Kashwakamak Lake

"The Lake with Rocky Shoals"

State of the Lake Report

July 2013

Step One – Kashwakamak Lake Sustainability Plan

Kashwakamak Lake

State of the Lake Report Summary - July 2013

Why Develop a Lake Sustainability Plan?

A lake sustainability plan is important for the lake community. Other lakes have done this due to significant issues on their lake. The Kashwakamak Lake Association (KLA) is doing this to be proactive before a potential large issue develops. Having a plan will help to ensure future generations can continue to enjoy what we have in this special place.

Working through this process as a community is a way to educate and provide stewardship for what we value. Also, part of the planning process is to create a "state of the lake" assessment, which will be a way to measure change in the future.

There are several benefits to lake sustainability planning. This process promotes discussion and action with all community members to:

- **Identify and protect specific lake values**
- **Identify issues and impacts**
- **Set a future vision for the lake**

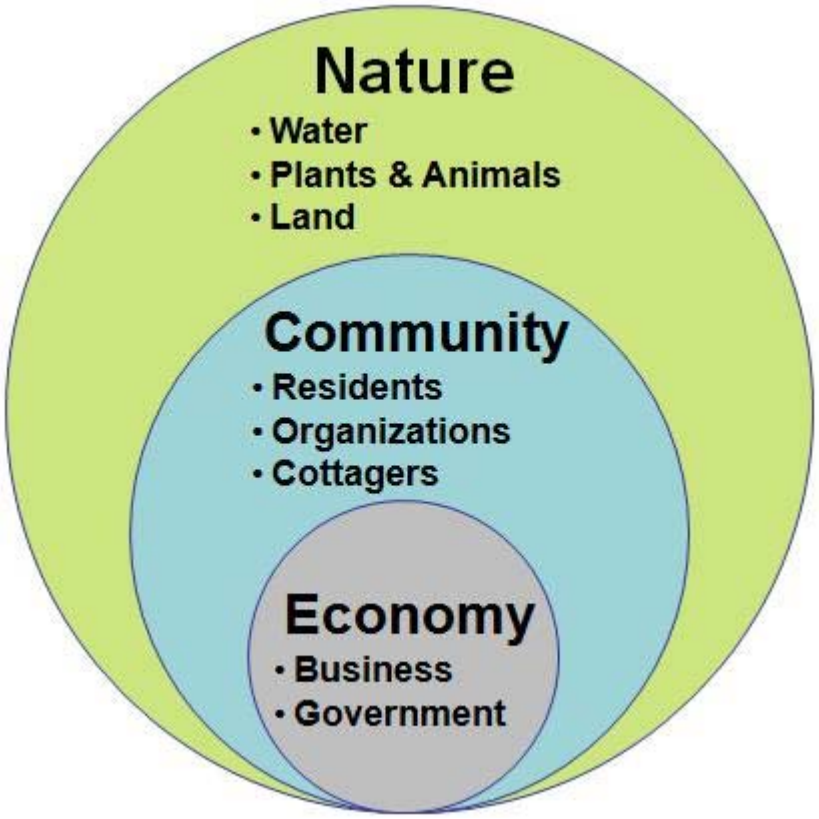
Lake Sustainability

Sustainability is defined in a way that ***future generations*** *have access to the same* ***opportunities*** *and* ***quality of life*** *that we do*. It's also described as a balancing act - one where nature, the community, and economy all work together. To explain this, let's look at the typical history of how lake communities were built.

Many years ago, when Canada was being settled, the natural environment provided resources where businesses began operations such as forestry or mining. As those businesses matured, a small community would develop close to the businesses, and the businesses supported the community through jobs. This was the start of a local economy. In Ontario, people began to discover recreation on lakes near these new communities. At first, lodges were the pioneers of lake recreation, offering accommodations, fishing, and relaxation. Later, people began purchasing land on the shoreline of the lake and built cabins to stay in. As this became more common, cottaging became the common term used to describe a seasonal residence on a lake.

Today, some people have permanent homes on and around lakes. The combination of seasonal and permanent residences make up what is commonly referred to as a "Lake Community".

The easiest way to describe the scope of sustainability is using the Nested Sustainability Model. This diagram illustrates that an economy can't exist without people (in society) or our planet (environment). For example, a business can't create a product without people and/or natural resources. This model also recognizes that society can't exist without the environment we live in on Earth. Sustainability is about balancing economic activity with the impacts on society (employees and the community) and the environment. For more details, see Sustainability Models by Bob Willard (an ISSP Instructor).



⇒ *An economy can only exist within a community*

⇒ *A community can only exist in a natural environment*

⇒ *There is an important dependency to keep in balance*

Lake Sustainability Planning Process

The planning process includes a broad group of people from the community, including permanent residents, businesses, cottagers, local government, community organizations, conservation authority, and visitors.

The planning process can take three to five years to complete. There are four phases in the process. The first step is the research phase, which begins with community surveys and research for background information about the lake. The phase finishes with completing a "state of the lake" report to publish the research findings for the community.

The second phase is to perform analysis based on the state of the lake report. The purpose of this phase is to engage the community again by discussing observations from the report to establish a direction for the lake sustainability plan. Once that is complete, the committee will draw up a draft lake sustainability plan and publish it for review and feedback. When the draft report has been updated with further input from the community, it will be published in final form.

Once the plan is complete, it represents a shared vision for the lake community. It will be implemented with a broad group of volunteers and active community engagement. This can be an exciting time for the community to rally to invest in our common future. The lake sustainability plan will be updated every five years to keep it current with the changing needs of the community.

Where we are

In 2010, a presentation about lake planning was given to members of the Kashwakamak Lake Association. It explained the process where a lake community comes together to share what they value as well as their concerns. This is done in an effort to develop a plan for the sustainability of the lake.

Following this meeting, the KLA decided to embark on the development of a Lake Sustainability Plan and established a Lake Planning Committee to start the process. The committee members represent those interested and impacted by the lake. It is made up of people who have or use cottages on the lake, commercial operators, town council and the Mississippi Valley Conservation Authority. This initiative was voted on and formally approved at the Annual General Meeting in 2011 with the expectation that there would be extensive research, community input and continuous consultation. The committee then began its research phase which included a survey sent to the Kashwakamak Lake community as well as a separate business survey. Survey results were then shared at the 2012 AGM and public discussion and input was sought.

The survey was completed by 170 individuals (**See Appendix 1: Survey Results**).

The **Values** most identified (weighted score) by the community respondents:

- Clean, clear water (503)
- Peace and Tranquility (460)
- Recreational Enjoyment (455)
- Appreciation of Wildlife, Birds, etc. (446)
- Retention of Crown Land (428)
- Night skies (419)
- Natural Shorelines (412)
- Cottage Safety/Property Security (401)
- Landscapes (391)
- "Cottage Country" Characteristics (334)

The **Use of Lake** identified by the 170 respondents

- Swimming (95%)
- Reading (87%)
- Boating (85%)
- Nature appreciation (77%)
- Canoeing (75%)
- Walking/hiking (74%)
- Fishing (74%)
- Kayaking (52%)
- Water skiing (47%)
- Ice skating (25%)

The **Issues/Concerns** (weighted score) Identified by the respondents:

- Personal Water Craft (498)
- Boat Traffic (459)
- Fish Depletion (383)
- Weeds/Algae (379)
- Daytime Noise (372)
- Water Levels (357)
- Residential/Commercial Development (349)
- Water Pollution (332)
- Night time Noise (311)
- Tree and Vegetation Removal (308)

There were also 30 businesses surveyed by telephone interview. The respondents reported that the success of their businesses was dependent upon maintaining or growing the number of customers, and therefore, the health and vitality of the lake community was important for their business survival.

Following the surveys and information gathering stage, a State of the Lake Report would then be prepared for discussion at the 2013 AGM. This would then be followed by the community developing recommendations to protect the things residents valued and wished to preserve for future generations.

Photo Millie King

Kashwakamak Lake

Watershed at a Glance

Kashwakamak Lake Watershed:

- Kashwakamak Lake drains an area of 417 square kilometers.
- The lake is essentially a widening of the Mississippi River, this is why it is also known as Long Lake.
- There is a dam located at the outlet of the lake on the Mississippi River.
- The watershed includes the Bon Echo Provincial Park, upstream on Mazinaw Lake.
- There are several small wetlands around the perimeter of the lake.
- Land is mostly forest covered, as it is poor agricultural land.

Kashwakamak Lake:

- Kashwakamak Lake is at an elevation of 261 m above sea level.
- The perimeter is approximately 66 km long.
- The mean depth is 8 metres, and the deepest point is 22 metres.
- The shoreline is dominated by numerous inlets and shallow bays.
- The lake has a surface area of 1191 hectares.
- There are approximately 530 properties around the lake, and approximately 450 residential structures and 4 resorts/marinas.

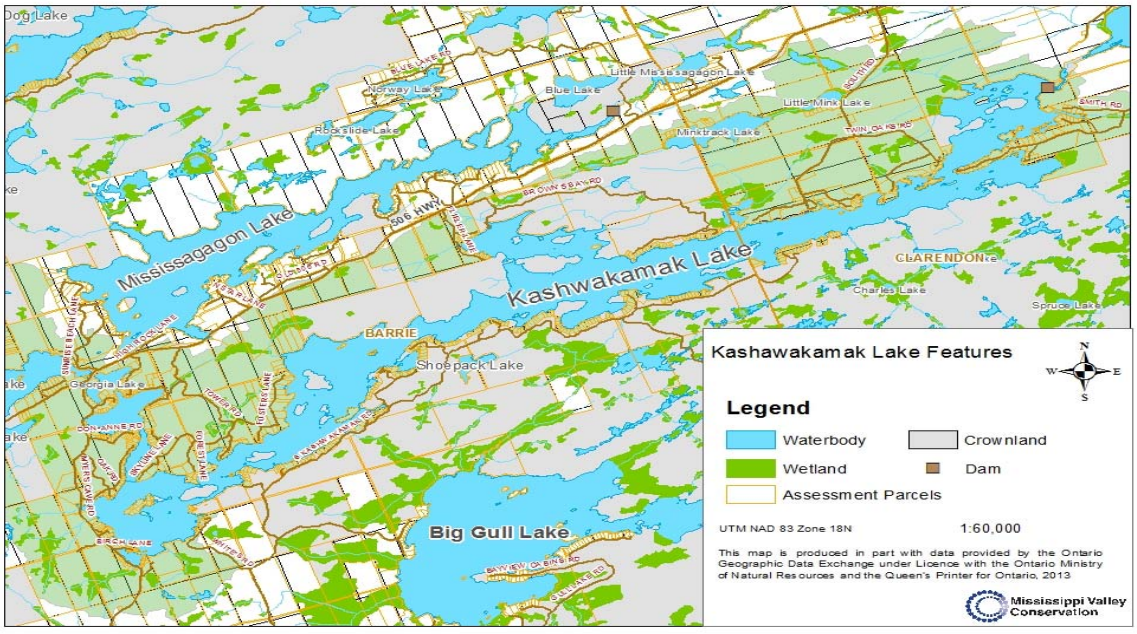
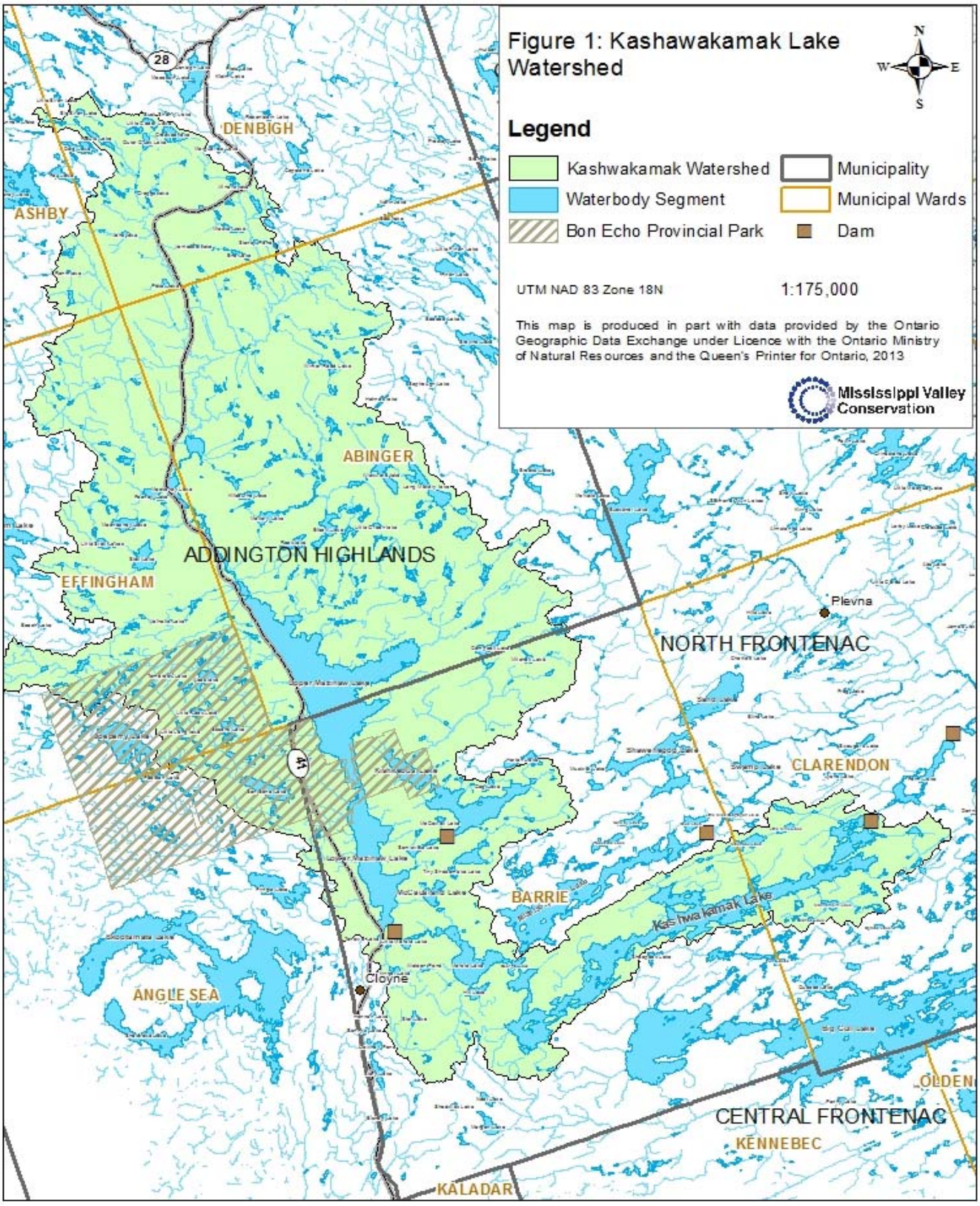


FIGURE 1: KASHWAKAMAK LAKE WATERSHED



Overview of Priorities Identified by the Lake Community

Surface Water Quality

- Water sampling shows that the lake has low to moderate nutrient levels (total phosphorus), fluctuating between Mesotrophic and Oligotrophic status.
- Dissolved oxygen and temperature profiles for the lake show that by mid-July the bottom waters of the lake become oxygen deficient; this reduces habitat and survivability for aquatic life.
- pH levels are consistently above 7.0 and within the Provincial Water Quality Objective range of 6.5 to 8.5.
- In 2008, sampling of the lake for invasive species found that Zebra Mussel larvae were not detected, however Spiny Water Flea were detected.
- The concentration of nutrients in the water, water temperature and the amount of light can all influence the type and the amount of algae and aquatic plant growth in the lake.

Aquatic Vegetation

- There is no specific research or documentation of weed growth in Kashwakamak Lake; however it has been observed that there has been noticeable increase in weed growth in the past 10 years.
- Filamentous algae is a common and troublesome aquatic weed that forms dense, hair-like mats near shore bottom sediments or submerged objects in lakes with good transparency where light reaches the bottom.
- Excessive nutrient loading (phosphorus and nitrogen) can result from man-made sources such as lawn fertilizers, faulty septic systems, soil erosion and phosphorus-rich detergents.

Water Levels

- The lakes' water levels are influenced by the Kashwakamak Lake dam that is located at the outlet.
- The dam is operated by Mississippi Valley Conservation.
- In the spring, the dam is operated to gradually bring lake levels up to summer requirements.
- Summer water levels are targeted before the start of the walleye spawn to protect a prime spawning shoal located at the head of the lake at Whitefish Rapids.

- Lake levels are targeted between 261.00 m and 261.20 m above sea level throughout the summer months, with a minimal flow being passed to keep water in the downstream channel.

- Fall drawdown begins after Thanksgiving weekend to reach the minimum lake level to 259.60 m above sea level.

- Over 53 years of records the annual maximum water levels have showed a relatively constant level, averaging 261.22 meters above sea level.

Development Pressures

- Kashwakamak Lake is fortunate to have large tracts of Crown Land along much of its shoreline. It is estimated that 35% of the lands fronting onto the lake are Crown.

- The Township of North Frontenac manages 19 established campsites on the Crown Land around Kashwakamak Lake.

- There are approximately 530 properties on the lake and there are approximately 450 cottages or homes, as well as 4 lodges/ marinas.

- To date there are no large scale residential developments, such as a subdivision or condominium type development on the lake.

- As development and population increase within the watershed, the water quality and overall health of the lake may be affected.

Fisheries

- Kashwakamak Lake boasts a diverse fish community including walleye, northern pike, largemouth bass and panfish populations.

- The weedy inlets and bays of Kashwakamak Lake are ideal habitat for cool water and warm water fish species that dominate Kashwakamak Lake.

- The fish community in the lake is managed and evaluated by the Ministry of Natural Resources.

- The most recent fisheries assessment was in 2000 and the lake fishery was classified as a “stressed or unstable” walleye fishery.

- There are several stressors on walleye populations in the region that may account for low relative abundance including: high harvest rates, shoreline development and alterations, decreased water quality, invasive species introductions, excessive water level fluctuations and changes in fish community structure.

Wildlife

- Kashwakamak Lake falls in the northern portion of the mixed wood plains ecozone.
- The lake lies just north of one of the world's "Areas of Natural Science Interest" containing many of Southern and Northern Ontario's wildlife and fauna.
- Limited deforestation in addition to large tracts of Crown Land help support a diverse ecological area surrounding Kashwakamak Lake.
- The unspoiled habitat supports various endangered and threatened species such as Golden Eagle, Bald Eagle, Henslow Sparrow, Blanding's Turtle and Least Bittern. There are also a number of rare species supported in North Frontenac Township such as Prairie Warbler, Drooping Blue Grass, Limestone Oak Fern and Rams Head Lady's Slipper.

Photo Jeremy Pottle

- Warming climates and the restoration of some extinct species has meant a changing ecosystem. Many species that were not present in the past have taken residency creating a more diverse wildlife profile.

Impacts of Boating

- Shoreline erosion is a common and natural process that many waterfront properties encounter. The various causes of shoreline erosion all have the same outcome: a loss of valuable waterfront property that can result in unsafe shorelines and deterioration of the natural shoreline environment.
- Boat wakes can cause shoreline erosion, disturb aquatic ecosystems, swamp the nests of loons and other waterfowl, damage docks and boats, upset canoes and small boats and create danger to swimmers.
- The best way to reduce the effects of boat wash and wake on shorelines is simply to slow down. In Ontario, by law, boats must slow down to 10 km per hour within 30 m of shore.
- The extent to which boat wake contributes to shoreline erosion around Kashwakamak Lake is currently not documented.
- There is no information available to determine if current boating activity is a significant source of air and water pollution for the lake.

Social History

The Kashwakamak Lake *"State of the Lake"* Report also includes a "Social History" section which is piecing together the story of our lake and how it was settled. It is a "living" section in that we will be adding to it as new information is provided and post it to the KLA website, www.kashwakamak.ca.

