Skootamatta District Ratepayers Association

Lake Management Plan 2019

Executive Summary

The primary goal of the Skootamatta District Lake Management Plan (hereafter referred to as LMP) is to establish meaningful discussion among residents and local community members in order to preserve the environmental, social, and recreational well being of the Skootamatta District Lakes and the surrounding community. This document continues to be an ongoing project and a living document, subject to change as the needs of the lakes change.

The LMP covers many topics relevant to lake health, including invasive species, water quality, fisheries, wildlife, shoreline health, and boating/recreation. This information was gathered using resident and cottager surveys, water quality testing, fishery data collection, and discussions with external stakeholders.

In an effort to understand what may impact both the environmental health of the lake, and the continual enjoyment by residents, the LMP includes past, present, and future considerations. For example, historic water quality testing and fishery monitoring provides a benchmark for analysis to compare to the current status of these indicators of lake health. Additionally, impacts of recreational activities on the lakes have increased, as more people are enjoying the lakes in new and different, more technologically advanced ways. The major theme throughout the LMP is lake health, as it relates to water quality, dam operations, and development.

Open communication with different levels of government, non-profit organizations, and businesses serves to align the LMP with other programs that may influence the lakes and their residents. Discussions with the Quinte Conservation Authority about water levels and dam operations provide a deeper understanding of challenges associated with maintaining the overall watershed and how the local lakes may be impacted. Regular communication with Mazinaw-Lanark Forestry Inc. allows residents to be informed about both the extent and type of logging activities that may be taking place. Resources provided by the Federation of Ontario Cottage Associations (FOCA) helped to develop and shape this LMP to align with the standards and examples set by other Ontario associations.

As mentioned, the key theme of the LMP is the health of our lakes, with the goal of keeping the lakes in a state that leaves them in good shape for future generations.

Keeping this in mind, as the lake communities grow and change, this document is designed to grow and change as well, to reflect the current needs and priorities.

Versions

Version	Year	Authors
1	2014	Malcolm Stewart Rosemary Teed Bob Hasler Gordon Birnie John Coulter Patrick Falby William Garnish Bruce Goodale Derek Mendham Gordon McCullough Jane Richmond
2	2019	Joel Arthurs Anders Holder Bob Hasler Christie Arthurs Sean Geddes

Background

In 2009, the Friends of Skootamatta, Sheldrake, and Pringle (FOSSP) distributed a survey to 350 lake residents. Thirty-five percent (35%) of the surveys were completed and returned. The survey respondents identified several values and goals related to various natural and human impacts on the lake environments, and made recommendations to address these impacts. During the following months, members of FOSSP exchanged communication with lake residents, other cottage/lake associations, and local, regional, and provincial government officials through meetings, informal discussions, emails, letters, and phone calls. FOSSP's successor, the Lake Management Planning Committee of the Skootamatta District Ratepayers Association (SDRA) then gathered descriptive data on the state of the three lakes. The LMP is based on these values, goals, recommendations and descriptive data. It sets out goals, objectives and action strategies that address a number of identified issues.

The goals identified by the Skootamatta District community as priorities for action on our lakes are to:

- improve, maintain, and protect the quality of water in the Skootamatta District Lakes;
- mitigate the negative effects of climate change on the lakes and surrounding wetlands to the extent possible, and assist lake residents to adapt to these changes;
- preserve, restore ,and maintain indigenous vegetation along the shorelines of the lakes;
- preserve and protect the habitats and health of indigenous fish, flora, and fauna in and surrounding the lakes;
- determine the optimal carrying capacity of the lakes and advocate appropriate lakeside and secondary residential development accordingly; and
- ensure that licensed industrial operations near the lakes, watershed, and wetlands are managed in a manner that does not negatively impact the health of the lakes and their biospheres.

The goals, objectives, and actions contained in the LMP incorporate educational, cooperative, and regulatory approaches to protecting the lakes. It is assumed that most lake residents and visitors to the lakes understand the vital role they play in protecting the lakes, but they may not be fully aware of how they can participate in this role, so education is a primary focus. In cases where regulations are in place to protect the health of the lakes and their watershed, cooperative strategies involve volunteers working with government and non-government organizations to enforce those regulations. When education and cooperation do not achieve goals, the regulatory approach may be necessary, meaning working with local, regional, and provincial government bodies to modify existing or introduce new regulations affecting the lakes.

The LMP is a living document that will be reviewed and revised over time, adapting to new issues as they arise. Implementation of the LMP will be the responsibility of the lake community, the SDRA, and its partners. The lake community will initiate an ongoing process, in partnership with government and non-government agencies, to care for Skootamatta District and its watershed on behalf of future generations. Continual monitoring of the education and action strategies will be carried out to ensure the identified lake issues are being addressed and the intended results are being achieved.

Introduction

What is a Lake Management Plan?

A lake management plan is a long-term action plan, developed by a lake community, to protect the health and special features of a lake. A lake plan reflects community consensus about what is needed to protect the natural, physical, cultural, and economical aspects of a lake and its watershed.

The lake planning process offers the opportunity for everyone with an interest in a lake (that is, everyone who works, lives, or recreates within a lake watershed) to come together to discuss their concerns. The process of gathering community input is as important as the end result. Through discussions, residents identify what they value about a lake, learn about the issues affecting it, and offer recommendations on goals, objectives, and actions that promote sustainable development and overall protection of a lake and its watershed.

How the Plan Was Developed

In the Fall of 2012, the Skootamatta District Lake Management Planning Committee developed the following vision statement for the lake management planning process, based on feedback from the lake community and its partners:

Vision

"That the health of Skootamatta District Lakes shall be sustained through the combined efforts of the residents and users of the Lakes and their watershed, in partnership with government and non-government organizations."

Guided by this Vision, the Planning Committee addressed each of the issues that were identified through the initial lake resident survey and focus group discussions. The Vision is reflected throughout the Plan, emphasizing resident responsibility and community partnerships as fundamental in protecting the long-term health of the lakes.

Thus, the Skootamatta District Lake Management Plan is based on input from the lake residents and others who have a vested interest in the long-term health of the lakes. It

provides an opportunity for the lake community to work together with various government and non-government agencies to address identified issues and develop goals, objectives and actions that will protect the water quality and natural environment of the lake and its watershed in the years ahead.

Community Participation in the Process

In 2008 the Skootamatta District Ratepayers Association (SDRA) formed a committee called the Friends of Skootamatta, Sheldrake, and Pringle (FOSSP). In the spring of 2009 this committee distributed a Survey to approximately 350 residents on and around the three lakes. Of the 350 surveys distributed 123 were returned, a significant return rate of 35 percent. This survey provided a starting point for identifying the values held by lake residents about the lakes and their environments, and issues of concern to them. From this a Vision Statement and a number of goals, objectives, and action plans have been developed by the Skootamatta Lake Management Planning Committee, which was struck by the SDRA board in 2012 to carry on the work of FOSSP.

