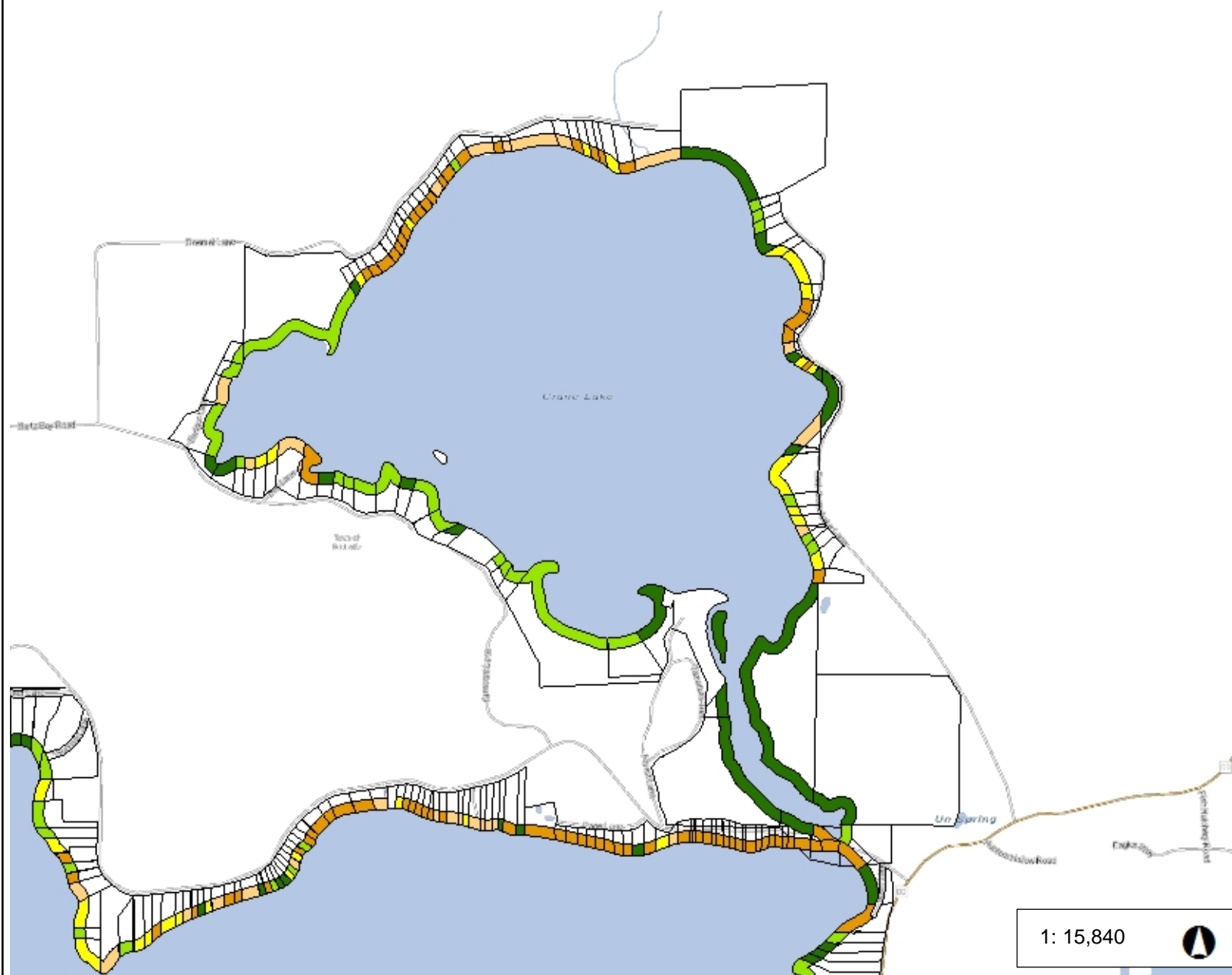


## Exhibit 5. Crane Lake Riparian Coverage - % Canopy - 2019





## Exhibit 6. Crane Lake Riparian Coverage - % Shrub Herbaceous - 2019



### Legend

#### Percent Shrub Herbaceous

- 0 - 20
- 21 - 40
- 41 - 60
- 61 - 80
- 81 - 100

- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries
- County Boundaries

#### Major Roads

- Interstate Highway
- State Highway
- US Highway

#### County and Local Roads

- County HWY
- Local Road

#### Railroads

- Tribal Lands

#### Rivers and Streams

- Intermittent Streams

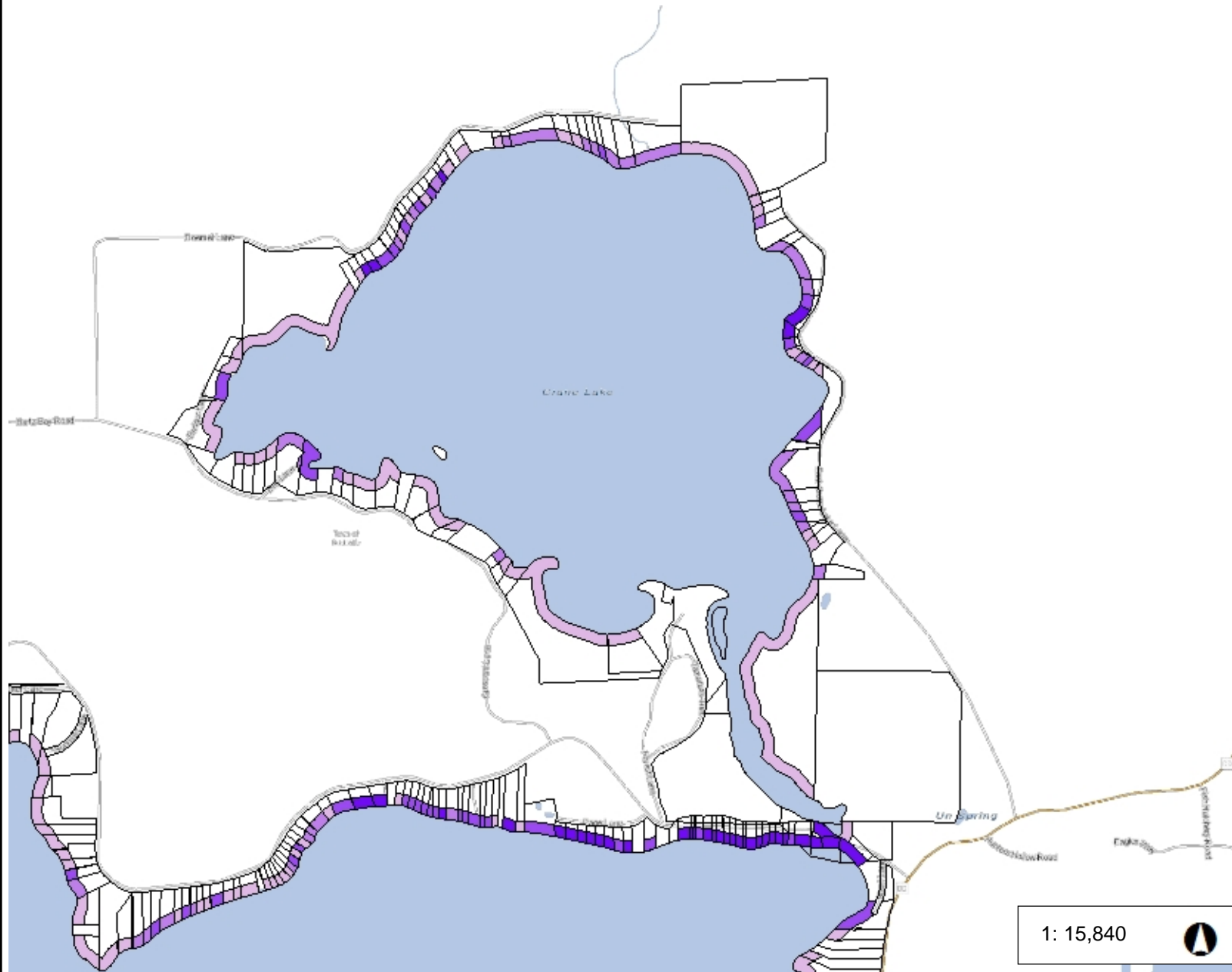
#### Open Water

- Great Lakes

### Notes



## Exhibit 7. Crane Lake Riparian Coverage - % Impervious - 2019



### Legend

#### Percent Impervious

- 1 - 5
- 6 - 15
- 16 - 35
- 36 - 100

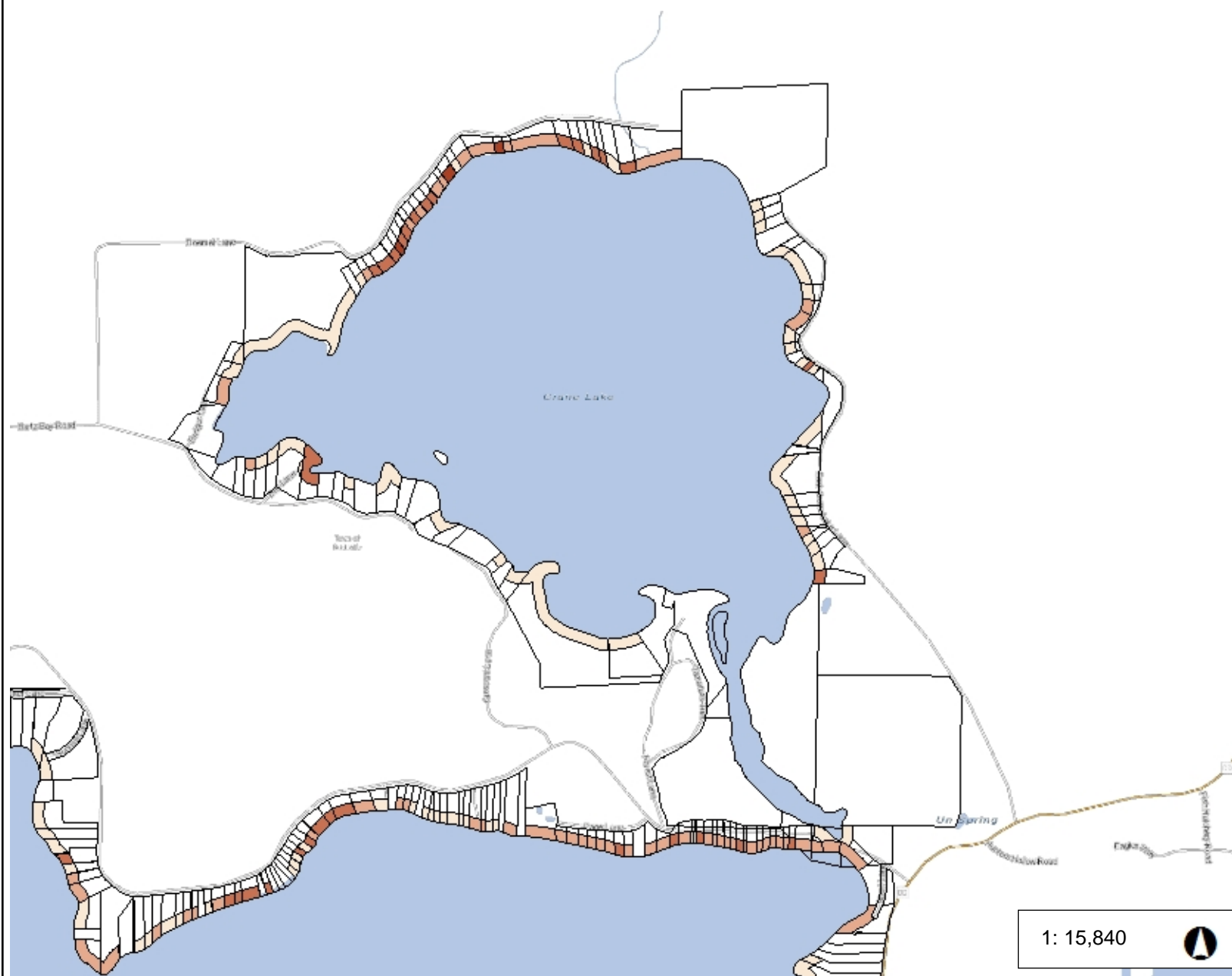
- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Open Water
- Great Lakes

### Notes





## Exhibit 8. Crane Lake Riparian Coverage - % Manicured Lawn - 2019



### Legend

#### Percent Manicured Lawn

- 1 - 25
- 26 - 50
- 51 - 75
- 76 - 100

- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries
- County Boundaries

#### Major Roads

- Interstate Highway
- State Highway
- US Highway

#### County and Local Roads

- County HWY
- Local Road

- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Open Water
- Great Lakes

1: 15,840



0.5 0 0.25 0.5 Miles

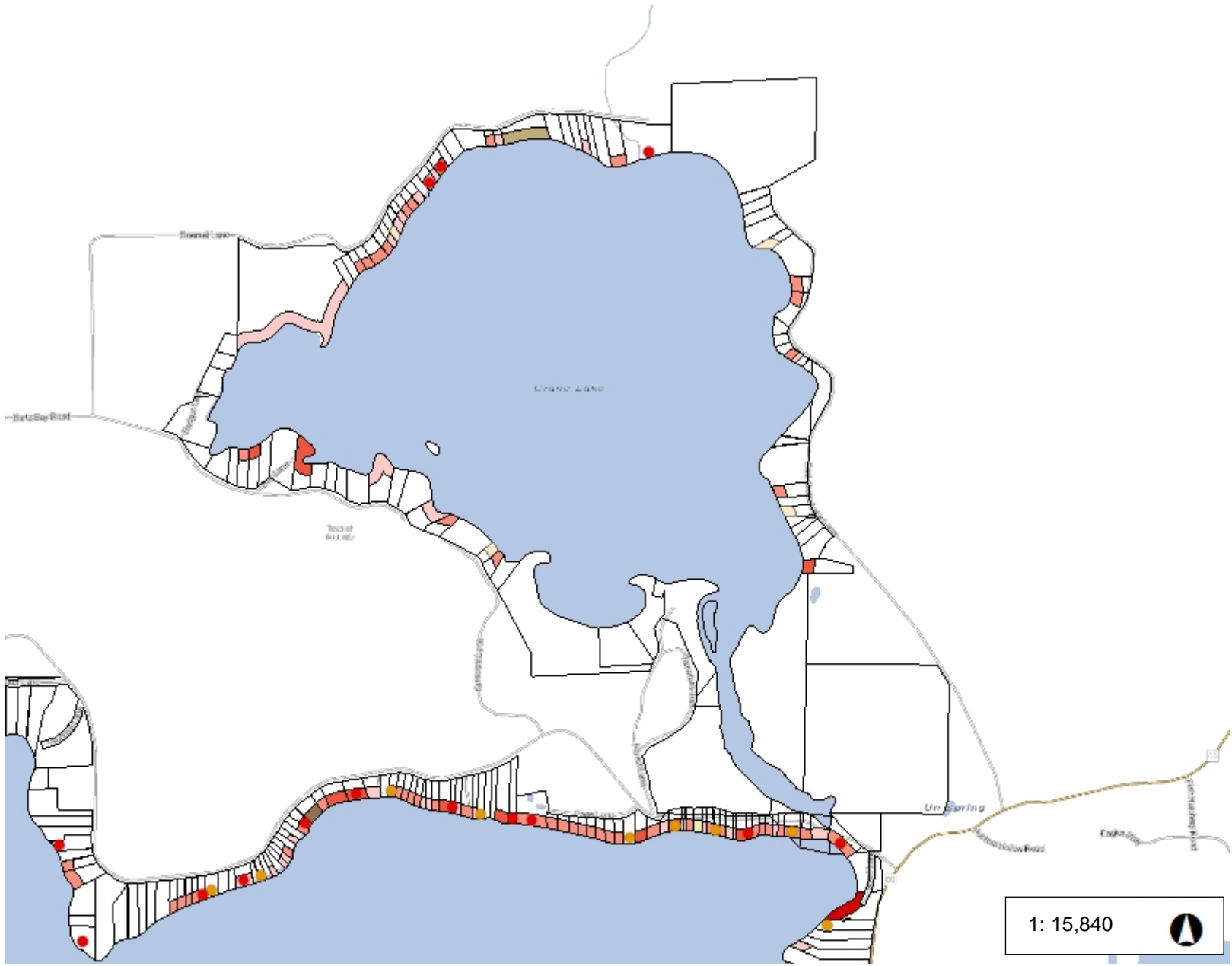
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### Notes



# Exhibit 9. Crane Lake Bank Erosion and Modifications - 2019



## Legend

- Bank Erosion >1ft
- Bank Erosion <1ft
- Vertical Sea Wall
  - 1 - 50 ft
  - 51 - 100 ft
  - 101 - 200 ft
  - 200 + ft
- Rip Rap
  - 1 - 50 ft
  - 51 - 100 ft
  - 101 - 200 ft
  - 200+ ft
- Other Bank Modifications
  - 10 - 50 ft
  - 51 - 100 ft
  - 101 - 200 ft
  - 200+ ft
- Artificial Beach
  - 0 - 50 ft
  - 51 - 100 ft
  - 101 - 200 ft
  - 200+ ft
- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries

1: 15,840



0.5 0 0.25 0.5 Miles

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## Notes



# Exhibit 10. Crane Lake Runoff Concerns (Channelized Flow and Point Source) - 2019



## Legend

- Channelized Flow
- Point Source
- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Open Water
- Great Lakes

1: 15,840



## Notes

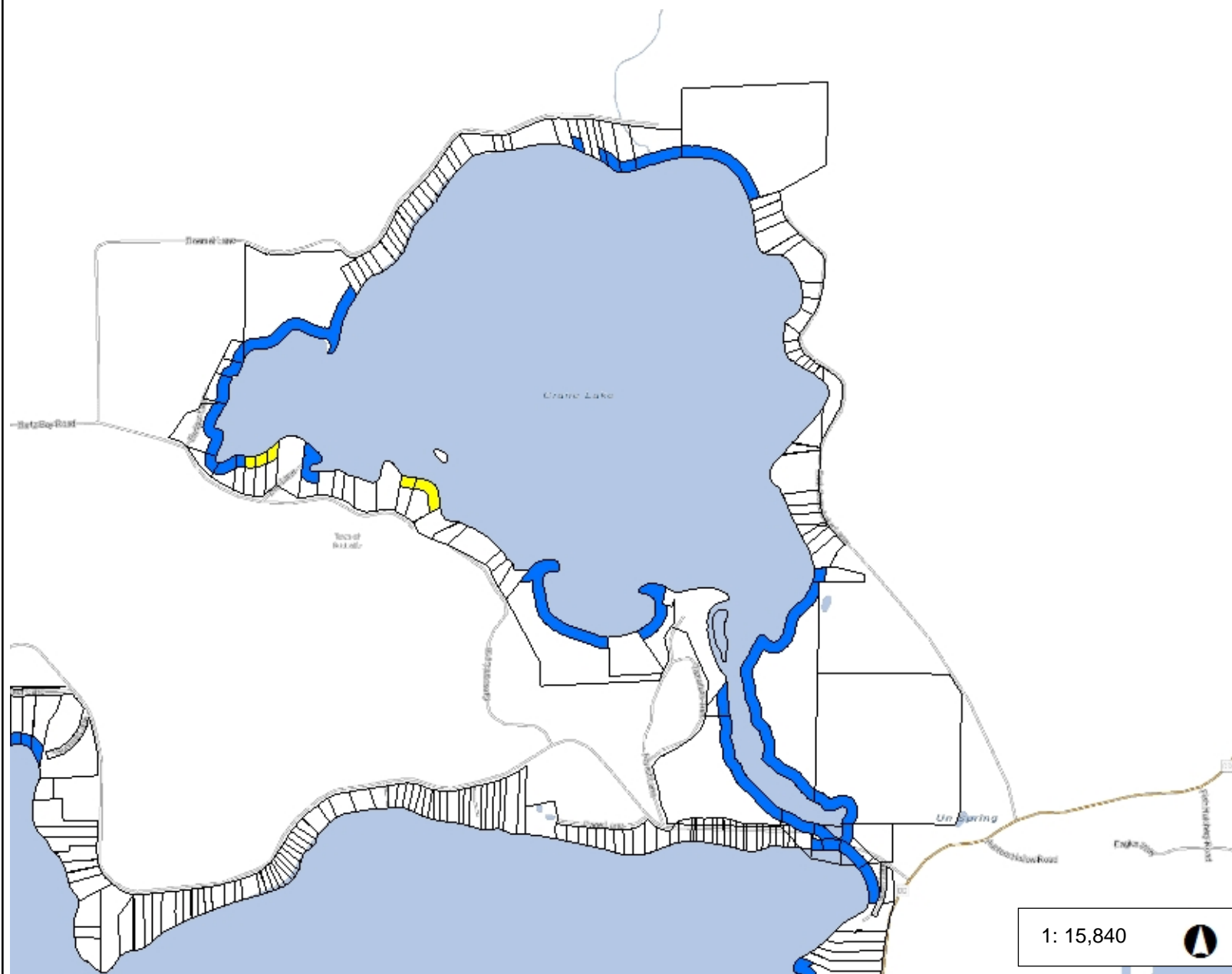
0.5 0 0.25 0.5 Miles

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## Exhibit 11. Crane Lake Littoral Zone - Aquatic Plants- 2019



### Legend

- Aquatic Plant Removal
- Floating & Emergent Plants
- Emergent Plants
- Floating Plants
- Shoreland Parcels
- County Boundary
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Open Water
- Great Lakes

1: 15,840



### Notes

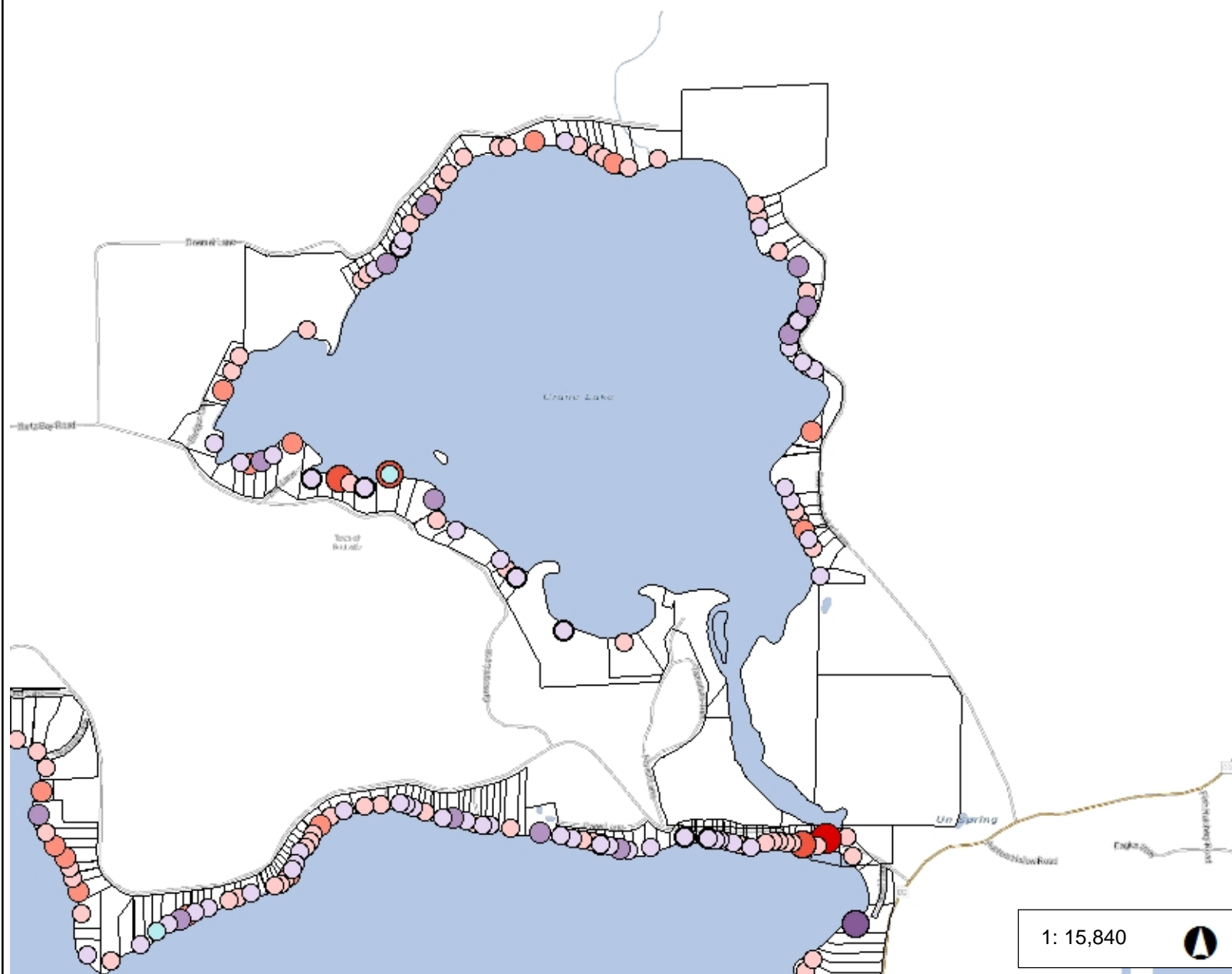
0.5 0 0.25 0.5 Miles

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## Exhibit 12. Crane Lake Littoral Zone - Human Structures- 2019



### Legend

#### Swim Rafts

- 1
- 2
- 3 - 5
- 6+

#### Boat Lifts

- 1
- 2
- 3 - 5
- 6+

#### Piers

- 1
- 2
- 3 - 5
- 6+

#### Boat Houses

- 1
- 2
- 3 - 5
- 6+

#### Marinas

- 1
- 2
- 3 - 5
- 6+

Shoreland Parcels

### Notes

0.5 0 0.25 0.5 Miles

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## Exhibit 13. Crane Lake Woody Habitat - 2019



### Legend

#### WH Branchiness

- No branches
- Few branches
- Full tree crown

#### WH Touching Shore

#### WH In Water

#### Shoreland Parcels

#### County Boundary

#### Municipality

#### State Boundaries

#### County Boundaries

#### Major Roads

- Interstate Highway
- State Highway
- US Highway

#### County and Local Roads

- County HWY
- Local Road

#### Railroads

#### Tribal Lands

#### Rivers and Streams

#### Intermittent Streams

#### Open Water

#### Great Lakes

1:15,840



0.5 0 0.25 0.5 Miles

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### Notes



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## **Appendices E1 and E2**

### **Pickereel/Crane Lakes Fisheries Reports**

# Pickerel Lake Fisheries Summary

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## Introduction

There have been many fish surveys conducted on Pickerel Lake by Wisconsin Department of Natural Resources' Bureau of Fisheries Management (WDNR-Fisheries) and The Sokaogon Chippewa Community (SCC) Mole Lake Fisheries. The most recent fish survey of Pickerel Lake was done in 2019 (a fall walleye recruitment survey using electrofishing). This same survey was also conducted in the fall of 2017 and 2018. A mark-recapture survey was conducted to estimate the abundance of adult walleye in Pickerel Lake during 2017. Northern pike were also captured and marked in the spring fyke net survey (2017) along with an early spring electrofishing survey. On 6/13/2017 the largemouth bass population was assessed during an electrofishing survey. There was a bullhead removal project that took place on 5/17 and 6/7/2017. An early spring netting survey was used to assess abundance of yellow perch, black crappie, and bluegill in 2017. Bullheads were measured during surveys to evaluate largemouth bass regulation in 2012. The walleye rehabilitation project began in 2012. Bullheads have been removed since the walleye rehabilitation project began in 2012. A survey was conducted 6/6/2011 to help assess the bass regulation on Pickerel and Crane Lakes.