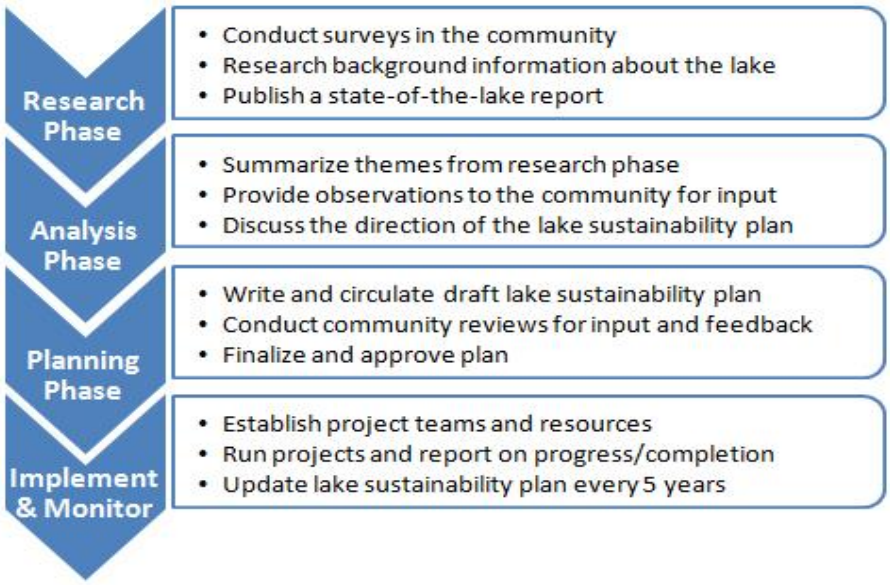
We are asking people who live, play and work on the Lake to share their stories. Add your photos, old documents and timelines. Share the history of your Kashwakamak Lake story. To date we have a comprehensive history of Weiss Point and we would like to add more. We will have a map of the lake indicating where we have social history contributions so you can learn about the history of this beautiful lake. Go to, http://www.kashwakamak.ca/index.php/map

Please help us out. Take some time this summer season to talk to your family and friends and then share it with us. For more details contact, Sue MacGregor, suemacgregor@comcast.net or call 613-336-2693, 612-916-8774.

The Next Steps in the Kashwakamak Lake Planning Process

The preparation of the Kashwakamak Lake "State of the Lake" Report represents the first milestone in the lake planning process as well as countless volunteer hours, invaluable input and support from our partners. This report will be released at the July 2013 AGM and posted on the KLA website. Limited copies will also be available at the North Frontenac Town Council office and the local library in Cloyne.

The next step in the process includes extensive community consultation on the State of the Lake Report and the development of recommendations and an action plan which will lead, over time, to the Kashwakamak Lake Sustainability Plan.



The Process

The Kashwakamak Lake "State of the Lake" Report is intended to capture what we know about the lake. We have compiled a collection of materials, background information, monitoring reports, research and social history specific to Kashwakamak Lake. This information will be used as the foundation for our lake community, decision-makers and stakeholders to develop sustainable land use recommendations and actions to protect Kashwakamak Lake. Specific community developed recommendations and actions will be included in the long term action plan which will then be implemented by our community and partners.

This community driven process will rely on continued participation and input at public meetings. The State of the Lake Report will be posted on our website and formally presented at the July 13, 2013 Annual General Meeting being held at the Northbrook Community Hall. Check the KLA website for more information, www.kashwakamak.ca.

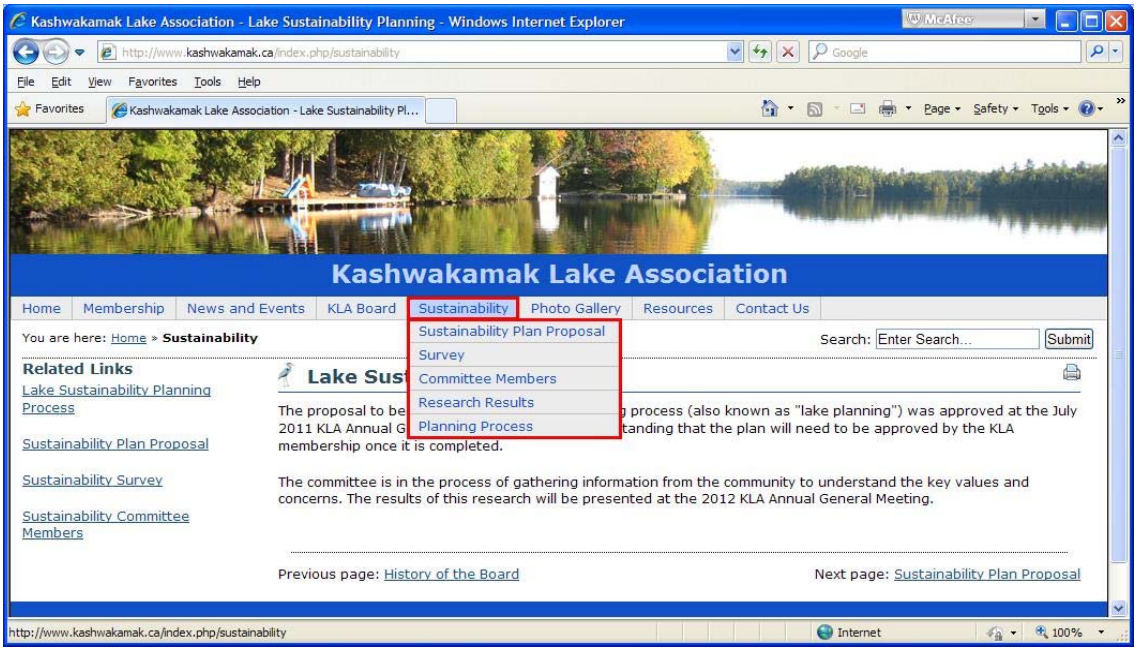
Accomplishments to Date

1. Established Lake Sustainability Committee (2010)
2. Completed Community Survey (Dec 2011)
3. Completed Business Survey (March 2012)
4. Presentation of Survey Results (July 2012)
5. Publish a draft State of the Lake Report (July 2013)

Resources

For more information, see the Sustainability section of the KLA website (www.kashwakamak.ca)

- Survey Results
- Presentations
- State of the Lake Report
- Interactive map of Kashwakamak Lake



The Kashwakamak Lake Planning Committee

The committee is a group of community volunteers working to bring the community together to engage in a discussion about our common future. We are a group of people who live, work, and enjoy Kashwakamak Lake. We appreciate its beauty, wildlife, and the community we live in. We have defined our purpose as follows:

*To bring together **common interests of the community** to develop a sustainability plan that carries forward a **legacy of enjoying the lake** while supporting the natural environment **for future generations** to enjoy.*

The committee members are:

- Judy McIntyre – Vice President & Liaison, Kashwakamak Lake Association (KLA)
- Sue MacGregor – Communications
- Scott Bennett - Sustainability Professional
- Kevin Phillips - Owner, Fernleigh Lodge
- Fred Perry - Deputy Mayor, North Frontenac
- Darryl Simpson - Forestry/Wildlife Management
- Joanne Fisher - Cottager
- Peter Burbidge – Cottager
- Alyson Symon – Mississippi Valley Conservation Representative

We need you to be part of this process!

Please be a part of this important process. We need your input, your insights and your feedback to make this lake planning a success. Your opinion and actions are vital because you are a part of our Kashwakamak Lake community.

To get involved, please contact our committee chair, Judy McIntyre for more information, ritchiemcintyre@rogers.com, cottage: 613-336-2882 or home: 613-233-3564.

Here's how you can help and be part of the process:

- Attend the AGM
- Join the KLA
- Gather your own social history about the lake and share it with us
- Share your expertise or skills with us as part of our planning process
- Provide your feedback and any information that we might be missing by:
    - Visiting our Lake Sustainability Planning Booth at **Family Day, Saturday August 10th, Fernleigh Lodge**
    - Reading the full report, filling out the form at the back of this Summary and sending it back to us by email or mail.
    - Contacting Judy McIntyre, Chair, Lake Planning Committee, by email @ ritchiemcintyre@rogers.com or call, home 613-233-3564/ cottage 613-336-2882

Kashwakamak Lake State of the Lake Report

We want to hear from you!

Please read the full **Kashwakamak Lake State of the Lake Report** and get back to us. We need to know:

⇒ Any information that we are missing (that you can provide or know where we can get it)

⇒ Your thoughts, social history, photos and old documents you can scan and ad etc.

How do you prefer to provide your input?

Please select all that apply by checking the appropriate box(es) below.

Group Setting

□ Road association meeting
□ Focus group discussion meeting
□ Winter webinar or conference call

1-on-1

□ Phone discussion
□ Fire side chat
□ In writing

How do you prefer the KLA contact you?

□ by email: _____
□ by telephone: _____
□ by mail: _____

Please provide your comments here and email back to ritchiemcintyre@rogers.com, or drop it in the mail to the **KLA, RR #1, Arden ON K0H 1B0**

Comments: I am a member of the KLA □ yes □ no

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Kashwakamak Lake

State of the Lake Report, July 2013

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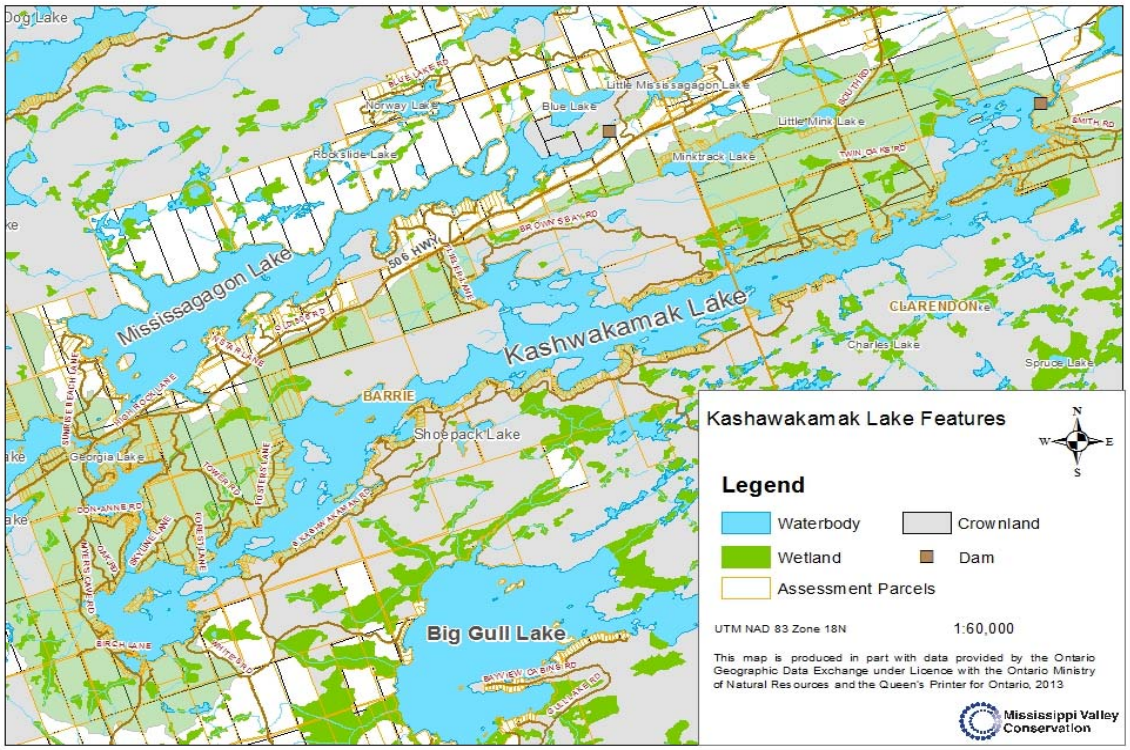
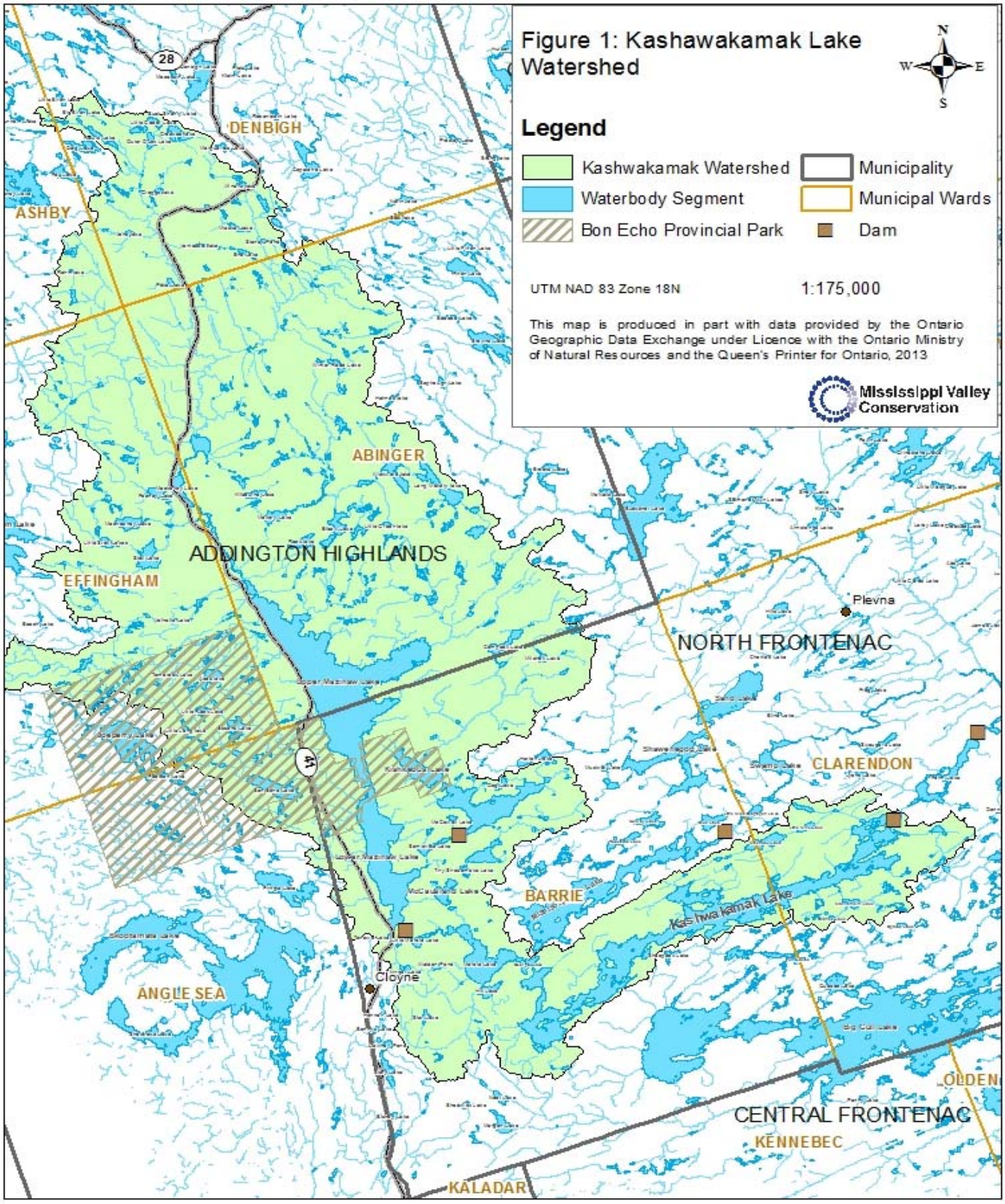


FIGURE 1: KASHWAKAMAK LAKE WATERSHED



2. Hydrology and Water Levels

2.1 Background and History

Located on the Mississippi River, downstream of Mazinaw and Marble Lakes and upstream of Farm, Mud and Crotch Lakes, Kashwakamak Lake is essentially a widening of the river punctuated by numerous inlets. The total drainage area for the lake is 417 square kilometres, with a surface area of 1274 hectares. The average depth of this lake is 8.4 metres and the maximum depth is 22 metres.

Kashwakamak Lake is dominated by numerous inlets and shallow bays and is located in the Townships of North Frontenac. Outflow from Mazinaw Lake is the main contributor to levels on the lake. The Mississippi River enters the west end of the lake from the outlet of Georgia Lake at Whitefish Rapids and exits at the Kashwakamak Lake Dam at the east end of the lake to flow down the Mississippi River through Farm and Mud Lake to Crotch Lake.

2.2 The Kashwakamak Lake Dam

The original lumberman dam was constructed at the outlet of the lake during the 1860s as part of the logging system of dams along the entire Mississippi River. The Mississippi River Improvement Company (MRIC) purchased the rights, title and interest of the dam in 1909 and reconstructed it in 1910. Its purpose was to hold title to the dams at Crotch, Big Gull and Kashwakamak Lakes and operate them to maintain storage capacity in the associated lakes. Within the next ten years, MRIC had assumed the maintenance and operation of Mazinaw and the abandoned lumberman’s dams at Shabomeka and Mississagagon Lakes.

The Kashwakamak Lake dam had undergone only relatively minor repairs to the concrete surfaces since 1910, until 1988, when extensive work was done to the concrete surfaces of the weir. The ownership and operation of the structure was transferred to Mississippi Valley Conservation (MVC) in January 1991. In 1992, MVC installed a pressure transducer near the middle of the length of the lake to provide hourly readings of water levels and water temperatures. A second staff gauge, located on the upper lake, and a manual precipitation gauge were also installed at a private cottage in 1993.

The dam consists of two structures, the main control dam and a secondary side block dam. The main structure is a concrete dam with two sluiceways and a broad crested concrete weir. There are ten stoplogs in each sluice. The crest elevation of the weir is 261.06 m.

The secondary concrete side block dam is located north of the main structure and controls an emergency spillway section. The elevation of the top of this weir is 261.67 m.

In 1989, rehabilitation of the Shabomeka Lake Dam was completed at substantial cost to the MRIC. In 1991, the MRIC decided that continued operation and maintenance of the control dams for Shabomeka, Mazinaw, Kashwakamak, Big Gull, and Mississagagon were beyond its financial capabilities and negotiated agreements to shift responsibilities to MVC (and to Ontario Hydro for Crotch Lake Dam). After these transfers, MRIC was formally dissolved. MVC constructed automated lake level gauges on Shabomeka, Mazinaw, Kashwakamak, Big Gull and Crotch Lakes in 1991 to collect detailed water level information and initiated a dam rehabilitation program with the reconstruction of Mazinaw Lake Dam in 1992.

In 1995, the Upper Mississippi Watershed Alliance (Alliance) was created, to address water level concerns across the watershed, and specifically from Crotch Lake to Dalhousie Lake. The Alliance consisted of residents from Shabomeka, Mazinaw, Kashwakamak, Big Gull, Crotch and Dalhousie Lakes as well as from the Snow Road and Ardoch communities. A working group was established with representatives from MVC, MNR, Ontario Hydro and the Alliance to discuss the various issues and identify opportunities to resolve them. Several meetings were held from 1995 to 1997 that resulted in clarification of several issues raised. While there were no recommendations made by the working group to revise current operating policies a variety of fishery related issues were resolved.

2.3 Present Dam Operations

The Kashwakamak Lake dam is operated by Mississippi Valley Conservation (MVC) in conjunction with the operation of upstream and downstream dams. In 2006 Mississippi Valley Conservation, waterpower producers, and the Ontario Ministry of Natural Resources (MNR) released a new Mississippi River Water Management Plan to establish regulated water flows and levels for five waterpower facilities on the Mississippi River system. The Kashwakamak Lake dam is one of six water control facilities that influence the levels and flows of downstream hydro facilities and was therefore subject to this planning process. In preparing the plan consideration was given to an integrated approach to maximize all uses of the river including waterpower, flood control, low flow augmentation, fish and wildlife, tourism and recreation.