Throughout the lake management planning process, every effort was made to keep everyone informed and involved through community meetings, mailings, and regular updates in the SDRA newsletter, emails and website. As we go forward, the SDRA will continue to encourage community input and participation in protecting the health of the lakes at any point in the process.

SDRA Mission

The SDRA Mission, as outlined in our Constitution, states;

> *"To collectively advance the interests of the property owners and their families on, and adjacent to, Sheldrake, Skootamatta, and Pringle Lakes."*

Strategic Plan – Four Pillars

Under the SDRA Strategic Plan, there are four main pillars that drive the Board's activities.

F.A.C.E: Fun, Advocacy Communication, Education

Fun: Focus on bringing fun events to the lake that will encourage members and their families to get involved in lake activities, meet new friends, and maintain existing relationships.

Advocacy: Represent members on issues of communal interest where it is not feasible for individual members to represent themselves.

Communication: Develop, provide, and utilize new and existing channels of communication to keep members informed of activities and issues around the lake.

Education: provide resources and education to members on topics of interest impacting residents of Skootamatta, Pringle, and Sheldrake Lake.

Location

The Skootamatta Lake Watershed lies sixty kilometres (60 km) north of Lake Ontario, on the southern edge of the Canadian Shield. It is located five kilometres (5 km) north of the Village of Cloyne, in Lennox and Addington County, Ontario. It spans the boundaries of the Townships of Addington Highlands and North Frontenac. It forms the headwaters of the Quinte Region via Skootamatta River and includes all of the land that drains into Skootamatta, Sheldrake, and Pringle Lakes. In addition to Skootamatta, Sheldrake, and Pringle Lakes, it includes several smaller lakes: Deer Rock, Grimsthorpe, Lingham, Partridge Creek and Topper, as well as Pearson Pond.

Physical Characteristics

The east bays of the lower Skootamatta Lake are bordered by basalt, a volcanic rock, that depth and temperature have significantly altered over the past billion years. To the west, runs a shear zone forming the soft base where Wolfe Creek and its outlet have eroded their channels. The main parts of Sheldrake and Skootamatta Lakes are sitting on rock that is very similar to pink granite, except that it lacks quartz, making it relatively

soft. Glaciers have scoured this ‘soft’ rock down lower than the surrounding rock, making the bowl that forms the lakes. Pringle Lake is sitting up in the volcanic rock. The west shore and most of the north shore of Skootamatta as far east as Blake's Island is gabbro, a type of rock that forms beneath the ocean.

Skootamatta Lake features:

- An upper section with few access roads where about forty seasonal residences are located, and a lower section served by several roads where over two hundred fifty residences are located. A narrows of fifteen hundred metres connects the two sections;
- Thirty seven kilometres of mainly rocky, forested shoreline with thin soil cover and steep slopes. About eighty percent (80%) of the Upper lake shoreline and about thirty percent (30%) of the Lower lake shoreline, including the east side of the narrows and Jacques Bay, is Crown land;
- Three named islands in the lower lake: Mike’s Island, situated east of Oborne Point; Bible and Masson Islands in the centre; and several unnamed islands, one in Sheldrake Bay and three others off the southeast end of Bible Island. There are six islands in the upper lake: Blake (the largest, at the north end of the narrows), a smaller one next to it, two unnamed ones at the southeast bay, and two more at the far west end;
- Two sand beaches in the Lower lake and one on the Upper lake;
- Three streams: Wholfe Creek on the northeast shore of the lower lake, a seasonal stream near Trail’s End landing in the lower lake, and Killer Creek on the far northwest shore of the upper lake;
- A river at the south end of the lake, also named Skootamatta, that flows from a dam that controls water levels in the lake;
- Three public boat launches: one at Trails End Landing, one in Sheldrake Bay, and one on the south shore of the Upper lake;
- Several campsites through the Upper and Lower lake;
- A well-established sport fishery that attracts campers and visiting day-fishers as well as lake residents;

Sheldrake Lake features:

- Twelve point six kilometres (12.6 km) of mainly rocky, forested shoreline, approximately eighty percent (80%) of which is Crown Land, with the entire southern, western, and northwest portions of the shoreline being Crown Land.
- A length of approximately four kilometres and a width of one kilometre at the widest point;

- One island at the midpoint of the lake, with three hundred twenty metres of shoreline;
- Land that rises gently from the water and is ninety percent (90%) flat, with the exception of several hundred metres of the north west shore where there are rolling hills;
- Two sizable, unnamed marshes on the extreme west end and a large duck pond on the north central portion that feed the lake. At the east end, Topper Lake flows into Sheldrake through another sizable marsh, and two small, seasonal streams also feed into the lake;
- Thirty cottages, several of which are permanent homes, and one small hunting lodge along the north east shore;
- No public road access to the lake. There is one boat launch at the extreme east end of the lake near the outflow to Skootamatta Lake;
- Fairly constant water levels, with high levels in the spring and low levels from mid-August until the fall rains. The lake flows out to Skootamatta Lake at the extreme east end through a dam built in 1970.
- A Walleye, Bass, and Northern Pike fishery.

Pringle Lake features:

- Eleven point six kilometres (11.6 km) of mainly rocky shoreline, with two small sand beaches. Along most of the shoreline, with the exception of several hundred metres on the southwest shore, the land rises gently from the water's edge.
- Two sizeable marshy areas at the north end and two smaller ones at the south end. More than eighty percent (80%) of the shoreline is Crown Land.
- A small residential population, which includes thirty cottages, two permanent homes, a summer camp (Gesher) and one small lodge (Bridan Cottages).
- No public water access, although Bridan Cottages will allow boat launching from its property for a fee.
- A modest level of sport fishing, although it is rare for more than three boats of anglers to be seen on Pringle Lake at even the busiest of times.
- A relatively constant water level, which is typically highest in the Spring and Fall and declines several inches by mid-August. The lake is spring-fed, and flows out into Wolfe Creek and then to Skootamatta Lake. A large beaver dam located in the marshy area at the North end maintains the level of water in the Lake.