The fishing regulations for Pickerel Lake are as follows (Pickerel/Crane Lake website (2021):

- Walleye - bag limit 3, minimum 18", possession limit is 10;
- Bass – bag limit 5, minimum 14", possession limit is 10.

The WDNR selects several lakes each year for walleye population estimates and corresponding nine-month creel surveys (Cichosz, 2019). The lakes sampled by the WDNR within the Ceded Territory during 2017-18 were chosen using a stratified random design considering size, historic level of tribal harvest, and primary walleye recruitment source (Cichosz, 2019). Pickerel Lake was one of the large lakes chosen for this survey. Data from these lake surveys is used to estimate walleye population size and derive safe harvest levels, estimate tribal and angler harvest and exploitation rates, examine temporal and spatial trends in walleye populations and angler effort, and maintain up to date characterizations of population status for each lake (Cichosz, 2019). Walleye spearing quotas have been determined for Pickerel Lake from 2013 to 2017 ranging from 22 to 26 walleye. A walleye spearing harvest has not occurred on Crane or Pickerel Lake.

In an effort to understand the fishery, White Water Associates biologist emailed the Fisheries biologist from the WDNR. An email correspondence (February 26, 2021) from Gregory Matzke (WDNR Fisheries), states that Pickerel Lake is managed for a stocked walleye lake and aiming toward natural reproduction. The following paragraphs are questions posed to Mr. Matzke and his responses.

### **1. How does this historic fishery compare with current Pickerel and Crane Lake fishery?**

At one time they were considered some of the best walleye fishing lakes around (especially Crane Lake), but they drastically declined. We are now trying to rebuild the walleye fishery. The fish communities also changed drastically. When walleye was on the decline it opened the door for centrarchid panfish, bass, and pike. Panfish became overabundant on both lakes, and WDNR put very restrictive regulations on predators to control panfish abundance, which worked on Crane Lake, but not Pickerel. Bullheads became extremely abundant at some point, when we removed a good portion of bullheads from both lakes the fishery then began to change drastically and fast, favoring yellow

perch and allowing stocked walleye to survive. We saw major and fast declines in bluegill abundance after bullhead removal, to the point that we were able to remove the restrictive regulation for largemouth bass. Then the reef got installed March 4-6, 2019, and we have documented the first walleye reproduction since the early-to-mid 80s. Right now, we are very encouraged that we can make these lakes desirable walleye lakes again, but the next decade will tell the story.

## **2. What are the overall management goals for the fish community in Pickerel and Crane Lake?**

We are managing for walleye. We would like to see yellow perch as the main panfish (that gives walleye the best chance). The “dream” is to return natural reproduction at significant levels, but the goal would be to at least create a desirable stocked walleye fishery. We would like bluegill abundance to stay relatively low (or at least at a level where they are not overabundant). Right now, my focus is to “stay the course” and fight for walleye success, and document the success or failure of our biomanipulation project.

## **3. What are some specific goals for individual species in Pickerel and Crane Lake?**

I don’t necessarily have levels written down. I will just go off the top of my head, species by species, on what I would like to see the populations stabilize at. This does not mean that these are management objectives, because angler preference may not coincide with what I would like to see. We will not be removing any species of fish besides bullheads, so we are going to hopefully achieve sustainable levels of each species population.

### **Pickerel:**

-Yellow Perch: I want them to be the dominant panfish. Five years ago, I would say that would never happen due to extreme bluegill abundance but it now looks possible.

-Bluegill: I would like them to not reach overabundant levels, ideally < 300/net-night, but with the history I wouldn’t be surprised if they made a comeback. Last survey had roughly 50/net-night, and the size structure and growth were improved, so I am happy where we are at.

-Black Crappie: No real thoughts on this, just don’t want to see them overabundant.

-Northern Pike: I would like to see a reduction in abundance. Adult pike abundance is very high.

-Walleye: We have no evidence that walleye ever successfully reproduced in Pickerel. When the walleye population was strong it was thought that natural reproduction (NR) came from Crane Lake. It would be amazing if reproduction on Crane got to that level again, but I am not sure that is a realistic goal. I would say that maintaining a stocked walleye population > 1/acre would be a success.

-Largemouth Bass: LMB are of low abundance and have very good size structure. I would like to see that continue.

## **4. How would you rank the quality of fish habitat? Have you surveyed to see if the rock reef is working?**

-The spawning reef has brought back natural reproduction of walleye after no natural reproduction for multiple decades, so it does work. Ideally, we will see increased natural reproduction, but time will tell. Both lakes have a vast number of aquatic plants, and there is no lack of habitat.

## **Fish Species**

For each fish species discussed, some statistics have been summarized. Total count has been recorded for some species. Measurements of fish were collected to create a representation of species size structure. For gamefish species (bluegill, largemouth bass, yellow bullhead, walleye, northern pike, yellow perch, and black crappie), analysis of the species' recruitment is also provided. Fall surveys are designed to look at gamefish reproduction. To determine the modal size the fisheries biologist takes structures from the gamefish (walleye, northern pike, largemouth bass) to separate them into age-0, age-1, and > age 1-year classes. They then use the relative abundance (#/mile captured) to determine the size of that year class. "N/A" typically means that we did not catch any of that species/age group, or that there wasn't enough caught to get a modal size.

### ***Bluegill***

Bluegill appeared to be the second most abundant panfish in Pickerel Lake in the early June survey of 2017. Pickerel Lake had a relative abundance of 51.6 fish per net-lift, which is of average abundance (Matzke, 2017). The size structure is considered average with approximately 86.6% of the fish being  $\geq 6$  inches and 38.2% of the fish being  $\geq 7$  inches in length (Matzke, 2017).

### ***Largemouth bass***

Largemouth bass electrofishing data for 1991, 2011, 2017, and 2018 on Pickerel Lake is shown in Exhibit 1. The largemouth bass population on 6/13/2017 had a total of 75 largemouth bass caught with 59 to be adults ( $\geq 8$  inches) (Matzke, 2017). Relative abundance of adult largemouth bass was measured at 8.8 adults per mile, slightly lower than the relative abundance of 10.2 adults per mile measured in 2012 survey (1.8 fish/acre) (Matzke, 2017). The Pickerel Lake largemouth population is considered of low abundance in comparison to other populations in the area (Matzke, 2017). The size structure of the Pickerel Lake largemouth bass is considered good with approximately 58.1% of the largemouth bass captured being  $\geq 14$  inches, and 6.8%  $\geq 18$  inches in length (Matzke, 2017). Exhibit 2 displays the catch/effort per mile of largemouth bass in 1991, 2011, 2012, 2017, and 2018. Exhibit 3 is the length frequency of the 9/18/2017 and 9/21/2018 electroshocking surveys.

Exhibit 1. Largemouth bass catch on Pickerel Lake, electroshocking (WDNR).					
Year	No.	Min. Length Inches	Max. Length Inches	Mean Length Inches	Catch/Unit Per mile
1991					7.09
2011					14.53
2012					10.2
6/13/2017	59	8	19		8.8
9/18/2017	116	5.3	14.8	9.0	14.7
2018	27	6.8	12.8	9.7	3.4

Exhibit 2. Pickerel Lake largemouth bass catch/effort per mile, WDNR electroshocking.

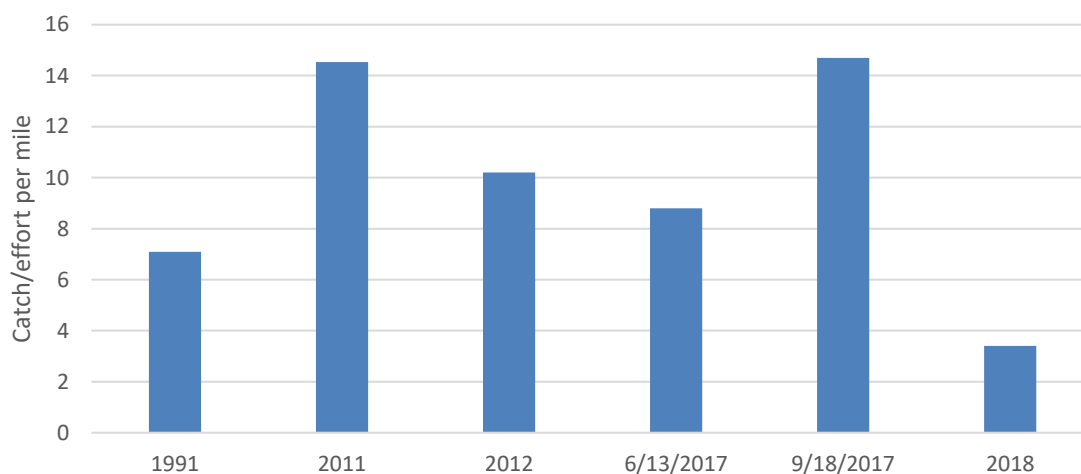
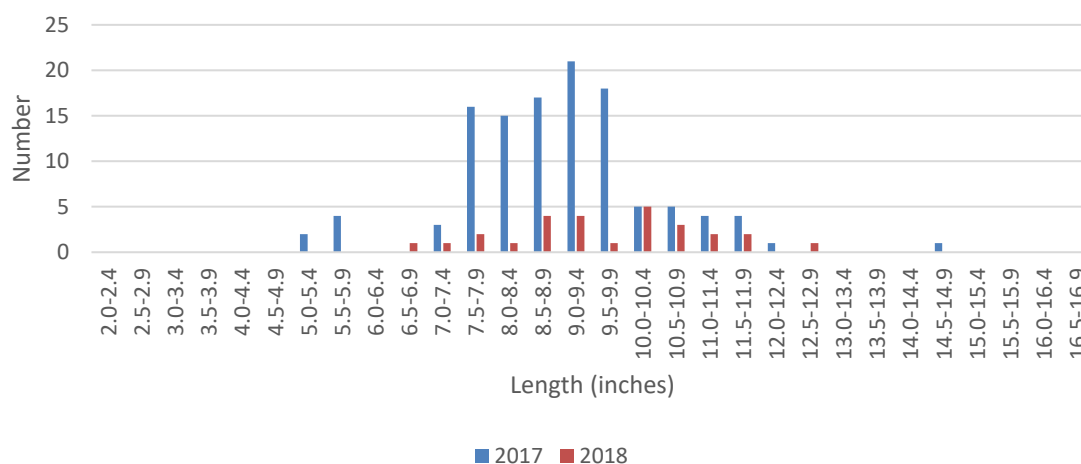


Exhibit 3. Pickerel Lake largemouth bass length frequency, 2017 and 2018 WDNR electroshocking.





The length frequency by inch group for the 6/13/2017 survey can be found in the WDNR Fisheries Information Sheet (2017).

### ***Yellow Bullhead***

In 2012 yellow bullhead were measured in high abundance. Since the walleye rehabilitation project, a total of 22,694 bullhead have been removed (Matzke, 2017). In 2017, 10,998 bullheads were removed. Survey results in 2017 indicate the bullhead population to be of above average abundance (Matzke, 2017). The length frequency by inch group 2017 survey can be found in the WDNR Fisheries Information Sheet (2017).

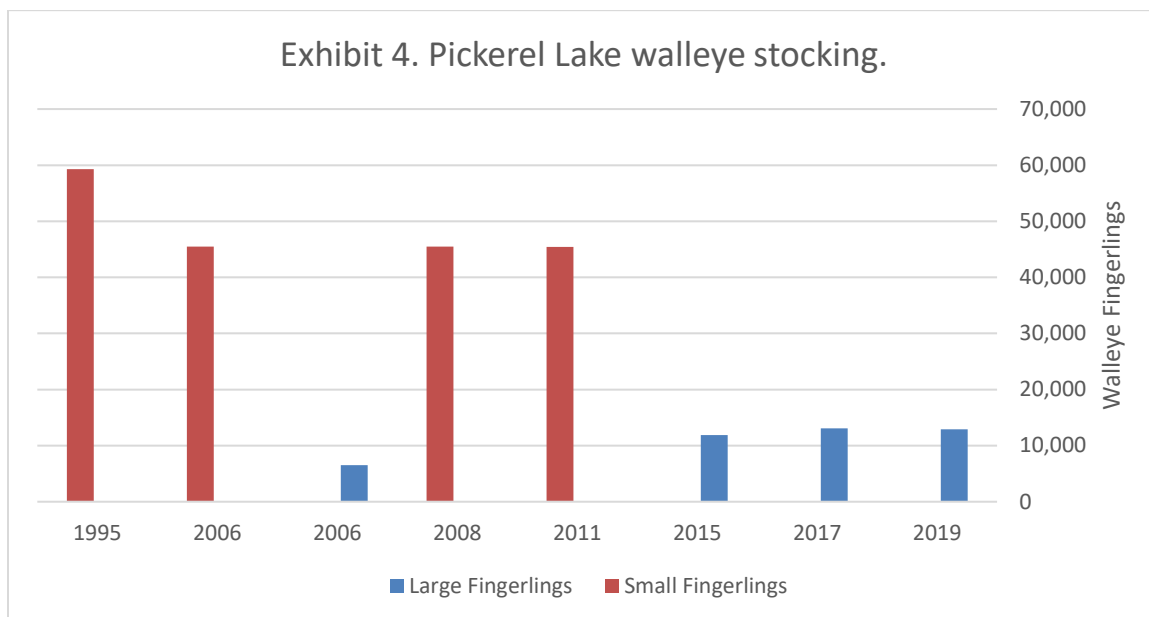
### ***Walleye***

The Wisconsin Department of Natural Resources (WDNR) 2017-2018 Ceded Territory Fishery Assessment Report included Crane Lake. The report by Thomas A. Cichosz can be found on the WDNR website. WDNR gathers data from a representative sample of lakes throughout the Ceded Territory each year in order to assess abundance and stability of walleye populations (Cichosz, 2019). The WDNR uses three methods: spring adult and total population estimates, fall age-0 (young-of-year) relative abundance estimates, and creel surveys of angler catch and harvest (Cichosz, 2019). When combined, these methods provide information on the current harvestable population, and indication of the future harvestable population, and the degree of exploitation in the walleye fishery (Cichosz, 2019). The WDNR also conducts muskellunge population estimates. These estimates described above are important to the management of Ceded Territory fisheries. Accurate population estimates allow calculation of “safe harvest” levels (Cichosz, 2019). Walleye spearing quotas have been determined for Pickerel Lake 2013 to 2017 in the range between 22 and 27 walleyes. A walleye spearing harvest has not occurred on Crane or Pickerel Lake in those years.

Catch per unit of effort (CPE) statistics are generated by dividing the numbers of age 0 and age 1 walleye captured by the length of the shoreline surveyed, which gives the number of age 0 and age 1 walleye captured per mile of shoreline surveyed. These CPE statistics can easily be compared from lake to lake in order to evaluate recruitment. On lakes sustained primarily or entirely by natural reproduction, age 0 CPEs typically average between 20 and 30 per mile, and age 1 CPEs typically average between 6 and 10 per mile (GLIFWC, 2012).

Greg Matzke (WDNR) described in the 2017 Pickerel Lake Fisheries Information Sheet that two different stocking regimes are being used on Pickerel Lake. The first of which are the older walleye in the system which were created through marginally successful stockings of small fingerling walleye (~2 inches) from the mid-1990s until 2011 (Matzke, 2017). More recently the

focus has been shifted to stocking fewer, but larger walleye (~7-8 inches) from 2012 until the present (Matzke, 2017). The Wisconsin Department of Natural Resources, Pickerel-Crane Lake District, and the Mole Lake Chippewa Community have contributed to the stockings. Exhibit 4 displays the walleye fingerlings stocked.



During the WDNR 2017 surveys there were 51 walleyes (0.4/acre). An adult population of 1 adult walleye for every 25 acres which is incredibly low (Matzke, 2017). An estimated 58.6 % of the fish sampled were  $\geq 20$  inches and 39.7 % were  $\geq 25$  inches (Matzke, 2017). The size structure of this population is artificially high, created by a cessation of walleye stocking from 1996 to 2005 (Matzke, 2017). Exhibit 5 displays the length frequency of smaller walleyes and Exhibit 6 displays the length frequency of larger walleyes for the 9/18/2017, 9/21/2018, and 9/11/2019 walleye recruitment surveys.

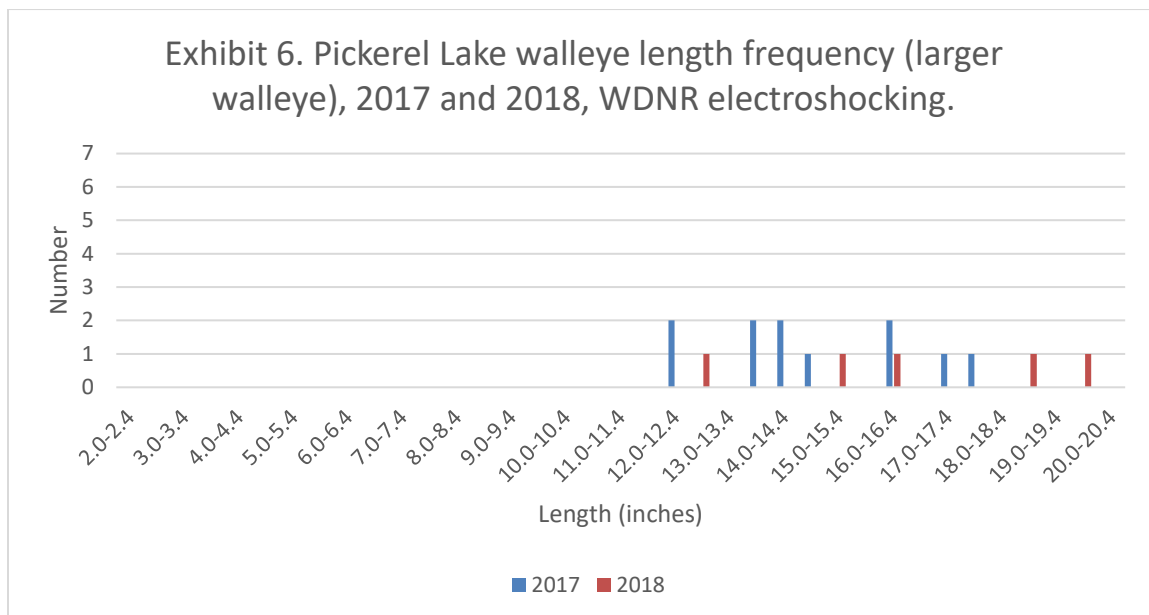
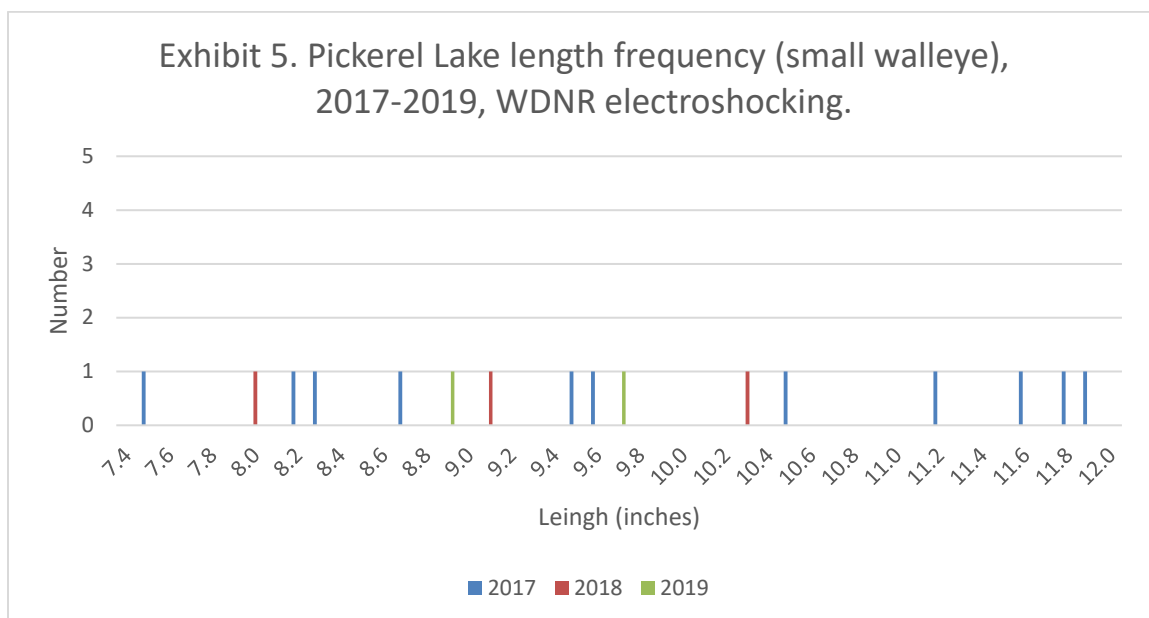


Exhibit 7 shows the age 0 and age 1 walleye catch per unit effort for Pickerel Lake in 2017, 2018, and 2019 and Exhibit 8 summarizes the number caught, minimum, maximum, and mean length and catch/unit per mile for walleye 2017-2019 for the fall recruitment surveys.

Exhibit 7. Pickerel Lake walleye catch/effort per mile, 2017-2019 WDNR electroshocking.