The first major water control structure on the Mississippi River system is located at the outlet of Shabomeka Lake and the second major water control structure is located at the outlet of Mazinaw Lake. From Mazinaw Lake, the river flows through the smaller lakes of Little Marble, Marble and Georgia Lakes into Kashwakamak Lake. The inlet to Kashwakamak Lake is known as Whitefish Rapids, an important walleye spawning site rehabilitated by the MNR.

The third major control structure in this sub-watershed is located at the outlet of Kashwakamak Lake. From here, the river flows through a smaller lake known as Farm Lake, which is maintained by an overflow weir. The Mississippi River then flows through the Village of Ardoch. A unique concern with regards to dam operations and water levels exists here. While flooding and erosion are a concern, the wild rice growing in this area is of great significance to the native Algonquin First Nations who harvest the rice each fall.

The maximum Operating Range for Kashwakamak Dam is 259.35 – 261.33 m a.s.l. The dam is operated according to the following operating plan procedures, also incorporating best practices that were identified as part of the Mississippi River Management Plan to provide additional direction on how the dam will be managed within this operating range.

Spring Operation

As the spring freshet occurs, the dam is operated to slowly bring lake levels up to summer requirements while trying to minimize shoreline damage from ice movement. The summer water levels are targeted prior to the start of the walleye spawn, if possible, due to the existence of a prime spawning shoal at the head of the lake at Whitefish Rapids.

The dam is left with three stoplogs in each bay throughout the winter until the start of the runoff, usually the middle of March to the 1st week of April. Four logs (two in each bay) are replaced in the dam the last week of March. Depending on ice conditions and the timing for the spring runoff, logs are replaced at a rate which allows levels on the lake to reach but not exceed 261.25 m. Logs are replaced or removed to maintain a range between 261.00 m and 261.20 m until the run off is over. This normally takes 3 to 4 weeks and normally 5 to 6 stoplogs will have been replaced in each sluiceway (a setting of 8/8 or 9/9 stoplogs). The level is then maintained by replacing or removing logs as required. All stoplogs are normally in by the end of June; however, during wet summers it may not be possible to get all the logs in.

Summer Operation

Lake levels are targeted between 261.00 m and 261.20 m throughout the summer months, with a minimal flow being passed through the dam to keep water in the downstream channel. During summer operation weekly water levels are obtained and the level is maintained as close as possible to 261.13 m. Evaporation is the major cause of levels dropping through the summer as there is virtually no outflow from the lake through this period. Stoplogs are removed only if the level exceeds the maximum of 261.20 m.

Operations of Mazinaw Lake will generally require operations to be undertaken at Kashwakamak Lake, with one or two logs pulled at Kashwakamak Lake Dam for each log pulled at Mazinaw Lake Dam.

Fall/Winter Operation

The fall drawdown begins after Thanksgiving weekend with 14 of the 20 stoplogs removed during the drawdown. Minimum winter lake level of 259.60 m a.s.l. is targeted for the end of February. Depending on the amount of rainfall received at this time, the stoplogs are removed two or four at a time (one or two from each bay) until the winter setting of three logs in each bay is reached. This is usually done by the first of December. As a result of the later drawdown on Mazinaw Lake (beginning in early November), the lake normally stabilizes from early November to mid to late December, then reaches its minimum level around the middle of February.

2.4 Water Level Trends on Kashwakamak Lake

As described above, MVC strives to maintain water levels in an overall **operating range** between the normal maximum of 261.33 m and normal minimum of 259.50 m, except under extreme weather events or when maintenance is required to be done to the dam. From the end of the spring freshet to the start of the following freshet, the dam is maintained as close as possible to a **target range** of 15 cm above and below the optimum level.

Flooding of main dwellings occurs above 261.60 m and nuisance flooding occurs at 261.30 m. Access to the developed bays by boat is hampered at 261.00 m, 10 cm below optimum levels. The water level must be high enough in early spring to ensure coverage at Whitefish Rapids for walleye and lake levels must be maintained throughout June for bass spawning. Stable and minimal outflows are required from early June through end of September to ensure growth and harvest of wild rice crop.

This lake is also heavily used by snowmobilers and skiers and fluctuating ice levels and its instability is of great concern for safe shore ice access during the winter sport season.

Water levels have been recorded on Kashwakamak Lake since 1959. The data for the period between 1959 and 1985 was derived from graphs or occasional unscheduled readings taken by the Mississippi River Improvement Company (MRIC). In 1985 Mississippi Valley Conservation took over the collection of water level data on Kashwakamak Lake. Between 1985 and 1992 water level data was recorded on a more regular basis, but with fewer readings obtained in the winter. The installation of an automated water level gauge in 1992 has allowed for the collection of hourly water level since that time.

The minimum and maximum water levels measured at the lake's outlet from 1959 to 2012 are outlined in Figure 2.

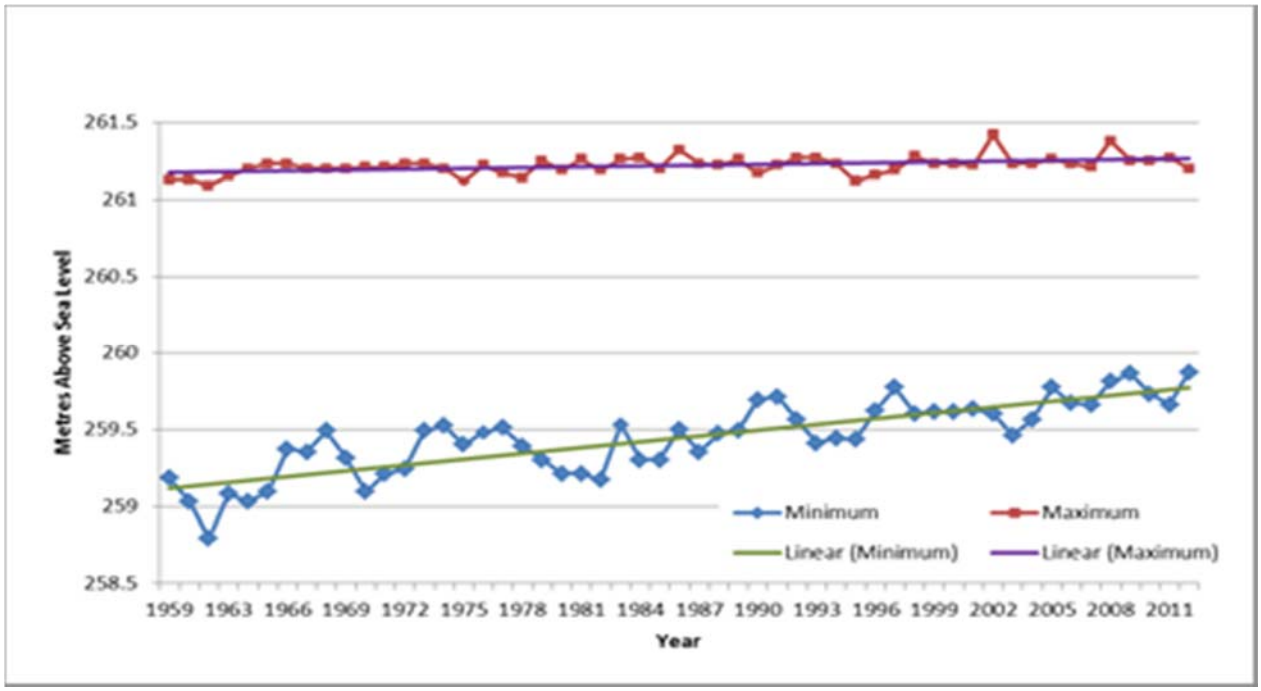


FIGURE 2: KASHWAKAMAK LAKE ANNUAL WATER LEVELS (1959 TO 2012)

Over the 53 years of records, the annual maximum water levels have shown a relatively constant level, averaging 261.22 metres above sea level (a.s.l.) and showing only a 0.33 metre difference between the highest and lowest recorded annual maximum level. The highest historic maximum water level of 261.42 metres was recorded on June 19, 2002.

The annual minimum water levels show a gradual overall rise over the 53 years of record, with more marked annual fluctuations from year to year. The average annual minimum water level over the 53 years is 259.45 metres a.s.l., with a 1.08 metre difference between the highest and lowest recorded annual minimum levels. The lowest historic minimum water level of 258.79 metres was recorded on February 10, 1962.

2.5 Water Level Concerns for Fish and Wildlife

The weedy inlets and bays of Kashwakamak Lake are ideal habitat for cool water and warm water fish species that dominate this lake. The lake is managed as a warm water fishery. There is an abundant walleye population that is known to spawn at a prime spawning shoal near the main inlet at Whitefish Rapids, and at several locations along the north shore of the lake. Water levels must be maintained high enough in early spring to ensure coverage at Whitefish Rapids' shoals for walleye spawning, as well as for shallow bay habitats for bass spawning in June. Bass reproduction has been assessed in the lake with nesting activities having been documented throughout the lake. Higher nest densities tend to occur in shallow bays on the north and east ends of the lake. Northern pike reproductive activities have been recorded at two shallow sites in the extreme eastern end of the lake.

Kashwakamak Lake once supported lake trout; however, this species is no longer in the lake likely due to a number of reasons such as water levels, logging, development, angling and poor spawning success. Kashwakamak Lake still supports other coldwater species such as lake herring and burbot. Below is a list of documented fish species in Kashwakamak Lake.

Fish Species – Kashwakamak Lake	
Lake Whitefish	Rock Bass
Lake Herring	Largemouth Bass
Northern Pike	Smallmouth Bass
Golden Shiner	Pumpkinseed
Fallfish	Walleye
White Sucker	Yellow Perch
Brown Bullhead	Burbot
Common Shiner	

In addition, certain shoreline wetland habitats on the lake provide suitable habitat for a species at risk turtle, known as Blanding's turtle (Emydoidea blandingii). The Blanding’s turtle is a Species at Risk (SAR) with a federal and provincial threatened SAR designation and is, therefore, afforded protection for itself and its critical habitat by the Fish and Wildlife Conservation Act, National and Provincial Parks Acts, the Natural Heritage component of the Provincial Policy Statement under Ontario's Planning Act provides for the protection of significant portions of the habitat of threatened species, and SARA. These turtles are protected from collection or disturbance in all National Parks where it occurs. Because of delayed sexual maturity, Blanding’s turtle is affected by a variety of disturbances that affect both adult and juvenile turtles.

3. Climate Change

Our lives are built around the fact that although there is some variability and change from season to season and year to year, weather usually repeats in predictable patterns. Climate Change is the change, both natural and human-induced, over a time period that ranges from decades to centuries. Many of the changes coming about as a result of climate change will be most apparent in the impact that they have on the amount and the temperature of water in our rivers, streams, lakes and wetlands. As a result, the impacts of climate changes may be noticed earlier and to a greater degree by people owning and/or living on or near waterfront areas.

Through collaboration between Mississippi Valley Conservation, Queens University and the University of Guelph, a locally based climate change adaptation strategy was initiated in 2007 to study how weather patterns (precipitation and temperature) will change in the Mississippi watershed and to assess the impact which projected changes in climate would have on the flow regime of the Mississippi River.

3.1 How Climate Influences the Mississippi Watershed [1, 2]

MVC analyzed decades of stream flow records dating back to 1918 that were collected on the Mississippi River at Appleton to show how the river has responded to climatic conditions and weather events since that time.

Figure 3 shows average annual stream flows have increased marginally over this period with the exception of a period between 1957 and 1965, a period of exceptionally low precipitation. While this indicates a relatively stable stream flow regime, examination of seasonal stream flow patterns provide insight into seasonal changes occurring over the past 93 years.

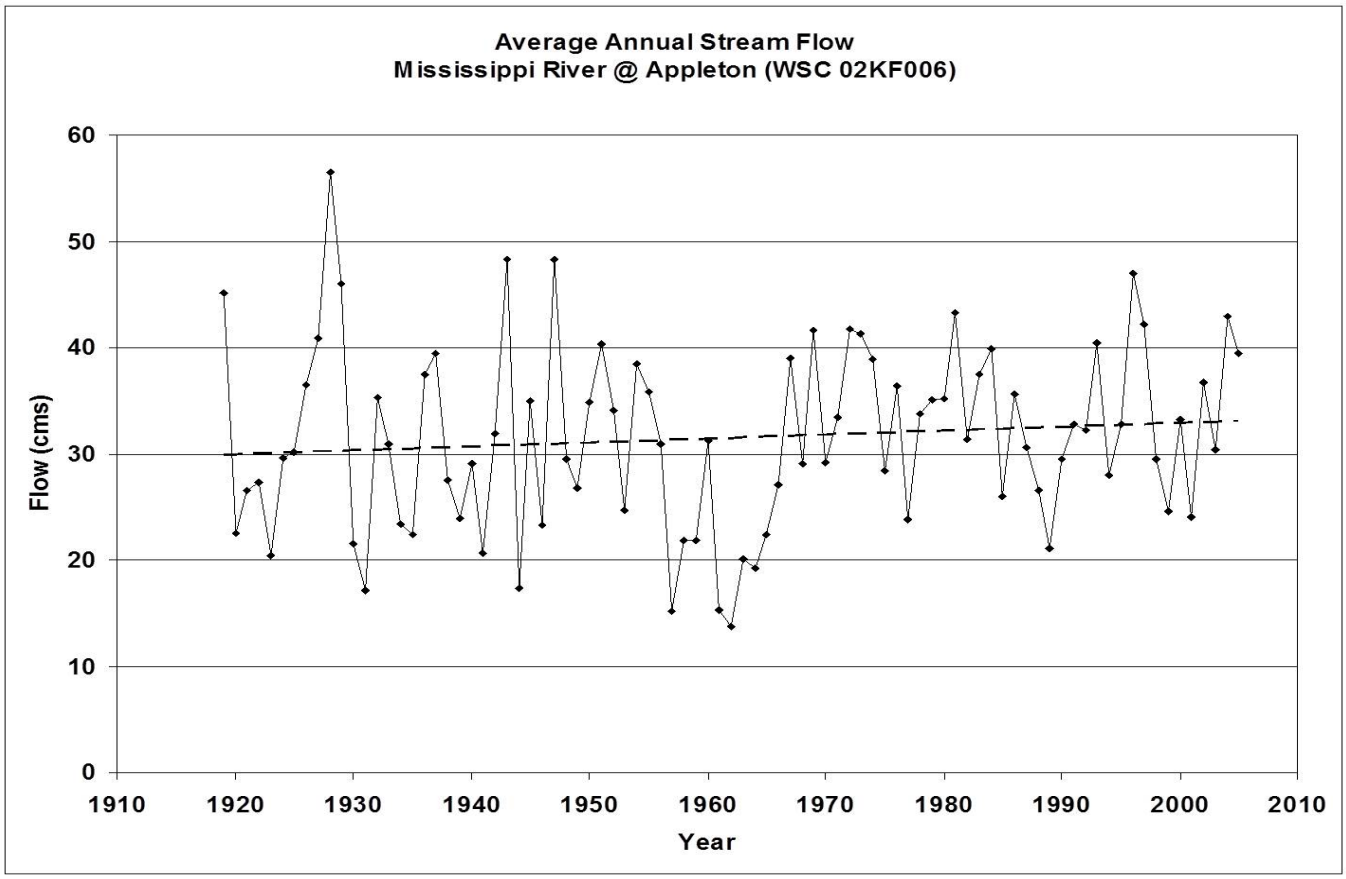


FIGURE 3: AVERAGE ANNUAL STREAM FLOW - MISSISSIPPI RIVER AT APPLETON

[1] Mississippi River in a Changing Climate, Paul Lehman, General Manager, Mississippi Valley Conservation, *(This article originally appeared in the Mississippi Lakes Association's – 2012 Mississippi Belle).*

[2] From Impact Towards Adaptation: Mississippi Watershed in a Changing Climate" by Paul Eggington and Beth Lavendar, 2009. www.mvc.on.ca/program/ccreport2009.pdf'

[3] Water Resource Impacts Water Sector: Vulnerability and Adaptation to Climate Change, J. Bruce et al, 2000

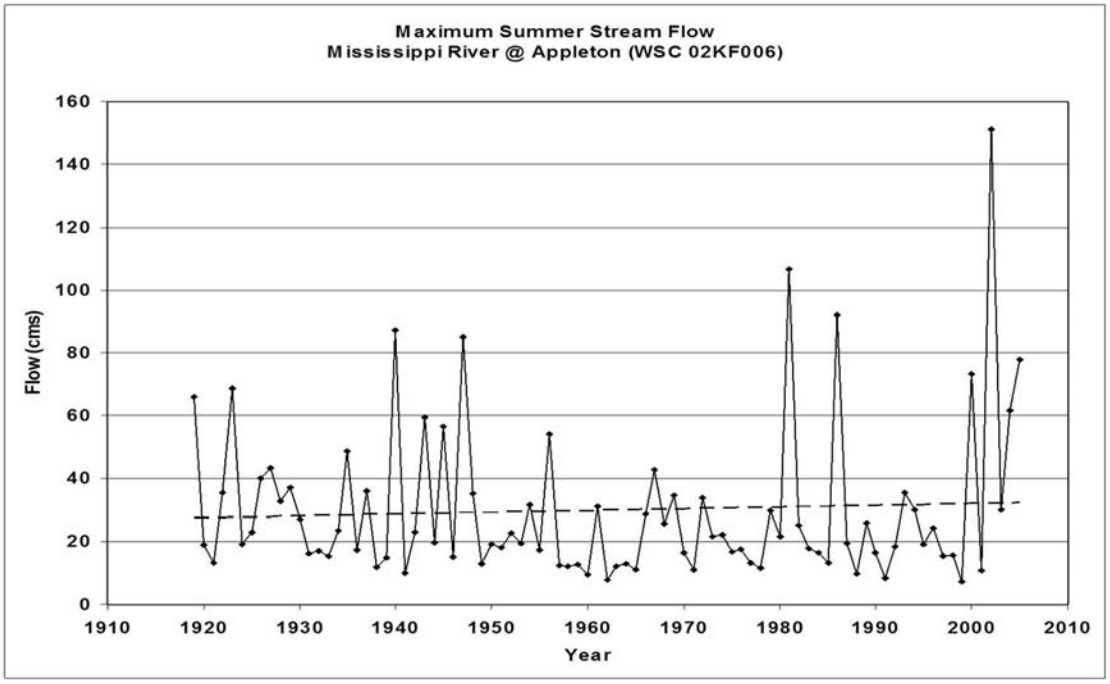


FIGURE 4: MAXIMUM SUMMER STREAM FLOW - MISSISSIPPI RIVER AT APPLETON

Conversely, **Figure 5** provides an indication of average stream flows over the winter period, January through February. As shown, the average winter stream flow in the period after 1970 has increased substantially and exhibits greater variability from year to year.