Table 1: Metrics of Skootamatta District Lakes and Their Watershed

Skootamatta Lake	Latitude	44.838°N
	Longitude	77.235°W
	Elevation	288 m
	Surface area	1220 ha (3015 acres)
	Average depth	7m (24 ft)
	Maximum depth	30 m (99 feet)
Sheldrake Lake	Latitude	44.49 N
	Longitude	77.16 W
	Elevation	300 m
	Surface area	185.6 hectares (458.7 acres)
	Average depth	2 m
	Maximum depth	5 m
Pringle Lake	Latitude	44.52º N
	Longitude	77.14º W
	Elevation	320 m
	Surface area	94.7 hectares
	Average depth	5.1 m
	Maximum depth	32 m

Source: Ministry of Natural Resources and Forestry (MNRF)

Current State and Recommendations

Social and Cultural

Boating

Host to over three hundred residences, and covering more than three thousand five hundred acres, the Skootamatta District lakes serve as a source of recreational boating. Many different boat styles, including large horsepower ski boats, pontoon boats, jet skis, sail boats, canoes, kayaks, and other personal watercraft can be seen on the lakes in almost any weather. Boating has been long recognized as a cottaging pastime and is enjoyed by many users on the lake. It is important to recognize that some of these uses may conflict, but adherence to courteous boating practices can mitigate many of these conflicts.

When operating a motorized vessel near non-motorized vessels, it is necessary to leave adequate space to avoid swamping, capsizing, or otherwise putting the non-motorized vessel at risk. Non-motorized vessels have a harder time maneuvering and may not be able to get out of the way of a fast approaching vessel.

The Canada Shipping Act, 2001, includes the laws and regulations regarding boating vessel operation. The *Vessel Operation Restriction Regulations (VORRs)* outlines legal considerations when operating a boating vessel in Canadian waters. For example, Section 2(7) states that, “no person shall operate a power-driven vessel at a speed in excess of 10 km/h within 30m of the shore,” except in cases where a skier is being pulled up or dropped off, or when on a waterway narrower than 30m. Other regulations include:

- Competency of Operators of Pleasure Craft Regulations
- Small Vessel Regulations;
- Collision Regulations; and
- Vessel Pollution and Dangerous Chemicals Regulations.

In Ontario, it is the boat operator’s responsibility to be aware of all laws and regulations regarding vessel operation.

Further considerations for boaters to keep in mind are the environmental impacts of the

activity. These can include shoreline erosion, fuel spills, invasive species introduction, and wildlife disturbance.

The wake created by a boat can be the source of some of these disturbances. Boat wakes can lead to shoreline erosion when excessive speeds are used too close to shore. These wakes can also swamp loon nests, damage boats that are tied off, or endanger swimmers. Being aware of your boat wake can help to mitigate negative impacts.

Additionally, fuel spills, motor leaks, and the release of metals and hydrocarbons from motor operation all have an impact on fresh bodies of water. Asplund (2000), describes that although the impact on water quality may be shown to be minimal, higher elevations of metals and hydrocarbons have been detected in sediment, which is stirred up during motor operation. Sediment that is stirred up may accelerate algae growth and oxygen depletion rates.

The introduction of Invasive species can occur through many aspects of boating activity. When moving a boat from one lake to another, invasive species may be transported on the body of the boat or boat trailer, and deposited into the new lake. With no natural means of control, these invasive species can have a detrimental impact on the water quality and native species of the lake. Fishing with live bait can lead to the introduction of invasive species through lost bait or bait buckets that are dumped into the water at the end of a day of fishing. Under the Ontario Invasive Species Act, 2015, it is illegal to use many invasive species as bait.

Boating is a highly desirable activity in the Skootamatta District and everyone should be entitled to enjoy it , while respecting the environment, and others' enjoyment of the lake. Consideration of the above and other boating etiquette can ensure that recreational activities on the lakes can be enjoyed with minimal conflict.

Fishing

Skootamatta Lake

With over a dozen different species of game fish in the Skootamatta District lakes, fishing is a regular activity on the lakes. Angling has always been a popular and important recreational activity for cottagers and permanent residents on the three lakes. For some, it is their favourite part of the lake experience. The fishery is something that needs to be fostered and protected. Skootamatta, as the larger, deeper lake, has historically supported both a coldwater (e.g. Lake Trout, Whitefish, Cisco) and

warmwater fishery, while Sheldrake and Pringle have contained only warm water species. Sheldrake is exceptionally shallow. It drains into Skootamatta with its water level being maintained by a man-made dam. Pringle is spring-fed and its water level is dependent on a very large and long established beaver dam. Beyond this dam, the lake drains into Wolfe Creek and from there into Skootamatta.

From an angler's point of view, anecdotal reports from long-time fishermen indicate that, overall, fewer walleye are being caught. The shoals, once the preferred locations for walleye fishing, are now seeing increasingly rare catches. Instead, one has to fish in open water where mature walleye are feasting on smelt. Although these fish are larger, the fact that they have a ready and abundant food supply makes them harder to catch. A significant downside is that the eggs and fry of walleye are very vulnerable to the predatory smelt.

Based on the work by Holder (2017), walleye of any age cohort were not captured in either 2016 or 2017 sampling. While the absence of walleye in the sampling does not directly indicate a decline, it certainly raises concerns as to the recruitment of the population. However, both smallmouth and largemouth bass from several age groups were captured, indicating that there are several successful recruitment years in both largemouth and smallmouth bass in Skootamatta.

Sheldrake Lake

Despite its shallowness, Sheldrake seems to have a reasonably robust and sustainable fishery for both walleye and smallmouth bass. Largemouth bass also seem to be well established at this point. It is reported that in recent years, there are fewer catches of walleye in the two to three pound range. On the other hand, a greater number of larger ones are being caught. Northern pike are reportedly not as plentiful, but large ones are still being taken. A representative of the Ministry of Natural Resources (MNR) mentioned that the presence of larger fish is considered to be a healthy indicator of the viability of a species. Rock bass are apparently abundant but sunfish seem to be in decline. It has also been speculated that yellow perch are now gone.

Pringle Lake

Over the last forty years, there have been very few changes on Pringle Lake. The small number of residents has remained relatively constant, and any development on the Lake has been minor in impact. There has been no appreciable change in fishing pressure or boating activity nor has there been any significant loss of fish habitat. Indeed, eighty percent (80%) or more of the shoreline is crown land and remains essentially untouched. On balance, there may be even less shoreline refinement than

there was forty years ago, as some cottage shorelines have been largely returned to nature. Nevertheless, anecdotal reports from experienced fishermen on the lake indicate that there has been a gradual decline in the walleye fishery over the same period. Catches of northern pike, largemouth and smallmouth bass, while perhaps not robust, seem to have remained fairly constant through that time.