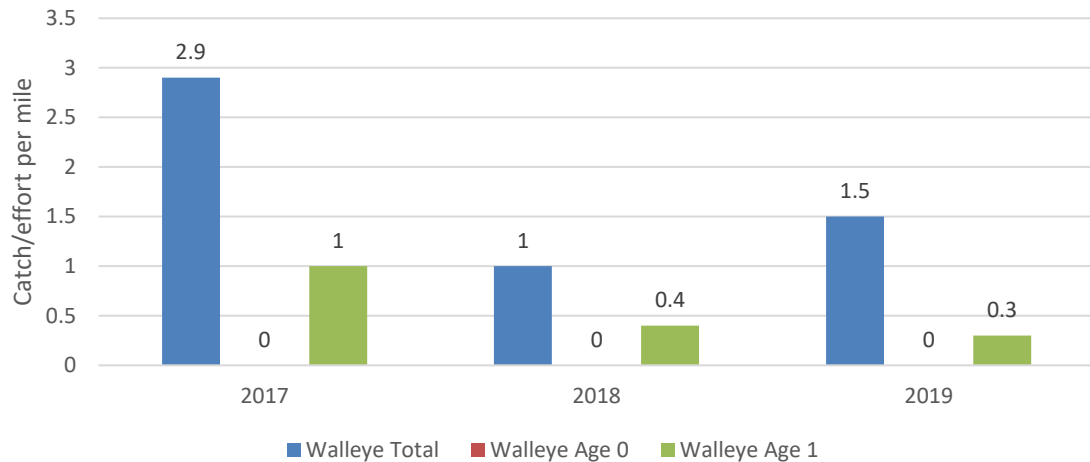
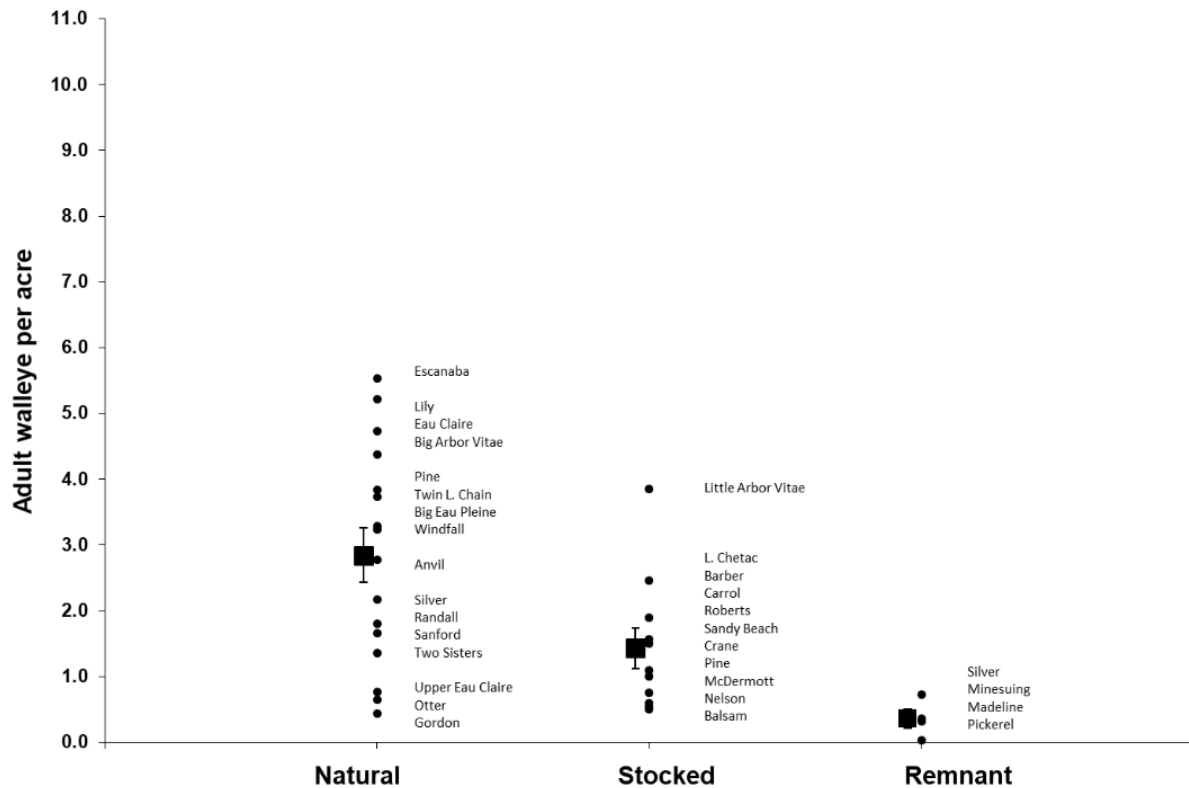


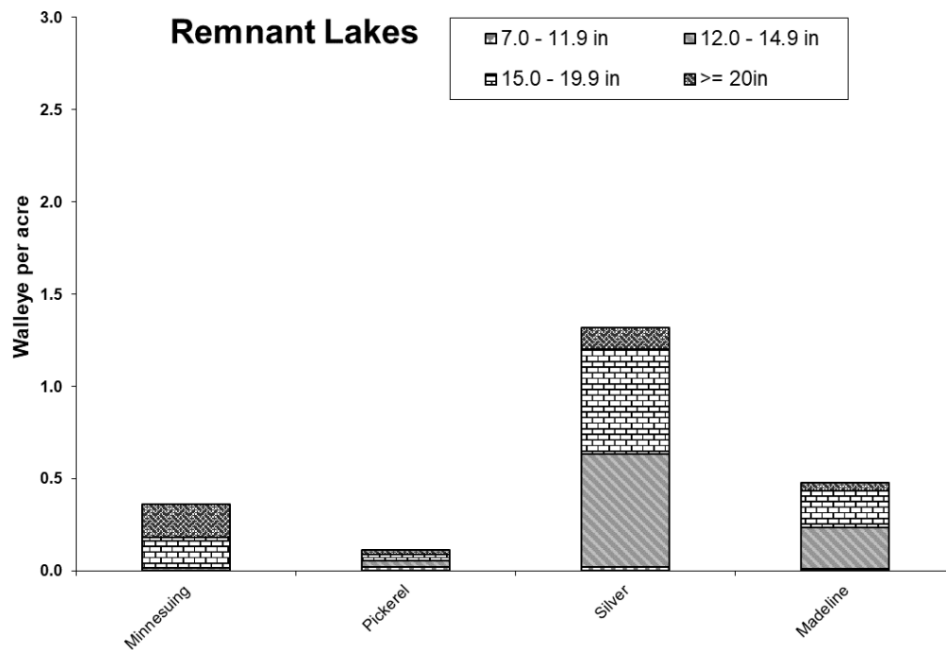
Exhibit 8. Walleye catch on Pickerel Lake, electroshocking (WDNR).

Year	No. Caught	Min. Length Inches	Max. Length Inches	Mean Length	Catch/Unit Per mile
2017	23	7.5	17.8	12.3	2.9
2018	8	8.0	19.8	13.8	1.0
2019	12	8.9	22.8	18.1	1.5

The walleye length frequency by inch group for the 2017 survey can be found in the WDNR Fisheries Information Sheet (2017). Exhibit 9 is the adult walleye density estimates for lakes sampled by WDNR in spring 2017 based on primary population recruitment source which includes Pickerel Lake as a remnant lake. The male to female ratio was 0.34 and the recruitment code was O-ST in 2017. O-ST is stocking that provides the only source of recruitment to the population in an attempt to establish an adult population, but survey data is either not available or indicates that adult density is less than 0.5 per acre. Exhibit 10 is the size distribution of spawning walleye sampled in remnant production model lakes during 2017 which included Pickerel Lake (Cichosz, 2019).



**Exhibit 9. Adult walleye density estimates for lakes sampled by WDNR in spring 2017 based on primary population recruitment source (Cichosz, 2019).**



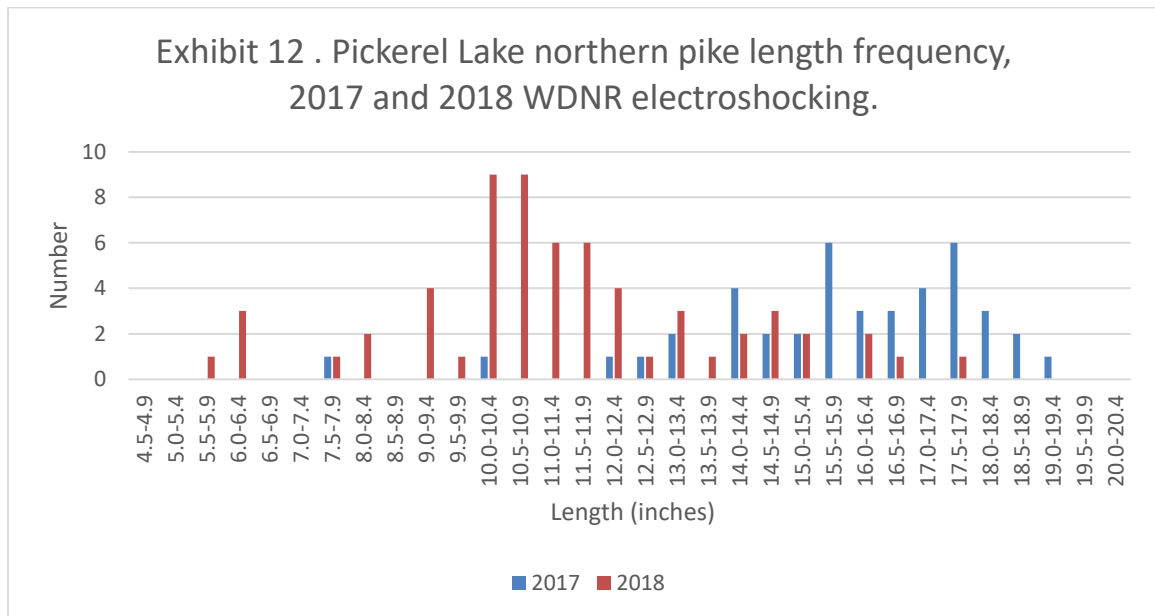
**Exhibit 10. Size distribution of spawning walleye sampled in remnant production model lakes during 2017 (Cichosz, 2019).**

### ***Northern Pike***

The adult ( $\geq 12$  inches) northern pike population in Pickerel Lake at approximately 9,286 (7.2/acre) which is considered to be over abundant when compared to other populations in the area (Matzke, 2017). The size structure of northern pike is considered poor with only 32.1% of the fish sampled being  $\geq 21$  inches, and 7.2%  $\geq 28$  inches in length (Matzke, 2017).

Length frequency of northern pike are shown in Exhibit 11 and 12 from the 2017-2018 electroshocking survey.

Exhibit 11. Northern Pike catch on Pickerel Lake, electroshocking (WDNR).					
Year	No. Caught	Min. Length Inches	Max. Length Inches	Mean Length	Catch/Unit Per mile
2017	42	7.8	20.3	16.1	5.3
2018	59	5.8	17.8	11.3	7.5



### ***Yellow Perch and Black Crappie***

There was an abundance of yellow perch and black crappie in the early spring survey of 2017. There were 80.9 fish per net-night, while black crappie relative abundance was 13.0 fish per net-night (Matzke, 2017). Yellow perch are considered abundant, while black crappie is of average abundance, when compared to other populations in the area (Matzke, 2017). Yellow perch size structure is considered poor with only 6.5% of the fish sampled being  $\geq 8$  inches and black crappie size structure to be below average for the area with 79.2% of the fish being  $\geq 8$  inches and 4.6% of the fish being  $\geq 10$  inches in length (Matzke, 2017). The length frequency by inch group 2017 survey can be found in the WDNR Fisheries Information Sheet (2017).



### ***Other Species of Fish***

Matzke (2017) mentions that during the 2017 surreys, pumpkinseed, hybrid bluegill, white sucker, and golden shiner were caught. Based on the catch rates and observations, pumpkinseed and hybrid bluegill are considered abundant (Matzke, 2017). White sucker and golden shiner are of low to moderate abundance (Matzke, 2017).

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Cichosz, Thomas A. October 2019. *Wisconsin Department of Natural Resources 2017-2018 Ceded Territory Fishery Assessment Report #91*. Treaty Fisheries Assessment Unit. Bureau of Fisheries Management. Madison, Wisconsin.

Great Lakes Indian Fish and Wildlife Commission (GLIFWC). 2012. Great Lakes Indian Fish and Wildlife Commission Website. Retrieved 2015. <[Http://www.glifwc.org/fisheries/inland/inland.html](http://www.glifwc.org/fisheries/inland/inland.html).>

Matzke, Greg. 2017. *Pickrel Lake Wisconsin Fisheries Information Sheet*. Wisconsin Department of Natural Resources. 2017.

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# Crane Lake Fisheries Summary

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## Introduction

There have been many fish surveys conducted on Crane Lake by Wisconsin Department of Natural Resources' Bureau of Fisheries Management (WDNR-Fisheries) and The Sokaogon Chippewa Community (SCC) Mole Lake Fisheries. The most recent fish survey of Crane Lake was done in 2020 (a fall walleye recruitment survey using electrofishing). A gamefish recruitment survey was conducted using electrofishing on 9/27/2007, 9/26/2018 and 9/30/2019. A mark-recapture survey was conducted to estimate the abundance of adult walleye in Crane Lake during 2017. There were spring netting surveys as well as 6 electrofishing surveys that took place between 4/26/2017 and 5/24/2017. Northern pike were also captured and marked in the spring fyke net survey (2017) along with an early spring electrofishing survey. There was a bullhead removal project that took place 5/17 and 6/7/2017. An early spring netting survey was used to assess abundance of yellow perch, black crappie, and bluegill in 2017. Bullhead were measured during surveys to evaluate largemouth bass regulation in 2012. The walleye rehabilitation project began in 2012. After observing the high abundance of bullhead in Crane Lake extensive effort has been put toward removing bullhead as part of a walleye rehabilitation project (Matzke, 2017). A survey was conducted 6/6/2011 to help assess the bass regulation on Pickerel and Crane Lakes.

The fishing regulations for Pickerel Lake are as follows (Pickerel/Crane website, 2021):

- Walleye - bag limit 3, minimum 18", possession limit is 10;
- Bass – bag limit 5, minimum 14", possession limit is 10.

The WDNR selects several lakes each year for walleye population estimates and corresponding nine-month creel surveys (Cichosz, 2019). The lakes sampled by the WDNR within the Ceded Territory during 2017-18 were chosen using a stratified random design considering size, historic level of tribal harvest, and primary walleye recruitment source (Cichosz, 2019). Pickerel Lake was one of the large lakes chosen for this survey but there is also data for Crane Lake. Data from these lake surveys is used to estimate walleye population size and derive safe harvest levels, estimate tribal and angler harvest and exploitation rates, examine temporal and spatial trends in walleye populations and angler effort, and maintain up to date characterizations of population status for each lake (Cichosz, 2019). Walleye spearing quotas have been determined for Crane Lake between 2013 to 2017 ranging from 42 to 44 walleye. However, a harvest has not occurred on Crane or Pickerel Lake.

In an effort to understand the fishery, White Water Associates biologist emailed the Fisheries biologist from the WDNR. An email correspondence (February 26, 2021) from Gregory Matzke (WDNR Fisheries), states that Crane Lake is managed for a stocked walleye lake and aiming toward natural reproduction. The following paragraphs are questions posed to Mr. Matzke and his responses.

### **1. How does the historic fishery compare with current Pickerel and Crane Lake fishery?**

At one time they were considered some of the best walleye fishing lakes around (especially Crane Lake), but they drastically declined. We are now trying to rebuild the walleye fishery. The fish communities also changed drastically. When walleye was on the decline it opened the door for centrarchid panfish, bass, and pike. Panfish became overabundant on both lakes, and WDNR put very restrictive regulations on predators to control panfish abundance, which worked on Crane Lake, but

not Pickerel. Bullheads became extremely abundant at some point, when we removed a good portion of bullheads from both lakes the fishery then began to change drastically and fast, favoring yellow perch and allowing stocked walleye to survive. We saw major and fast declines in bluegill abundance after bullhead removal, to the point that we were able to remove the restrictive regulation for largemouth bass. Then the reef got installed March 4-6, 2019, and we have documented the first walleye reproduction since the early-to-mid 80s. Right now, we are very encouraged that we can make these lakes desirable walleye lakes again, but the next decade will tell the story.

## **2. What are the overall management goals for the fish community in Pickerel and Crane Lake?**

We are managing for walleye. We would like to see yellow perch as the main panfish (that gives walleye the best chance). The “dream” is to return natural reproduction at significant levels, but the goal would be to at least create a desirable stocked walleye fishery. We would like bluegill abundance to stay relatively low (or at least at a level where they are not overabundant). Right now, my focus is to “stay the course” and fight for walleye success, and document the success or failure of our biomanipulation project.

## **3. What are some specific goals for individual species in Pickerel and Crane Lake?**

I don’t necessarily have levels written down. I will just go off the top of my head, species by species, on what I would like to see the populations stabilize at. This does not mean that these are management objectives, because angler preference may not coincide with what I would like to see. We will not be removing any species of fish besides bullheads, so we are going to hopefully achieve sustainable levels of each species population.

### **Crane Lake:**

-Yellow Perch: I would like to see yellow perch become the dominant panfish, and hopefully sustain a catch rate > 15 YP/net-night during Spring Netting #1 surveys. Spring Netting #1 occurs immediately after ice out. Primary targets are walleye and northern pike. This is used to look at perch and black crappie.

-Bluegill (BG): I want the bluegill abundance to stay under 300 bg/net-night during Spring Netting #3 surveys. Spring Netting #3 occurs the last week of May through mid to late June. The primary target is summer spawning panfish. That is very high, but the history of the lake shows bluegill can become very abundant. We would like to maintain quality size structure of BG on Crane Lake. The last survey had BG abundance around 25/net-night if I remember correctly, I would be very pleased if BG abundance stayed in the 25-100/net-night range.

-Black Crappie: They are kind of the wild card. Crane is a very good crappie lake. First and foremost, we want to make sure quality size structure is maintained, and we don’t want them to become overabundant and potentially have negative impacts with our walleye plans.

-Northern Pike: Typically, with bullhead removals northern pike abundance declines, as long as they don’t become overabundant (which they are not – they are of average abundance) I would be happy with whatever the pike population becomes (example: low abundance/high size structure, or average abundance with average size structure)

-Walleye: Walleye are doing very well right now, survival of stocked walleye is considered very good. Ideally, we would have a stocked walleye population > 1.5 adults/acre. But there is a fair amount of angling pressure on walleye, so even if we don't quite get over that level, I would think the limiting factor would be angler harvest, which means that anglers are using the resource and that is good too. Ultimate goal is to maintain natural reproduction and hopefully get significant levels of natural reproduction

-Largemouth bass (LMB): LMB have gotten abundant under the restrictive regulation, for the sake of walleye I would like to see LMB abundance drop down to more average levels, but it is a quality fishery for LMB, and I am ok with their population being a bit higher than average.

**4. How would you rank the quality of fish habitat? Have you surveyed to see if the rock reef is working?**

-The spawning reef has brought back natural reproduction of walleye after no natural reproduction for multiple decades, so it does work. Ideally, we will see increased natural reproduction, but time will tell. Both lakes have a vast number of aquatic plants, and there is no lack of habitat.

## **Fish Species**

For each fish species discussed, some statistics have been summarized. Total count has been recorded for some species. Measurements of fish were collected to create a representation of species size structure. For gamefish species (bluegill, largemouth bass, yellow bullhead, walleye, northern pike, yellow perch, and black crappie), analysis of the species' recruitment is also provided. Fall surveys are designed to look at gamefish reproduction. To determine the modal size the fisheries biologist takes structures from the gamefish (walleye, northern pike, largemouth bass) to separate them into age-0, age-1, and > age 1-year classes. They then use the relative abundance (#/mile captured) to determine the size of that year class. "N/A" typically means that we did not catch any of that species/age group, or that there wasn't enough caught to get a modal size.

### **Bluegill**

Bluegill appeared to be the most abundant panfish in Crane Lake in the early June survey of 2017. Crane Lake had a relative abundance of 24.8 fish per net-lift, which is low to moderate abundance of bluegill (Matzke, 2017). The size structure is considered very good with approximately 94.2% of the fish being  $\geq 6$  inches and 19.7 % of the fish being  $\geq 8$  inches in length (Matzke, 2017). The catch/unit per mile of bluegill was high in 2017-2019 (Exhibit 1).

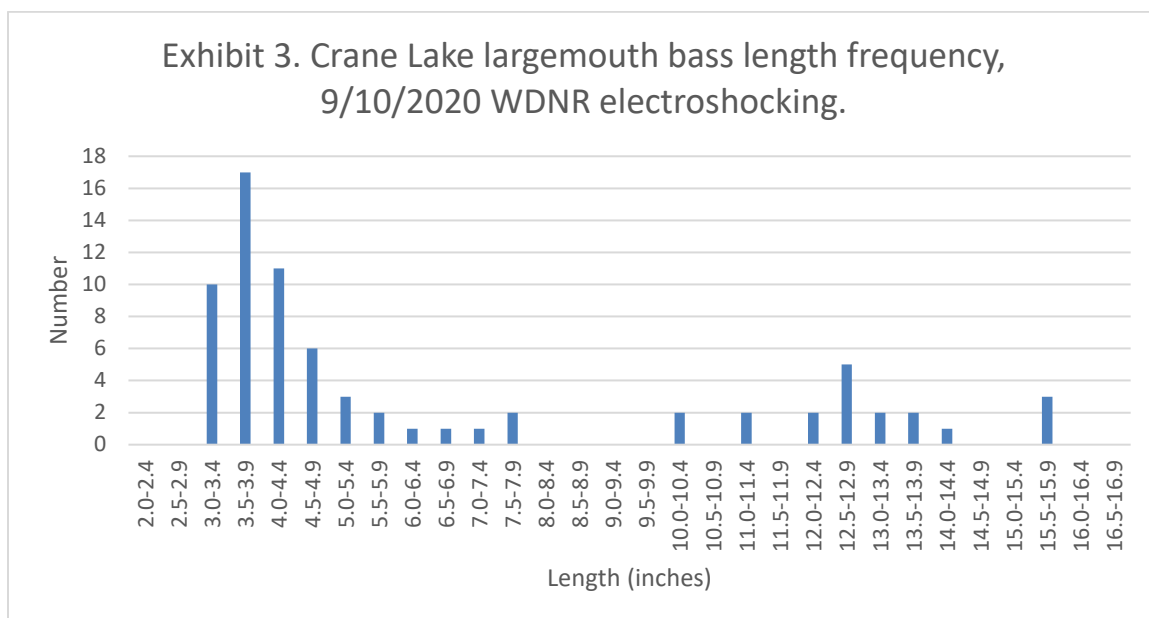
Exhibit 1. Bluegill gamefish recruitment (WDNR)				
Year	No. Caught	Modal Size(s)	Size Range	Catch/Unit Per mile
9/27/2017	193	3.5-3.9	1.0-7.4	386.00
9/26/2018	117	3.0-3.4	1.0-6.4	254.35
9/30/2019	201	4.5-4.9	1.0-7.4	402.00



## ***Largemouth bass***

Largemouth bass electrofishing data for 2011, 2017-2020 on Crane Lake is shown in Exhibit 2. The largemouth bass population in Crane Lake ( $\geq 8$  inches) was estimated to be 1,849 fish (5.4/acre) making Crane Lake the largemouth population to be considered abundant in 2017 (Matzke, 2017). The length frequency by inch group for the 6/13/2017 survey can be found in the WDNR Fisheries Information Sheet (2017). Exhibit 3 is the length frequency of the 9/10/2020 electroshocking survey.

Exhibit 2. Largemouth bass catch on Crane Lake, electroshocking (WDNR).					
Year		No. Caught	Model Size(s)	Size Range	Catch/Unit Per mile
9/27/2017	Age 0+	0	n/a		0.00
	Age 1+	7	5.5-5.9	4.6-6.6	1.71
	Other	27	8.0-8.4	6.9-9.3	6.60
9/26/2018	Age 0+	24	2.5-2.9	2.5-4.6	5.97
	Age 1+	2	n/a	6.3-6.6	0.50
	Other	10	8.0-8.4	7.9-9.8	2.49
9/30/2019	Age 0+	32	3.0-3.4	1.5-4.6	7.53
	Age 1+	6	6.6	6.0-6.6	1.41
	Other	4	9.5-9.7	7.1-9.7	0.94
		Number caught	Min. Length	Max. Length	
6/6/2011		79	4.6	18.4	23.37
9/10/2020		73	3.3	15.8	18.7



### ***Yellow Bullhead***

In 2012 bullhead were measured in high abundance so there was extensive effort to remove bullhead (10,274 removed) in 2013 from Crane Lake (Matzke, 2017). In 2017, 774 bullhead were removed. Survey results in 2017 indicate the bullhead population to be of moderate abundance (Matzke, 2017). Bullhead were caught and evaluated in September of 2017-2019 (Exhibit 4).

Exhibit 4. Yellow bullhead gamefish recruitment (WDNR)				
Year	No. Caught	Model Size(s)	Size Range	Catch/Unit Per mile
9/27/2017	4	n/a	6.0-12.4	8.00
9/26/2018	3	n/a	7.5-11.4	6.52
9/30/2019	10	10.0-10.4	8.5-12.0	20.00

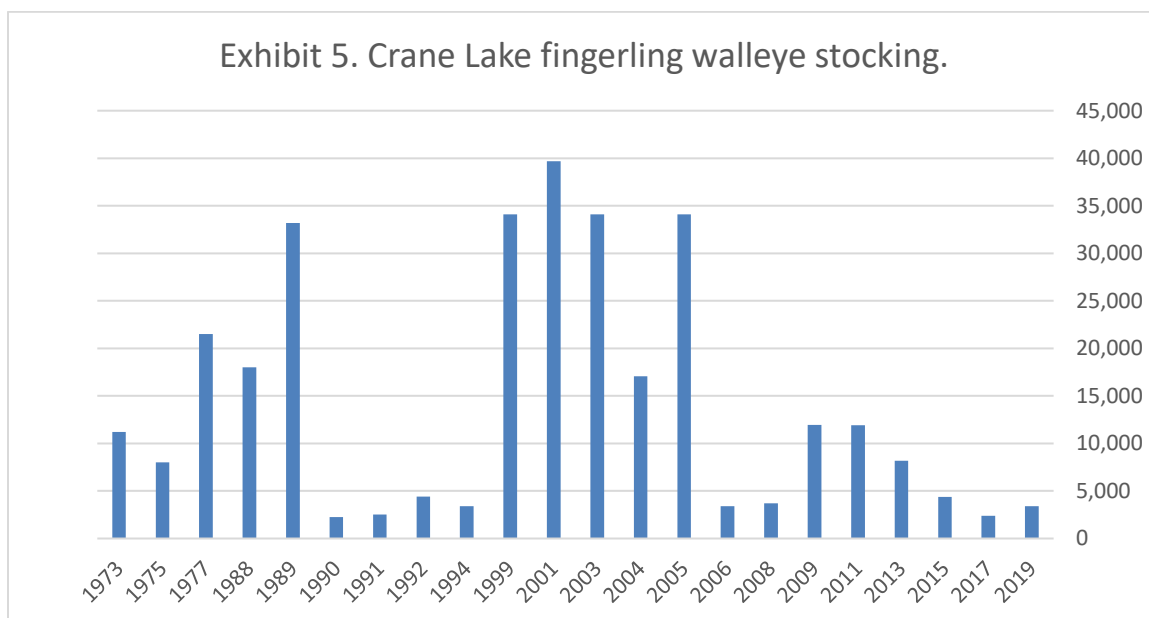
### ***Walleye***

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populations (Cichosz, 2019). The DNR uses three methods: spring adult and total population estimates, fall age-0 (young-of-year) relative abundance estimates, and creel surveys of angler catch and harvest (Cichosz, 2019). When combined, these methods provide information on the current harvestable population, and indication of the future harvestable population, and the degree of exploitation in the walleye fishery (Cichosz, 2019). The WDNR also conducts muskellunge population estimates. These estimates described above are important to the management of Ceded Territory fisheries. Accurate population estimates allow calculation of “safe harvest” levels (Cichosz, 2019). Walleye spearing quotas have been determined for Crane Lake 2013 to 2017 in the range of 42 to 44 walleye. A walleye spearing harvest has not occurred on Crane or Pickerel Lake.

Catch per unit of effort (CPE) statistics are generated by dividing the numbers of age 0 and age 1 walleye captured by the length of the shoreline surveyed, which gives the number of age 0 and age 1 walleye captured per mile of shoreline surveyed. These CPE statistics can easily be compared from lake to lake in order to evaluate recruitment. On lakes sustained primarily or entirely by natural reproduction, age 0 CPEs typically average between 20 and 30 per mile, and age 1 CPEs typically average between 6 and 10 per mile (GLIFWC, 2012).