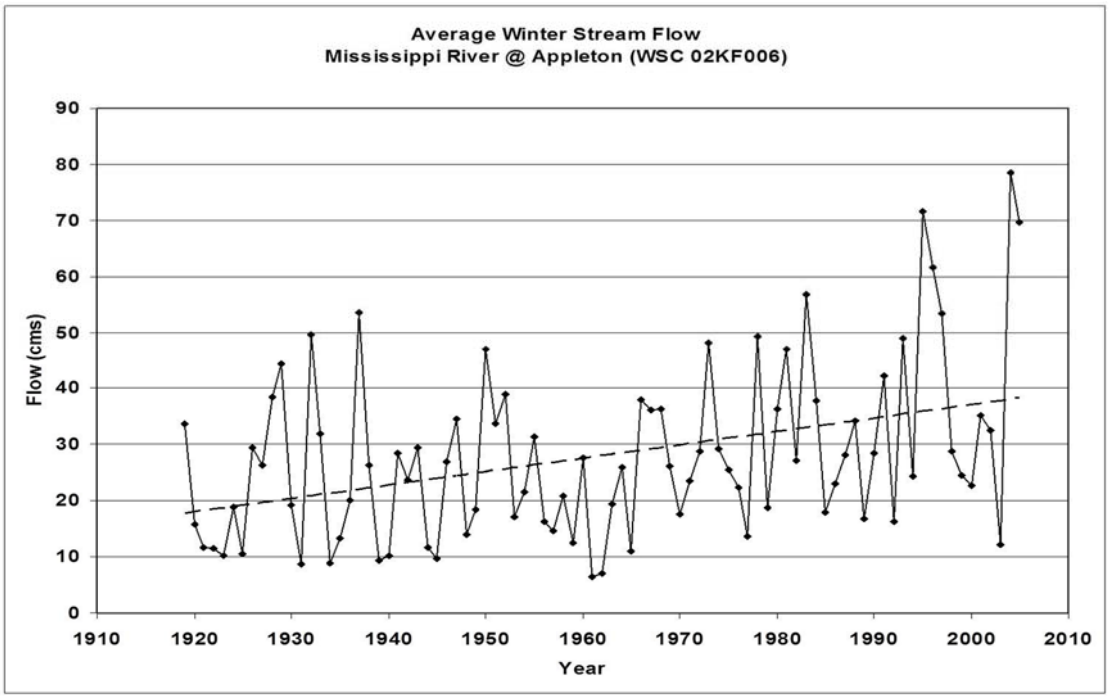


FIGURE 5: AVERAGE WINTER FLOW - MISSISSIPPI RIVER AT APPLETON

Changes of the magnitude observed in the seasonal stream flow patterns can be attributed to either large scale changes in land use or changes in climatic conditions. Since 1970, changes in land use across the Mississippi River watershed have been relatively minor and cannot account for the shifts in runoff characteristics which are being observed.

In 2007, Natural Resources Canada published "From Impacts to Adaptation: Canada in a Changing Climate 2007" which reports that the average annual temperature in Ontario has increased by as much as 1.4° C since 1948. This trend is projected to continue, with the most pronounced temperature increases occurring in winter. Projected impacts on water resources across the Great Lakes Basin are consistent with observed changes in the Mississippi River stream flows.

Temperature and Precipitation

Overall, the studies predict generally warmer temperatures with an average temperature increase of 4.5° C by 2055. For precipitation, the scientific model predicts less snow and more rainfall in winter and spring. Modeling predicts that over the next 100 years, summer water temperatures will increase 4° C; summer flows of rivers will decrease by 44%, lasting 28% longer; and spring discharge will peak 7 weeks earlier and decrease by 33%, negatively affecting walleye recruitment (-24%).

Stream Flows

To assess how things may be expected to change in the future, three consecutive 30 year periods were modeled (2010 to 2039, 2040 to 2069 and 2070 to 2099) and compared to observed stream flow conditions between 1970 and 2000. Figure 6 shows the average annual stream flow hydrograph for the Mississippi River at Appleton for the four periods that were analyzed. The overall prediction is for higher stream flows from September to January and lower stream flows from April to September. Spring flood will occur earlier and will have lower volumes and low flows in the summer will be lower. The climate change impact analysis has indicated that by 2099 summer stream flows will be 40% less than present, with periods of intense rainfall, resulting in additional nutrient loading and decreased capacity to assimilate nutrient loads.

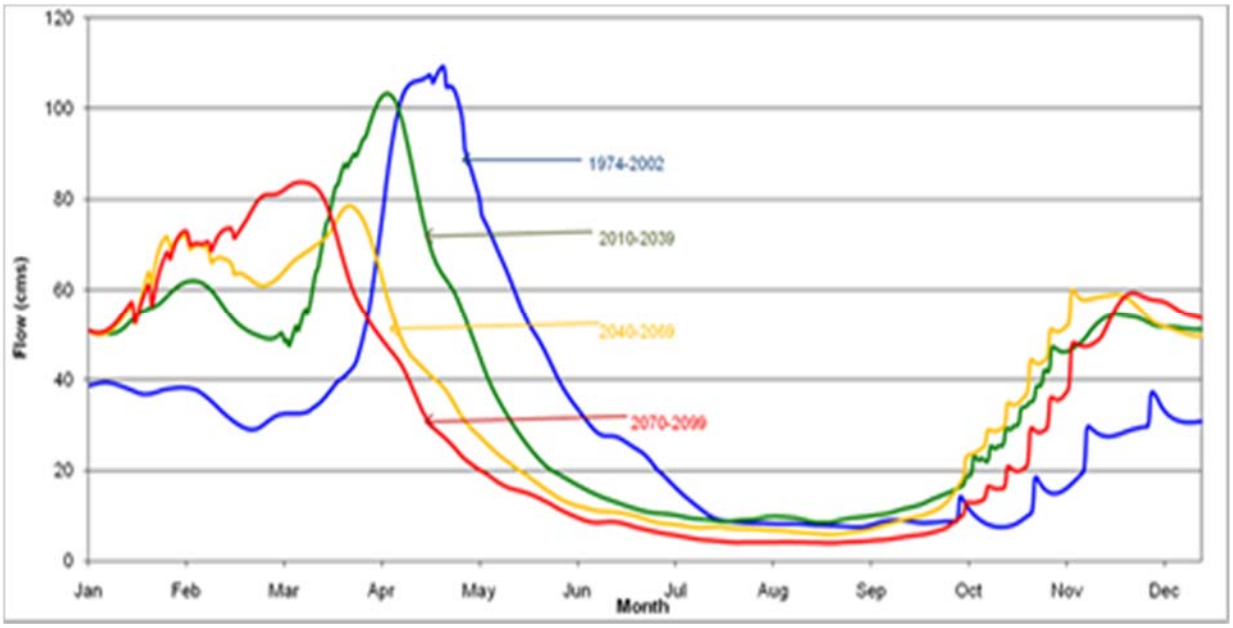


FIGURE 6: AVERAGE ANNUAL STREAM FLOW - MISSISSIPPI RIVER AT APPLETON

This graph shows the Average Annual Stream Flow Hydrograph for the Mississippi River at Appleton (1974 to 2002, 2010 to 2039, 2040 to 2069, 2070 to 2099) Note: these represent the average yearly hydrograph for each period modeled and are based on the output from a single climate model and future emission scenario. Within each 30 year period there will continue to be considerable variability from year to year.

The specific predictions are:

- spring freshets will be 28% lower in volume and will occur 6 to 7 weeks earlier;
- minimum summer flows will be 44% lower and the low flow will persist for 28% longer with greater variability in summer water levels; and,
- fall and winter flows will be 70% higher, resulting in a greater flood risk in fall and winter, with the likelihood or increased shoreline erosion and increased frazil ice generation.

Water Levels

The reservoir system on the Mississippi River was developed in the early 1900s to use historic runoff characteristics of the watershed and store spring snowmelt runoff then releasing water over the summer during periods of low flow. During extended dry weather periods most of the stream flow in the Mississippi River is supplied from this stored water. With projected shifts in future runoff patterns, the length of time in which stream flows may require augmentation will exceed the capacity of the reservoir system if it is to provide the same level of augmentation as in the past. This will ultimately result in lower water levels throughout the watershed. These average or expected conditions

are expected to be highly variable from year to year due to a greater frequency in high intensity rainfall events.

Fisheries

Dr. John Casselman from Queens University also studied the effects of water temperature on fish communities in the Mississippi River watershed and across the Great Lakes Basin. Casselman reports that the average summer surface water temperature in the Mississippi River increased by approximately 1° C between 1970 to 2000, and that it is apparent a relatively small increase in temperature is associated with a substantial increase in recruitment of warm water species and a reduction in recruitment of cold water species. The analysis of Mississippi River watershed data provides additional confirmation that fish community structure and dynamics are changing in association with climate warming. His research has concluded that an increase in average surface water temperature of 3° C will result in a 14.7 fold increase in the recruitment of warm water fish species with a corresponding 20.1 fold decrease in cold species.[4]

Recreation

Overall, the longer summer seasons may provide for extended swimming and enjoyment of water activities, however lower water levels may impact boating activities. Warmer summers may also reduce the flushing rate of the lake if water levels fall below the level permitted by the dam, due to the combined effects of lower inflows from upstream and higher rates of evaporation. Water levels will take longer to return to the top of the dam stop-log sections before the flow through will be restored. Shorter winters and periods of safe ice on the lakes will reduce winter recreation opportunities such as ice fishing, snowmobiling, snowshoeing and cross-country skiing.

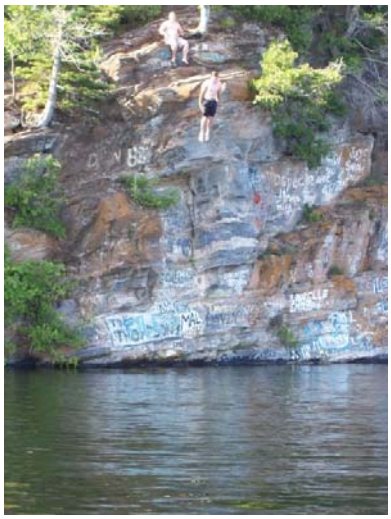


Photo Jim McDonald

Photo L. McKeown

[4] Fish and Fisheries: Sensitivity to Climate Change – Response and Adaptation , by John Casselman, Department of Biology, Biosciences Complex, Queen's University

4. Water Quality and Aquatic Life

4.1 Water Quality Data

The water quality of Kashwakamak Lake is affected by both natural processes and anthropogenic sources such as; shoreline development, excessive recreational use, faulty septic systems and surface runoff carrying fertilizers or other chemicals. These human sources can cause an increase in nutrient levels leading to eutrophication which is a deterioration of oxygen in the lake water. Monitoring the lake water quality is an important task in ensuring the lake does not become eutrophic or dead. Lakes are given a trophic status based on the nutrient level of the water. There are three trophic statuses: Oligotrophic, Mesotrophic and Eutrophic. Oligotrophic lakes are young, nutrient poor lakes with low productivity, and often support cold-water fisheries. Mesotrophic lakes are moderately enriched middle-aged lakes, but due to the range of the classification Mesotrophic lakes can be nutrient poor to nutrient rich. Eutrophic lakes are old, nutrient enriched and very productive, often supporting warm water fisheries.

Water quality parameters that are monitored to determine the nutrient load of the lake are water clarity, total phosphorus and chlorophyll *a* concentration. Water clarity is measured with a Secchi disc, (a black and white disc that is lowered into the water until it can no longer be seen). Total phosphorus is the amount of phosphorus that is in the water column, and is one of the most important nutrients for plant and algae growth. Chlorophyll a is the pigment that is used for photosynthesis by plants and algae. The concentration is used to estimate the potential vegetation growth and abundance of algae. Other parameters that are also monitored are pH and temperature/ dissolved oxygen depth profiles.

Table 1 summarizes the water quality ranges for each of the lake nutrient statuses, as well as descriptions of the statuses. Secchi disc depth is measured in metres, while phosphorus and chlorophyll concentrations are measured in micro-grams per litre (µg/L).

Photo Susan Robinson

TABLE 1: WATER QUALITY RANGES

Lake Trophic Status	Description	Total Phosphorus (µg/L)	Chlorophyll *a* (µg/L)	Secchi Disc Depth (m)
Oligotrophic	Low productivity lakes that have low levels of nutrients such as Phosphorus which limits biological productivity, resulting in low levels of Chlorophyll *a*. The water is clear and cold, with sufficient quantities of oxygen in the entire water column throughout the year to support fish and other aquatic organisms. Usually support cool to cold water fisheries.	10 µg/L or less	Up to 2 µg/L-low algal density	Over 5 metres
Mesotrophic	Moderately enriched lakes, nutrient and Phosphorus levels higher than those of Oligotrophic lakes, resulting in greater biological production. Chlorophyll *a* levels are higher with increased algal density. Water clarity is moderate compared to Oligotrophic, with greater probability of oxygen depletion in the deeper areas of water. Can support a range of cold water to warm water fish species due to range of nutrient loads.	11 to 20 µg/L	2 to 4 µg/L-moderate algal density	3.0 to 4.9 metres
Eutrophic	Nutrient enriched lakes, high concentrations of Phosphorus resulting in high concentrations of Chlorophyll *a*, dense aquatic vegetation and productive fisheries. Water clarity can be reduced greatly in summer months when algae blooms cover the surface, discouraging recreational activities. Oxygen depletion in deep waters can occur throughout the year due to excessive decomposition of aquatic vegetation and algae. These lakes typically support warm water fisheries.	21 µg/L or more	More than 4 µg/L-high algal density	Less than 2.9 metres

Water Clarity

Water quality data, in the form of water clarity measurements (Secchi Disc readings) was first collected for Kashwakamak Lake in 1974. More detailed data including total phosphorus and chlorophyll *a* measurements were obtained in 1976, through the Ministry of Environment (MOE) Recreational Lake Program, and in 1980 by volunteers from the Kashwakamak Lake Association,

(Lake Steward) through the MOE Self Help Program and Lake Partner Program.

Water quality on Kashwakamak Lake is currently monitored through the Mississippi Valley Conservation (MVC) Watershed Watch Program. This program was designed to collect water quality data through the sampling of sixty lakes throughout its watershed area. Kashwakamak Lake has two sampling stations, one in the west basin and the second station is at the deepest point mid-lake. Based on a five year sampling rotation, Kashwakamak was sampled in 1998, 2003 and 2008, and is scheduled to be sampled again in 2013.

Water clarity is determined by measuring how far down sunlight can penetrate into the water. It is measured by lowering the Secchi Disc into the water until it can no longer be seen, at which point a measurement is taken. The Secchi Disc depth indirectly indicates the amount of algae/ phytoplankton, suspended soil sediments, and other materials in the water column.

Secchi Disc measurements as shown in **Figure 7** below have been collected 20 times out of the 34 year sampling range of 1974 to 2008 on Kashwakamak Lake. The average reading for the two stations in 2008 was 6.5 metres, compared to 10 years ago, when the average was 4.4 metres. This indicates that Kashwakamak Lake is an unenriched (few nutrients) or Oligotrophic lake. The following chart displays the average Secchi depth for all years sampling was completed. The area shaded orange indicates the Secchi range for Eutrophic lakes, the yellow shaded area indicates the Mesotrophic Secchi range, and the pink area is the Oligotrophic Secchi depth range.

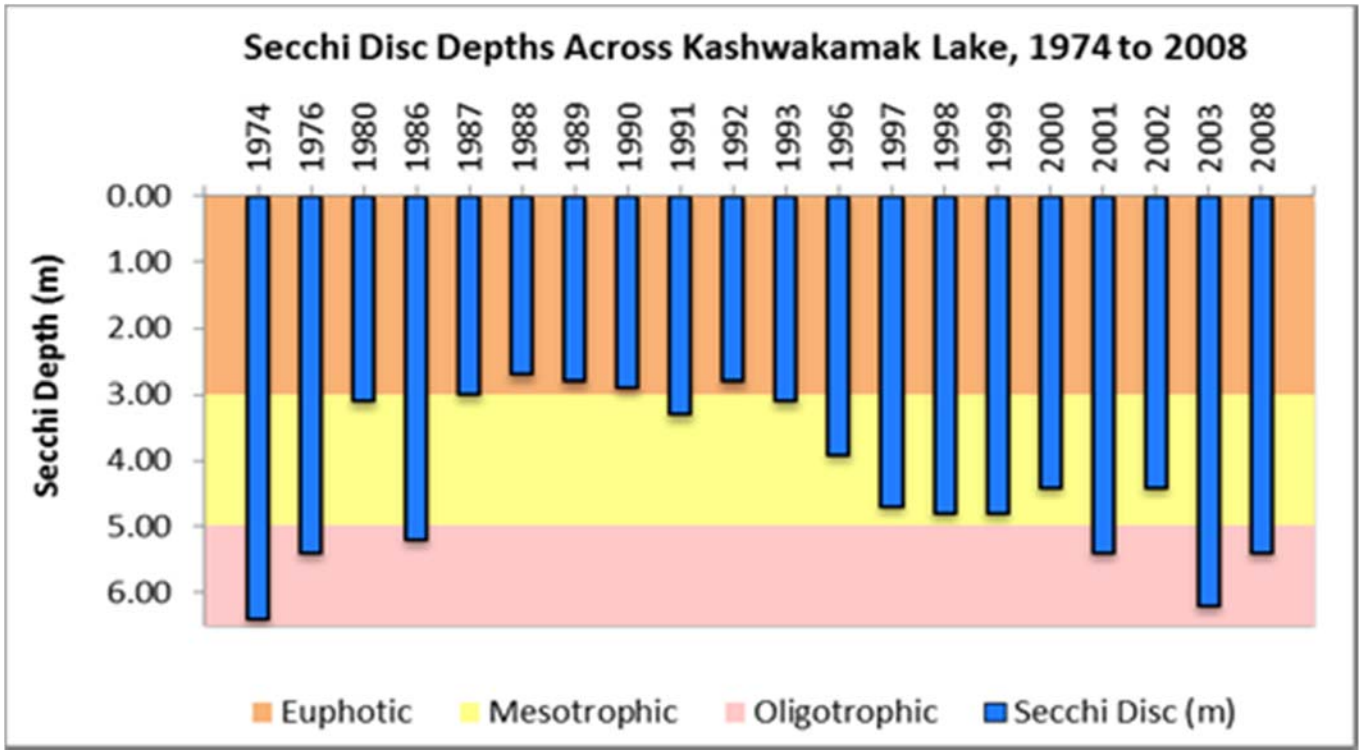


FIGURE 7: SECCHI DISC DEPTHS 1974 TO 2008

The Secchi depth measurements indicate the clarity of Kashwakamak Lake has varied greatly over the past 38 years. The most drastic change occurred in 1986 to 1987 when the water clarity went from the Oligotrophic range to border line Eutrophic range, respectively. The water clarity then stayed in or around the Eutrophic range for the majority of the late 1980s and early 1990s. The water clarity began to increase again in mid-1990 and continued to increase until the clarity reached the Oligotrophic range again in 2001. Though the water clarity reduced slightly in 2002 back into the Mesotrophic range, the most recent sampling in 2003 and 2008 is within the Oligotrophic range.

There can also be differences in the Secchi Disc data across the seasons of the year as well. Water clarity is usually reduced in the spring and fall when lake-turnover is in effect, which causes sediments and debris to become suspended in the water column. Water clarity can also be reduced in the summer months if there is excessive algae growth in the lake. The following Figure 8 and Figure 9 depict the 2003 and 2008 monthly Secchi Disc depths for both sections of the lake.