Fishing is a popular pastime in the Skootamatta District, and it also has the potential to create conflicts between other recreational users, such as boaters or swimmers. If operating a motorized vessel, leave plenty of distance around fishing boats. If a fishing boat is trolling, be aware that a fishing line may be at quite a distance behind the boat and avoid crossing or cutting the line. As some of the best fish habitat is along the shore, it is common to see fishing boats casting near the shoreline. However, it is important that those who are fishing be aware of where their hooks are being cast. Swimmers may be in the water near docks and waterfront properties, and casting should be avoided near waterfront properties. This is especially important as young children may be harder to see.

The following listing attempts to identify the main species of fish found in the lakes at this time. It is not an exhaustive list and purposely ignores the variety of minnow species which exist there. The list, as well as many of the comments in this section of the Lake Management Plan reflect the results of conversations with experienced and knowledgeable anglers on the three lakes.

Species	Skootamatta	Sheldrake	Pringle
Walleye	Declining	X	X
Northern Pike	X	X	X
Smallmouth Bass	Increasing	X	X
Largemouth Bass	Increasing	X	X
Rock Bass	X	X	X
Yellow Perch	Declining	?	X
Pumpkinseed	Increasing	Declining	?
Bluegills	Declining	No	No

Brown Bullhead	Captured (2017)	Rare	Rare
Lake Trout	No	No	No
Whitefish	Decreasing	No	No
Cisco (Lake Herring)	Decreasing	No	No
Ling (Burbot)	Decreasing	No	Rare
Fallfish	X	No	No
White Sucker	X	No	No
Creek Chub	X	X	?
Rainbow Smelt	X	No	No

Stocking History

As can be seen from the detailed stocking histories in Appendix A, The Ministry of Natural Resources and Forestry authorities began stocking desirable species of fish in Skootamatta and Sheldrake Lakes in the 1920s and in Pringle Lake in the 1930s, in an effort to establish a more varied and robust fish population.

In Skootamatta, while some of the species stocked, including walleye, smallmouth and largemouth bass, are well established, the lake trout appear to have gone, as perhaps have the whitefish. There are still cisco (lake herring) in the lake, but brook trout apparently did not take hold, nor did the atlantic salmon stocked in 1952. In the 2000s stocking was focussed solely on walleye, and was stopped in 2007 after confirming that the walleye population was healthy. There are no current plans to stock any species in Skootamatta.

Walleye were stocked in Sheldrake in 1922 and again in 1984, but unfortunately, this population collapsed. Smallmouth bass were stocked between 1937 and 1949, and largemouth bass were stocked in the 1950s.

Pringle was stocked with smallmouth bass and walleye between 1934 and 1958 and with largemouth bass in the 1950s, all of which are still viable in the lake, even though there has been no stocking of any kind for more than fifty years.

Fishing Regulations

Ontario Fishing Regulations provides rules regarding fishing in Skootamatta District lakes, which is part of the Fisheries Management Zone (FMZ) 18. These limits are set in order to preserve the population of these species, and should be observed by all participants. Most people who want to fish in Ontario must purchase an Outdoors Card and hold a valid fishing licence tag.

Live bait can be used in Ontario, but regulations identify which species are permitted. It is important to note that the transportation of live bait between fishing zones increases the risk of invasive species introduction.

These rules are created, updated or modified based on the most recent science, and are provided to the FMZ 18 advisory council. The FMZ 18 council provides advice during the development of fisheries objectives and strategies. Council members represent a broad range of views including:

- angling groups,
- scientists and researchers,
- conservation groups, and
- interested community members.

The advisory council participates in fisheries management by:

- sharing ideas and expertise with the Ministry of Natural Resources and Forestry;
- helping to develop and implement management strategies; and
- communicating with the local and angling community.

For more information about the Fisheries Management Zone 18 advisory council, please contact Kemptville district office, at 613-258-8303

Zone 18 Catch Limits - 2019

S- Sports License
C- Conservation License
S/C-# is the number of each species you may have in your possession at any one time

<u>Northern Pike</u>
Season: January 1 to March 31 and second Saturday in May to December 31
Limits: S-6 and C-2

<u>Largemouth and Smallmouth Bass combined</u>

Season: third Saturday in June to December 15
Limits: S-6 and C-2

Walleye and Sauger combined
Season: January 1 to March 1 and second Saturday in May to December 31
Limits: S-4 and C-2; must be between 40-50 cm

Yellow Perch
Season: open all year
Limits: S-50 and C-25

Sunfish
Season: open all year
Limits: S-300; only 30 may be greater than 18 cm, and C-15

Noise and Lighting

Excessive noise and/or lighting can impact both wildlife and other residents of the Skootamatta District. Loud music, power tools, or other excessive noises may disturb other residents around the lake. It is important to recognize that sound also travels across water, and even a localized noise source may be heard across the lake. Some noise may also contravene the municipal noise by-law that prohibits most excessive noise at all times, with the exception of construction equipment or combustion engines between 8:00 pm and 7:00 am. There are also limits on the use of fireworks, with the exception of Victoria Day, Canada Day, and Labour Day. Additional exceptions take into account the need for public safety.

The use of outdoor lighting can increase the safety of residents around buildings, on uneven ground, and near the shoreline. It is often used to mark a dock at night, or a pathway. However, special attention needs to be paid to the angle of light fixtures. Large spotlights can be seen across the lake and may, unintentionally, be pointed directly into another building.

Natural Heritage

Fish

Skootamatta Lake has historically been known to support coldwater fishes such as Burbot (*Lota lota)*, Cisco (*Coregonus artedi)*, Lake Trout (*Salvelinus namaycush*), and Lake Whitefish (*Coregonus clupeaformis*); coolwater species including Fallfish (*Semotilus corporalis*), Golden Shiner (*Notemigonus crysoleucas*), and Northern Pike (*Esox Lucius*), Smallmouth Bass (*Micropterus dolomieu*), and Walleye (*Sander vitreus*). It also supports warm-water species including Largemouth Bass (*Micropterus salmoides*) and Pumpkinseed (*Lepomis gibbosus*). Stocking in Skootamatta Lake began in 1923 and continued until 2007 (Holder, 2017). It included numerous attempts at stocking a variety of sportfishes including several of the species in historical records. Species from all three thermal regimes were stocked dissimilarly throughout the eighty-four years. Cold-, cool-, and warm-water guilds of fishes differ in preferred temperatures and performance over different temperature ranges (Magnuson *et al*., 1979). According to Griffin (2010), Skootamatta Lake is considered healthy, with numerous years of stocking, fluctuating seasonal fishing pressures, masked with a growing concern by the community that the diversity of fishes and their populations are changing.