Greg Matzke (WDNR) described in the 2017 Crane Lake Fisheries Information Sheet that two different stocking regimes are being used on Crane Lake because natural reproduction has not been documented since 1983. The current Crane Lake walleye population has been created by two different stocking regimes (Matzke, 2017). The first of which are the older walleye in the system which were created through marginally successful stockings of small fingerling walleye (~2 inches) from the mid-1990s until 2011(Matzke, 2017). More recently the focus has been shifted to stocking fewer, but larger walleye (~7-8 inches) from 2012 until the present (Matzke, 2017). The WDNR, Pickerel-Crane Lake District, and the Mole Lake Chippewa Community have contributed to the stockings. Exhibit 5 displays the walleye fingerlings stocked.



During the WDNR 2017 surveys there were 250 walleyes (1.0/acre). An adult population of 1 adult per acre is considered to be low abundance (Matzke, 2017). An estimated 77.7 % of the fish sampled were  $\geq 15$  inches and 13.6% were  $\geq 20$  inches. This data suggest that the size structure of the Crane Lake walleye population is moderate (Matzke, 2017).

Exhibit 6 displays the length frequency for larger walleyes 9/10/2020. The length frequency by inch group for the 2017 survey can be found in the WDNR Fisheries Information Sheet (2017). Exhibit 7 and 8 display the catch per unit effort of Age 0 and Age 1 walleye in 2013, 2015-2020. Exhibit 9 is the size distribution of spawning walleyes sampled in stocked production model lakes in 2017. The recruitment code for Crane Lake was ST (stocked) and the male to female ratio for walleyes was 3.39 in 2017 (Cichosz, 2019). Stocking provides the only source of recruitment and is consistent enough to result in a multi-year class adult population (Cichosz, 2019).

Exhibit 6. Crane Lake walleye length frequency, 9/10/2020  
WDNR electroshocking.

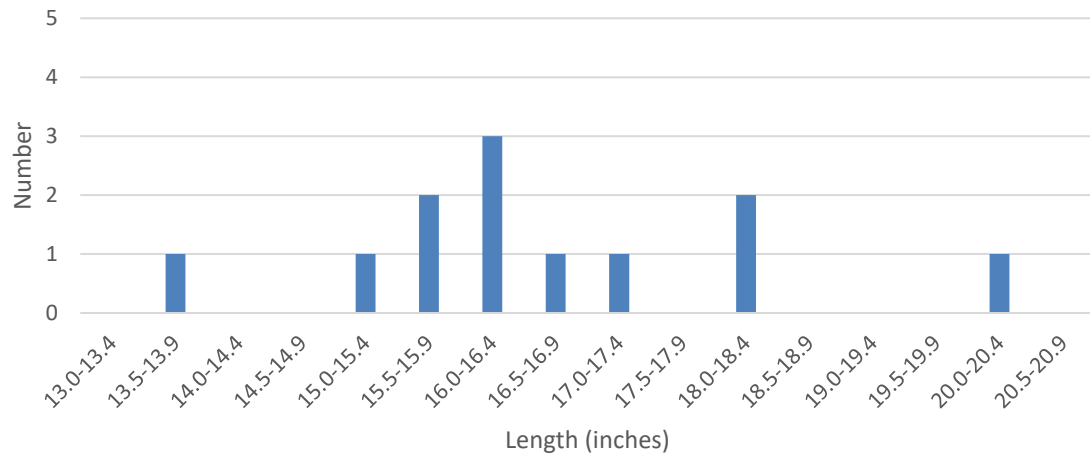


Exhibit 7. Age 0 and 1 walleye catch per unit effort,  
Crane Lake.

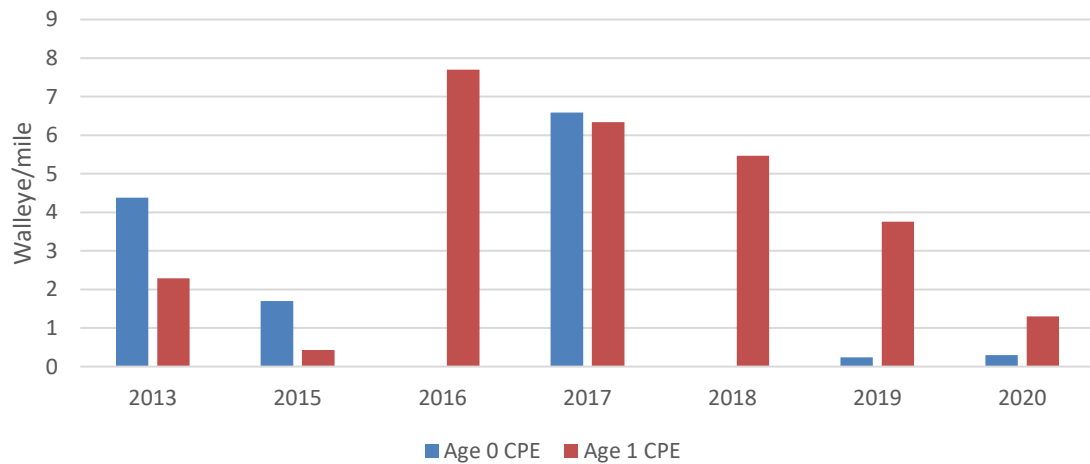
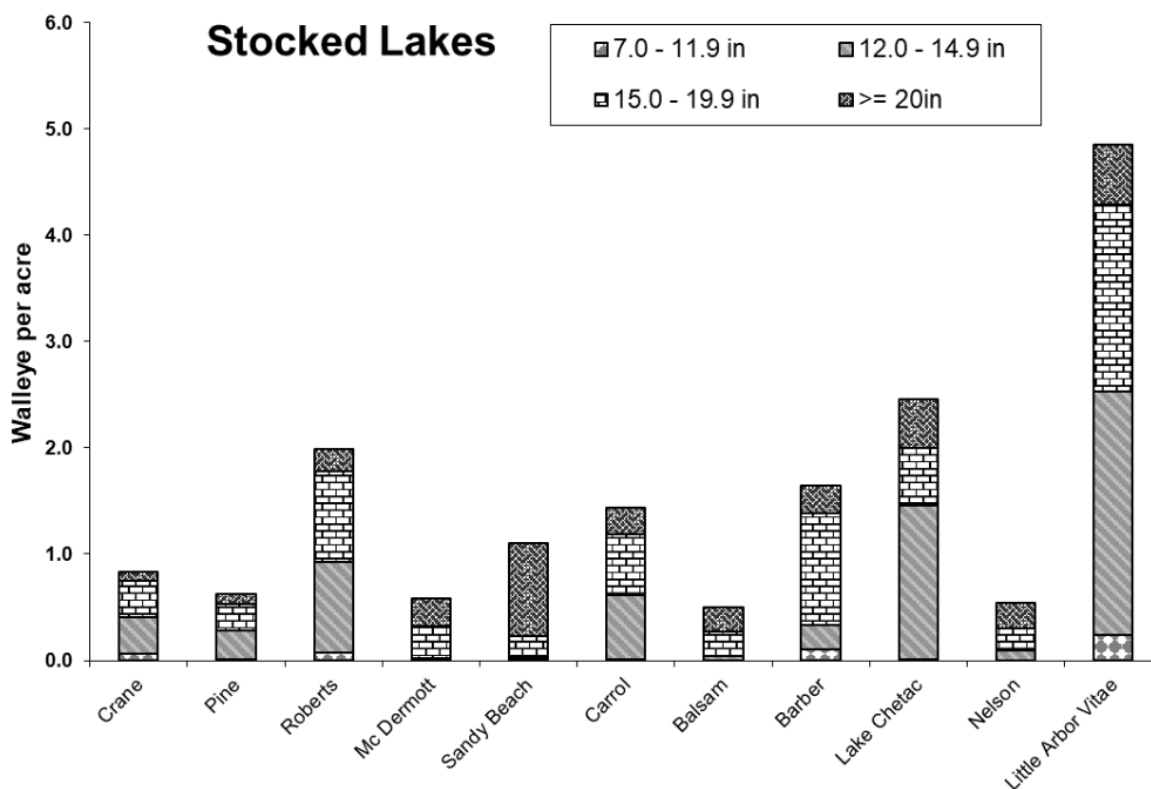


Exhibit 8. Walleye catch on Crane Lake, electroshocking (WDNR).					
Year		No. Caught	Model Size(s)	Size Range	Catch/Unit Per mile
9/27/2017	Age 0+	27	5.5-5.9	4.8-6.5	6.60
	Age 1+	26	9.5-9.9	8.3-11.9	6.36
	Other	23	13.0-13.4, 13.5-13.9	12.4-24.9	5.62
9/26/2018	Age 0+	0	n/a		0.00
	Age 1+	22	9.5	8.3-11.6	5.47
	Other	10	n/a	12.6-25.4	2.49
9/30/2019	Age 0+	1	n/a	5.7-5.7	0.24
	Age 1+	16	9.8	9.4-12.0	3.76
	Other	15	12.3, 12.4	12.3-12.9	3.53
9/10/2020	Age 0	1		6.3-6.3	0.3
	Age 1	0		6.4-10.8	1.3
	Total	19		6.3-20.3	4.9



**Exhibit 9. Size distribution of spawning walleyes sampled in stocked production model lakes in 2017 (Cichosz, 2019).**



Below is a summary from Greg Matzke (fisheries biologist WDNR) and Mike Preul (Director of Mole Lake Fisheries) (<https://pickerelcranelakedistrict.org/walleye-restoration>, 2021) summarizes that fish shocking was conducted prior to the fish stocking in 2019. In 2020 there was no fish stocking but it is anticipated in the fall of 2021.

According to our fish biologist, Greg Matzke, we will be conducting another fall survey on Crane Lake to determine if we have natural reproduction without the aid of Mole Lake fertilization efforts. Last spring, Mike Preul and his crew, Gene Ebben, and I fertilized a number of female eggs, to determine if the newly established reef would indeed hatch eggs. During the fall of 2019, Greg was able to shock one walleye that was 3.5", confirming the fact that the reef is functional.

Director of Mole Lake Fisheries, Mike Preul said, "Unfortunately, we will not be fertilizing eggs on Crane Lake (this spring) but on a positive note, we will be able to evaluate whether there is true natural reproduction of walleye in Crane Lake. Last year, we saw naturally recruited walleye in Crane, but we don't know if it was from our fertilization effort or walleye on their own."

During the fall of 2020, we will be looking for walleyes that were hatched naturally on the reef, without our help in the fertilization process. Keep your fingers crossed, as it would be exciting to have natural walleye reproduction return to Pickerel and Crane Lakes.

The Districts' website has a link to the article below and also there is a link to "special thanks" for the project along with many photos and even a drone video. Below is a summary by Brad Kupfer, 2019 that can be found in the newsletter.

### **PICKEREL/CRANE LAKE SPAWNING REEF PROJECT SUMMARY (BRAD KUPFER, SPRING NEWSLETTER, 2019)**

Work officially began on the walleye spawning reef on February 4, 2019. Bill Marquardt spent 4 hours removing snow from the proposed reef area and completed about ¾ of the reef before nightfall. We were then blessed with a series of snowfalls, thanks to Mother Nature, including a two-day total of over 14 inches. On February 19<sup>th</sup>, Brad Graves (Brad Graves Landscaping) and Flannery Excavating began the 9-hour task of moving all of the accumulated snow and slush from the reef area pushing it back to the marking stakes using skid steers equipped with tracks. Once the reef was free of snow, Rob Aderholdt (Aderholdt Builders) was contracted to snowplow the area and keep the reef free of snow until our proposed construction dates of March 5-7. On Friday, March 2<sup>nd</sup>, Brad Graves again cleared the reef area of snow and slush. Rob Aderholt finished the job with a final snowplowing. This prepared the reef for the following week, as temperatures were below zero for the weekend, allowing the ice to thicken until the gravel could finally be deposited.

On Monday, March 4<sup>th</sup>, volunteers from Flannery Excavating, Brad Graves, Mike Preul (Mole Lake Fisheries Director), Greg Matzke (DNR Fish Biologist), Katie Renschen (DNR Fisheries Technician), and our own volunteers from the district (Gene Ebben, Jerry Hietpas /Hot Dog, Keith Verhagen, Mark Starich and Mike Stieve) showed up around noon to map out the various contours for the reef. We were able to initiate a trial run of the Flannery dump trucks driving down the slope from Alexander's to the channel and then dumping the gravel on the ice at the beginning of the reef. The first load of gravel arrived around 3:00pm; unfortunately, the first dump truck proceeded to get stuck. Luckily, Flannery had a bulldozer on site and was able to pull out the truck and eventually dump the load of mixed gravel and rock. Small dump trucks were loaded using a skid steer and the rock was deposited and leveled according to the marked contours. Five loads of rock were put down the first day, beginning on the far west end of the reef.

On Tuesday, March 5<sup>th</sup> we moved approximately 28 truckloads (roughly 480 yards) of gravel. Mother Nature was not very kind again as temperatures hovered around the mid-teens. Kathy Kupfer (District Treasurer) provided lunch for all of the volunteers while Steve and Mike Alexander let us serve lunch for all the volunteers in their kitchen/dining area.

Wednesday's temperatures brought more of the same weather temperatures but this time with 20 mph winds. Art Seidel joined the group on day 2 and we were able to finish the reef around 5:00pm, adding another 31 truckloads of gravel for a grand total of 64 truckloads and 1,018 yards of gravel! Lunch was again provided by Kathy and, thanks to the Alexanders, we were able to get out of the cold and wind. Exhibit 10 and 11 are images of the reef.

Moving forward, once the ice goes out, Mike Preul (Mole Lake Fisheries Director) has agreed to test the viability of the reef by physically distributing walleye spawn eggs onto the newly-established reef to hopefully demonstrate that the enhanced reef is suitable for reproduction.

This fall, we will be receiving a total of 16,000 Walleye Fingerlings from the Mole Lake Hatchery, of which 3,500 fingerlings will be stocked into Crane and the remainder of 12,500 will be stocked into Pickerel. The Friday before these are stocked, Greg Matzke will conduct a boom shocking on Crane Lake, hoping to locate and identify newly-hatched walleye generated by the eggs Mike Preul dispersed.

Exhibit 10. Planned Design of the walleye reef on Crane Lake, 2019.

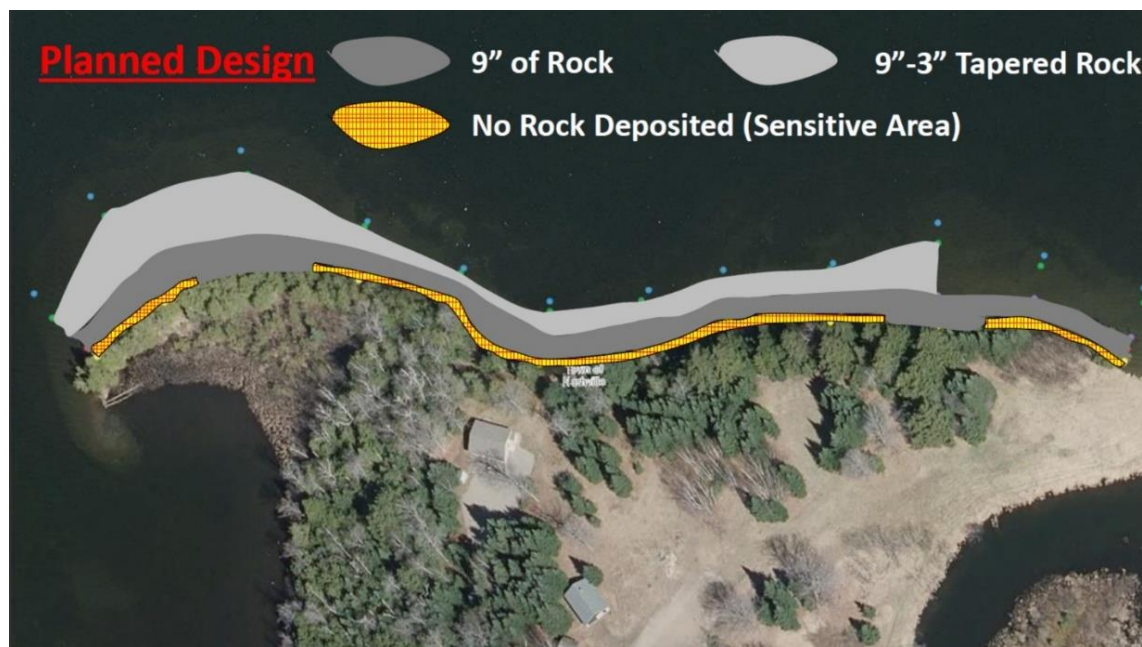
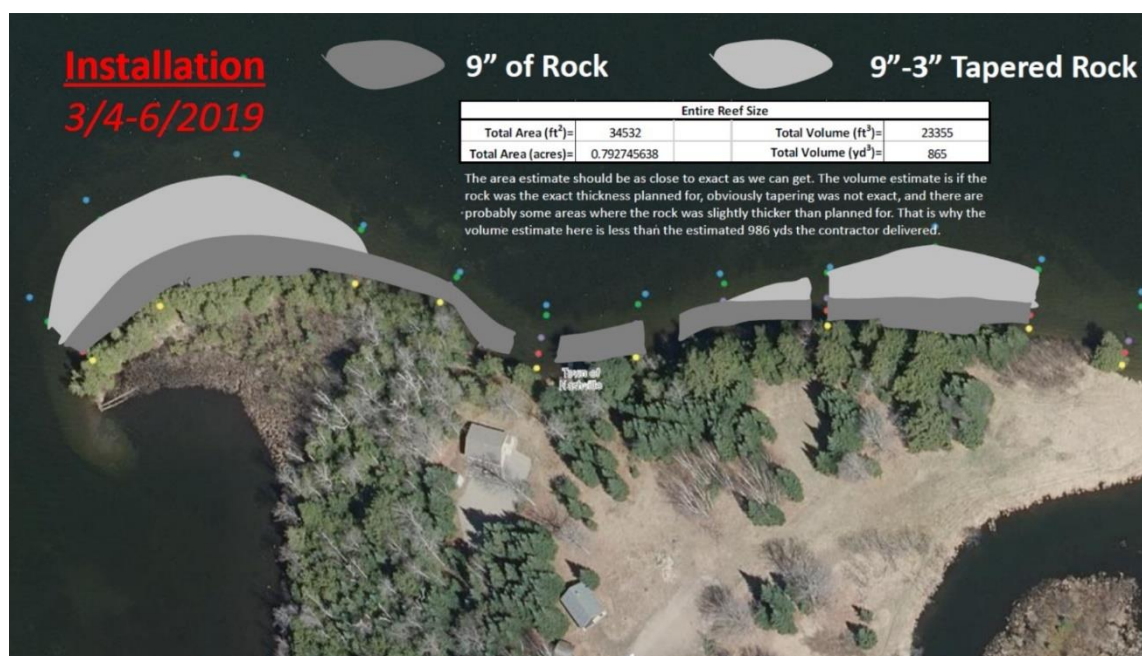


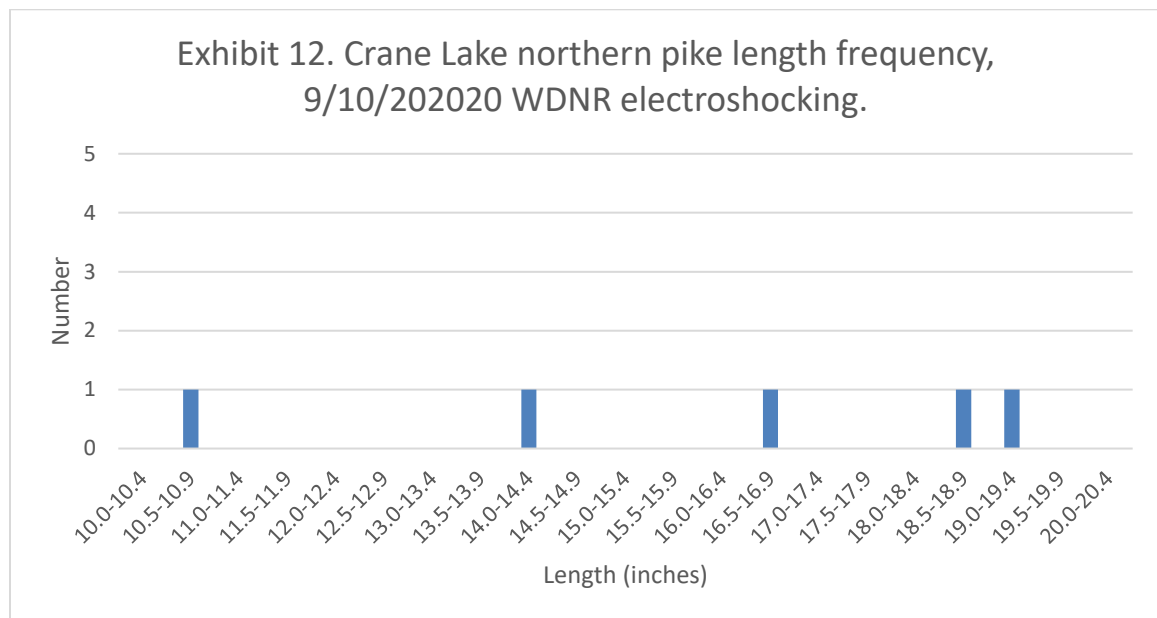
Exhibit 11. Installation of rock on Crane Lake, 2019.



## Northern Pike

The adult ( $\geq 12$  inches) northern pike population in Crane Lake (2017) is at approximately 1,048 (3.1/acre) which is considered to be average abundance (Matzke, 2017). The size structure of northern pike (2017) is considered poor with only 19.9% of the fish sampled being  $\geq 21$  inches, and 1.8%  $\geq 28$  inches in length (Matzke, 2017).

Length frequency of northern pike are shown in Exhibit 12 and 13 from the electroshocking surveys. The length frequency by inch group 2017 survey can be found in the WDNR Fisheries Information Sheet (2017).



Year		No. Caught	Model Size(s)	Size Range	Catch/Unit Per mile
9/27/2017	Age 0+	8	5.5-5.9, 7.5-7.9	5.7-9.2	1.96
	Age 1+	0	n/a		0.00
	Other	0	n/a		0.00
9/26/2018	Age 0+	6	n/a	6.0-10.4	1.49
	Age 1+	1	n/a	11.1-11.1	0.25
	Other	6	13.5-13.9	13.5-14.9	1.49
9/30/2019	Age 0+	2	n/a	6.1-8.9	0.47
	Age 1+	0	n/a		0.00
	Other	3	n/a	13.5-14.9	0.71
9/10/2020		Number caught	Min. Length	Max. Length	
		5	10.8	19.3	1.3

### ***Yellow Perch and Black Crappie***

There was an abundance of yellow perch and black crappie in the early spring survey of 2017. There was 19.1 fish per net-night, while black crappie relative abundance was 1.8 fish per net-night (Matzke, 2017). Yellow perch are considered to be of average abundance, while black crappie is of low to moderate abundance, when compared to other populations in the area (Matzke, 2017). The length frequency by inch group 2017 survey can be found in the WDNR Fisheries Information Sheet (2017). Exhibit 14 and 15 show the model size, size range, and catch/unit per mile for yellow perch and black crappie.

Exhibit 14. Yellow perch gamefish recruitment (WDNR)				
Year	No. Caught	Model Size(s)	Size Range	Catch/Unit Per mile
9/27/2017	15	4.5-4.9	4.0-8.4	30.00
9/26/2018	16	2.5-2.9, 6.0-6.4	2.0-8.9	34.78
9/30/2019	13	2.5-2.9	2.0-10.4	26.00

Exhibit 15. Black crappie gamefish recruitment (WDNR)				
Year	No. Caught	Model Size(s)	Size Range	Catch/Unit Per mile
9/27/2017	48	4.5-4.9	2.0-6.9	96.00
9/26/2018	6	2.5-2.9	2.0-7.9	13.04
9/30/2019	6	2.5-2.9	2.5-9.4	12.00

### ***Other Species of Fish***

Other fish species mention in the 2017 surveys were pumpkinseed, hybrid bluegill, white sucker, and golden shiner (Matzke, 2017). Based on the catch rates and observations, pumpkinseed and hybrid bluegill are considered abundant (Matzke, 2017). White sucker and golden shiner are of low to moderate abundance (Matzke, 2017). Other species noted in 2017 were molted sculpin, bluntnose minnow, central mudminnow, and bluegill x pumpkinseed hybrid. Golden shiner was abundant in the 2020 survey and other species present were pumpkinseed and logperch (WDNR, 2020).