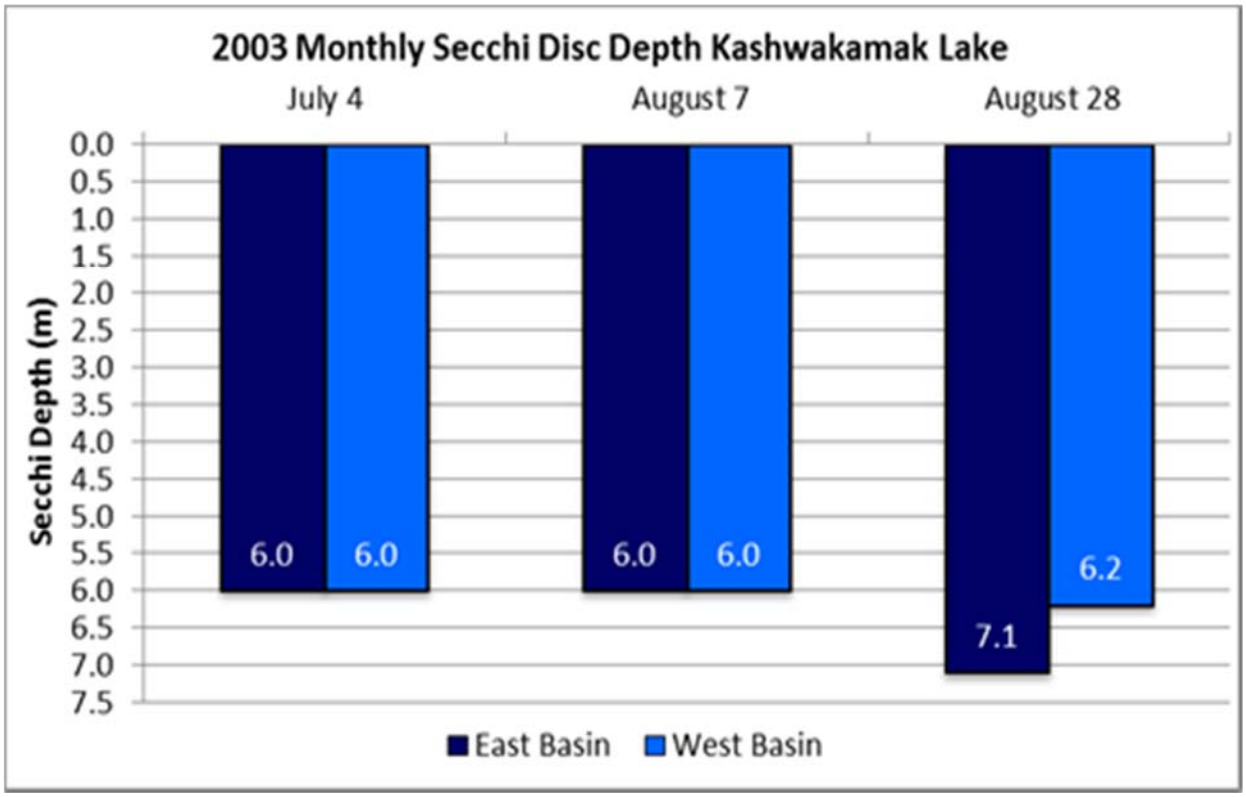


FIGURE 8: 2003 SECCHI DISC DEPTH

The information shows a trend of Secchi depth increase from the early summer samples to early autumn samples. This trend in the data would suggest that the lake does not experience seasonal eutrophication during the summer months; there is no dramatic increase in nutrient levels to cause excessive algae or vegetation growth to decrease the clarity of the water significantly. The majority of the measurements are within the Oligotrophic range, except for the June 2008 samples that were in the upper limit of the Mesotrophic range.

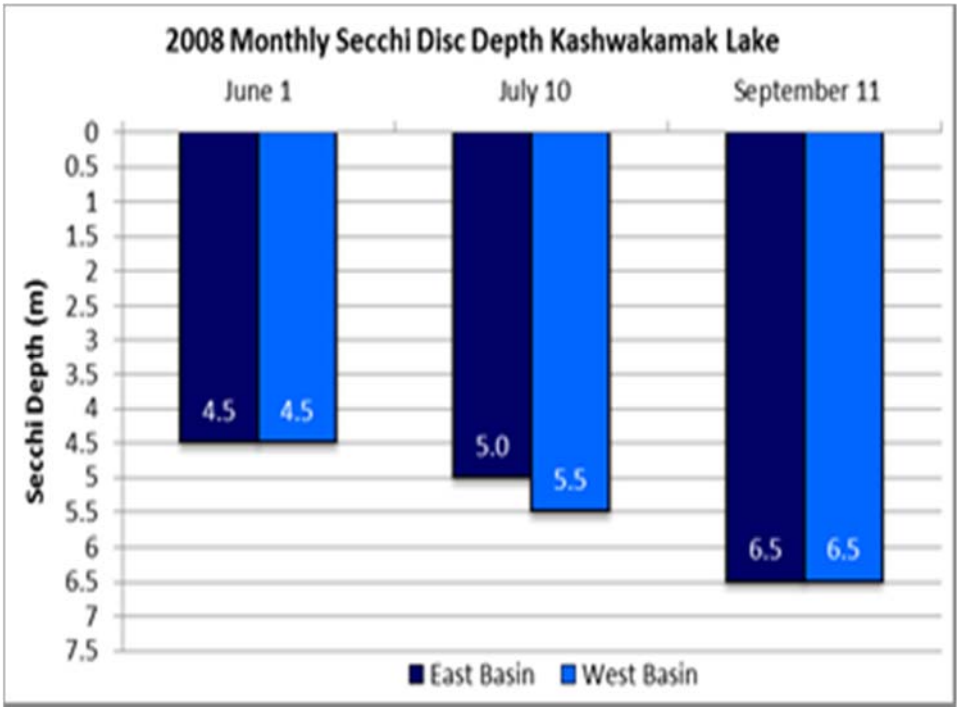


FIGURE 9: 2008 SECCHI DISC DEPTH

The recent results of the water clarity sampling place Kashwakamak Lake within the Oligotrophic lake status; though measurements from previous years have been in the Mesotrophic and even Eutrophic range. The total lake averages fall within the range of 3 to 4.9 metres for Mesotrophic lakes, for all periods that were sampled. There are some yearly fluctuations in the data; some sample years have measurements lower than 3 metres. This is mainly due to the dynamic nature of a lake environment, and some human activities along the lakeshore.

Phosphorus

Phosphorus measurements are important data to have as a measure of water quality, because it is a key nutrient in survival for plants and algae. Without phosphorus there would be no aquatic vegetation growth, and the lake would be barren. Phosphorus is the nutrient that controls the growth of algae in most Ontario lakes, for this reason any increase in phosphorus in the lake will increase the quantity of algae that can grow. High levels of phosphorus can lead to algal blooms and in some cases affect the habitat of cold water fish such as Lake Trout. Phosphorus is used as a measure of the water quality of a lake by providing a measure of its enrichment or nitrification. The Provincial Water Quality Objective for phosphorus levels in warm water lakes is 20 micrograms per litre (µg/L).

There is a limited amount of phosphorus data available for Kashwakamak Lake. From 1976 to 2008 phosphorus sampling was conducted only 5 times on the lake, making it difficult to determine historical trends and the impact of human activity on the nutrient levels. The following **Figure 10** displays the available phosphorus data for the lake. The dark blue bars represent the phosphorus levels in the Euphotic zone (depth that sunlight can penetrate or two times the Secchi Disc depth); the light blue bars represent the phosphorus levels in the bottom zone (one metre off the bottom). The yellow shaded area represents the Oligotrophic range for phosphorus levels, and the orange shaded area represents the Mesotrophic range for phosphorus levels.

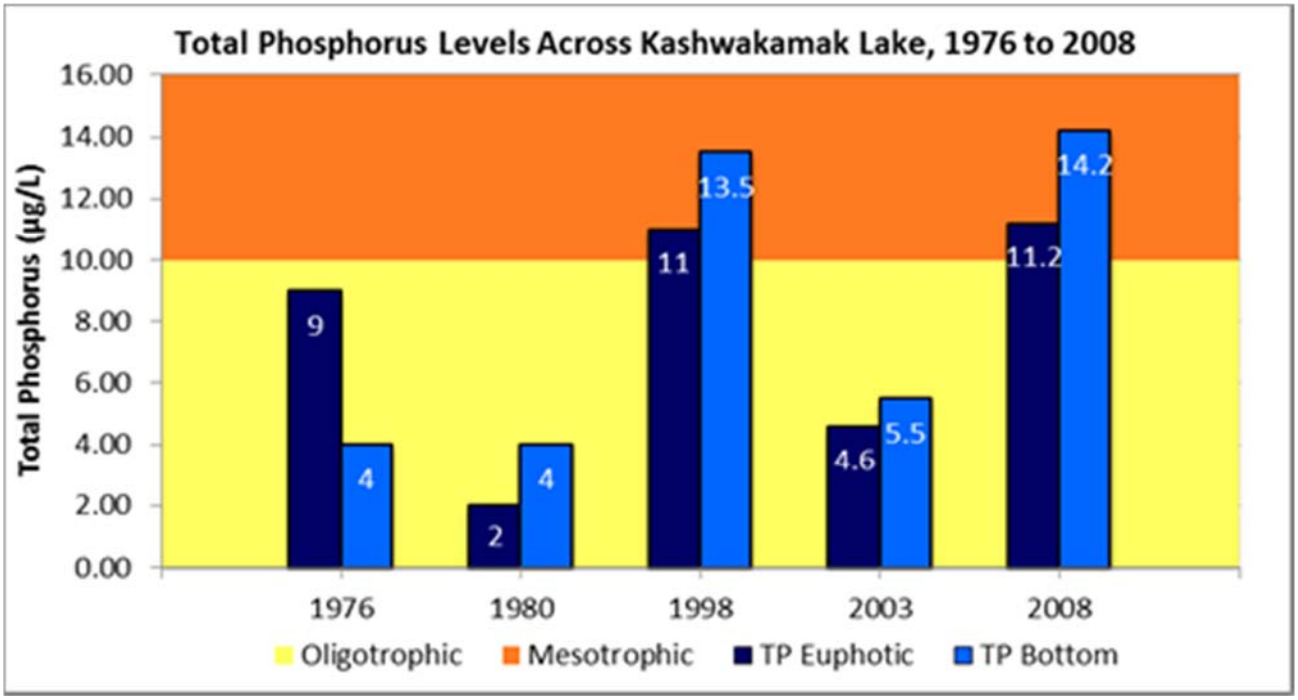


FIGURE 10: TOTAL PHOSPHOROUS LEVELS, 1976 TO 2008

Since 1976, the phosphorus readings for Kashwakamak Lake have fluctuated with a peak in 1998 and a slightly higher peak in 2008. The measurements taken in 2008 showed an increase for both sampling stations, bringing the rating from Oligotrophic in 2003 to Mesotrophic in 2008. In the Euphotic zone phosphorus increased from 4.67 µg/L in 2003, to 11.15 µg/L in 2008. The phosphorus measurements for the samples taken one metre off the bottom increased from 5.5 µg/L in 2003, to 14.15 µg/L in 2008. Though the nutrient load increased into the Mesotrophic range, the Mesotrophic range has a great degree of variability, from low nutrient lakes to high nutrient lakes. The phosphorus levels of the lake in 1998 and 2008 stayed within the lower limit of the Mesotrophic range, so the levels are not nearing Eutrophic conditions.

Figures 11 and 12 depict the Watershed Watch data for total phosphorus levels in the Euphotic zone (depth that sunlight can penetrate or two times the secchi disc depth) and bottom zone (measured 1 metre off the lake bottom) of Kashwakamak Lake for 2003 and 2008. This data gives a more detailed look at the current phosphorus levels in the lake.

The data sets are separated into the two most recent years detailed information is available, and gives the total phosphorus in the Euphotic and bottom zones of the East and West Basins for both years.

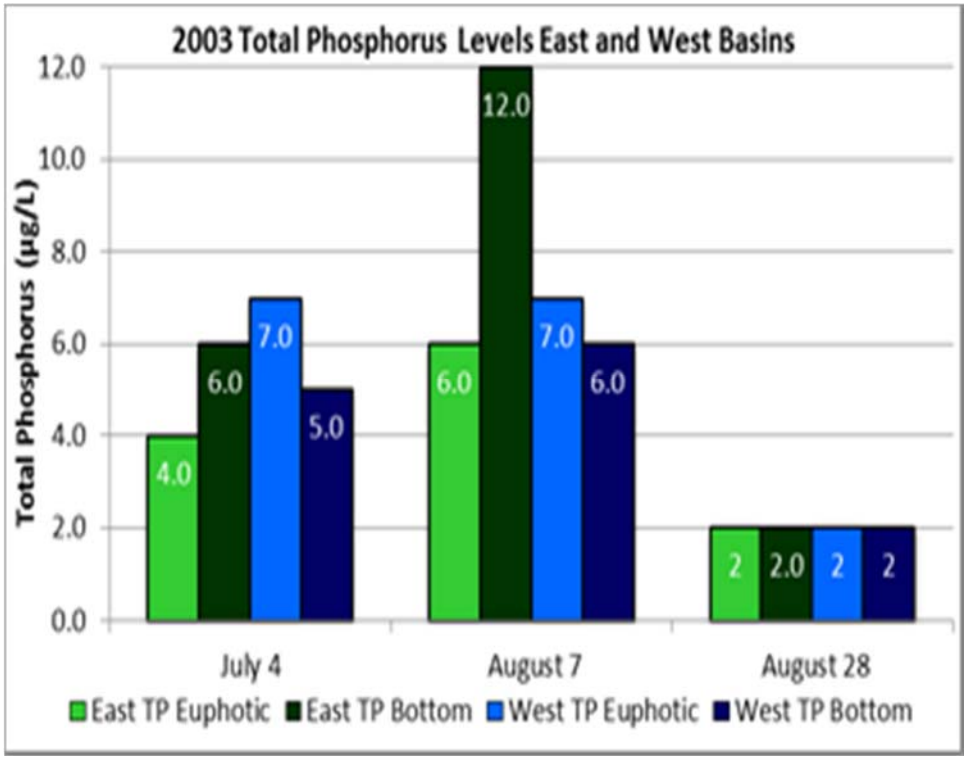


FIGURE 11: 2003 TOTAL PHOSPHOROUS LEVELS

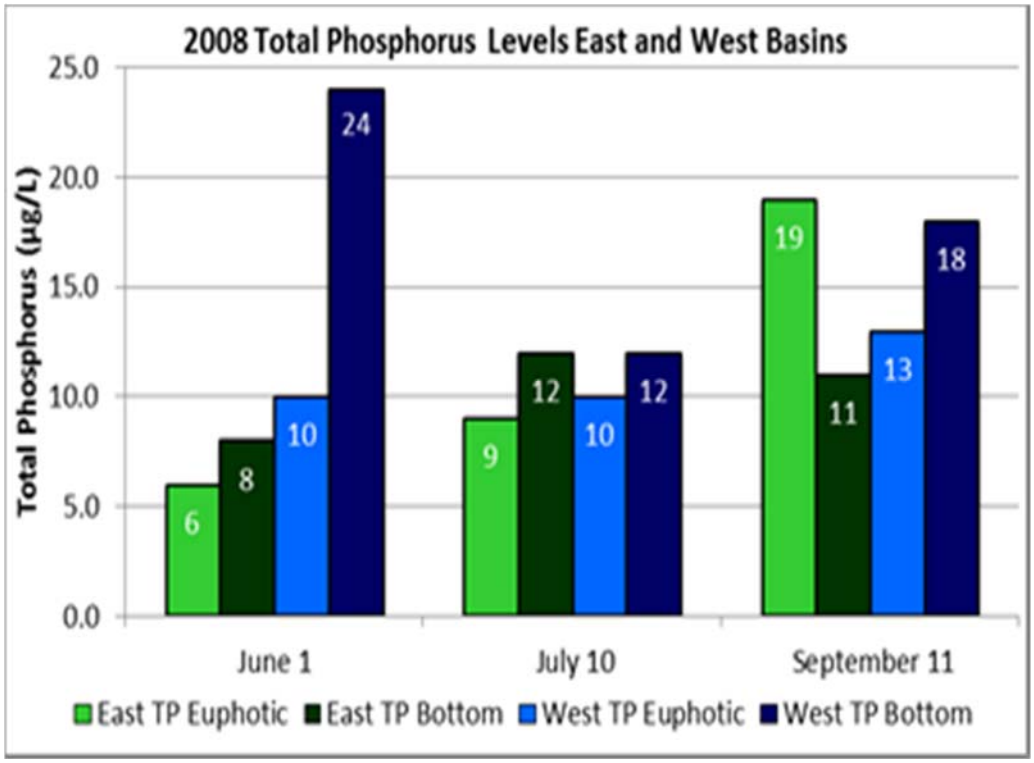


FIGURE 12: 2008 TOTAL PHOSPHOROUS LEVELS

As the figures show, the phosphorus levels for Kashwakamak Lake fluctuate between Mesotrophic and Oligotrophic status. In 2003 the majority of the samples were under 10 µg/L, with the late August samples being the lowest at 2 µg/L. The only sample which was above the Oligotrophic threshold of 10 µg/L was the TP Bottom East Basin level, which was 12 µg/L, but that is still in the lower limit of the Mesotrophic range. More than half of the 2008 levels were above 10 µg/L, in the Mesotrophic range. The June 1 West Basin bottom sample was the highest at 24 µg/L, which is considered Eutrophic. Overall the average phosphorus levels of the lake stay under 20 µg/L, which is the Provincial Water Quality Objective for warm water lakes.

Chlorophyll *a*

Chlorophyll *a* is the green pigment contained in algae and aquatic plants that is used for photosynthesis. The Chlorophyll *a* concentration is used to measure the abundance of algae and potential plant growth in the water. The concentration of the chlorophyll is directly related to the amount of nutrients available in the water. If the concentration of Chlorophyll *a* is high, then it can be assumed that the nutrient levels in the water are high as well, promoting the abundant growth of the algae. High concentrations of algae and vegetation can also cause oxygen depletion in the lake. As the algae and vegetation die off, the decomposition uses up available oxygen, if there are more organisms the amount of oxygen needed for decomposition increases.

The collection of Chlorophyll *a* data began in 1974, when the first monitoring programs commenced. From 1974 to 2008 sampling was conducted 11 times, on a somewhat regular basis. The following **Figure 13** summarizes the data collected, displaying the average chlorophyll *a* concentration for each year. The pink shaded area represents the Oligotrophic range, the yellow shaded area represents the Mesotrophic range, and the orange area represents the Eutrophic range.

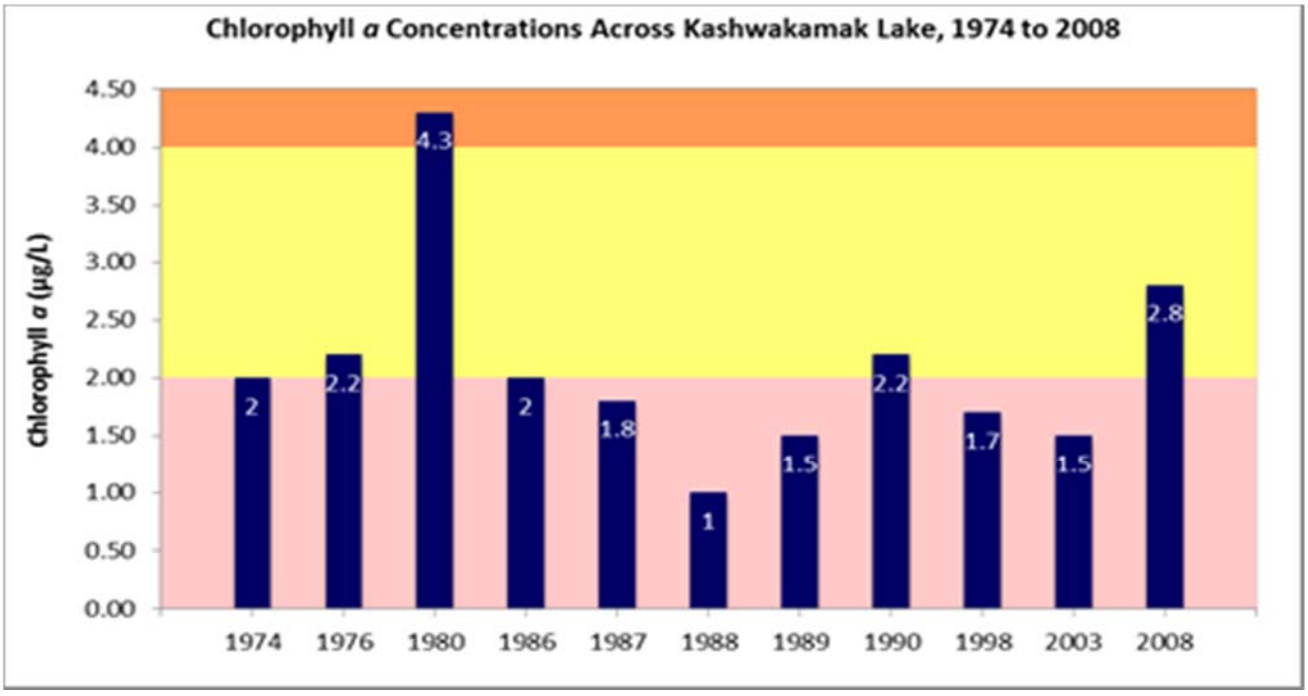


FIGURE 13: CHLOROPHYLL A CONCENTRATIONS, 1974 TO 2008

The majority of the data falls within the Oligotrophic range for chlorophyll concentration. In 1980 the concentration peaked quite high at 4.3 µg/L, which is classified as Eutrophic. However, the levels dropped back down in the mid-1908`1980s into the Oligotrophic range, where it reached the maximum low of 1 µg/L in 1988. In 2008 the concentration rose again to 2.8 µg/L, but that is within the Mesotrophic range, which is acceptable for the lake.