A review of aquatic studies conducted on Skootamatta Lake revealed that five studies had been conducted by the Ontario Ministry of Natural Resources and Forestry: 1971 and 1979 Ontario Ministry of Natural Resources aquatic habitat surveys; 1999 Fall Walleye Index Netting (FWIN); and, two Broad-Scale monitoring (BSM) programs (2010 and 2016).

To determine whether changes in the fish community of Skootamatta Lake is occurring over time, Holder (2017) conducted a replication of the 1979 survey in 2016 and 2017. This allowed for the best possible comparable assessment of the nearshore fish community to what was conducted in 1979. This comparative analysis of fish communities between the historical and contemporary time periods enabled the researcher to determine what, if any, changes occurred to the fish community. The results of this study indicate that the fish community in Skootamatta Lake has changed over time. The shift from cool-water species, to warm-water species suggests that climate change is impacting these deep, cool-water shield lakes. The issue remains as to how to deal with this threat moving forward. Knowing that a transition is taking place will enable fisheries managers to adequately plan for any future mitigation measures. However, due to limited historical studies (1971 and 1979 aquatic habitat surveys) and studies focused on sportfish health (1999 FWIN, 2010, and 2016 BSM) regarding Skootamatta Lake, further studies on the fish and aquatic invertebrate community, along with additional water-quality monitoring, is needed to understand and mitigate the full breadth of changes the lake is undergoing.

A cold-water fishery requires water temperatures below 15°C (below 10°C is optimal) and dissolved oxygen levels of at least 4 mg/l (above 6 mg/l is optimal). The deeper areas of Skootamatta, which traditionally harboured the lake trout and whitefish, still meet these conditions but lake trout are sensitive to stressors such as a loss of habitat, contaminants in the water and, importantly, predation by and competition for food with other species. Cold-water species spawn in shallow water where their eggs and fry are particularly vulnerable to predatory species such as rainbow smelt and rock bass. Theoretically, the cold-water fishery might be regenerated by stocking, but given the massive effort which would be required to support it, this may not be feasible. For cisco and whitefish, such an undertaking would, for example, require that shoreline habitat be restored, preserved and that stringent requirements regarding shoreline development be established and enforced. The Township of Addington Highlands has introduced such a policy, which will be enforced during development applications. However, rainbow trout have shown to benefit greatly from feeding on smelt, and provided that dissolved oxygen is sufficient, could possibly be stocked. The focus for Skootamatta Lake will be invasive species prevention and mitigation.

Wildlife

For most cottagers, the appreciation of nature and viewing or listening to wildlife of various forms is a significant part of their enjoyment of the lake experience. At Skootamatta, Sheldrake, and Pringle Lakes, we are fortunate that we are surrounded by huge, mostly undeveloped areas of woodland and wetlands, including Bon Echo Provincial Park, which provide habitat for an abundance of wildlife. Nevertheless, we cannot simply take the presence of land-based wildlife(mammals, birds, reptiles and amphibians) for granted, because, as in the case of the fishery, wildlife species are very sensitive to their habitat. The more their habitat is disrupted, altered, or removed, through development, unsustainable logging, invasive species, or other human activities, the more the wildlife population will suffer. Clearly, all of us who have cottages or permanent homes on the lakes have a stewardship responsibility to maintain and protect wildlife habitat, and to be vigilant for any activities of others which may endanger this aspect of the lake environment.

To detail a complete list of the species of wildlife which are resident or regular visitors in the Skootamatta district would be an extremely daunting task.. Appendix B is a partial inventory of those species.

Historically, the Five-lined Skink (*Plestiodon fasciatus*) was known to frequent rock

outcroppings around Skootamatta Lake. Over the past thirty years, sightings have declined to the point that a species sighting is considered rare. The flipping of rocks (by humans or black bears) and removal of rocks for landscaping take away important skink habitat (MECP, 2019). The use of all-terrain vehicles (ATVs) off of designated trails are also known to cause significant damage to the Skink habitat. Currently, the Canadian Southern Shield population is designated as “Special Concern.” This means the species lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats.

The presence of wildlife is a feature of the lake experience that is highly valued by residents and visitors. Given the sensitivity of our wildlife populations to their environment, and the ever-increasing pressures on their habitat, we cannot take for granted that those populations will always be with us and our successors unless action is taken to protect and preserve their habitat.

Water Quality

Water quality testing was conducted as part of the Aquatic Habitat Inventory by the Ontario Ministry of Natural Resources and Forestry. Skootamatta Lake was sampled in 1971, concluding that the water quality was indicative of a healthy oligotrophic lake (OMNRF, 1971). In 1979, another Aquatic Habitat Inventory was conducted with the emphasis on water quality only. Consistent with the 1974 data, Skootamatta Lake continues to be stable and healthy with little variation from the 1974 data (OMNRF 1979).

While water chemistry and geographic parameters indicate Skootamatta Lake as oligotrophic, the average secchi disk depth was 3.4 metres (MNR, FWIN, 1999). Secchi disk depths indicate how much organic material is suspended in the water and influence the clarity of the water. The 3.4 metre depth is indicative of a higher productive lake (more aquatic plant life), which raises concerns that anthropogenic sources of nutrient input are occurring; sources such as environmental pollutants from human activity. In 2003-2004, Quinte Conservation and the Lake Partner Program conducted total phosphorus and secchi disk depth reports. The reports indicated that the average total phosphorus for Skootamatta Lake was 8.6-9.2µg/L and a secchi disk depth of 3-3.4m (Quinte Conservation 2008). This is consistent with earlier water quality reports and signifies that over the past few decades, the water quality has been stable. Average total phosphorus was 8.9µg/L; consistent with a higher productive oligotrophic lake (Quinte Conservation 2008). This indicates that the lake is healthy, and provides a

stable aquatic ecosystem.

In 2013, the Skootamatta District Ratepayers Association conducted water quality testing at ten locations around Skootamatta Lake (See Appendix C). The average results confirmed a small rise in total phosphorus (<10.0µg/L), with a high concentration of 80µg/L in Oborne Back Bay, which is an indication of anthropogenic (human) sources of nutrients. These sources include degraded septics, use of fertilizers, and degradation of property shorelines (excessive construction, re-grading, removal of trees and shrubs). *E. coli* was also noted as having a concentration of 5cfu/100ml in Sheldrake Bay (SDRA 2014). The remaining locations either tested negative or were not tested.

In 2015, the SDRA completed additional water quality tests, mimicking the 2013 water testing methodology. An increase in nitrogen concentrations was noted at all testing sites, which emphasizes the need to ensure septic systems are not leaking, and that fertilizers are not being used on waterfront property.