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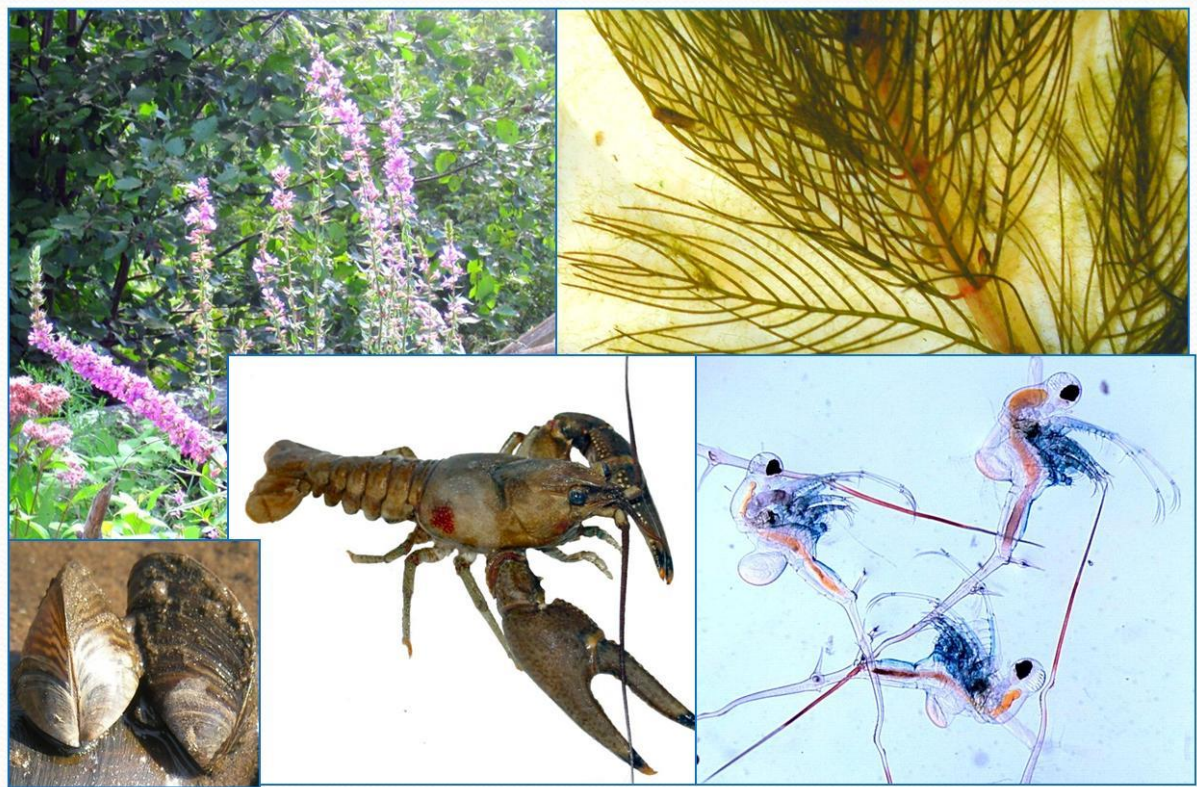
**Appendices F1 and F2**  
**Pickereel/Crane Lakes Aquatic Invasive Species Reports**

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# **Pickerel Lake (Forest and Langlade Counties, Wisconsin)**

## **Aquatic Invasive Species Report**

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**Date: 2021**

## INTRODUCTION

White Water Associates, Inc. has been retained by the Pickerel/Crane Protection & Rehabilitation District through a Large Scale Planning Grant on Pickerel Lake (Forest and Langlade Counties, Wisconsin). Some tasks for this project focused on aquatic invasive species (AIS). Efforts are intended to increase the understanding of AIS as well as native species in Pickerel Lake. This work prepares Pickerel/Crane Lakes stakeholders to conduct actions that serve lake health. A portion of this project monitored Pickerel Lake for AIS using Wisconsin Department of Natural Resources (WDNR) protocol. This approach assesses the lake as to its vulnerability to AIS and documents any AIS detected. Findings from the survey were entered into the SWIMS database.

## AQUATIC INVASIVE SPECIES EARLY DETECTION MONITORING

In order to determine if aquatic invasive species (AIS) were present in study area, biologists followed the *Aquatic Invasive Species Early Detection Monitoring Standard Operating Procedure* (WDNR, 2014). This procedure outlines several types of monitoring techniques, including: boat landing searches, sample site searches, targeted searches, waterflea tows and/or a Ponar dredge, and a meander search. The Pickerel Lake Survey took place on June 3, 2019.

Five sites around the lake shoreline were thoroughly searched and a meander search was conducted while traveling from one site to another. The public boat landing was surveyed for 30 minutes by checking the dock and walking 200 feet of shoreline. The other four shoreline sites were randomly selected and are identified in Exhibit 1 and Exhibit 2. Snorkeling was not used to search for AIS due to the limited water clarity. A long rake was used to collect any suspicious aquatic plants for closer inspection and identification. A D-net was used to collect invertebrate animals to look for AIS. Any invasive species observed were documented. In the event of a new AIS record, specimens are collected for verification.

Spiny water fleas are an aquatic invasive zooplankton that is found in several lakes in Wisconsin. They can be monitored by way of plankton tow nets or by an examination of sediment for dead waterflea exoskeleton fragments. In Pickerel Lake, a Ponar dredge was used to collect a sediment sample in the middle of the lake (Exhibit 1 and Exhibit 2). The sample was brought back to the lab and filtered to look for spiny water flea spines under magnification. No AIS were found.



**Exhibit 2. AIS Survey on Pickerel Lake 6/3/2019.**

**Density (1-5), and live (L) or dead (D). Boat Landing (BL). Meander Search (MS)**

Site	Latitude	Longitude	Species found
1	45.39764	-88.88471	Banded mystery snail 2 (L and D), Chinese mystery snail 2 (L)
2	45.38853	-88.89388	None
3	45.39185	-88.92216	Rusty crayfish 1 (L)
4	45.40252	-88.91711	Banded mystery snail 3 (L and D), Chinese mystery snail 2 (L)
MS			Visualized rusty crayfish, Eurasian water-milfoil, and Chinese mystery snail
BL	45.40146	-89.89910	Eurasian water-milfoil 1 (L), Banded mystery snail 2 (L)



Exhibit 3. Spiny Water Flea Sediment Sample from Pickerel Lake			
Date: 6/3/2019	GPS Coordinates		Depth of sample (feet)
Dredge Site	45.39592	-88.91113	15



**Exhibit 5. Red arrows indicate the Eurasian water-milfoil located in Pickerel Lake.**

Five known AIS are established in Pickerel Lake; the banded mystery snail, Chinese mystery, Eurasian water-milfoil, hybrid Eurasian/Northern water-milfoil, and the rusty crayfish. During this survey the banded mystery snail was found at Site 1. The banded and Chinese mystery snails were found at Site 1 and 4 and the boat landing. Site 2 had no AIS present. The boat landing and Site 4 had EWM and Site 3 had the rusty crayfish. Eurasian

water-milfoil was also noted at many locations during the plant survey (See the Pickerel Lake Aquatic Plant Management Plan for more detail) (Photo of EWM Exhibit 5).

Banded mystery snails (*Viviparus georgianus*) intentionally introduced into the Hudson River basin by an amateur conchologist in 1867; spread to the Great Lakes via the Erie Canal and Mohawk River (Morningstar et al. 2019). They are also likely released to the Great Lakes from an aquarium. Large snail (up to 1 ¾ inches); olive-green shell has 4-5 whorls with distinct sutures; 4 reddish bands circle the shell. The snail does not seem to have a significant impact on native species, but its ecological and anthropological threat comes from its potential to transmit parasites and diseases (Morningstar et al. 2019). It is illegal to introduce the banded mystery snail into Wisconsin waters.

Chinese mystery snails are from Southeast Asia and Eastern Russia and were likely released to the Great Lakes from an aquarium (Kipp et al., 2015). The snail does not seem to have a significant impact on native species, but its ecological and anthropological threat comes from its potential to transmit parasites and diseases (Kipp et al., 2015). It is illegal to introduce the Chinese mystery snail into Wisconsin waters.

Eurasian water-milfoil (EWM) can be aggressive AIS. EWM is identified by having whorls of finely divided leaves. EWM usually has 14 or more leaflets on each side of the leaf axis. Native water-milfoils usually have fewer than 12 pairs of leaflets. EWM is detrimental to lakes because it can form dense mats, preventing light from reaching other native plants and can interfere with boating and other recreational activities. EWM reproduces by buds, rhizomes and by mechanical fragmentation (such as being chopped up by boat engine propellers).

Rusty crayfish are native to parts of Ohio, Tennessee, Kentucky and Indiana, and were likely introduced to Wisconsin waters by fishermen using the crayfish as bait (Gunderson, 2014). Rusty crayfish negatively affect other native crayfish species, cause destruction to aquatic plant beds, reduce fish populations by eating eggs, and cause shoreland owners recreational problems (Gunderson, 2014). It is illegal to possess both live crayfish and angling equipment simultaneously on any inland Wisconsin water (except Mississippi River) (WDNR, 2015). It is also illegal to release crayfish into a water body without a permit (WDNR, 2015).

The Wisconsin DNR has a very informative website that educates on invasive species. The Pickerel Lake stakeholders are the ones that frequent the lake and play a big role in protecting the lake. Stopping the spread of AIS and early detection is important is

important when it comes to invasives. Please feel free to take the time to browse through the many links provided: <https://dnr.wi.gov/topic/Invasives/>.

## **FLOATING WORKSHOP**

A floating workshop to be conducted by White Water Associates for Pickerel Lake stewards was planned, but due to Covid-19 restrictions was not held. Instead White Water Associates staff presented at two spring meetings of the Pickerel/Crane Protection & Rehabilitation District Board.



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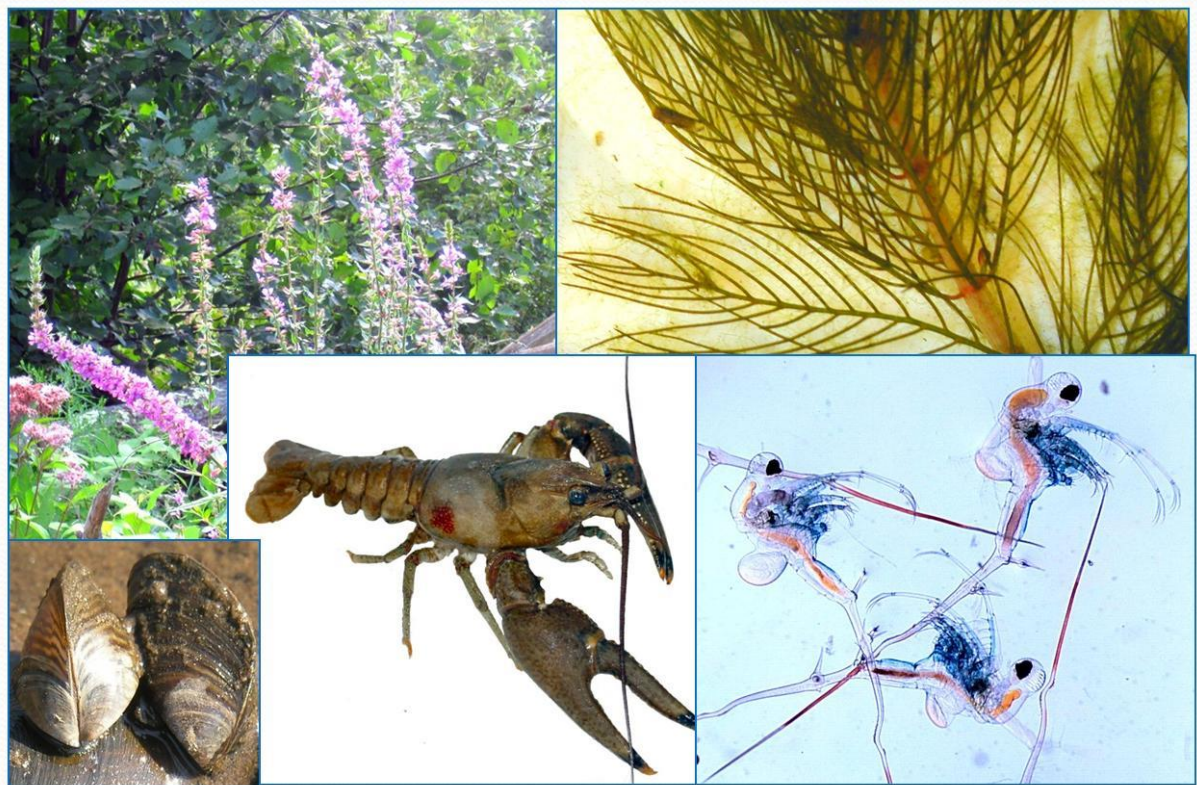
<<http://dnr.wi.gov/lakes/invasives/AISDetail.aspx?roiseq=22588740>>

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# **Crane Lake (Forest County, Wisconsin)**

## **Aquatic Invasive Species Report**

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**Date: 2021**

## INTRODUCTION

White Water Associates, Inc. has been retained by the Pickerel/Crane Protection & Rehabilitation District through a Large Scale Planning Grant on Crane Lake (Forest County, Wisconsin). Some tasks for this project focused on aquatic invasive species (AIS). Efforts are intended to increase the understanding of AIS as well as native species in Crane Lake. This work prepares Crane Lake stakeholders to conduct actions that serve lake health. A portion of this project monitored Crane Lake for AIS using Wisconsin Department of Natural Resources (WDNR) protocol. This approach assesses the lake as to its vulnerability to AIS and documents any AIS detected. Findings from the survey were entered into the SWIMS database.

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Five sites around the lake shoreline were thoroughly searched and a meander search was conducted while traveling from one site to another. The public boat landing was surveyed for 30 minutes by checking the dock and walking 200 feet of shoreline. The other four shoreline sites were randomly selected and are identified in Exhibit 1 and Exhibit 2. Snorkeling was not used to search for AIS due to the limited water clarity. A long rake was used to collect any suspicious aquatic plants for closer inspection and identification. A D-net was used to collect invertebrate animals to look for AIS. Any invasive species observed were documented. In the event of a new AIS record, specimens are collected for verification.

Spiny water fleas are an aquatic invasive zooplankton that is found in several lakes in Wisconsin. They can be monitored by way of plankton tow nets or by an examination of sediment for dead waterflea exoskeleton fragments. In Crane Lake, a Ponar dredge was used to collect a sediment sample in the middle of the lake (Exhibit 1 and Exhibit 2). The sample was brought back to the lab and filtered to look for spiny water flea spines under magnification. No AIS were found.

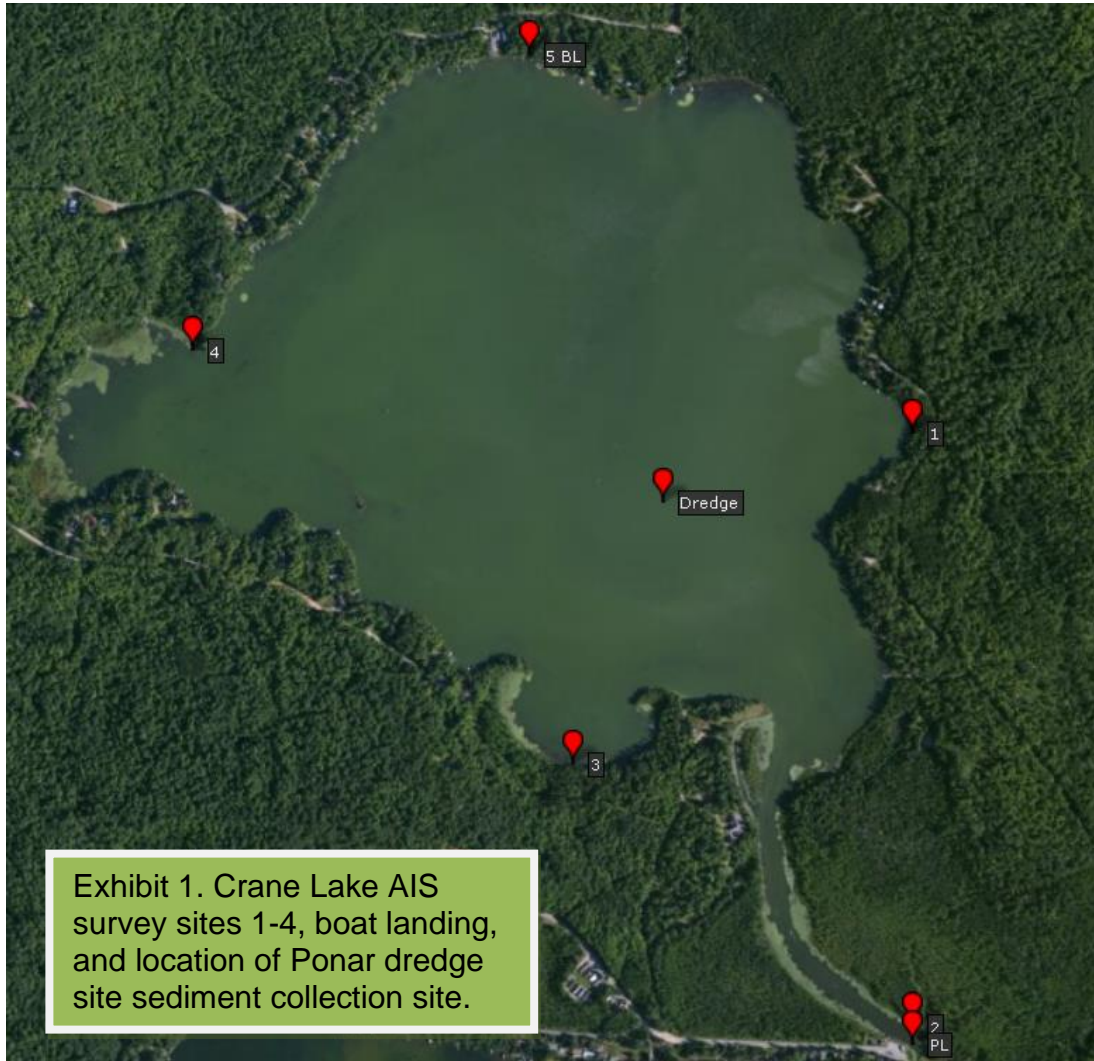


Exhibit 2. AIS Survey on Crane Lake 5/31/2019.			
Site	Latitude	Longitude	Species found
1	45.41127	-88.88350	Banded mystery snail 1 (D)
2	45.40110	-88.88350	Chinese mystery snail 2 (L)
3	45.40560	-88.89178	Chinese mystery snail 2 (D)
4	45.41267	-88.90108	None
PL	45.40080	-88.88353	Purple loosestrife - aquatic plant survey 7/28/2019.
BL	45.41773	-88.89288	Chinese mystery snail 2 (D)



Exhibit 3. Spiny Water Flea Sediment Sample from Crane Lake			
Date: 5/31/2019	GPS Coordinates		Depth of sample (feet)
Dredge Site	45.41007	-88.88959	23



**Exhibit 5. Red arrow indicates the purple loosestrife located on the shore of Crane Lake.**

Three known AIS are established in Crane Lake; the banded mystery snail, Chinese mystery, and Eurasian water-milfoil. During this survey the banded mystery snail was found at Site 1. The Chinese mystery snail was found at Site 2, 3, and the boat landing. Site 4 had no AIS present. During the aquatic plant survey a small patch of purple loosestrife was located by a shed of the resort before the culvert entering Pickerel Lake (Exhibit 5). Eurasian water-

milfoil was also noted in a few locations during the plant survey (See the Crane Lake Aquatic Plant Management Plan for more detail).

Banded mystery snails (*Viviparus georgianus*) intentionally introduced into the Hudson River basin by an amateur conchologist in 1867; spread to the Great Lakes via the Erie Canal and Mohawk River (Morningstar et al. 2019). They are also likely released to the Great Lakes from an aquarium. Large snail (up to 1 ¾ inches); olive-green shell has 4-5 whorls with distinct sutures; 4 reddish bands circle the shell. The snail does not seem to have a significant impact on native species, but its ecological and anthropological threat comes from its potential to transmit parasites and diseases (Morningstar et al. 2019). It is illegal to introduce the banded mystery snail into Wisconsin waters.

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Eurasian water-milfoil (EWM) can be aggressive AIS. EWM is identified by having whorls of finely divided leaves. EWM usually has 14 or more leaflets on each side of the leaf axis. Native water-milfoils usually have fewer than 12 pairs of leaflets. EWM is detrimental to lakes because it can form dense mats, preventing light from reaching other native plants and can interfere with boating and other recreational activities. EWM reproduces by buds, rhizomes and by mechanical fragmentation (such as being chopped up by boat engine propellers).

Purple loosestrife was introduced in North America in the early 1800s. Now, it is spread primarily via highways and waterways. Purple loosestrife is a perennial plant (2+ growing seasons) that prefers wetland areas (Czarapata 2005). It has opposite/whorled leaves with attractive purple flowers. Purple loosestrife was introduced as an ornamental plant, and has since infested every county in Minnesota, Wisconsin, and Michigan (Czarapata 2005). It impacts native plants by competing for food sources and by replacing native plants. Its survival rate is excellent because it can produce up to 2 million seeds annually, which can lie dormant in the substrate for years. Dispersal can occur by floating on open water, however, long distance dispersal may occur from seeds being imbedded in animal fur, truck or ATV tires, and outboard engines or live wells (Gilbert et al., 1998). Germination sites are most often associated with recent disturbances that expose the soil such as road construction,

reduction of water levels, and roadside mowing (Gilbert et al., 1998). Purple loosestrife can also regenerate from plant fragments, necessitating careful selection of control methods.

The Wisconsin DNR has a very informative website that educates on invasive species. The Crane Lake stakeholders are the ones that frequent the lake and play a big role in protecting the lake. Stopping the spread of AIS and early detection is important when it comes to invasives. Please feel free to take the time to browse through the many links provided: <https://dnr.wi.gov/topic/Invasives/>.

## **FLOATING WORKSHOP**

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<<http://dnr.wi.gov/water/wsSWIMSDocument.ashx?documentSeqNo=99459630>>

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## **Appendix G**

### **Lake User Survey**

# Pickerel/Crane Lake District Lake Management Plan

## Survey Recap and Recommendations

### Survey Design

The Pickerel/Crane Lake Management survey was divided into five distinct sections:

- Pickerel/Crane Lake Property
- Pickerel/Crane Lake Recreation Activities
- Pickerel/Crane Lake Current Condition, Health and Management
- Pickerel/Crane Lake Future Considerations
- Pickerel/Crane Lake District Questions

In the first section (Property), questions were asked regarding your property on Pickerel Lake, Crane lake or off-shore property around both lakes. Questions such as length of ownership, year-round house or seasonal cottage, how many days you use the property and the type of septic system used.

The second section (Recreational Activities) included questions regarding watercraft, fishing, and what activities are most important to you.

The third section (Current Conditions, Health and Management) includes questions regarding the past and current conditions of our water quality, aquatic plant management, invasive species, shoreline erosion and other general concerns for the conditions of our lakes.

The fourth section (Future Consideration) has questions pertaining to our boat landings, the Pickerel Lake road culvert and potential improvements and the expansion of the Wild Rice Project on Pickerel Lake.

The fifth and final section asks questions regarding our Lake District, including the spring and fall newsletters and our Lake District website. It also asks for your interest in volunteering for lake district activities and any suggestions or concerns that you would like to share publicly.