Chlorophyll concentration also fluctuates with the seasons. The concentrations are low in the late fall when vegetation has died and stopped growing and in the early spring before vegetation growth takes off. The mid and late summer months see the peak of chlorophyll concentration when plant and algae growth peak.

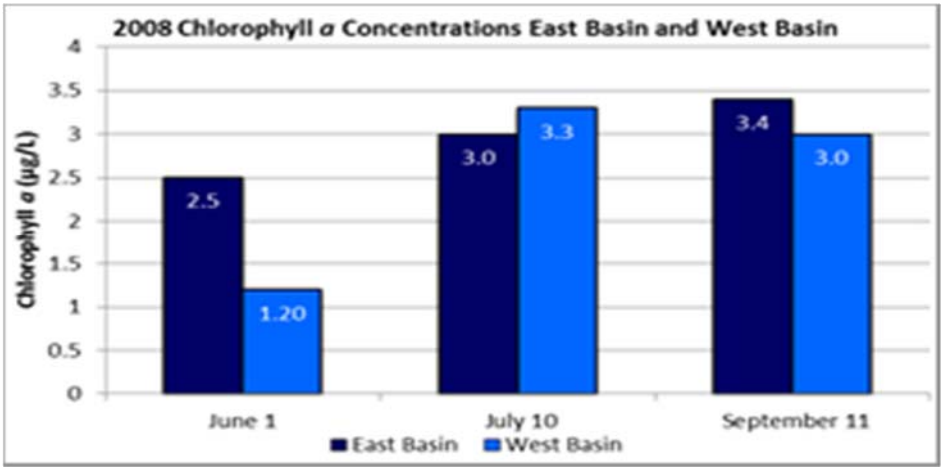


FIGURE 14: 2008 CHLOROPHYLL A CONCENTRATIONS

The data in **Figure 14** shows that the concentration of chlorophyll increases from early summer to early autumn. The West Basin concentration was much lower than the East Basin on June 1st; this may be because the East Basin is much deeper, which may cause dilution of the concentration of chlorophyll in the early summer months. The average chlorophyll *a* density for the two sampling stations was, 2.75 µg/L; indicating a moderate algal density for Kashwakamak Lake in 2008.

There is also a relationship between Secchi Disc depth and Chlorophyll *a* concentration; that being the concentration of the chlorophyll can affect the clarity of the water. The higher the concentration of chlorophyll, the more algae are present in the water. If particles are increased in the water there are more opportunities for light rays to be scattered when they penetrate the water surface, which decreases the overall clarity of the water. Figure 15 depicts the average Secchi Disc depth and average chlorophyll concentration for the years with available data.

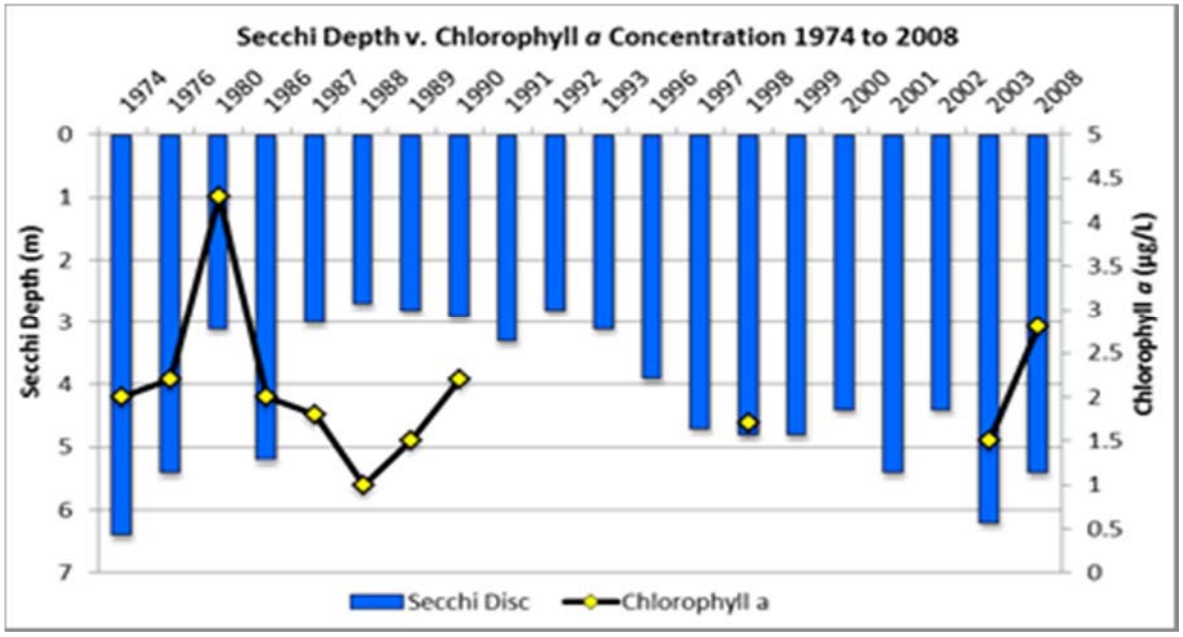


FIGURE 15: SECCHI DEPTH V. CHLOROPHYLL A CONCENTRATION, 1974 TO 2008

The trend in the data suggests that the concentration of Chlorophyll *a* can impact the water clarity, but is not the only variable influencing the clarity. There is some similarity in the data collected; the early sample year's show some correlation from 1974 to 1986 when the peaks and troughs of the data points correspond. The highest recorded chlorophyll concentration was in 1980 when the water clarity was reduced greatly from the previous year. Unfortunately chlorophyll sampling was not conducted on a regular basis from 1990 to 2000 so little data is available for analyzing water quality trends.

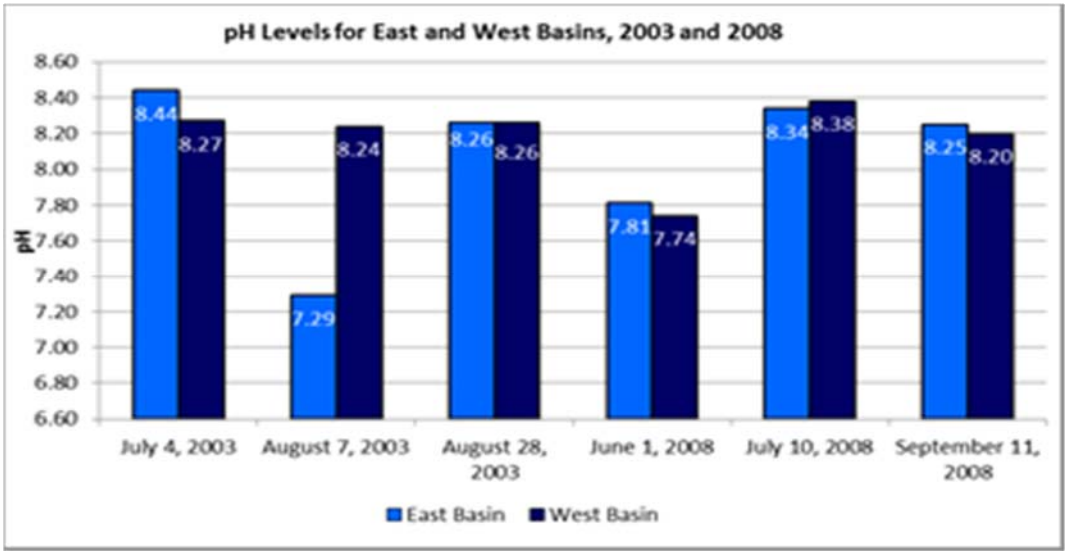
pH

The pH of the water is an important indicator of the suitability of the lake environment to support aquatic flora and fauna since every plant and animal has a pH range they are adapted to living within. The majority of organisms are adapted to a pH range of 6.5 to 8.0. If the pH of the lake goes outside of that range, either too acidic or too alkaline, the result is loss of species. The pH of the lake is affected by the amount of carbon dioxide (CO_2) that is in the water. If the concentration of CO_2 is high the pH will be lower, as CO_2 binds with water to form carbonic acid. The process of photosynthesis fixes or removes CO_2 from the water, so the more productive the lake environment (i.e. the more photosynthetic organisms present) the higher the pH should be. PH is also affected by the underlying geology of the catchment basin for the lake. For lakes that are situated on the Canadian Shield pH tend to be low because igneous rock is resistant to weathering processes and the soil that forms on it is acidic because it is mainly composed or organic matter, (much of which is derived from coniferous vegetation).

There is very little pH data available for Kashwakamak Lake. The only detailed data available was collected through the Watershed Watch program in 2003 and 2008. The lack of data makes it difficult to establish a historical trend or level of pH for the lake.

Kashwakamak Lake is situated on the Canadian Shield, which can make it more susceptible to acidification due to previously stated causes. **Figure 16** displays the available pH data for the lake; the data is separated into East Basin and West Basin pH levels for the years of 2003 and 2008.

FIGURE 16: PH LEVELS, 2003 TO 2008



The pH levels are consistently above 7.0 and within the Provincial Water Quality Objective range of 6.5 to 8.5. For the year 2008 sampling was more spread out, beginning the start of June and ending in mid-September. This spread of the data shows that pH levels tend to rise from spring to late summer or early fall. This is not surprising since the presence of photosynthetic organisms increases pH by removing CO_2 from the water, and there are more of those organisms present in the lake from July to September than in late May or early June. The majority of the pH levels for the lake are above 8.0, which leaves some buffering capacity against acidification of the lake water.

Temperature and Dissolved Oxygen

The concentration of dissolved oxygen in the water column is an important indicator for determining the fish species that can be supported in the lake environment. As the temperature of the surface water rises, the amount of dissolved oxygen in the water decreases, which affects the survivability of fish deeper in the lake. This is particularly important for cold water fish species such as Lake Trout, which spend summer months in the depths of the lakes. Kashwakamak Lake however, supports a warm water fishery, and warm water fish species are more tolerant of low oxygen levels than cold water fish species.

Dissolved oxygen concentrations are affected by the temperature of the water, (the ability of water to hold oxygen declines with temperature increase), as well as vegetation growth and mixing of the lake water. Decomposing aquatic vegetation at the bottom of the lake will consume available oxygen in the decomposition process. Excess vegetation growth such

as in Eutrophic lake conditions, can result in severely depleted oxygen as the amount of decomposing organic matter increases. Lake turnover is a contributing factor to dissolved oxygen, as the process mixes the bottom lake water with the top layers of the lake water in the spring and fall. This process replenishes the oxygen in the deep waters, but if the lake does not mix completely or experience full lake turnover, the oxygen levels in the bottom waters will remain low or depleted. After the spring turnover, in deep water lakes, the water will become stratified based on the temperature of the water and depth. The water will stratify into three layers; the Epilimnion (warm water zone where light penetrates and photosynthesis occurs at optimum rate), Thermocline (the transition layer between the mixed warm water layer of water near the surface and the deep water layer), and the Hyplimnion (water closer to the bottom of the lake where cooler temperatures maintain a more favourable level of dissolved oxygen for longer periods of time).

Figures 17, 18, 19 and 20 show the temperature and dissolved oxygen depth profiles for Kashwakamak Lake. There are two profiles for each of the sampling sites, East Basin and West Basin, for July and September of 2008. These readings represent current trends for dissolved oxygen and temperature in the lake. The light grey shaded area represents the Epilimnion, the medium grey area represents the Thermocline, and the dark grey area represents the Hypolimnion.

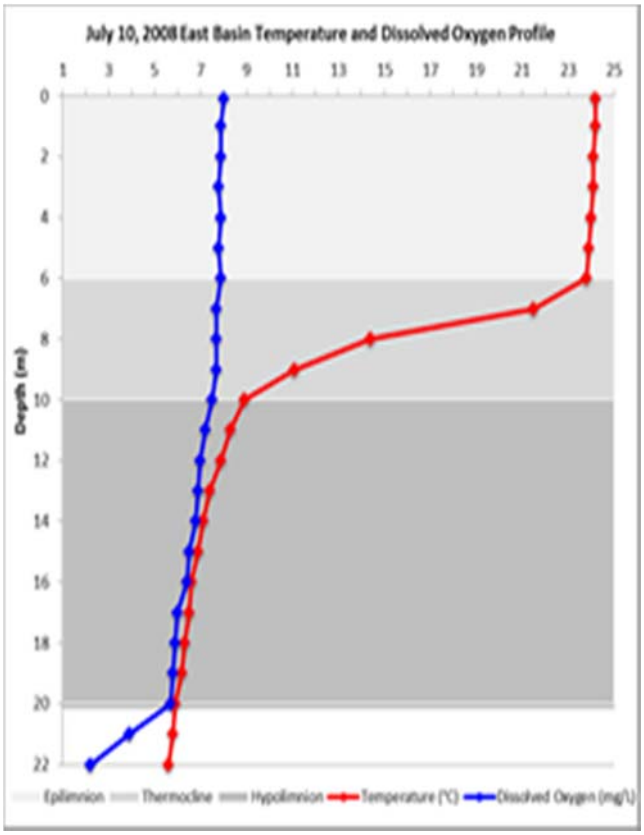


FIGURE 17: EAST BASIN, JULY 10 2008

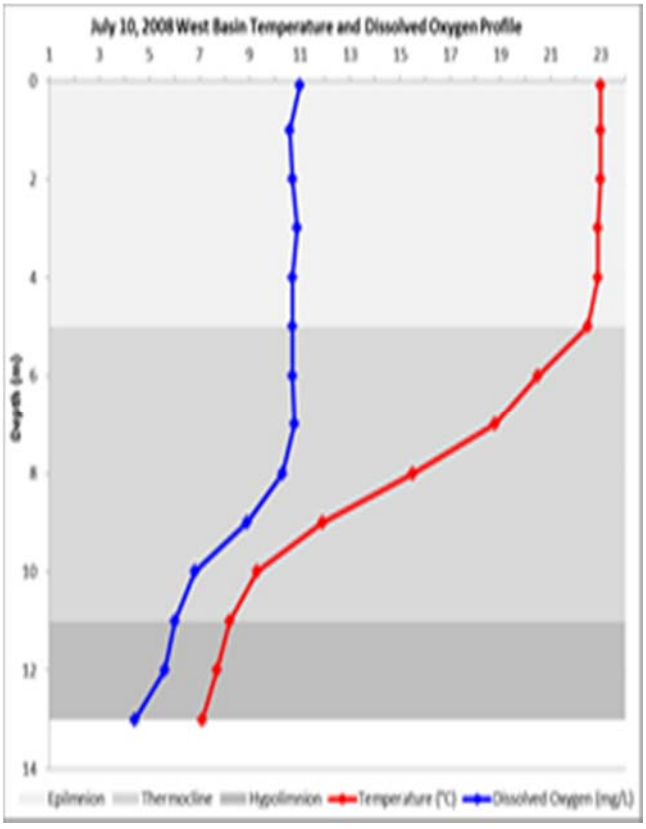


FIGURE 18: WEST BASIN, JULY 10 2008

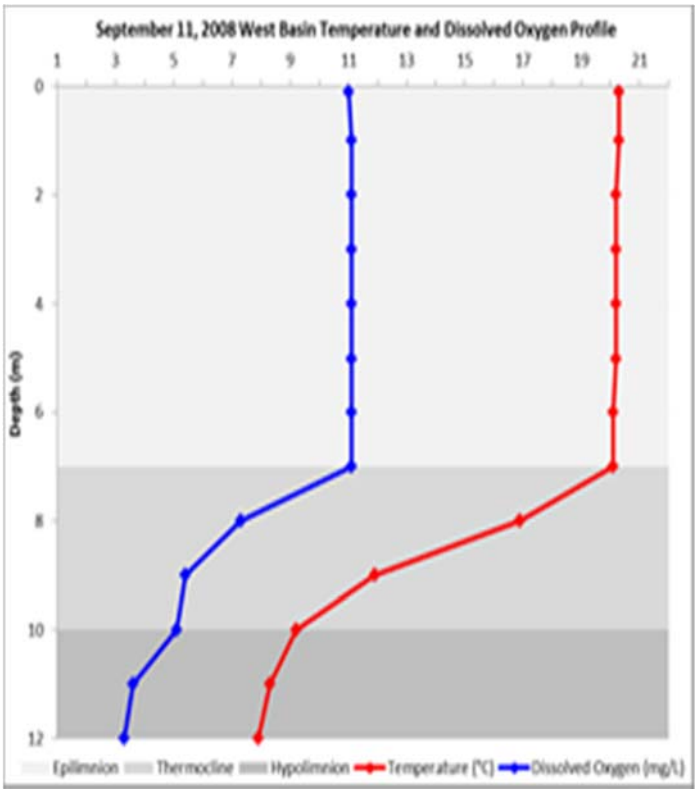


FIGURE 19: EAST BASIN, SEPTEMBER 11 2008

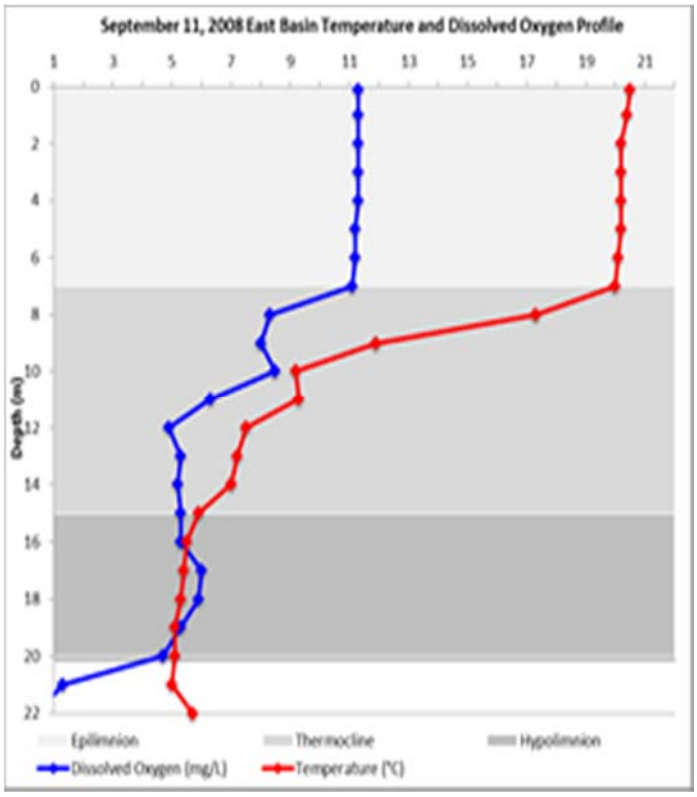


Figure 20: WEST BASIN, SEPTEMBER 11 2008

The Ontario Ministry of the Environment has set out objectives for dissolved oxygen in lakes, based on the oxygen requirement of the lake biota. The Provincial Water Quality Objective (PWQO) of dissolved oxygen for warm water biota is shown in Table 2:

TABLE 2: PROVINCIAL WATER QUALITY OBJECTIVES

Dissolved Oxygen Concentration		
Temperature °C	DO mg/L	% Saturation
0	7	47
5	6	47
10	5	47
15	5	47
20	4	47
25	4	48

These profiles show that Kashwakamak Lake does experience oxygen depletion in the deepest parts of the lake, in the Hypolimnion layer. PWQO states that >4 mg/L of dissolved oxygen is required for water <25° C. The East Basin in September has close to 0 mg/L dissolved oxygen. This is problematic for some fish species that require cooler water in the summer months, as the cool water layers are deficient in oxygen. Walleye and Northern Pike are classified as cool water fish species that prefer water below 23° C and 20° C, respectively. This is particularly detrimental to Lake Herring, who prefer cold water around 10° C. The dissolved oxygen concentrations for the July profiles indicate that Kashwakamak Lake has sufficient dissolved oxygen in most of the water column, excepting the bottom 1 to 2 metres of the basins. The September profiles reveal the lake experiences oxygen depletion in the late summer and early autumn in half of the Thermocline and most of the Hypolimnion. This oxygen depletion may affect the survivability of some fish species within the lake.