In 2017, the SDRA conducted additional tests similar to those completed in 1974. A decrease in calcium levels between 2013-2017 has been noted, but the variation is considered insignificant. It is important to note that calcium levels are well below the acceptable threshold for zebra mussel development and survival (Cohen and Weinstein 2001).

Invasive Species

Introduced species are frequently cited as the greatest threat to native aquatic biodiversity in North America along with habitat degradation and loss (Crossman, 1984; Fuller, *et al.*, 1999; Jelks, *et al*., 2008; Lynch *et al*., 2016). While Skootamatta Lake remains a healthy lake from a water quality standard, there has been an increasing concern regarding the presence of Rainbow Smelt within the waterbody. It is unknown when Rainbow Smelt were introduced into Skootamatta Lake. It is expected that this introduction occurred in the 1960s when angling pressure began to increase on the lake. In Ontario, the Rainbow Smelt is native only to a few lakes in the Ottawa Valley (Holm *et al.* 2010). According to Holm *et al*. (2010), Rainbow Smelt has been spread throughout Ontario and beyond, largely through bait buckets and subsequent dispersal. Since Skootamatta Lake lacks any substantial development near or along its source, the introduction of rainbow smelt would likely fall towards the deliberate or accidental introduction through bait buckets.

While invasive Rainbow Smelt (*Osmerus mordax*) are caught annually in Skootamatta

during the early spring spawning, there is little evidence to suggest that it has contributed to a change in the nearshore fish community. The species most often affected are cold-water and cool-water species with similar niches (Evans and Loftus, 1987), such as Walleye, Whitefish, and Cisco. Further study is needed to assess the impact of Rainbow Smelt in Skootamatta, along with their presence/absence in Sheldrake and Pringle Lakes.

Rainbow smelt may also affect piscivorous (fish eating) fish populations through consumption of juvenile fishes, larva, and eggs of species that feed on Rainbow Smelt later in their development (Evans and Loftus 1987). This may lead to recruitment failure in fish species that Rainbow Smelt were introduced to feed (cited in Rooney and Paterson, 2009). Mercado-Silva *et al.* (2007) attributed declines in Walleye recruitment in twelve small Wisconsin lakes to predation and/or competition with Rainbow Smelt. According to Hrabik (1998), predation effects by Rainbow Smelt include recruitment reductions, population declines, and potentially the extirpation of the native species. Spatial overlap between Rainbow Smelt and native fishes, with a body diameter smaller than the gape of adult Rainbow Smelt, will likely result in predation effects by Rainbow Smelt on the native fishes.

In the most recent broad-scale fisheries monitoring study, smallmouth bass represented forty-seven percent (47%) of all species caught in the large-mesh gillnets, Rock Bass represented thirty percent (30%) and Pumpkinseed represented five percent (5%) (OMNRF 2015). According to Evans and Loftus (1987), there is very high frequency of Smallmouth Bass (73.3%) in lakes inhabited by Rainbow Smelt. Pumpkinseed, Rock Bass, and several cyprinids also have a higher occurrence with the introduction of Rainbow Smelt. Rainbow Smelt are utilized as food by virtually all cohabiting piscivores, including larger smelt (Evans and Loftus 1987). Burbot feed heavily on Rainbow Smelt, especially in spring, as do Walleye and Northern Pike (Evans and Loftus, 1987). Evidence of competition has been largely circumstantial and has consisted of information on habitat and diet overlaps and of changes in growth, survival, and abundance of species associated with Rainbow Smelt (Evans and Loftus 1987). Competition between young piscivores and adult Rainbow Smelt for food resources and the predation of Rainbow Smelt on their eggs and larvae may offset any improvements to recruitment, adult growth rates, and condition factors achieved by introducing Rainbow Smelt as forage fishes (Rooney and Paterson 2009).

The current information suggests that there is a causal impact of Rainbow Smelt through predation on juvenile fishes, larva and eggs; as well as providing an additional resource of prey for piscivorous fishes. This would additionally lead to a change in food

availability in prey species, increasing competition. Further study is needed on the distribution of piscivorous fishes, along with population dynamics of the prey species within Skootamatta Lake.

Species at Risk

In 2013, the Department of Fisheries and Oceans (DFO) developed a recovery strategy for the Channel Darter (*Percina copelandi*). According to DFO 2013, a discrete viable population of Channel Darter was discovered in the Skootamatta River and connected river bodies (Moira, Black, and Salmon Rivers). The Channel Darter has been designated as Threatened in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and is listed on Schedule 1 of the federal Species at Risk Act (DFO 2013). The Moira, Black, Skootamatta, and Salmon Rivers are all fragmented by human-made structures and, although Channel Darter was found both upstream and downstream of the barriers, it is possible that the species had a wider historical distribution (cited in DFO 2013). While the Channel Darter has not been confirmed within Skootamatta Lake itself, the only outlet is through the Skootamatta Lake dam, into Skootamatta River. This places a greater emphasis on ensuring the water quality entering the Skootamatta River is healthy and stable.

Snapping turtles, peregrine falcons, bald eagles, and many other species at risk have been seen in the Skootamatta District. Habitat degradation, hunting, vehicular impacts, and other human activities, may all contribute to declining populations.

Shoreline Vegetation

Native vegetation is an important contributor to shoreline stability, reducing erosion from boat wakes and wind. Plants that grow near the shore also help to reduce runoff from manicured properties that may otherwise deposit fertilizers in the water, encouraging the growth of algae and weeds. Some wildlife depend on shoreline vegetation for habitat. Snakes, frogs, fishers, and other wildlife can often be seen along the shore, between plants.

Owners of shoreline properties that do not own the waterfront road allowance (sixty-six feet from the high water mark) are prohibited from removing aquatic vegetation under the Public Lands Act, 1990, unless specific methods are followed.

Physical

Forestry

Forestry operations in the Skootamatta District are conducted by Mazinaw-Lanark Forest Inc (MLFI). The company's annual work plan is posted to the Ministry of Natural Resources and Forestry website and details the areas of planned work and type of forestry activity. The SDRA maintains ongoing conversations with the MLFI to ensure our members are kept up-to-date on planned forestry operations.

Submerged Obstacles

While operating powered boats within local lakes, it is important to be aware of submerged obstacles, such as rocks, logs, or tree stumps. Although some obstacles are voluntarily marked by residents, the SDRA takes no responsibility for this practice and it should be assumed that not all obstacles will be marked.