## Pickerel/Crane Lake Property

### *1. On which lake (Township) is your property located (or closest to)?*

Question 1	Responses	%
Pickerel Lake (Town of Nashville)	<b>178</b>	<b>66.9%</b>
Pickerel Lake (Town of Ainsworth)	20	7.5%
Crane Lake (Town of Nashville)	68	25.6%
<b>Total Responses</b>	<b>266</b>	<b>100.0%</b>

2012 Survey Results	Total	%
Pickerel Lake (Nashville)	<b>208</b>	<b>69.3%</b>
Pickerel Lake (Ainsworth)	24	8.0%
Crane Lake (Town of Nashville)	68	22.7%
<b>Total Responses</b>	<b>300</b>	<b>100.0%</b>

### *2. Please check the response(s) that describe your affiliation with the Pickerel/Crane Lake District.*

Question 2	Responses	%
Shoreline home/cottage owner	<b>163</b>	<b>59.3%</b>
Shoreline vacant landowner	5	1.8%
Shoreline year-round resident	23	8.4%
Shoreline seasonal resident	26	9.5%
Nearby offshore resident (year-round)	16	5.8%
Nearby offshore resident (seasonal)	37	13.5%
Area business owner	5	1.8%
<b>Total Responses</b>	<b>275</b>	<b>100.0%</b>

### *3. Approximately how many days each year is your property used by you or others?*

Question 3	Responses	%
0 to 50 days	<b>71</b>	<b>26.9%</b>
51 to 100 days	<b>73</b>	<b>27.7%</b>
101 to 150 days	45	17.0%
151 to 200 days	28	10.6%
201 to 365 days	47	17.8%
<b>Total Responses</b>	<b>264</b>	<b>100.0%</b>

2012 Survey Results	Total	%
0 to 50 days	<b>94</b>	<b>40.5%</b>
51 to 100 days	<b>94</b>	<b>40.5%</b>
101 to 150 days	22	9.5%
151 to 200 days	19	8.2%
201 to 365 days	3	1.3%
<b>Total Responses</b>	<b>232</b>	<b>100.0%</b>

**4. How many years have you owned property within the Lake District?**

Question 4	Responses	%
Less than 5 years	35	13.1%
5 to 10 years	42	15.7%
11 to 20 years	69	25.8%
21 or more years	<b>121</b>	<b>45.3%</b>
<b>Total Responses</b>	<b>267</b>	<b>100.0%</b>

2012 Survey Results	Total	%
Less than 5 years	38	13.1%
5 to 10 years	59	20.3%
11 to 20 years	67	23.1%
21 or more years	<b>126</b>	43.4%
<b>Total Responses</b>	<b>290</b>	<b>100.0%</b>

**5. What type of septic system does your property utilize?**

Question 5	Responses	%
Conventional System	<b>164</b>	<b>61.0%</b>
Holding tank	<b>75</b>	<b>27.9%</b>
Mound system	11	4.1%
Advanced treatment system	0	0.0%
Outhouse	4	1.5%
None	10	3.7%
Do not know	5	1.9%
<b>Total Responses</b>	<b>269</b>	<b>100.0%</b>

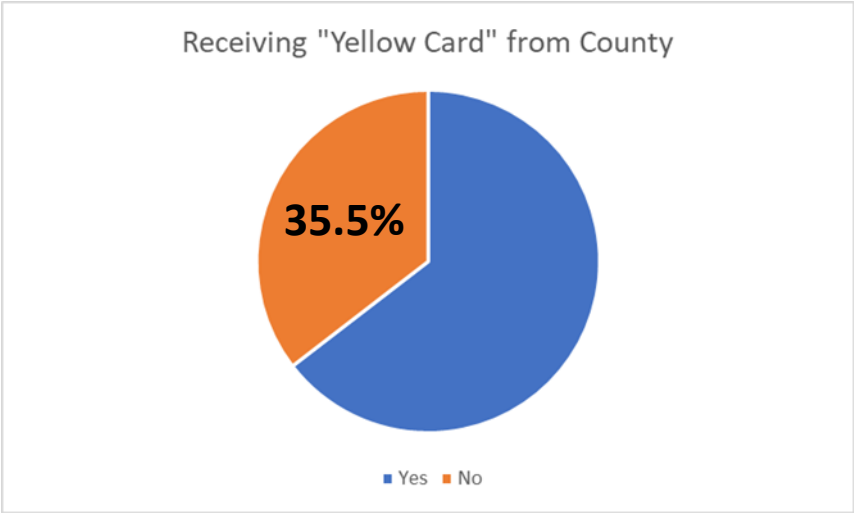
2012 Survey Results	Total	%
Conventional System	<b>187</b>	<b>63.6%</b>
Holding tank	<b>74</b>	<b>25.2%</b>
Mound system	4	1.4%
Advanced treatment s	3	1.0%
Outhouse	1	0.3%
None	20	6.8%
Do not know	5	1.7%
<b>Total Responses</b>	<b>294</b>	<b>100.0%</b>

**6. How often is your septic system on your property pumped?**

Question 6	Total	%
Multiple times a year	50	19.6%
Once a year	24	9.4%
Every 2-4 years	<b>156</b>	<b>61.2%</b>
Every 5-10 years	14	5.5%
Do not know	11	4.3%
<b>Total Responses</b>	<b>255</b>	<b>100.0%</b>

7. Are you currently receiving a “Yellow Form” (Septic Inspection Notice) from the county?

Question 7	Total	%
Yes	162	64.5%
No	89	35.5%
Total Responses	251	100.0%



## Pickrel/Crane Lakes Recreational Activities

### 8. What types of watercraft do you, or others that use your property, currently use on Pickrel/Crane Lakes?

Question 8	Responses	%
Motor boat with greater than 25hp motor	149	56.0%
Pontoon	128	48.1%
Motor boat with 25 hp or less motor	78	29.3%
Paddleboat	72	27.1%
Non-motorized watercraft	123	46.2%
Boat longer than 18 ft.	30	11.3%
Jet ski or personal watercraft	32	12.0%
Sailboat	4	1.5%
Do not use watercraft	15	5.6%
<b>Total Responses</b>	<b>266</b>	<b>100.0%</b>

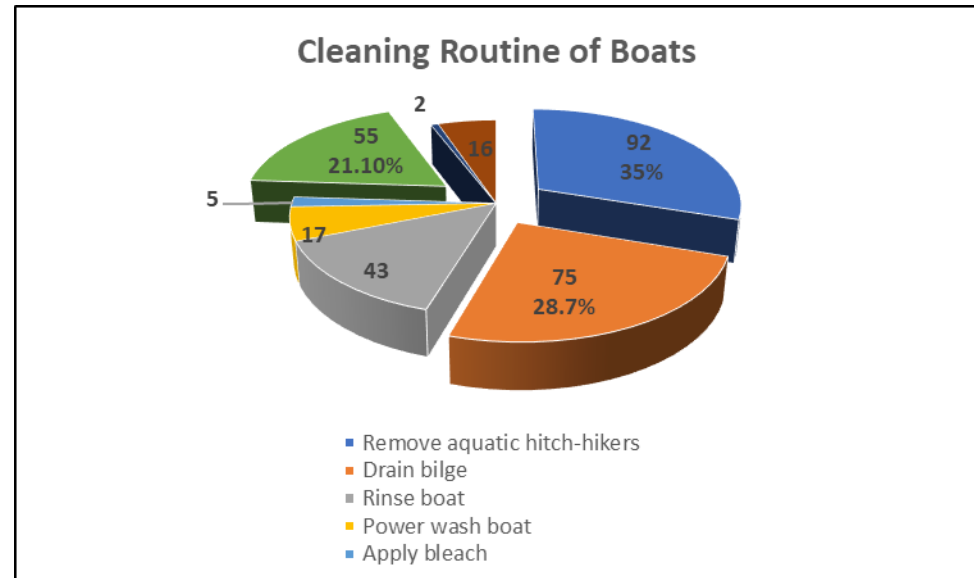
2012 Survey Results	Total	%
Motor boat with greater than 25hp motor	155	51.7%
Pontoon	136	45.3%
Motor boat with 25 hp or less motor	118	39.3%
Paddleboat	102	34.0%
Non-motorized watercraft	59	19.7%
Boat longer than 18 ft.	32	10.7%
Jet ski or personal watercraft	29	9.7%
Sailboat	12	4.0%
Do not use watercraft		
<b>Total Responses</b>	<b>300</b>	<b>100.0%</b>

### 9. Do you use your watercraft on waters other than Pickrel/Crane Lakes?

Question 9	Responses	%
Yes	71	27.2%
No	190	72.8%
<b>Total Responses</b>	<b>261</b>	<b>100.0%</b>

### 10. What is your typical cleaning routine before/after using your watercraft on waters other than Pickrel/Crane Lakes?

Question 10	Responses	%
Remove aquatic hitch-hikers	92	35.2%
Drain bilge	75	28.7%
Rinse boat	43	16.5%
Power wash boat	17	6.5%
Apply bleach	5	1.9%
Air dry boat for 5 or more days	55	21.1%
Do not clean boat	2	0.8%
Other	16	6.1%
<b>Total Responses</b>	<b>261</b>	<b>100.0%</b>





11. Please rank up to 5 activities that are important reasons for owning your property on or near Pickerel/Crane Lakes with 1 being the most important and 5 being the least important.

Question 11	Responses	Total 1's	%
Fishing -- open water	208	104	50.0%
Ice fishing	82	22	26.8%
Motor boating	125	34	27.2%
Jet skiing	18	5	27.8%
Relaxing/entertaining	212	122	57.5%
Nature viewing	138	38	27.5%
Hunting	37	11	29.7%
Water skiing/tubing	66	10	15.2%
Sailing	7	1	14.3%
Canoeing/kayaking/paddleboard	71	12	16.9%
Swimming	86	23	26.7%
Snowmobiling/ATV/UTV	104	35	33.7%

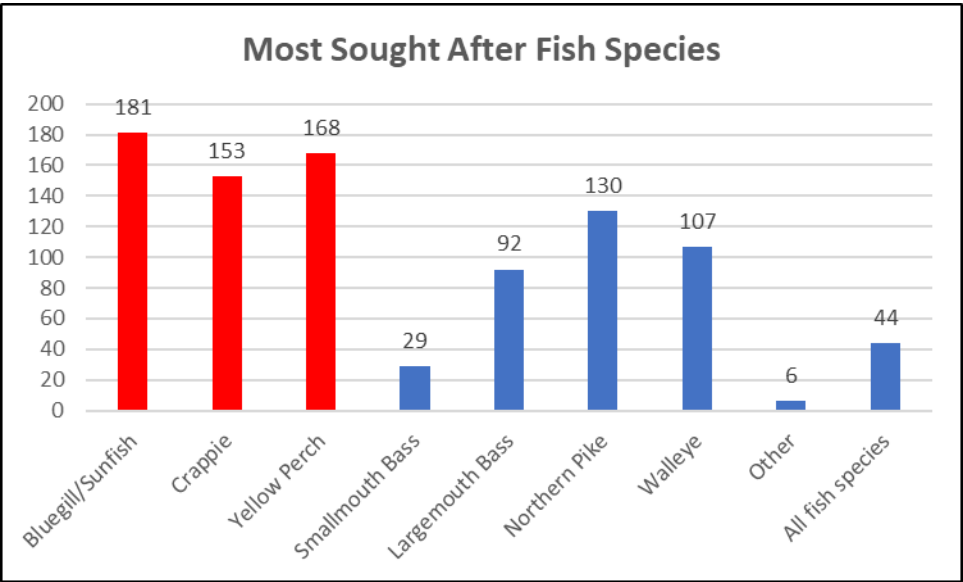
12. Have you personally fished on Pickerel Lake or Crane Lake in the past 3 years?

Question 12	Responses	%
Pickerel Lake only	60	22.6%
Crane Lake only	33	12.4%
Both Pickerel and Crane Lakes	145	54.5%
No, neither lake	31	11.7%
Total Responses	266	100.0%

13. What species of fish do you like to catch on Pickerel/Crane Lakes?

Question 13	Responses
Bluegill/Sunfish	181
Crappie	153
Yellow Perch	168
Smallmouth Bass	29
Largemouth Bass	92
Northern Pike	130
Walleye	107
Other	6
All fish species	44

2012 Survey Results	Responses
Fishing -- open water	206
Ice fishing	54
Motor boating	86
Jet skiing	7
Relaxing/entertaining	150
Nature viewing	88
Hunting	12
Water skiing/tubing	35
Sailing	4
Canoeing/kayaking/paddleboard	14
Swimming	39
Snowmobiling/ATV/UTV	62



14. How would you describe the current quality of fishing on Pickerel/Crane Lakes?

1=Very Poor 2=Poor 3=Fair 4=Good 5=Excellent 6=Unsure

Question 14	Sum Of Responses	Actual Responses	Average	Rating
Pickerel Lake	622	201	3.09	Fair
Crane Lake	593	181	3.28	Fair

\* Only ratings of 5 or less were counted. A “6” response was listed as “Not Sure”

15. How has the quality of fishing changed since you started fishing Pickerel/Crane Lakes?

Please use the numbers below to rate the lake. If you fish both lakes, please answer for both lakes.

1=Much Worse 2=Somewhat Worse 3=Remained the Same 4=Somewhat Better  
5=Much Better 6=Unsure

Question 15	Sum of Responses	Actual Responses	Average	Rating
Pickerel Lake	482	189	2.55	< Fair
Crane Lake	483	172	2.81	Fair

Only ratings of 5 or less were counted. A “6” response was listed as “Not Sure”

16. How would you say the game fish (Walleye, Northern and Bass) population has changed in Pickerel/Crane Lakes over the past 3 years? Please put a number next to each fish species listed below for each lake that you fish.

1=Much Worse 2=Somewhat Worse 3=Remained the Same 4=Somewhat Better  
5=Much Better 6=Unsure

Pickerel Lake:	Sum of Responses	Actual Responses	Average	Rating
Walleye	330	119	2.77	Same
Northern Pike	419	155	2.70	Same
Largemouth Bass	416	126	3.30	Same
Crane Lake	Sum of Responses	Actual Responses	Average	Rating
Walleye	402	126	3.19	Same
Northern Pike	377	137	2.75	Same
Largemouth Bass	365	119	3.07	same

\* Only ratings of 5 or less were counted. A “6” response was listed as “Not Sure”

2012 Survey	1=Poor	2	3=Fair	4	5=Excellent	Don’t Know
Pickerel Lake	15	30	144	390	6	28
Percentage	2.45%	4.89%	23.49%	63.62%	0.98%	4.57%
Crane Lake	8	16	114	35	11	64
Percentage	3.23%	6.45%	45.97%	14.11%	4.44%	25.81%

2012 Survey	1=Worse	2	3=Same	4	5=Improved	Don’t Know
Pickerel Lake	43	66	87	29	5	27
Percentage	16.73%	25.68%	33.85%	11.28%	1.95%	10.51%
Crane Lake	23	51	75	19	5	72
Percentage	9.39%	20.82%	30.61%	7.76%	2.04%	29.39%

2012 Survey	1=Numbers Decreasing	2	3=Same	4	5=Numbers Increasing	Don’t Know
Pickerel/Crane	38	76	91	24	8	34
Percentage	14.02%	28.04%	33.58%	8.86%	2.95%	12.55%

17. How would you say the panfish (Bluegills, Perch and Crappie) population has changed in Pickerel/Crane Lakes over the past 3 years? Please put a number next to each fish species listed below for each lake that you fish.

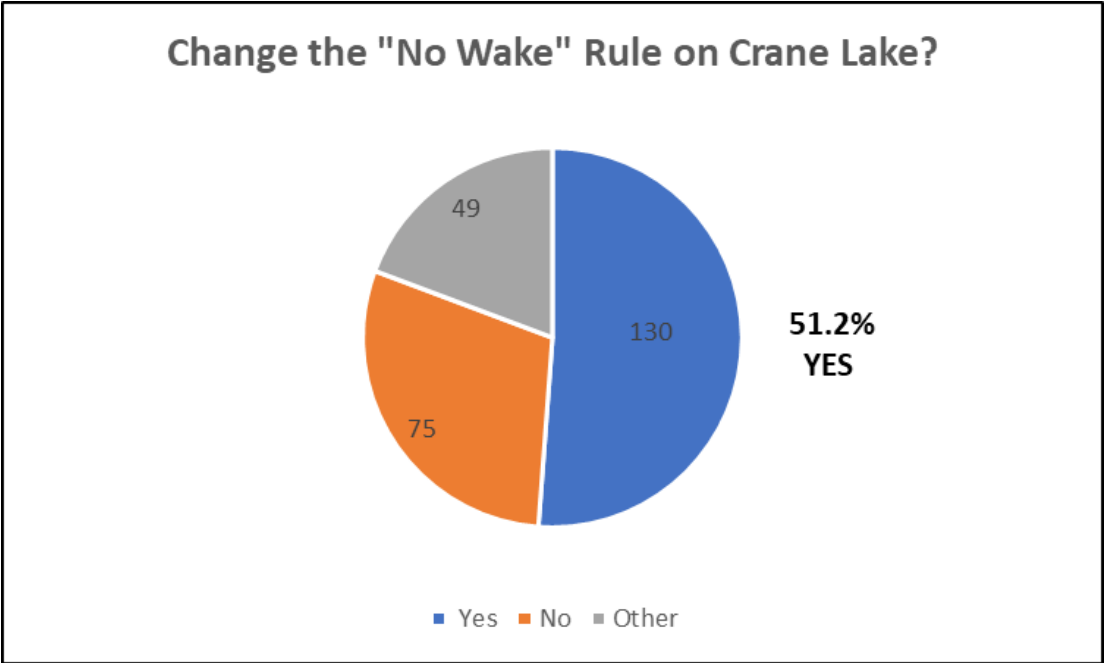
1=Much Worse    2=Somewhat Worse    3=Remained the Same    4=Somewhat Better  
5=Much Better    6=Unsure

Pickerel Lake:	Sum of Responses	Actual Responses	Average	Rating
Bluegill	472	178	2.65	Worse
Perch	454	177	2.56	Worse
Crappie	426	161	2.65	Worse
Crane Lake:	Sum of Responses	Actual Responses	Average	Rating
Bluegill	392	147	2.67	Worse
Perch	368	144	2.56	Worse
Crappie	376	137	2.74	Same

\* Only ratings of 5 or less were counted. A “6” response was listed as “Not Sure”

18. Currently there is a “NO WAKE RULE” on Crane Lake from 4:30 PM to 9:00 AM the following day. Would you be in favor of changing the “NO WAKE RULE” to apply from 6:30 PM to 9:00 AM the following day?

Question 18	Responses	%
Yes	130	51.2%
No	75	29.5%
Other	49	19.3%
Total Responses	254	100.0%



Pickereel/Crane Lakes Current Conditions, Health and Management

19. From the list below, please rank your top five concerns for Pickereel/Crane Lakes. Write 1 for your primary (most important) concern and 5 for your least important concern.

Question 19	Actual Responses	Number of "1" Responses	%
Water Quality	174	83	47.70%
Quality of Fish Habitat	129	27	20.93%
Human-caused Noise	42	3	7.14%
Algae Growth	109	31	28.44%
Sediment Buildup	77	16	20.78%
Too much mechanical harvesting	30	6	20.00%
Aquatic Invasive Species	148	40	27.03%
Shoreline Erosion	45	13	28.89%
Boat Landings	57	11	19.30%
Boating Safety	30	6	20.00%
Fisheries	67	19	28.36%
Excessive aquatic plant growth	173	72	41.62%
Shoreline Vegetation Removal	44	9	20.45%
Boat Traffic	37	5	13.51%
Lily Pad Encroachment	51	9	17.65%
Septic Tank Inspection Compliance	56	17	30.36%
Not enough mechanical weed harvesting	95	20	21.05%

20. How would you describe the current water quality of Pickereel/Crane Lakes during the period from May-October? Please use the numbers below to rate each lake.  
1=Very Poor 2=Poor 3=Fair 4=Good 5=Excellent 6=Unsure

Question 20	Sum of Responses	Actual Responses	Average	Rating
A. Pickereel Lake	747	218	3.43	> Fair
B. Crane Lake	597	186	3.21	Fair

\* Only ratings of 5 or less were counted. A “6” response was listed as “Not Sure”

2012 Survey Results	Actual Responses
Water Quality	127
Quality of Fish Habitat	73
Human-caused Noise	na
Algae Growth	81
Sediment Buildup	78
Too much mechanical harvesting	na
Aquatic Invasive Species	145
Shoreline Erosion	61
Boat Landings	na
Boating Safety	42
Fisheries	na
Excessive aquatic plant growth	172
Shoreline Vegetaion Removal	10
Boat Traffic	na
Lily Pad Encroachment	na
Septic Tank Inspection Compliance	na
Not enough mechanical weed harvest	na
Other	na

2012 Survey	1=Poor	2	3=Fair	4	5=Excellent	Don’t Know
Pickereel Lake	5	18	102	88	16	43
Percentage	1.84%	6.62%	37.50%	32.35%	5.88%	15.81%
Crane Lake	8	38	84	47	8	95
Percentage	2.86%	13.57%	30.00%	16.79%	2.86%	33.93%

21. Based on your answer to Question #20, which of the following answers is the single most important aspect when you consider water quality? Please check only one choice.

Question 21	Sum of Responses
A. Water clarity	104
B. Smell	6
C. Aquatic Plant Growth	73
D. Water Level	7
E. Water Color	10
F. Fish Kills	17
G. Algae Blooms	54
H. Other	5

22. How has the water quality changed in Pickerel/Crane Lakes since you’ve owned your property? Please use the numbers below to rate each lake.

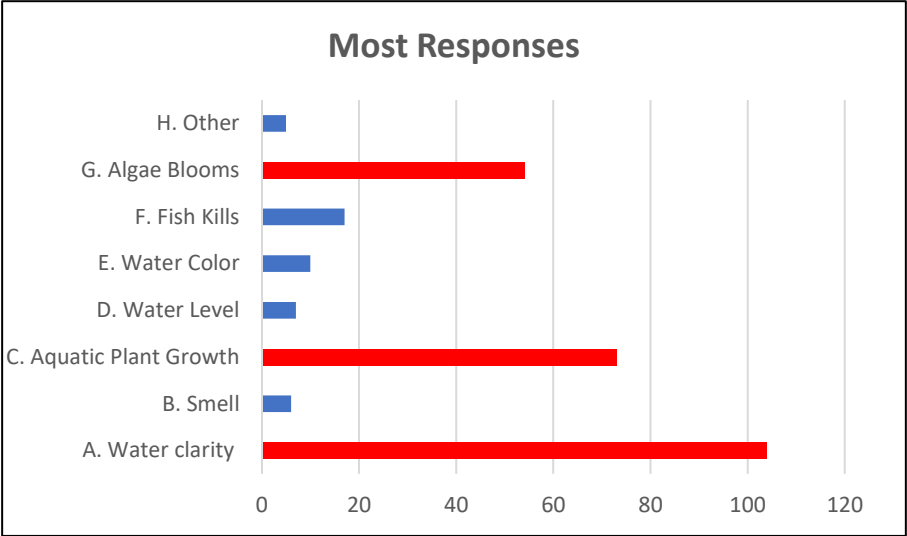
1=Severely Degraded 2=Somewhat Degraded 3=Remained the Same 4=Somewhat Improved  
5=Greatly Improved 6=Unsure

Question 22	Sum of Responses	Number of Actual Responses	Average	Rating
Pickerel Lake	593	203	2.92	Same
Crane Lake	452	165	2.74	Same

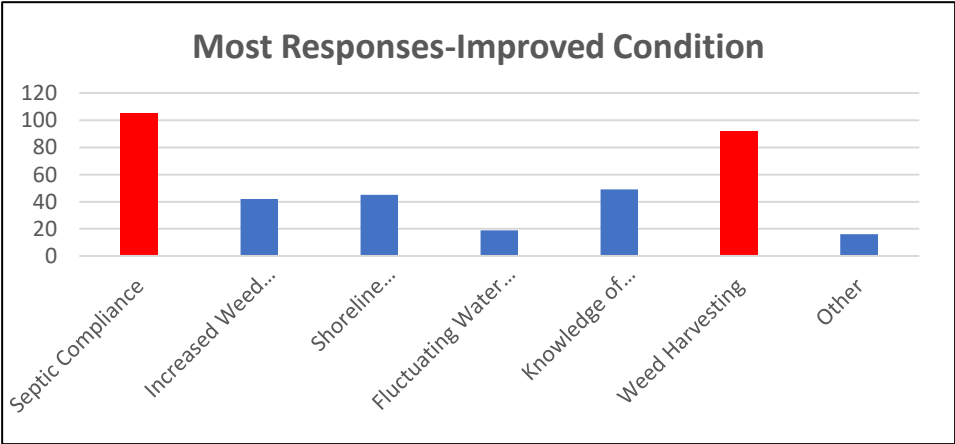
\* Only ratings of 5 or less were counted. A “6” response was listed as “Not Sure”

23. Based on your answer to Question #22, which of the following issues below are responsible for water quality improvement/or degraded condition? Please check all that apply.

Question 23	Sum of Responses
Improved Condition:	
Septic Compliance	105
Increased Weed Growth	42
Shoreline Improvement	45
Fluctuating Water Levels	19
Knowledge of Phosphorus and Nitrogen	49
Weed Harvesting	92
Other	16



2012 Survey	1=Degraded	2	3=Same	4	5=Improved	Don't Know
Pickerel Lake	7	35	89	74	18	53
Percentage	2.54%	12.68%	32.25%	26.81%	6.52%	19.20%
Crane Lake	7	47	80	19	11	101
Percentage	2.64%	17.74%	30.19%	7.17%	4.15%	38.11%



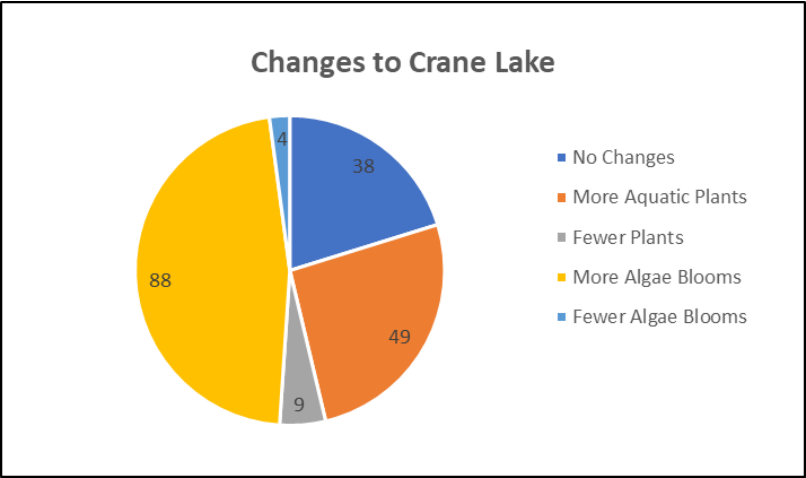
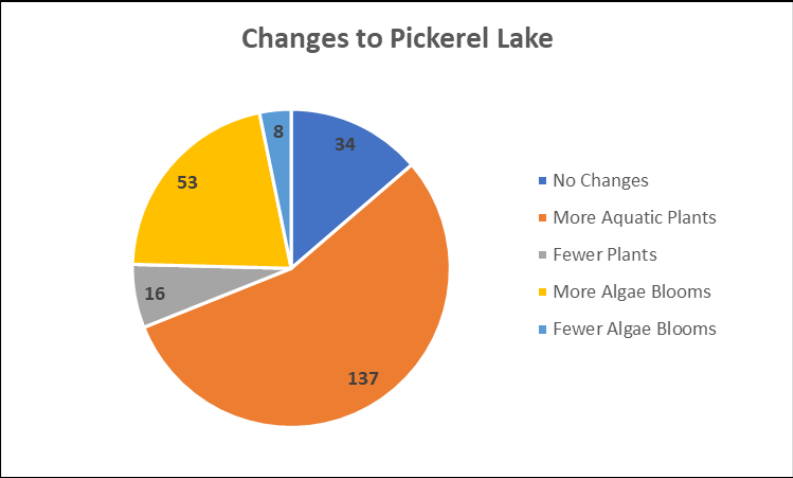
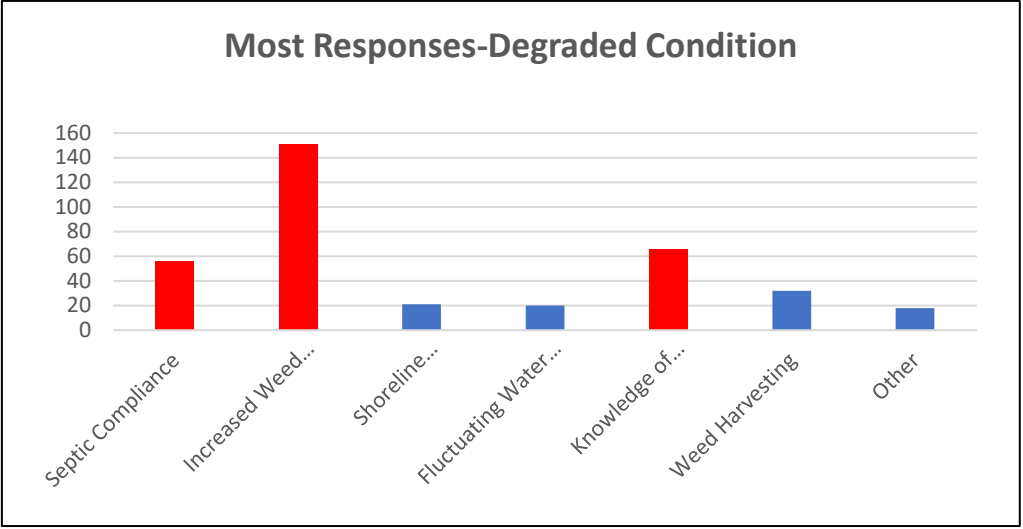
Based on your answer to Question #22, which of the following issues below are responsible for water quality improvement/or degraded condition? Please check all that apply.