4.2 Invasive Species

Kashwakamak Lake was tested for invasive species in 2008**,** in particular for zebra mussels and spiny water flea, which was completed in partnership with the Ontario Federation of Anglers and Hunters. Kashwakamak Lake did **not** have zebra mussel veligers (larvae) present, however, spiny water flea were detected in the samples collected.

The pH of a lake can also determine if it will be invaded by zebra mussels. Lakes with pH above 7.3 are more sensitive to Zebra Mussel colonization; a higher pH means there is more calcium available in the water for the mussels to use to form their shells. Kashwakamak Lake currently has a high pH level, most often above 8.0, which makes it more vulnerable to the mussels. Fortunately, the last testing of the lake determined that zebra mussels are not present.

Mississippi Valley Conservation in partnership with the Ontario Federation of Anglers and Hunters, are sampling lakes in the Mississippi Valley watershed and surrounding area for invasive species such as zebra mussels, veligers and spiny water flea. These invasive species are harmful to the natural balance of the environment, causing native species to decline. Though there are not many aquatic invasive species in this area, the monitoring process continues each year with great success.

Rusty Crayfish are invasive species which are very aggressive towards native crayfish and the environment. Each year MVC monitors lakes and rivers in the watershed to see if Rusty Crayfish are present. Rusty Crayfish were last monitored on Kashwakamak Lake in the summer of 2011 at which time none were found.

Sixty-five percent (65%) of Kashwakamak Lake shoreline is developed and privately owned. Thirty-five percent (35%) remains undeveloped Crown Land. Some private land remains in natural state but this figure is unattainable at this time. Shoreline development impacts water quality

including fish habitat. Human activity accelerates the process. Erosion from boating and natural wind action along with shoreline vegetation and poor septic systems contribute to poor water quality including weeds and algae.

There has been a noticeable presence of a snail in the lake. This is a very easy identification because only one snail looks like the one pictured below, the Banded Mystery Snail, Viviparus cf. georgianus. It is native to North America but used to be more common in the USA. Some publications list this species as spreading into new territories in Ontario. "In the Great Lakes Region: The first record of this introduced species in the Great Lakes basin is from the Hudson River drainage, connected to the Erie Canal and Mohawk River, in 1867. It was later reported from the Lake Michigan watershed by 1906 and Lake Erie by 1914. Other records are from 1931 near Buffalo, Lake Erie and the Niagara River. The New York State Museum has records from the 1950s and 1960s from 11 counties. Mackie et al. (1980) list this species as recorded from Lake

Huron, but they do not give the date of establishment, or any references." [5] Some publications (MNR Ontario) do not list this species as a problem. It is not to be confused with the Oriental Mystery Snail which is not striped and agreed to be invasive from Asia.

The MVC sources[6] report the snails are a native species and the population boom is part of a natural cycle. Some have been noted in the west end of the lake; however a concentration of them in the east end of the lake probably has to do with wind and water currents pushing them that way. Given the extremely warm temperatures in the spring and early summer of 2012, it is suspected that the snails died as a result of a rapid increase in water temperatures, especially in shallow bays. The other explanation could be the presence of a predator, such as otters, mink or raccoons that often prey on snails and leave the shells in piles in the water. It is very unlikely that the die off was a result of any sort of pollution as many other organisms would have died prior to seeing any snails perish.

[5] http://en.wikipedia.org/wiki/Viviparus_georgianus

[6] Jacqueline Madill at the Museum of Nature, Erin MacDonald, Biologist MNR by email.

4.3 Sustaining Water Quality

Directly related to water clarity is the amount of nutrients, in particular phosphorus, entering the lake. The Provincial Objective for phosphorus levels in warm water lakes is 20 micrograms per litre (ug/L). In 2003, the mean for the two stations in the Euphotic zone (depth at which sunlight can penetrate or two times the secchi disc depth) was 4.67 *ug*/L, the 2008 reading is 11.15ug/L. The mean for the samples taken one metre off the bottom in 2003 was 5.5 *ug/*L, the 2008 reading is 14.15ug/L.

The mean for both sampling stations have increased from 2003, bringing both stations from Oligotrophic (few nutrients) to Mesotrophic (some nutrients).

Chlorophyll a is a measure of the algal density in the lake. The average chlorophyll a density for the two sampling stations was 2.75 *ug/*L thus indicating a moderate algal density for Kashwakamak Lake in 2008.

The dissolved oxygen (DO) and temperature data, measured at the two sampling stations, indicate adequate levels all the way to the bottom for most of the ice-out season. However, data collected in mid-September revealed that the DO readings in the East and West Basin were inadequate in the bottom two meters, for warm water fish species, such as pike and bass.[7]

4.4 Weeds and Algae

There is no specific research or documentation of weed growth in Kashwakamak Lake; however, there has been a noticeable increase in weed growth in the past 10 years.

Nutrient Loading

Nutrient loading is one of the main determinants of unsatisfactory water conditions which creates anxiety among lake residents. Weeds, algae, and water quality affect swimming which is one of the main pastimes of lake residents. This section outlines the various factors of nutrient loading.[8]

Eutrophication

Eutrophication is a natural lake aging process that, under normal conditions, takes thousands of years to occur. It is the process by which lakes are enriched by nutrients (usually phosphorus and nitrogen) which leads to excessive plant growth. If phosphorus concentrations in a lake are greater than 20 micrograms per litre, the lake is nutrient enriched or Eutrophic. Lakes that receive nutrients from human activities become "old" before their time. This accelerated aging is called cultural eutrophication.

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7 State of the Lake Report, 2008. Mississippi Valley Conservation Authority. http://www.mvc.on.ca/images/stories/Kashwakamak%20Lake%202008.pdf

8 www.greatersudbury.ca/cms/index.cfm?app=div_lakewaterquality&lang=en&currID=690

Eutrophication will result in a deterioration of lake water quality:

- Noxious algae (scums, blue-greens, taste and odour, visual)
- Excessive macrophyte growth (loss of open water)
- Loss of water clarity (secchi depth goes down)
- Low dissolved oxygen levels (loss of habitat for fish and fish food)
- Excessive organic matter production (smothering of eggs and insects)
- "Toxic" gases (ammonia, H2S) in bottom water (more loss of habitat)
- Drinking water degradation
- Poor lake aesthetics
- Possible decrease in lakeshore property value

Algae

Filamentous algae sometimes called "pond scum," is a common and troublesome aquatic weed that forms dense, hair-like mats. The algae forms on shore bottom sediments or submerged objects in lakes with good transparency where light reaches the bottom. Loading excessive nutrients into a lake will speed up its natural eutrophication process. Algae blooms can be minimized by reducing or eliminating the amount of nutrients (phosphorus and nitrogen) from man-made sources such as lawn fertilizers, faulty septic systems, run off from agricultural fields and construction sites, soil erosion and phosphorus-rich detergents.

Blue Green Algae

Cyanobacteria (better known as blue-green algae), in our lakes and rivers across Canada and the US is a very serious problem. It is also a fairly common problem in the summer. Warm, still, stagnant water with too much nutrient will result in blue-green algae.

Blue-green algae is serious because the toxins produced by the algae can cause liver or nervous system damage to humans who touch or drink contaminated water, or eat infected fish or birds. It can have deadly consequences to wildlife and pets. The problem is becoming more and more common.

Currently there are warnings of blue-green algae in Alberta, Saskatchewan, Manitoba, Quebec, and Ontario watersheds in addition to warnings in the United States. Although the chain reaction causing blue-green algae is natural, people precipitate the problem.[9] Blue-green algae has never been reported in Kashwakamak Lake.

[9] The Waterkeeper. http://www.waterkeeper.ca/2011/08/17/blue-green-algae-is-a-very-serious-very-solvable-problem/

Water Weeds

Many native species of aquatic plants, and some non-natives, form mini-forests underwater where fish find shade, protection, food, and places to lay eggs or build nests. Aquatic plants provide "services" for human beings too. They help clarify lake water and slow the action of waves that erode shorelines. Healthy aquatic plants also make it less likely that algae will take over a lake, which can result in smelly surface scum that can even be toxic.

Ultimately, too much of this algae can lead to drastic changes in the health and appearance of our lakes.

5. Shoreline Erosion

At this time, there is no evaluation of Kashwakamak Lake erosion conditions; however, anecdotal observations show that banks are slowly being undercut as demonstrated by overhanging trees that eventually over time fall into the lake. Having greater exposure of rocky ledges also show that erosion is a fact of life on the lake, albeit moving slowly.

The protection of fish, wildlife, their habitats and water quality depends upon the protection of vegetated lake shores to:

- protect root systems that stabilize shorelines and maintain natural bank geometry,
- sustain a natural source of fish food in the form of leaf litter and insect drop,
- maintain cover and shade for predator avoidance and temperature moderation in shallow near shore rearing areas,
- reduce the introduction of sediment and non-point source pollution into the lake, and
- provide critical habitats for many wildlife species, especially amphibians, raptors and cavity dependent species.

[10] Aquatic Plants Guide. Kawartha Lakes Stewardship Association (KLSA) 2009. http:/ www.lakefieldherald.com/

Lakeshore stabilization refers to work undertaken to protect or amour a bank or shore from erosion. Erosion processes along lakeshores are similar to streams. They can occur naturally, from the ongoing action of waves dissipating their energy against erodible banks, and can be worsened by increased water levels, wave action associated with boat use, other human activities, including vegetation removal.

5.1 The Consequences of Erosion

Shoreline erosion has many consequences on the aquatic environment, including habitat destruction, an increase in sedimentation and in turbidity of the water, and the release of nutrients (phosphorous and nitrogen) that promote algal blooms. As well, shoreline erosion can result in the loss of land and affect shoreline property values.

The significance of each factor varies and may depend, among other things, on the size of the watercourse. In larger channels, boat wakes have relatively little impact compared with streamflow, as they make up only 2% to 5% of the annual energy dissipated against the banks. The opposite is true in smaller channels where wake accounts for between 95% and 98% of the energy (Hill et al., 2002).[11]

Recreational boating in small channels, then, has a considerable impact. Where craft navigate is therefore very important. However, it is important to keep in mind that other factors may increase the impact of erosion.[12]

11 http://www.marinfo.gc.ca/en/dossiers/erosion_des_berges.pdf

12 W. Glamore, A Decision Support Tool for Assessing the Impact of Boat Wake Waves on Inland Waterways. http://www.pianc.org/downloads/dwa/Wglamore_DPWApaper.pdf

The magnitude of the waves generated by a boat depends on different factors, particularly the boat's speed, its size, passenger/cargo loading, the shape of its hull, distance from shore and water depth. Wave height is one of the most important factors in shoreline erosion.

Kashwakamak Lake is for the most part narrow with the result that boaters need to be aware of their wake, proximity to the shoreline, and take appropriate precautions. The slowest speed of a boat (displacement speed) causes the least wake, powering up (transition speed) causes the largest wake, and at near full throttle (planing speed) causes a medium wake.

The North Frontenac Official Plan (unapproved at time of publication) will require waterfront lots to include a 50 ' undisturbed buffer zone along the shoreline leaving only a maximum of 25% or 75' (whichever is less,) of the lot for access to the water. While this regulation applies to newly severed lots, it is the best practice for waterfront properties to restore cleared shoreline to this standard.

6. Flora, Fauna, and Wildlife

6.1 Flora

Kashwakamak Lake falls in the northern portion of the Mixed Wood Plains ecozone. Of special note Kashwakamak lies just north of one of the world's "Areas of Natural Science Interest" containing many of Southern and Northern Ontario's wildlife and fauna.

Photo Milt Houle

Limited deforestation and little to no industrial build up, supported by large tracts of Crown Land, rugged terrain and on the whole a cottage community that keeps a low profile and natural frontages has meant there is a diverse ecological area surrounding Kashwakamak Lake.

North Frontenac Township

Endangered Species	Threatened Species	Special Concern Species	Rare Species
Golden Eagle	Blandings Turtle	Red Shouldered Hawk	Prairie Warbler
Bald Eagle	Least Bittern	Corulean Warbler	Houghton's Umbrella Sedge
Henslow Sparrow		Five Lined Skink	Drooping Blue Grass
			Purple Stemmed Cliffbreak
			Limestone Oak Fern
			Zebra Clubtail Dragonfly
			Rams Head Lady's Slipper

Note: Photos available on North Frontenac web site www.northfrontenac.ca/leisure-wildlife.html

The lake area supports a proliferation of unique plant, animal and bird species. There is a biodiversity that is enjoyed by the residents, neighbours and users of the lake. This unspoiled habitat supports all the following species of which some are endangered, threatened, special concern, and rare species.

Warming climates and the restoration of some extinct species has meant a changing ecosystem. Many species that were not here in times past have taken residency creating an even more colourful floral and wildlife profile.

6.2 Forests

The Kashwakamak Lake area is surrounded by large tracts of Crown Land that is mostly forested. The area is geologically controlled by the Canadian Shield and is covered with a diverse mixture of hardwood and conifer forests. The forests are considered a transition between Carolina forest and the Great Lakes St. Lawrence Lowland forest.

The species that are native to our area are:

American Mountain Ash, Balsam Fir, Black Cherry, Black Spruce ,Bur Oak ,Eastern Hemlock, Eastern White Cedar, Eastern White Pine, Jack Pine, Peachleaf Willow, Pin Cherry, Red Maple, Red Oak, Red Pine, Shagbark Hickory, Snowy Mountain Ash, Silver Maple, Sugar Maple, Tamarack (Eastern Larch), Trembling Aspen, White Birch, and White Spruce.

These forests are managed by the Mazinaw-Lanark Forest Inc. in cooperation with the Ministry of Natural Resources. Three silviculture systems are used when harvesting these forests including Selection Silviculture, Shelterwood Silvicuture and Clear cut. Selection and Shelterwood are applied 40 % of the time, with clear cut making the remaining 20 % of the harvest.

1. Selection Silviculture is suited for shade tolerant hardwood forests and forest stands dominated by Eastern hemlock. Selection involves tree marking individual tree stems for harvest with the objective of improving tree quality and stand structure while maintaining important wildlife habitat features, such as cavity trees and mast trees (trees such as oak which produce nuts that wildlife depend on for food).
2. Shelterwood silviculture is practiced in forest stands that contain a sufficient amount of species that are mid-tolerant of shade. Species such as white pine and red oak are often managed this way by harvesting the stand in three or four progressive harvests while establishing seedlings in the lightly shaded conditions. The final removal of over story trees is ready when seedlings are established well enough to grow in full sunlight.
3. Clear cut is best suited to tree species that are intolerant to shade such as poplar, white birch, red maple, red pine or white spruce. The objective is to create a full sunlight condition for the trees that intolerant to shade conditions. Seed Trees are maintained to provide seeds for regeneration. Tree planting usually follows this type of tree removal.

The most common use of wood products are saw logs, pulp and paper, veneer and personal fuel wood.

Mazinaw-Lanark Forest Inc. maintains a Sustainable Forest Licence and is required to prepare a ten year Management Plan. This is available to view for any who are interested. (See Cloyne Community Centre)

7. Lake Development

7.1 Crown Land

Kashwakamak Lake is fortunate to have large tracts of Crown Land along much of its shoreline. It is estimated that 35% of the lands fronting onto the lake are Crown. This estimate does not include the un-purchased 66 foot shore road allowance in front of privately owned properties. These lands are managed by the Ontario Ministry of Natural Resources (OMNR) under their Crown Land Policy. The policy directs the management of various activities including: commercial activities such as aggregate extraction, timber harvest, fur harvest, mineral exploration, etc.; resource management activities such as Crown Land disposition and road development; and recreational activities such as hunting, road use, sport fishing and camping. **Figure 21** below shows the location of Crown Land on the lake.

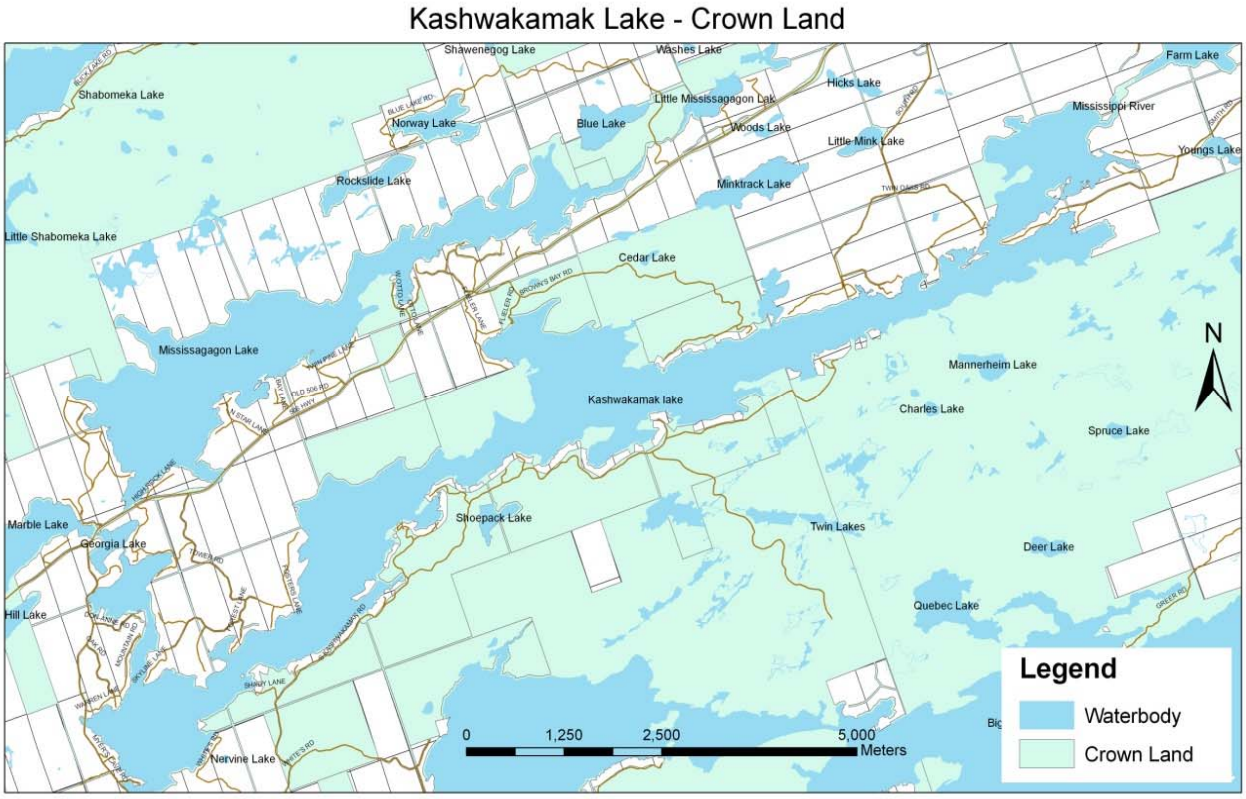


FIGURE 21: MAP OF CROWN LAND

7.2 Campsites

Under Agreement with OMNR, the Township of North Frontenac manages 19 established campsites on the Crown Land around Kashwakamak Lake. The campsites were originally established through the Mississippi River Canoe Route and as a result all of the sites are water access only and about half are located on islands. Camping is allowed by permit from May 1st to October 1st.