Dam and Water Levels

The Skootamatta Dam is operated by the Quinte Conservation Authority and is used to control the level and flow of water downstream, impacting residents in connected water systems. Consequently, adjustments to the dam impacts water levels in Skootamatta Lake. Between 2016 and 2017, Skootamatta Lake experienced both extremely high and extremely low water levels: Minimal snow accumulation and a dry spring resulted in low spring water levels in 2016. In addition, the dam was used to maintain adequate water levels in downstream communities. The summer of 2016 was also quite dry. These factors contributed to some of the lowest water levels we had seen in a long time. Submerged rocks were more visible, aquatic vegetation seemed to thrive along the shores, and water temperatures were noticeably warmer. The summer of 2017 appeared to be a mirror-opposite of the previous year. Substantial snowfall in the winter, coupled with a wet spring, resulted in extremely high spring water levels. With periods of extensive rainfall throughout the summer, the downstream system maintained adequate water levels, meaning the dam was not needed to increase water access. This resulted in water levels remaining high through much of the summer; surface rocks were submerged, aquatic vegetation was less abundant, and the lake remained cooler than in the previous year.

Between 2017 and 2018, the dam underwent significant construction to replace the stop logs and the gantry system that is used to lift and lower logs. In addition, a remote monitoring system is being investigated to allow for the monitoring of water levels on a regular basis.

Past Actions

Water Testing

In 1971, the Ontario Ministry of Natural Resources (MNR) conducted an extensive review of the health of Skootamatta Lake. Water testing, fishery assessment, and general attributes were some of the things that the MNR reviewed. More recently, the SDRA has conducted water quality tests in 2013, 2015, and 2017. The 2017 test was completed by referencing the 1971 report and testing for the same chemicals and minerals. The intention was to give a clear picture of lake health over the past 45+ years.

The table in Appendix C details the average levels for a variety of factors. There are some important details to note when reviewing the data.

Total Alkalinity: This is the ability of the lake to resist fluctuations in pH levels. Lower levels are a result of lower concentrations of chemicals, such as calcium.

pH: This is presented as a scale where a value of 7 is neutral; less than 7 is more acidic while greater than 7 is more basic. An ideal pH level for lake water is between 6.5-8.0.

Conductivity: This is the ability of water to conduct an electric charge. Lower concentrations in minerals, such as calcium and iron, reduce this value. Sudden increases or decreases in conductivity could indicate pollution (https://www.fondriest.com/environmental-measurements/parameters/water-quality/conductivity-salinity-tds/)

Hardness: Water hardness is directly related to the mineral concentrations.

Calcium: Calcium concentrations have been declining, which is evident with other declining factors. This could be due to climate change as well as an increase in raw

sewage from faulty septic systems. Regular testing of septic systems should be undertaken to ensure effective operation, appropriate sizing, and that there are no cracks or leaks from the holding tanks that may end up leaching septic waste into the lake.

E. Coli: This bacteria can directly impact the health of those who ingest lake water, either through drinking or accidentally while swimming. Safe levels of E. Coli are below 100 cfu/100mL. The increase in 2017 was a direct result of 1 of the 10 samples, which was from Wolf Creek, measured at 22 cfu/100mL. This particular sample does not conform to previous test results and may have been due to increased sediment disturbance by passing boats. Additional testing will be undertaken in 2019 and particular attention will be paid to quality of water samples.

Aquatic Habitat Research

A review of aquatic studies conducted on Skootamatta Lake revealed that five studies have been conducted by the Ontario Ministry of Natural Resources and Forestry: 1971 and 1979 Ontario Ministry of Natural Resources aquatic habitat surveys; 1999 Fall Walleye Index Netting (FWIN); and, two Broad-Scale monitoring (BSM) programs (2010 and 2016). Additional sampling was conducted in the Littoral zone by Anders Holder in 2016 and 2017. Both sampling periods replicated the historical sites (4) to obtain habitat conformity, while adding an additional 8 sites to improve the rigor and reduce the sampling bias at each site.

Current Fishes found in Skootamatta Lake (2010- Present)

Family	**Species**	**Common Name**
Catostomidae	*Catostomus commersoni*	White Sucker
Centrachidae	*Lepomis gibbosus*	Pumpkinseed
	Micropterus dolomieu	Smallmouth Bass
	Micropterus salmoides	Largemouth Bass
	Ambloplites rupestris	Rock Bass
Cottidae	*Cottus cognatus*	Slimy Sculpin

	Cottus bairdii	Mottled Sculpin
Cyprinidae	*Semotilus corporalis*	Fallfish
	Semotilus atromaculatus	Creek Chub
	Hybognathus hankinsoni	Brassy Minnow
	Pimephales notatus	Bluntnose Minnow
	Pimephales promelas	Fathead Minnow
	Notemigonus crysoleucas	Golden Shiner
	Notropis heterolepis	Blacknose Shiner
	Chrosomus neogaeus	Finescale Dace
	Chrosomus eos	N. Red Belly Dace
	Margariscus nachtiebi	N. Pearl Dace
	Nocomis biguttatus	Hornyhead Chub
Esocidae	*Esox lucius*	Northern Pike
Fundulidae	*Fundulus diaphanus*	Banded Killifish
Ictaluridae	*Ameiurus nebulosus*	Brown Bullhead
Osmeridae	*Osmerus mordax*	Rainbow Smelt
Percidae	*Perca flavescens*	Yellow Perch
	Sander vitreus	Walleye
	Etheostoma exile	Iowa Darter
Umrbidae	*Umbra limi*	Central Mudminnow

Next Steps

While past work and actions provide a good basis to work from, next steps are vitally

important to provide direction for maintaining or improving the health of the lake and surrounding ecosystem. The following actions are recommended:

1. That property owners and residents on the lakes be encouraged to be mindful of the need to protect the natural habitat on their properties and adjacent Crown Land and, where possible, take action to restore habitat, notably shoreline vegetation, to its natural state.

2. That an information package be developed to inform all property owners of best management practices to preserve and maintain natural habitat.

3. That a plan be developed to identify and protect nesting sites on and around the lakes.

4. That special care be taken to preserve and avoid disturbance to the nesting areas of any species known to be “at risk.”

5. That an ongoing liaison be maintained with authorities at all government levels to ensure that the SDRA is made aware of any proposed development or other actions which may result in the destruction of any natural habitat, in order that such proposals may be carefully scrutinized in advance.

Conclusion

As mentioned, the key theme of the LMP is the health of our lakes, with the goal of keeping the lakes in a state that leaves them in good shape for future generations. Keeping this in mind, as the lake communities grow and change, this document is designed to grow and change as well, to reflect the current needs and priorities.

We recognize that there are informational gaps as it would be impossible to include all aspects of the lake community. We strive to include information that is both relevant to the lake health and of interest to residents and cottagers.

Suggestions are welcome, as the LMP relies on the contribution of subject matter experts and historical knowledge. The LMP is a community document that will be more effective with contributions from the community.