Question 23	Sum of Responses
Degraded Condition	
Septic Compliance	56
Increased Weed Growth	151
Shoreline Improvement	21
Fluctuating Water Levels	20
Knowledge of Phosphorus and Nitrogen	66
Weed Harvesting	32
Other	18

24. During the years you’ve been familiar with Pickerel and Crane Lakes, what changes, if any, have you seen in the aquatic plants (including algae growth)? Please use the numbers below to rate all the changes that apply for each lake.

1=No dramatic changes    2=More aquatic plants than in the past    3=Fewer aquatic plants  
4=More algae blooms than the past    5=Fewer algae blooms than in the past

Question 24	Sum of Responses
Pickerel Lake	
No Changes	34
More Aquatic Plants	137
Fewer Plants	16
More Algae Blooms	53
Fewer Algae Blooms	8
Crane Lake	
No Changes	38
More Aquatic Plants	49
Fewer Plants	9
More Algae Blooms	88
Fewer Algae Blooms	4



25. In the summer months (Memorial Day through Labor Day), how often does aquatic plant growth (including algae) negatively affects your use of Pickerel/Crane Lakes? Please use the numbers below to rate each lake.

1=Always 2=Most of the time 3=Sometimes 4=Rarely 5=Never

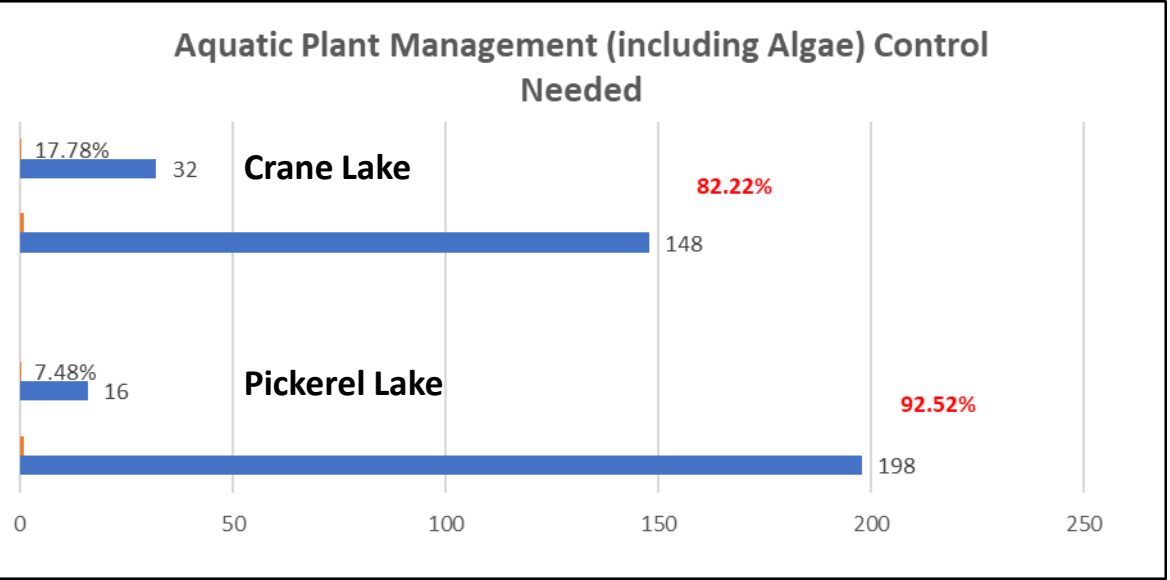
Question 25	Sum of Responses	Number of Responses	Average	Rating
Pickerel Lake	581	215	2.70	Sometimes
Crane Lake	581	181	3.21	Sometimes

26. Do you believe that aquatic plant management (including algae) is needed on Pickerel/Crane Lakes? (Yes or No)

Question 26	Sum of Responses	%
Pickerel Lake		
Yes	198	92.52%
No	16	7.48%
Crane Lake		
Yes	148	82.22%
No	32	17.78%

27. What aquatic invasive species (AIS) are you aware of in Pickerel and/or Crane Lakes? Please check all that apply.

Question 27	Total Responses
Pickerel Lake:	
Zebra Mussels	13
Curly-Leaf Pondweed	30
Rusty Crawfish	20
Spiny Water Fleas	4
Eurasian Milfoil	129
Purple Loosestrife	43
Round Goby	5
Unsure-But presume AIS is Present	98
Do not know if AIS is Present	47



Are you aware of Aquatic Invasive Species in:				
2012 Survey	Pickerel Lake	%	Crane Lake	%
Yes	205	85.42%	69	31.08%
No	35	14.58%	153	68.92%
Total	240	100.00%	222	100.00%



**What aquatic invasive species (AIS) are you aware of in Pickerel and/or Crane Lakes?**

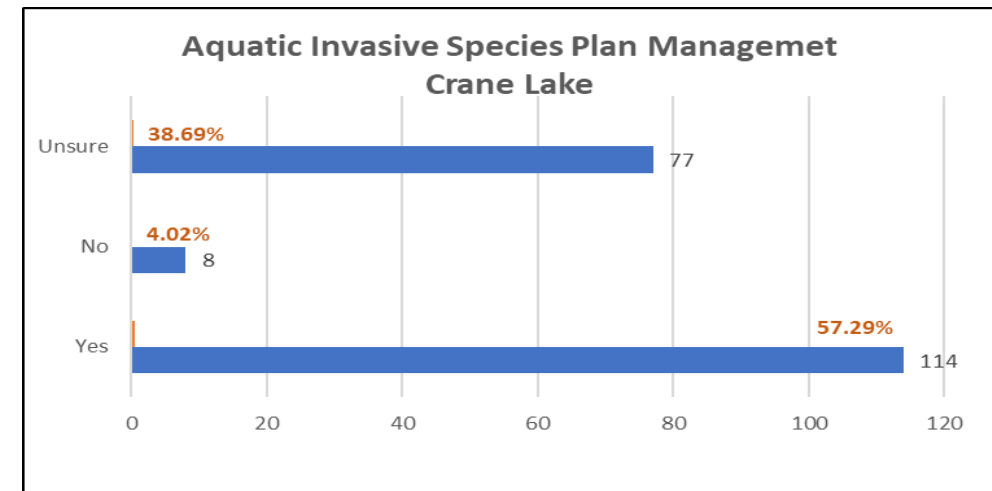
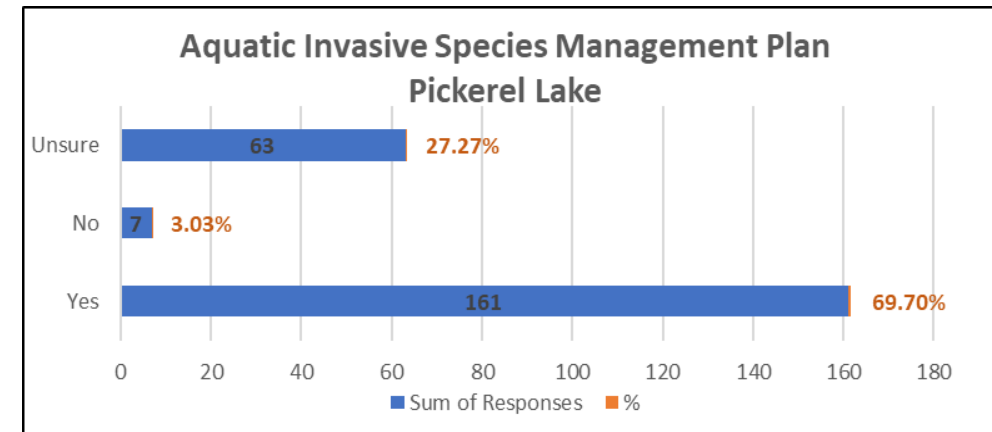
**Please check all that apply.**

Question 27	Sum of Responses
<b>Crane Lake:</b>	
Zebra Mussels	9
Curly-Leaf Pondweed	12
Rusty Crawfish	12
Spiny Water Fleas	3
<b>Eurasian Milfoil</b>	<b>52</b>
Purple Loosestrife	19
Round Goby	2
<b>Unsure-But presume AIS is Present</b>	<b>96</b>
Do not know if AIS is Present	48

**28. Considering your answer to Question #27, do you believe aquatic invasive species control is needed on Pickerel Lake and/or Crane Lake?**

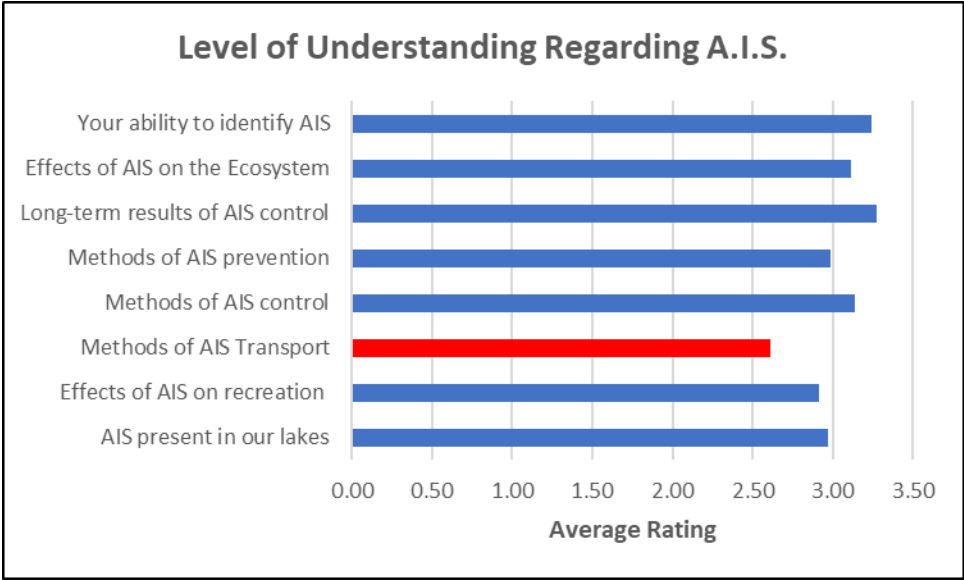
Question 28	Sum of Responses	%
<b>Pickerel Lake:</b>		
<b>Yes</b>	<b>161</b>	<b>69.70%</b>
No	7	3.03%
Unsure	63	27.27%
<b>Total Responses</b>	<b>231</b>	<b>100.00%</b>
<b>Crane Lake:</b>		
<b>Yes</b>	<b>114</b>	<b>57.29%</b>
No	8	4.02%
Unsure	77	38.69%
<b>Total Responses</b>	<b>199</b>	<b>100.00%</b>

Are you aware of Aquatic Invasive Species in:				
2012 Survey	Pickerel Lake	%	Crane Lake	%
<b>Yes</b>	<b>205</b>	<b>85.42%</b>	69	31.08%
<b>No</b>	35	14.58%	<b>153</b>	<b>68.92%</b>
<b>Total</b>	<b>240</b>	<b>100.00%</b>	<b>222</b>	<b>100.00%</b>



29. Education is a fundamental component of Aquatic Plant Management (APM) planning projects. Please use the following scale to rate your understanding of the Aquatic Invasive Species (AIS) topics listed below. (For example, if you have no knowledge about methods of AIS transport, place a 4 next to that choice.)

Question 29	Sum of Responses	Number of Responses	Average	Rating
AIS present in our lakes	641	216	2.97	Limited
Effects of AIS on recreation	612	210	2.91	Limited
Methods of AIS Transport	553	212	2.61	Good
Methods of AIS control	662	211	3.14	Limited
Methods of AIS prevention	637	213	2.99	Limited
Long-term results of AIS control	695	212	3.28	Limited
Effects of AIS on the Ecosystem	664	213	3.12	Limited
Your ability to identify AIS	724	223	3.25	Limited



30. What is your level of support for responsible Aquatic Invasive Species control techniques on Pickerel Lake and Crane Lake? Please rate all that apply as follows: 1=Not Supportive 2=Moderately Supportive 3=Highly Supportive 4=Unsure

Question 30	Sum of Responses	Number of Responses	Average	Rating
Pickerel Lake:				
Mechanical Harvesting	500	187	2.67	MSupport
Biological Control	313	130	2.41	MSupport
Manual Removal by property owners	390	153	2.55	MSupport
Dredging	252	117	2.15	MSupport
Herbicide Control	264	134	1.97	MSupport
Hand Removal by Divers	233	110	2.12	MSupport
Control using many methods	323	122	2.65	MSupport
Water Level Drawdown	178	134	1.33	NSupport
Do nothing	124	116	1.07	NSupport

\* Only ratings of 3 or less were counted. A “4” response was listed as “Unsure”

NSupport = Not Supportive MSupport = Moderately Supportive

2012 Survey Results: Pickerel Lake	Sum of Responses	Average	Rating
Mechanical Harvesting	190	4.30	Supportive
Biological Control	146	3.40	MSupport
Manual Removal by property owners	188	3.30	MSupport
Dredging	166	2.80	MSupport
Herbicide Control	160	3.00	MSupport
Hand Removal by Divers	175	2.50	MSupport
Control using many methods	165	4.20	Supportive
Water Level Drawdown	168	1.60	NSupport
Do nothing	162	1.20	NSupport
Need more Information	n/a	n/a	n/a

What is your level of support for responsible Aquatic Invasive Species control techniques on Pickerel Lake and Crane Lake? Please rate all that apply as follows: 1=Not Supportive 2=Moderately Supportive 3=Highly Supportive 4=Unsure

Crane Lake	Sum of Responses	Number of Responses	Average	Rating
Mechanical Harvesting	312	128	2.44	MSupport
Biological Control	217	93	2.33	MSupport
Manual Removal by property owners	268	107	2.50	MSupport
Dredging	155	80	1.94	MSupport
Herbicide Control	180	91	1.98	MSupport
Hand Removal by Divers	172	82	2.10	MSupport
Control using many methods	242	93	2.60	MSupport
Water Level Drawdown	131	96	1.36	NSupport
Do nothing	91	83	1.10	NSupport

\*Only ratings of 3 or less were counted. A “4” response was listed as “Unsure”

NSupport = Not Supportive MSupport = Moderately Supportive

31. What is your level of support or opposition for future aquatic herbicide use to target Eurasian water milfoil on Pickerel Lake and/or Crane Lake? Please use the numbers below to rate each lake.

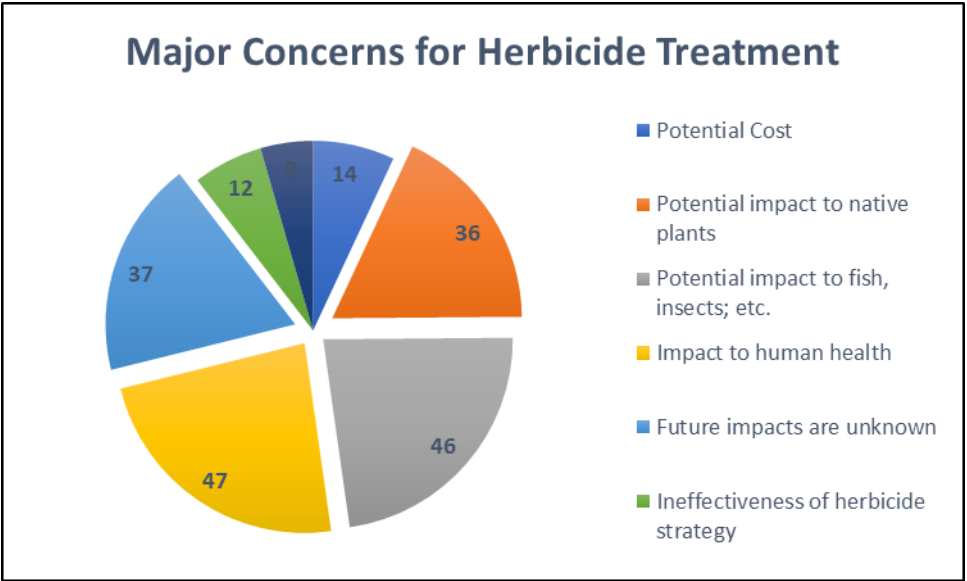
1=Completely support 2=Moderately support 3=Unsure 4=Moderately oppose 5=Completely oppose 6=Need more info.

Question 31	Sum of Responses	Number of Responses	Average	Rating
Pickerel Lake	669	228	2.93	Unsure
Crane Lake	649	195	3.33	Unsure

32. If you selected “Moderately oppose” or “Completely oppose” in Question #31, what is the reason or reasons you oppose the future use of aquatic herbicides to target Eurasian

water milfoil? Please check all that apply.Question 32	Sum of Responses
Potential Cost	14
Potential impact to native plants	36
Potential impact to fish, insects; etc.	46
Impact to human health	47
Future impacts are unknown	37
Ineffectiveness of herbicide strategy	12
Another reason	9

2012 Survey Results: Crane Lake	Sum of Responses	Average	Rating
Mechanical Harvesting	253	4.10	Supportive
Biological Control	195	3.30	MSupport
Manual Removal by property owners	248	3.40	MSupport
Dredging	220	2.80	MSupport
Herbicide Control	213	3.10	MSupport
Hand Removal by Divers	223	2.50	MSupport
Control using many methods	214	4.10	Supportive
Water Level Drawdown	213	1.60	NSupport
Do nothing	211	1.30	NSupport



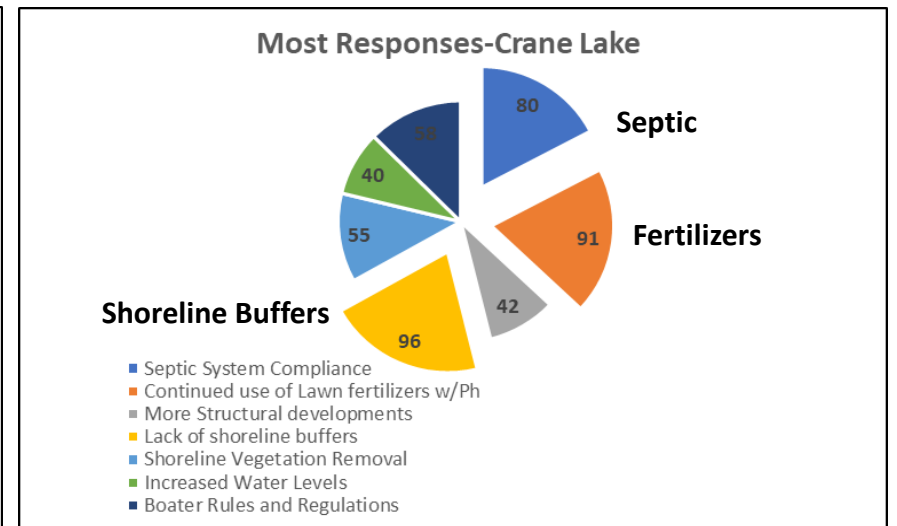
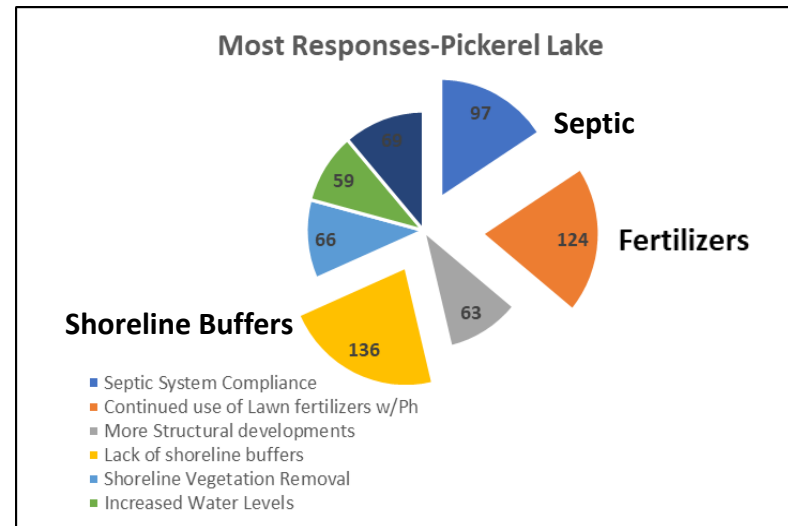
**33. Please place an “X” to describe your level of understanding of each of the following lake management issues: 1=No Understanding 2=Basic Understanding 3=Full Understanding**

Question 33	Sum of Responses	Number of Responses	Average	Rating
Human Impact on shorelines	608	249	2.44	Basic
Shoreline Preservation	559	249	2.24	Basic
Shoreline Restoration	548	249	2.20	Basic
Use of Lawn Fertilizers	636	247	2.57	Basic
Degradation of Native Lake Plants	470	248	1.90	Basic
Septic System Discharge	637	249	2.56	Basic
Creating a Shoreline Buffer	503	248	2.03	Basic
Boater Rules and Regulations	657	251	2.62	Basic

2012 Survey Results Level of Understanding	Sum of Responses	Average	Rating
<b>How Invasive species are spread</b>	<b>288</b>	<b>3.80</b>	<b>Good</b>
<b>Human impacts on lakes</b>	<b>289</b>	<b>3.60</b>	<b>Good</b>
Shoreline Preservation	288	3.40	Basic
Impact of AIS on Pickerel Lake	291	3.30	Basic
Shorline Restoration	293	3.30	Basic
Benefits of AIS Control	290	3.20	Basic
Invasive Species in Pickerel Lake	287	3.10	Basic
Methods of Controlling AIS	288	2.90	Basic
Risks of AIS Control	287	2.80	Basic

**34. What factors below do you believe may be impacting shoreline erosion and/or run-off on Pickerel and/or Crane Lakes? Please check all that apply.**

Question 34	Most Responses
<b>Pickerel Lake</b>	
<b>Septic System Compliance</b>	<b>97</b>
<b>Continued use of Lawn fertilizers w/Ph</b>	<b>124</b>
More Structural developments	63
<b>Lack of shoreline buffers</b>	<b>136</b>
Shoreline Vegetation Removal	66
Increased Water Levels	59
Boater Rules and Regulations	69
<b>Crane Lake</b>	<b>Most Responses</b>
<b>Septic System Compliance</b>	<b>80</b>
<b>Continued use of Lawn fertilizers w/Ph</b>	<b>91</b>
More Structural developments	42
<b>Lack of shoreline buffers</b>	<b>96</b>
Shoreline Vegetation Removal	55
Increased Water Levels	40
Boater Rules and Regulations	58

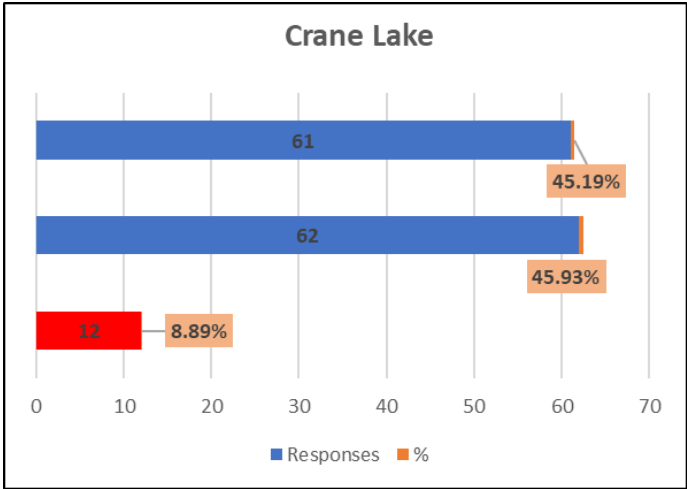
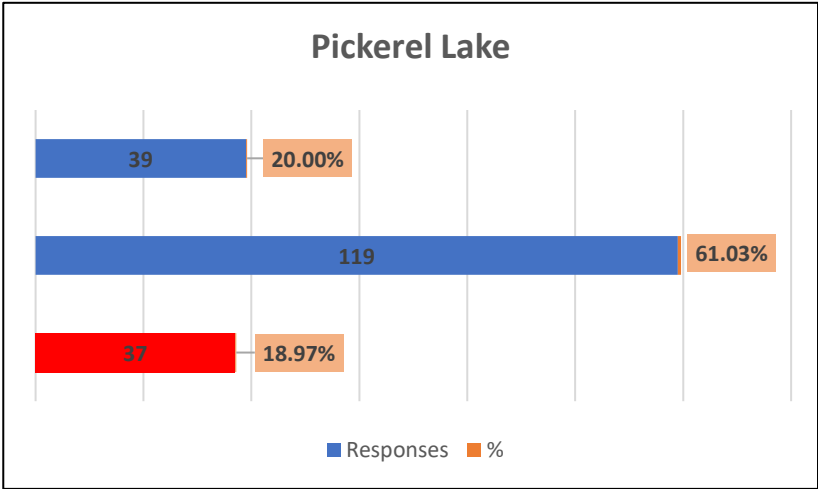


**35. Shoreline restoration involves returning a shoreline to its former healthy condition by reintroducing native plants and natural landscaping. Have you completed a shoreline restoration project on your Pickerel/Crane Lakes property?**

Question 35	Responses	%
Pickerel Lake		
Yes	37	18.97%
No	119	61.03%
Does Not Apply (non-waterfront owner)	39	20.00%
Total Number of Responses	195	100.00%
Crane Lake	Responses	%
Yes	12	8.89%
No	62	45.93%
Does Not Apply (non-waterfront owner)	61	45.19%
Total Number of Responses	135	100.00%

**36. If you checked “Yes” in Question #35, did you utilize grant money from the county for the shoreline restoration project?**

Question 36	Responses	%
Yes	2	3.77%
No	51	96.23%
Total Number of Responses	53	100.00%



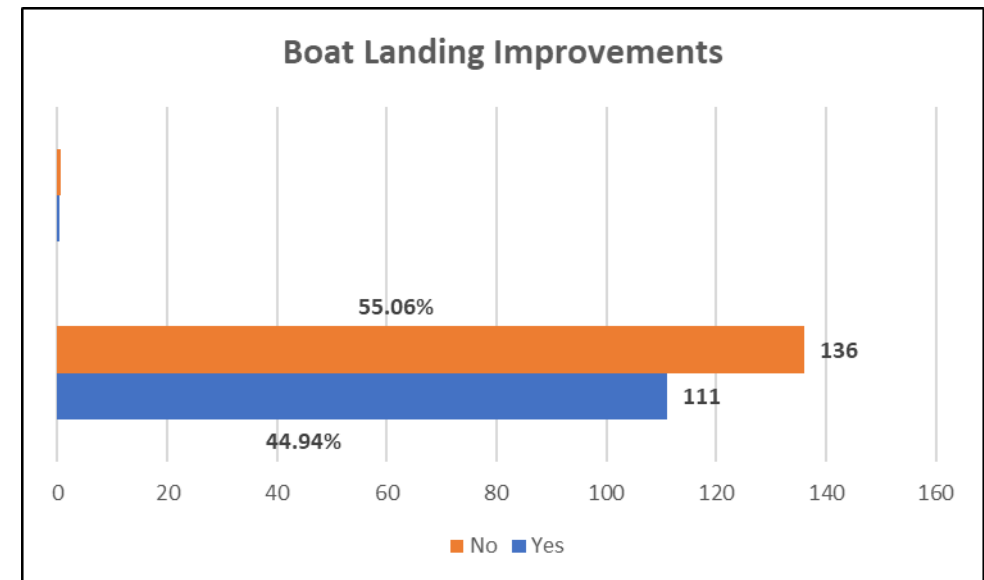
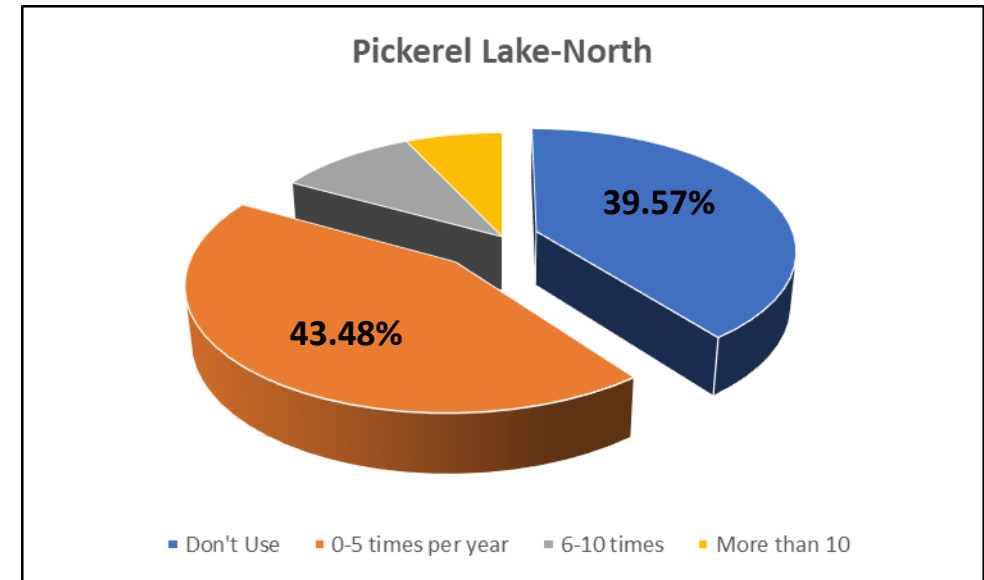
## Pickerel/Crane Lakes Future Considerations

**37. How often do you use the public boat landings on Pickerel/Crane Lakes?**  
Please answer for each location below.

Question 37	Responses	%
<b>Pickerel Lake -North</b>		
Don't Use	91	39.57%
<b>0-5 times per year</b>	<b>100</b>	<b>43.48%</b>
6-10 times	23	10.00%
More than 10	16	6.96%
<b>Total Number of Responses</b>	<b>230</b>	<b>100.00%</b>
<b>Pickerel Lake-South</b>		
<b>Don't Use</b>	<b>137</b>	<b>68.50%</b>
0-5 times per year	44	22.00%
6-10 times	9	4.50%
More than 10	10	5.00%
<b>Total Number of Responses</b>	<b>200</b>	<b>100.00%</b>
<b>Crane Lake</b>		
<b>Don't Use</b>	<b>141</b>	<b>66.51%</b>
0-5 times per year	48	22.64%
6-10 times	11	5.19%
More than 10	12	5.66%
<b>Total Number of Responses</b>	<b>212</b>	<b>100.00%</b>

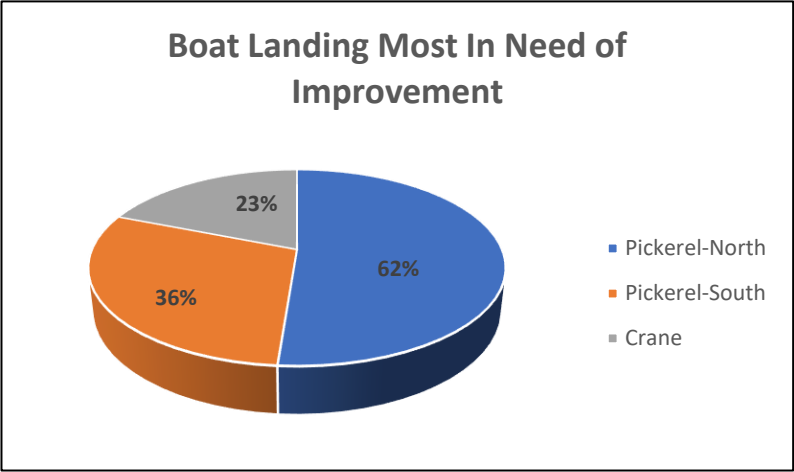
**38. Would you like to see additional boat landing improvements?**

Question 38	Responses	%
Yes	111	44.94%
No	136	55.06%
<b>Total Number of Responses</b>	<b>247</b>	<b>100.00%</b>



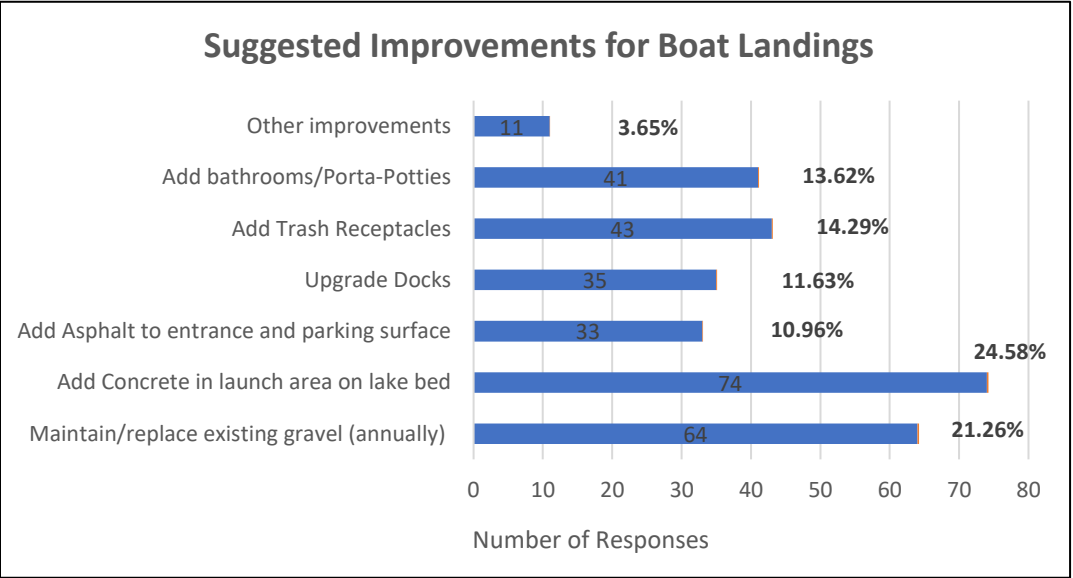
39. If you checked “Yes” in Question #38, in your opinion which boat landing is most in need of improvement? Please check only one choice.

Question 39	Responses	%
PickereI-North	62	51.24%
PickereI-South	36	29.75%
Crane	23	19.01%
Total Number of Responses	121	100.00%



40. If you checked “Yes” in Question #38, what improvements would you like to see? Please check all that apply.

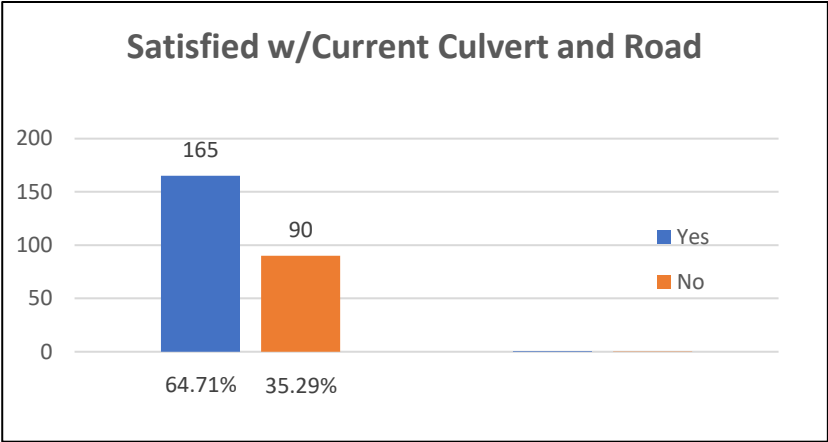
Question 40	Responses	%
Maintain/replace existing gravel (annually)	64	21.26%
Add Concrete in launch area on lake bed	74	24.58%
Add Asphalt to entrance and parking surface	33	10.96%
Upgrade Docks	35	11.63%
Add Trash Receptacles	43	14.29%
Add bathrooms/Porta-Potties	41	13.62%
Other improvements	11	3.65%
Total Number of Responses	301	100.00%





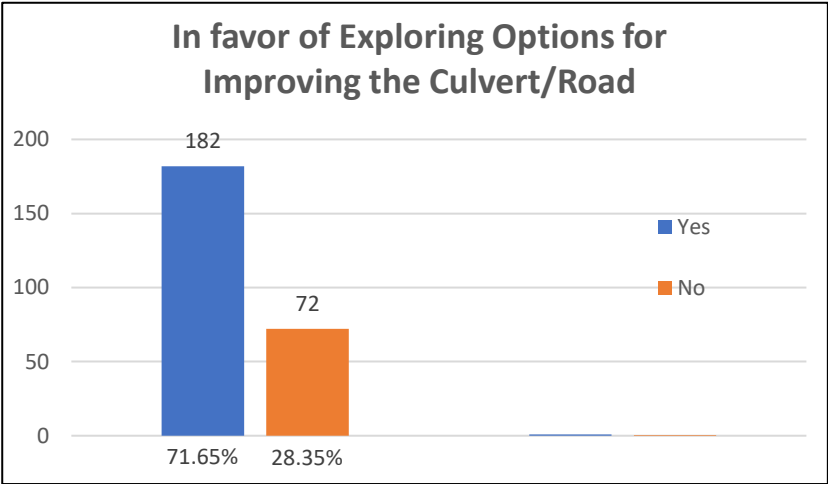
**41. Are you satisfied with the current culvert and road condition separating Pickerel and Crane Lakes?**

Question 41	Responses	%
<b>Yes</b>	<b>165</b>	<b>64.71%</b>
No	90	35.29%
Total Number of Responses	255	100.00%



**42. Would you be in favor of the Town of Nashville Board exploring the possibilities of improving the current conditions of the culvert and/or the road, but only if this activity does not affect the ecology of Crane and Pickerel Lakes?**

Question 42	Responses	%
<b>Yes</b>	<b>182</b>	<b>71.65%</b>
No	72	28.35%
Total Number of Responses	254	100.00%



**43. How concerned, if at all, are you about lily pad growth on Pickerel/Crane Lakes? Please use the following numbers to rate each lake. 1=Not at all concerned 2=Not too concerned 3=Unsure 4=Somewhat concerned 5=Very concerned**

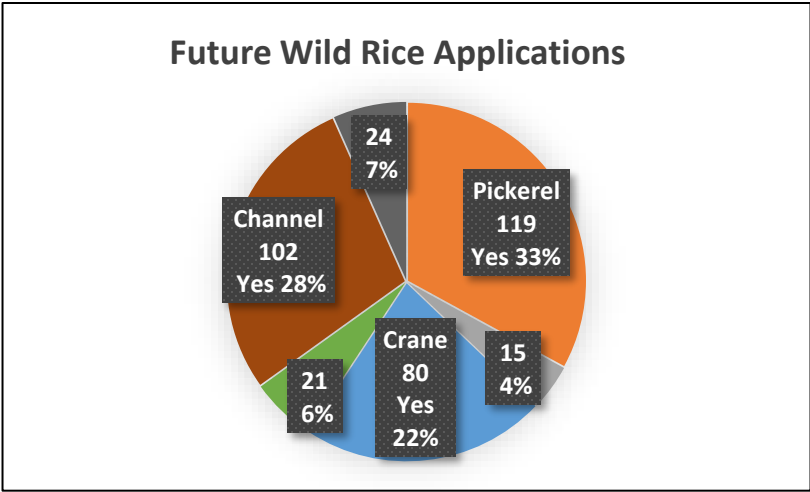
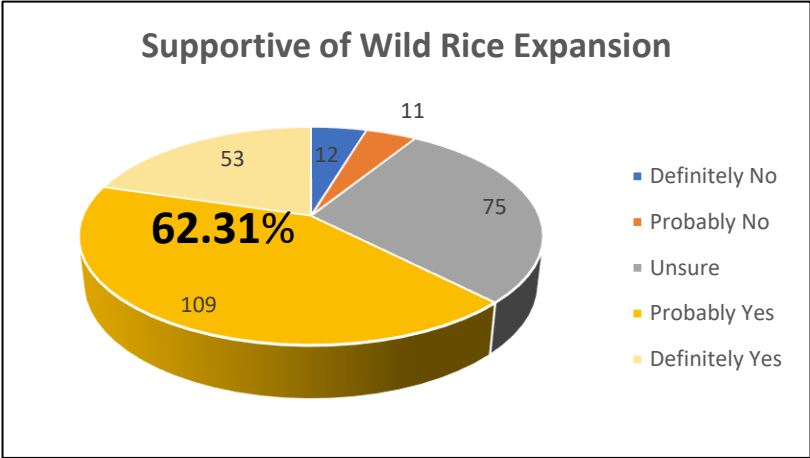
Question 43	Sum of Responses	Number of Responses	Average	Rating
Pickerel Lake	655	222	2.95	Unsure
Crane Lake	509	186	2.74	Not Too Concerned

44. If the WDNR deems the wild rice test plot successful, are you in favor of expanding the planting of wild rice to help contain lily pad expansion?

Question 44	Responses	%
Definitely No	12	4.62%
Probably No	11	4.23%
Unsure	75	28.85%
Probably Yes	109	41.92%
Definitely Yes	53	20.38%
Total Number of Responses	260	100.00%

45. If you checked “Yes” to Question #44, where would you like to add another rice bed (subject to WDNR approval)?

Question 45	Most Responses
Pickerel Lake	
Yes	119
No	15
Crane Lake	
Yes	80
No	21
Channel Between the Lakes	
Yes	102
No	24



Pickerel/Crane Lakes District Questions

*46. Before receiving this mailing, had you ever heard of the Pickerel/Crane Lake Protection and Rehabilitation District?*

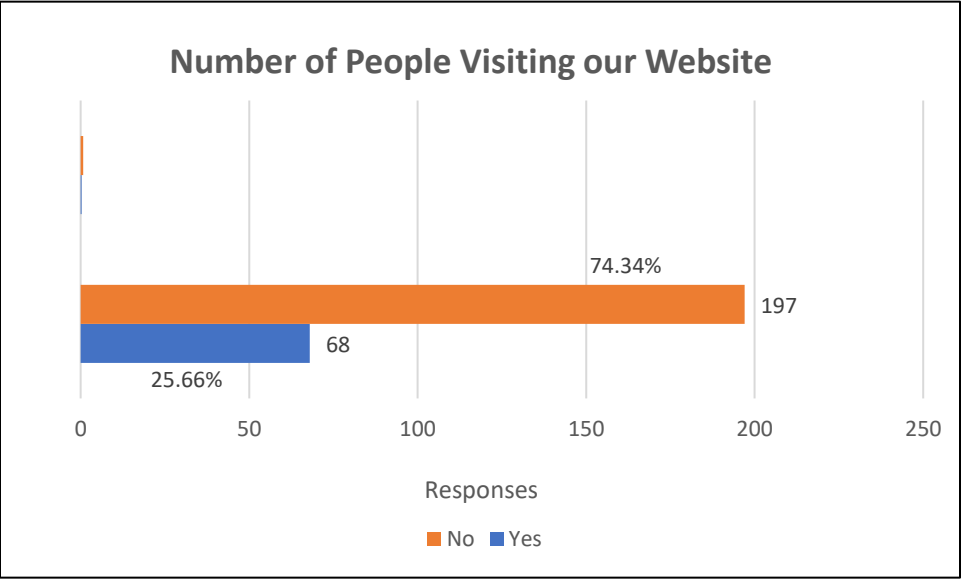
Question 46	Responses	%
Yes	183	69.32%
No	81	30.68%
Total Number of Responses	264	100.00%

*47. Have you ever visited the Lake District website at [pickerelcranelakedistrict.org](http://pickerelcranelakedistrict.org)?*

Question 47	Responses	%
Yes	68	25.66%
No	197	74.34%
Total Number of Responses	265	100.00%

*48. Are you currently receiving our spring and fall newsletters? If you'd like to receive the newsletters, please fill in your contact information below. Note that by providing your contact information your responses are no longer anonymous.*

Question 48	Responses	%
Yes	204	80.95%
No	48	19.05%
Total Number of Responses	252	100.00%



**49. Please check all the activities in which you would be willing to participate. Volunteers are needed in all areas and because this survey is anonymous your response to this question is not a commitment to participate but instead will be used to gauge potential volunteer participation.**

Question 49	Most Responses
<b>Harvester Operator/Weed Truck Driver</b>	<b>77</b>
Aquatic Plant Monitoring	28
Water Quality Monitoring	40
Helping with Winter Aeration	35
Watercraft Inspections at boat Landings	7
Bulk Mailing assembly	15
Public Boat landing dock installation/removal	36
P/C Lake District Board Member	10
Writing Newsletter Articles	3
Helping with lake district website	4
Educating others on Lake Management	7
Hand pulling aquatic invasive species	23
Other	6
<b>I do not wish to volunteer</b>	<b>83</b>

2012 Survey	Most Responses
<b>Harvestor Operator/Weed Truck Driver</b>	<b>68</b>
Aquatic Plant Monitoring	31
Water Quality Monitoring	28
Helping with Winter Aeration	25
Watercraft Inspectioins at boat Landings	22
Bulk Mailing assembly	21
Public Boat landing dock installation/removal	17
P/C Lake District Board Member	8
Writing Newsletter Articles	5
Helping with lake district website	na
Educating others on Lake Management	na
Hand pulling aquatic invasive species	na
Other	5
<b>I do not wish to volunteer</b>	<b>63</b>

**50. Please list any additional suggestions that you would like to see incorporated into the Lake Management Plan.**

- “stricter harvest regulations on panfish, too many greedy people.”
- “I’d love to volunteer but don’t live in the area, unless there is something that doesn’t have to be done regularly.”
- “change the panfish limit to 15 in aggregate, especially during spawning.”
- “it seems to us there are less perch in the lake. Fish sizes seem to be smaller, whatever it would take to incorporate ways to improve this. We feel the lake is overfished...overall not enough DNR wardens to enforce rules. Survey was too long...hope you get good results despite that.”
- “limit use of Jet-skis.”
- “higher level of communication.”
- “would love to see the DNR trap Bullhead on Pickerel Lake.”
- “there have never been enough volunteers to efficiently manage the lake with a weed harvester. Think a good pellet program to manage the weeds would be much more applicable.”
- “muck removal northeast end of Pickerel Lake. It’s over a foot deep by our piers.”
- “the muck needs to be mechanically removed on both lakes. This will improve conditions for fish, natural plants and homeowners.”
- “several years ago, the Rollingstone Lake District started developing a plan with the Mole Lake Tribe to dredge every inlet on Rollingstone and plant wild rice. This was the plan to control weeds. Can this be done on Pickerel Lake?”
- “yearly-any study results, tips on maintaining shorelines, project updates by email.”
- “I’m only up to the lake during the summer and I’m not sure I could be of much help. But given the information, maybe I could be of some help. Also monitor the harvest of walleye, we should not allow more than one line for motor-trolling.”
- “the weeds are getting to be a bigger and bigger issue on Pickerel. Something needs to be done to correct it. The fishing is also going downhill. I was amazed at the lack of ice fishing this winter.”

- “as stated, we are very part-time residents so volunteer time is limited.”
- “a plan to reduce weeds so the lake can be used in late summer and fall.”
- “talking to the DNR about harvesting weeds out in the .... I talked to the warden and he said they should let us harvest the whole lake, knowing we have invasive plants in the lake.”
- “perch stocking in addition to the walleye stocking.”
- “crayfish would help with the weeds. No zebra mussels.”
- “improving the current culvert and road. Don’t wait until someone gets hurt or killed.”
- “I live on the east side of Pickerel Lake. I am very interested in the Wild Rice project near my property.”
- “Need to eliminate invasive species in Pickerel...even deeper areas are affected, and it is hard to cast for northerns...too much weed harvesting has added to floating masses of weeds.”
- “we are elderly and not able to enjoy most water activities.”
- “If I wanted to add more stone to my shoreline, how can I do that and is there a method to use to prevent it from moving during winter ice movement? My cottage is in a bay on Pickerel that has always collected weeds. I could be in the water daily if I was there. This is very frustrating! The weed cutter is helpful, but these are weeds blown in from the lake. Help here is much appreciated!”
- “would be nice to have the weed harvester cut a lane the appropriate distance from shore and around the lake.”
- “maybe install an aerator in the winter time closer to the old Pickerel Point bar.”
- “6 years till retirement, then I will volunteer (will have more time-still working).”
- “thank you for taking care of our lakes.”
- “I currently help w/aerator and dock installation. Clean up the weeds and clean off scum clumps in later summer. Also try to control Eurasian Milfoil (chemical treat).”

- “protect and try to get back the reed beds on Pickerel Lake over by the popular swimming area. No weed harvester operation before 7:30am (noise).”
- “I don’t understand the only thing done with the weeds is harvest them? In the meantime, I have to spend hours of every morning/weekend pulling mounds of weeds out of the water. The lake needs to be dredged all along the houses from the boat launch down to the pass through to Crane.”
- “thank you very much for sending this survey! My neighbors and myself have been frustrated for many years with the weeds and muck situation. Most of us are normally at the lake each weekend and an occasional week here and there throughout the summer. Being that I’m six doors down from the culvert entering Crane, the wind basically blows our direction. Along with the wind comes islands of weeds that get cut from boat propellers, form islands, and float against our shoreline. We all normally spend a couple hours each morning getting weeds out of the water, putting them in wheel barrels, and disposing of them.

If we don’t get them out of the water on the regular basis it will get out of control and can take an entire day to remove them. The next problem is the weeds start to stink and dead fish get caught in them. Its tiring tot constantly address them, and the weed machine only does so at best. I absolutely do not want to take away from the volunteers but, that’s exactly what they are. Let’s be honest with ourselves and not pretend they’re professional operators that are getting paid by the hour. Does the harvesting help? I think the answer is yes, a little but its not the long-term answer.

The muck seems to be an entirely different issue but, strictly in my opinion I don’t think it is. I grew up spending every weekend of my adolescent life on the Rock River. If anyone knows or understands the Rock River, they would know it was heavily polluted in the 60s and 70s. It also floods constantly, high current, and extremely dirty as rivers often are. With that said I always thought I d never see muck as bad as that particular river has! In the worst case you could sink in a foot to a foot and a half in a horrible spot. I can honestly say I was wrong and who knew it would be in the beautiful lakes of Northern Wisconsin I was wronged. If I walk out to 8 or 9’ from my shoreline I will sink in waist deep or 3’ in muck. I also tried to go deeper just to see and I made it to almost arm pit deep in muck before turning back. I think its almost impossible to have a healthy body of water when that much muck is present. On top of that is how much depth of water is lost from the muck that the fish don’t get to use because its so shallow. The DNR has the capability to dredge lakes and I personally think this is the only place to start.

My neighbors and myself all agree that there is an expense to perform this process and funds don’t just magically appear. Through all our deep discussions we all agree that we would all be willing to contribute funds on a yearly basis to try and fix the problem. I feel very confident many other land owners also feel the same way and would also be willing to contribute if they knew instant progress would start happening.

Lastly and most importantly in my life is my kids and they can’t even swim off their own dock because, they’ll get stuck in the muck even if the weeds are cleaned up. My sister, brother and I spent hours upon hours jumping off the dock and swimming at my parents place as kids. My wife and I thought we were providing that for our kids as well. Unfortunately, we were severely wrong and must take them away from the dock to actually swim!

I completely understand that the DNR likes to take baby steps with every problem as they should. This problem is well past that point and needs to be addressed head on rather than band aids. I don’t really care to be negative because, it doesn’t fix the problem. I’d rather get a list of progressive solutions that will actually move the needle. I’m sure may people are on the same page.

Thank you very much for your time!

- “get the ducks and geese to shower when they fly from one lake to another”