We thank those that have contributed over the years to the document, in its current

form, and look forward to the updates that will follow in the years to come.

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Appendix A - Stocking History

Skootamatta Lake			Pringle Lake			Sheldrake Lake		
Year	Species	# Stocked	Year	Species	# Stocked	Year	Species	# Stocked
1923	Walleye	100,000	1934	S. Bass	5,000	1922	Walleye	50,000
1937	S. Bass	5,000	1937	S. Bass	1,000	1937	S. Bass	500
1942	L. Trout	20,000	1939	S. Bass	5,000	1948	S. Bass	5,000
1942	Walleye	500,000	1939	Walleye	200,000	1949	S. Bass	2,000
1943	S. Bass	1,000	1940	S. Bass	5,000	1950	L. Bass	1,000
1943	L. Trout	5,000	1940	Walleye	200,000	1950	S. Bass	8,000
1943	Walleye	500,000	1941	S. Bass	1,000	1951	L. Bass	5,000
1944	S. Bass	1,000	1941	Walleye	250,000	1952	L. Bass	500
1944	L. Trout	5,000	1942	S. Bass	10,000	1953	L. Bass	2,000
1946	L. Trout	850	1943	S. Bass	1,000	1954	L. Bass	400
1946	S. Bass	500	1943	Walleye	100,000	1955	L. Bass	7,500
1946	Walleye	500,000	1946	S. Bass	150	1958	L. Bass	8,000
1947	B. Trout	800	1946	Walleye	150,000	1984	Walleye	100,000
1947	L. Trout	1,000	1947	S. Bass	750			
1947	L. Trout	2,000	1947	Walleye	100,000			
1947	S. Bass	750	1948	S. Bass	3,000			
1947	Walleye	500,000	1948	Walleye	200,000			
1948	L. Trout	2,000	1949	S. Bass	60			
1948	S. Bass	5,000	1950	S. Bass	5,000			
1948	Walleye	400,000	1950	Walleye	100,000			
1948	B. Trout	6,000	1950	L. Bass	1,000			

1949	L. Trout	1,000	1951	L. Bass	5,000			
1949	L. Trout	1,000	1951	S. Bass	5,000			
1949	Walleye	500,000	1951	Walleye	80,000			
1949	S. Bass	3,000	1952	S. Bass	117			
1949	B. Trout	900	1952	Walleye	100,000			
1950	L. Trout	1,000	1952	L. Bass	500			
1950	S. Bass	5,000	1953	L. Bass	3,000			
1950	Walleye	300,000	1953	S. Bass	1,000			
1950	B. Trout	800	1953	Walleye	500,000			
1951	L. Bass	5,000	1954	L. Bass	800			
1951	S. Bass	5,000	1954	S. Bass	750			
1951	L. Trout	2,000	1954	Walleye	500,000			
1951	Walleye	100,000	1955	L. Bass	7,500			
1952	A. Salmon	4,000	1955	S. Bass	255			
1952	L. Trout	1,000	1958	S. Bass	6,000			
1952	L. Bass	500	1958	L. Bass	8,000			
1952	L. Bass	400	1959	L. Bass	4,000			
1952	S. Bass	100						
1952	Walleye	200,000						
1953	L. Trout	5,000						
1953	L. Bass	3,000						
1953	S. Bass	900						
1953	S. Bass	1,000						
1953	Walleye	1,000,000						
1954	L. Trout	500						
1954	L. Bass	800						

1954	S. Bass	1,250						
1954	Walleye	1,000,000						
1955	L. Trout	1,000						
1955	L. Bass	7,500						
1955	S. Bass	2,000						
1956	S. Bass	350						
1956	B. Trout	1,000						
1956	L. Trout	5,000						
1959	B. Trout	1,00						
1959	Cisco	355,916						
1959	Whitefish	666,667						
1960	Whitefish	773,000						
1984	Walleye	200,000						
1989	Walleye	45,000						
1998	Walleye	250,000						
1999	Walleye	235,000						
1999	Walleye	100,000						
2007	Walleye	250,000						

Appendix B - Wildlife

Birds	Mammals	Reptiles	Amphibians
Common Loon	White-Tailed Deer	Painted Turtles	Spring Peeper
Great Blue Heron	Moose	Common Snapping Turtle	Northern Leopard Frog
Osprey	Black Bear	Blandings Turtle	Grey Tree Frog
Canada Goose	Red Fox	Eastern Garter Snake	Green Frog
Duck	Coyote	Northern Water Snake	Bullfrog
Woodpecker	Grey Wolf	Eastern Milk Snake	American Toad
Turkey Vulture	Lynx		Spotted Salamander
Wild Turkey	Cougar		
Partridge	Northern River Otter		
Owl	Beaver		
Blue Jay	Raccoon		
Ruby-Throated Hummingbird	Muskrat		
Black-Capped Chickadee	Fisher		
Nuthatch	Porcupine		
Swallow	Mink		
Finch	Weasel		
Common Grackle	Elk		
Red-Winged Blackbird	Groundhog		
Bald Eagle	Squirrel		
Hawk	Chipmunk		
Rose-Breasted Grosbeak	Eastern Cottontail		
Cedar Waxwing	Mice		
Sparrow	Vole		

Purple Martin	Shrew		
Scarlet Tanager	Bat		
Whip-Poor-Will			
Boblink			
Eastern Phoebe			
Eastern Pewee			
Grey Catbird			
Pine Siskin			
Robin			
Cowbird			
Starling			
Mourning Dove			
Dark-Eyed Junco			
Sandpiper			

Appendix C - Water Quality Tests

		1974	2009 Average	2011 Average	2013 Average	2015 Average	2017 Average
Analysis	**Units**						
Temperature Upon Receipt	°C						20.00
Alkalinity	mg/L as CaCO3	13.00					10.60
pH	units	7.00					7.26
Conductivity	µS/cm	53.00					37.10
Total Kjeldahl Nitrogen	as N mg/L	0.35	0.39	0.29	0.30	0.51	0.50
Ammonia+Ammonium (N)	as N mg/L	0.01			0.03	0.01	0.10
Chloride	mg/L	0.60					1.00
Hardness	mg/L as CaCO3	20.00			17.77	16.88	16.05
Calcium (total)	mg/L				5.47	5.16	4.94
Iron (total)	mg/L	0.30					0.08
Potassium (total)	mg/L	1.10					0.61
Sodium (total)	mg/L	1.10					0.97
Phosphorus (total)	mg/L	0.02	0.01	0.10	0.02	0.02	0.01
E. Coli	cfu/100mL		1.00	22.40	0.56	0.33	2.00