7.3 Severances/Development

Cottage lots were originally severed and sold by the Crown starting in the late 1950s. Since that time, development on Kashwakamak Lake has taken the form of piecemeal lot creation through the severance of individual parcels from larger farm holdings or through the dividing of some of the larger Crown Land severed lots. Information dating back to 1985 shows that severance activity has continued to take place with a peak of 83 lots created between 1985 and 1995, followed by a decrease in severance activity between 1996 and 2005 when 12 lots were severed. This was followed by a slight rise between 2001 and 2010 when 27 lots were severed. To date, there have been no large scale residential developments, such as subdivision or condominium type development on the lake.

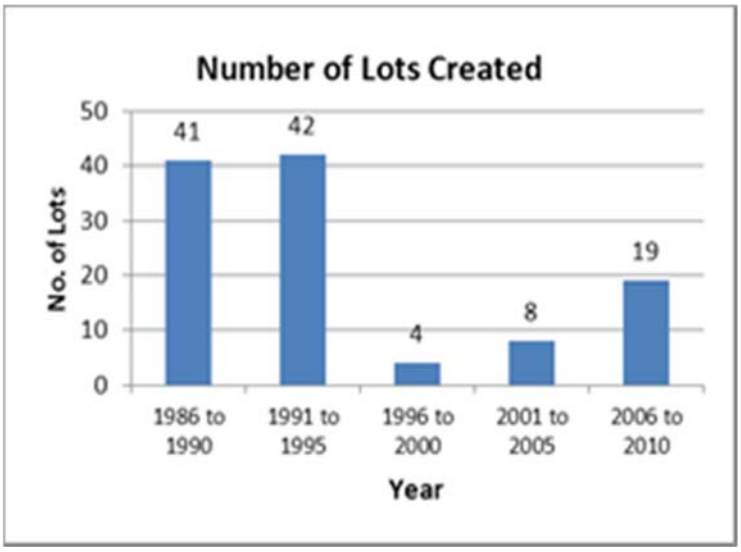


FIGURE 22: SEVERANCE ACTIVITY 1986 TO 2010

7.4 North Frontenac Residential Waterfront Zoning By Law for Kashwakamak Lake

The Township of North Frontenac Zoning By-law No 15-06, adopted by Township Council in December 2003 sets out the specific zoning and provisions that regulate the use of land, dwelling, and accessory structures within the Township. The Zoning By-law is currently under review and is undergoing updates to ensure that is it consistent with changes to the Official Plan. With regards to Kashwakamak Lake the majority of the waterfront lots in use are 'Waterfront Residential' (RW). The back lots on Kashwakamak Lake are considered ' Rural' (R) or 'Limited Service Rural'(LSR) and tourist or resort operations(trailer parks, lodges, marinas etc.) are zoned as 'Tourist Commercial' (TC).

Uses permitted in the 'Waterfront Residential' zone include a dwelling (single detached, seasonal, or mobile home), group home, home based business, marine facility, mobile home, park, parking area, public service use, public utility and shoreline structures. Despite the maximum number if dwelling units allowed in the Waterfront (RW) Zone, apartments-in-a-house shall be

permitted in accordance with Section 4.2 of the Draft By-law 15-04, June 2011. Table 3 shows zoning provisions passed in the Township of North Frontenac Zoning By-law No. 15-04, July 6, 2004 compared to zoning provisions proposed in the Township of North Frontenac Zoning By-law No. 15-04 Draft, June 2011.

The zoning provisions are generally the same with some exceptions regarding lot area, water frontage and lot coverage of accessory buildings which sets out the maximum lot coverage and size of accessory buildings. Lot area in Zoning By-law No. 15-04, 2004 is set at 4000m^2(0.98ac), this provision has yet to be decided in the 2011 draft. The provision regarding water frontage has been proposed to see an increase from 45m (147.6ft) to 61m (200 ft.) or 91m (300ft) for a narrow water body channel which is defined as "any water body where the perpendicular distance across from the shoreline is 200m (656ft) or less". Lot coverage of main buildings is proposed to remain unchanged, but accessory building lot coverage is proposed to decrease from 5% to 3%. The Township Planner recommends the adoption of the Provincial Best Practice of 1 hectare for a lot size which will leave size of accessory buildings the same but will occupy less of the total lot size with a 0.2 hectare increase. Accessory buildings with water frontage may be permitted to have a front yard size of 30m (98.4ft), if not the size remains 7m (22.9ft). Lot size and waterfront length are very important provisions in the By-laws because they limit and control the development around a lake.

Apartments shall be permitted in accordance with section 4.2, *Accessory Residential use,* to a single detached or semi-detached dwelling provided that parking requirements are can be met (Section 4.30 and 4.31 North Frontenac Zoning By-law Draft 2011). Apartments-in-a-house shall be considered *dwelling units* for the purposes of this By-law and may be rented out to the public for gain or profit.

Township of North Frontenac Zoning By-Law Provisions Related to Dwelling and Accessory Structures on Residential Waterfront Lots

	North Frontenac (Zoning By-Law No. 15-04 2004)		**North Frontenac (Zoning By-Law No. 15-04 2011 Draft)**	
Zone	Waterfront Residential (RW)			
Lot Area	4000 m^2(0.98 ac)		To be decided	
Water Frontage	45 m (147.6 ft.)		61 m (200 ft.) 91 m (300 ft.) for narrow water body channel	
	Main Building	**Accessory Building**	**Main Building**	**Accessory Building**
Lot Coverage	15%	5%	15%	3%
Front Yard	30 m (98.4 ft.)	7 m (22.9 ft.)	30 m (98.4 ft.)	With water frontage: 30 m (98.4 ft.) Without: 7 m (22.9 ft.)
Exterior Side	7 m (22.9 ft.)	7 m (22.9 ft.)	7 m (22.9 ft.)	7 m (22.9 ft.)
Interior Side	3 m (9.8 ft.)	3 m (9.8 ft.)	3 m (9.8 ft.)	3 m (9.8 ft.)
Rear Yard	7.5 m (24.6 ft.)	3 m (9.8 ft.)	7.5 m (24.6 ft.)	3 m (9.8 ft.)
Setback from High -water Mark	20 m (65.6 ft.)		30m (98.4 ft.)	

Township of North Frontenac Zoning By-Law Provisions Related to Dwelling and Accessory Structures on Residential Waterfront Lots (continued)		
	North Frontenac (Zoning By-Law No. 15-04 2004)	**North Frontenac (Zoning By-Law No. 15-04 2011 Draft)**
Zone	Waterfront Residential (RW)	
Shoreline Occupancy Provisions	No shoreline structure shall be permitted within a depth of 20 m (65.6 ft.) from the shoreline except a boat house, boat port, float plane hangar, dock or wharf.	No person shall erect any building or structure in the Waterfront Residential (RW) Zone unless the lot upon which such a building or structure is to be erected has *frontage* onto and direct asses to pubic street or private lane, except a boat house, boat port, float plane hangar, dock or wharf.
Building Height	Main Building: 10 m (32.6) Accessory Building: 6m (19.7 ft.) Boat House: 1 storey	
Decks	Maximum of one gazebo and viewing stand per lot is permitted. Additional provisions shall not apply to such structures where they are set back 5 m (16.4 ft.) from the high water mark	A maximum of one gazebo or viewing deck or platform per lot is permitted. Additional provisions shall not apply to such structures where they are set back 5 m (16.4 ft.) from the high water mark.
Dwelling unit area	Single, detached, mobile home, seasonal or group home (1)	Single, detached, mobile home, seasonal or group home (1). Apartments in a house shall be permitted in accordance with Section 4.2(*Accessory Residential Uses)*
Docks	Non-toxic materials. Limited to floating, cantilevered or post dock construction. Shall not exceed 2.4 m (7.84 ft.) in width or 10 m (32.8 ft.) in length.	
Sleeping Cabins	A maximum of one Sleep Cabin per lot shall be permitted as an accessory use to a main permitted seasonal residential or waterfront residential dwelling. Shall not exceed 18 m^2 (193.7 ft^2)	A sleep cabin or a loft above a detached garage shall comply with the provisions of Section 4.2 (*Accessory Residential Uses)*
Marine Facilities	No shoreline structure which will destroy fish habitat will be permitted. The gross floor area of a boat house or boat port shall not exceed 38 m^2 (409.1 ft^2).	No shoreline structure which will destroy fish habitat shall be permitted. The gross floor area of a boat house or boat port shall not exceed 38 m^2 (409.1 ft^2).
Private ROW setback		
Swimming Pools	Private Swimming Pools, both above-ground and in-ground both open and covered shall be permitted subject to any By-law of the township regarding swimming pools and following requirements in section 4.1.2	Private swimming pools, both above ground and in-ground both open and covered *and including inflatable pools* shall be permitted subject to any of the By-law of the Township regarding swimming pools in section 4.1.2

TABLE 3: WATERFRONT RESIDENTIAL ZONE REGULATIONS FOR THE TOWNSHIP OF NORTH FRONTENAC

7.5 Land use on Kashwakamak Lake

Land use on Kashwakamak Lake is primarily used for residential purposes with seasonal cottages comprising the majority of shoreline structures. The Township of North Frontenac Zoning By-Law No.15-04 sets out provisions for new waterfront development and ensures minimum setbacks from the lake are followed. Responsible land use on Kashwakamak Lake is important for the overall health and sustainability of the lake.

Lot inventories on Kashwakamak Lake were conducted to determine the state of land use around Kashwakamak Lake and to assess existing waterfront developments proximity to the lake shoreline. As discussed in the previous section, the current provisions within the North Frontenac Zoning By-Law No. 15 draft 2011 state that the setback for new waterfront development, excluding marine facilities, be 30 metres. This is an increase from the 2004 Zoning By-Law which states that main building setbacks be 20 meters. The lot inventories determined that a total of approximately 133 lots contained main building structures within 15 meters of the shoreline. The majority of main building structures were found to be within 30 meters of the shoreline with approximately 241 such structures being identified. Approximately 82 lots with main building structures beyond 30 meters from the shoreline were also identified during lot inventories. The Kashwakamak Lake Association states that there are approximately 450 cottages and 6 camps or lodges are present on the lake. The lot inventory accounts for 456 lots with main building structures on Kashwakamak Lake.[13]

Development Status of Property	Number of Properties
Structure Beyond 30 m from Shoreline	82
Structure Between 15 m and 30 m of Shoreline	241
Structure Within 15 m of Shoreline	133
Multiple Structures on Property	13
Vacant Property	62
Total Properties	**531**

FIGURE 23: DEVELOPMENT STATUS OF PROPERTY ON KASHWAKAMAK LAKE

7.6 Algonquin Land Claim

Algonquin communities are located in the general vicinity of: Ardoch, Bancroft, Golden Lake, Mattawa, North Bay, Ottawa, Sharbot Lake and Whitney. The Algonquin Land Claim, which started negotiations between the Algonquins of Ontario, the Government of Canada and the Government of Ontario in 1991, covers a territory of 36,000 square kilometres, and includes several large tracts of land in the Township of North Frontenac. Following more than twenty years of negotiation, the Ontario Algonquin Land Claim Agreement-in-Principle was released to the public in December 2012. It sets out the main elements of a potential settlement which is still a number of years away. Public information meetings will be held in 2013. Go to www.ontario.ca/landclaims for up to date information.[14]

13 Kashwakamak Lake Association. http://www.kashwakamak.ca/

14 See www.ontario.ca/landclaims" and Frequently Asked Questions and Executive Summary - Algonquin Preliminary Draft Comprehensive Land Claim Agreement in Principle," Dec, 2012

8. *Septic Systems & Water Source Inspectors*

8.1 Private On Site Servicing (Septic Systems)

The properties around Kashwakamak Lake are serviced by private water and sanitary sewage disposal systems (wells, individual water intakes, and septic systems). Much of the concern about water quality today is related to either phosphorus loading or bacterial contamination. Shoreline development and the associated sewage treatment systems that have been installed over the years are of particular concern.

As the average age of homes and cottages around the lake increases, their septic systems age too. Older septic systems, privies and grey water pits often do not meet current standards and are prone to malfunction, potentially releasing untreated sewage containing both phosphorus and harmful bacteria directly into the water table or lake. Untreated runoff from improperly functioning septic systems can impact the lake's water quality. Renovations or conversions of cottages can lead to a higher demand on these systems (through the installation and use of dishwashers, showers and baths, laundry facilities) and can increase the possibility of system failure. However, major renovations or building of permanent houses results in updated wastewater systems (and in some cases tertiary, rather than conventional systems) being installed. Even with new systems, proper maintenance and water conservation is required to ensure the system works properly.[15,16]

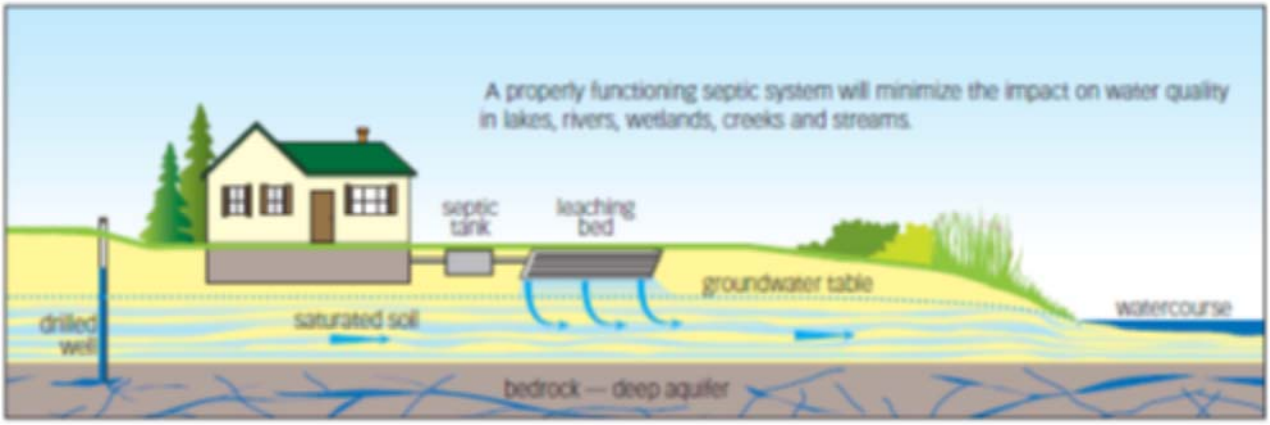


FIGURE 24: DIAGRAM OF A SEPTIC SYSTEM

Source: Septic Smart: Understanding Your Home's Septic System [17]

15 Report on the State of Otty Lake and its Watershed, Otty Lake Association, May 2007

16 Draft Report on the State of Pike Lake and its Watershed, Pike Lake Community Association, July 2009

17 Septic Smart: Understanding Your Home's Septic System http://rvca.ca/news/septicsmart/Septic_Smart_English.pdf

The improper maintenance and use of sewage treatment systems around the lake can have detrimental effects on drinking water sources, which can lead to potential human health concerns and impacts to overall lake health. Nutrient and bacteria rich effluent can travel through soil and rock fractures to surface water bodies, and ground water sources. Contamination of surface water can cause excess aquatic plant growth, depletion of oxygen in lakes, and alteration of the natural habitat of fish.

Symptoms of a failing septic system include, drains slow down, toilets back up, sewage smell, grass over system is unusually green or spongy, bacteria or nitrate contamination showing up in drinking water test, and surface ponding of effluent. Regular maintenance is key to the longevity of any system, and replacement is inevitable at some point in time.

8.2 Septic System Approvals, Placement and Replacement

In the Township of North Frontenac the permitting and regulation of private residential septic systems is administered by Kingston Frontenac Lennox and Addington Health Public Health (KFL&A Public Health) under authority of the *Building Code Act* (BCA) (1992). Part 8 of the Ontario Building Code (OBC) regulates the design, construction, operation and maintenance of sewage systems. The OBC regulation applies to systems with a design flow of less than 10,000 Litres/ day, serving no more than one lot.

The KFL&A provide permits for new and replacement septic systems and they enforce the provisions of Division B Part 8 of the Ontario Building Code 350/06. A permit to install or construct a sewage system is required in order for municipalities to issue a building permit. An application, including the design and layout of the proposed system and components (lot lines; existing, proposed, or neighbouring wells; the building footprint; driveways; and roadways) must be submitted. Public health inspectors review each application and will inspect the site to assess the soil conditions and review the requirements of the Building Code.

Large scale development requiring larger sewage systems with a design flow greater than 10,000 Litres/day are regulated by the Ministry of the Environment (MOE), under the *Ontario Water Resources Act*. The MOE also has the responsibility for enforcing the *Environmental Protection Act, Nutrient Management Act; Ontario Water Resources Act* and the *Environmental Assessment Act*. The MNR is responsible for enforcing the *Lakes and Rivers Improvement Act*.

While the Township of North Frontenac Zoning By-law (By Law No. 15-04) requires a 30 m setback from the water for all new septic systems, where that cannot be achieved it also offers an opportunity for a lesser setback (in no case less than the OBC 15 m minimum). Through approval of a Minor Variance application, a setback of less than 30 m but greater than 15 m may be allowed. In making its determination a municipal Council may consider other factors, the goal being to achieve an environmental net gain through a combination of measures:

- Physical site constraints
- Options to enlarge lot to allow compliance
- Alternative Treatment
- Introduction of vegetation to mitigate impact

8.3 Septic System Re-Inspection

A working sewage system is an integral part of any functioning home or cottage not serviced by the municipal sewer. As such, proper maintenance and operation of the sewage system is integral to the continued life of the system.

In 2005, the Township of North Frontenac entered into an agreement with the Mississippi-Rideau Septic System Office (MRSSO) to implement a voluntary, targeted septic re-inspection program on a trial basis. The program helps to ensure individuals are accountable for the proper functioning of their septic system so that it is not a health or environmental risk to the community. It also educates the public about the importance of septic system maintenance and protecting surface and groundwater quality, (MRSSO, 2007).

At the start of each season, the Re-Inspection Program staff mail out a questionnaire to selected property owners. Once the questionnaires have been returned, homeowners are encouraged to make an appointment for re-inspection. When the property owner returned correspondence to the MRSSO, a site visit is made and a tank inspection and visual inspection of the distribution field are completed If the homeowner is insistent that their septic tank not be excavated, only a visual inspection of the property is completed. In situations requiring further attention, the KFL&A Health Unit is mailed a copy of the septic re-inspection to provide enforcement accordingly.

With the introduction of the Septic Reinspection program in North Frontenac in 2005, Kashwakamak Lake was selected as the first lake to receive inspections as it is one of the most populated lakes in North Frontenac. It was through the effort of Elma MacLachlan that the program was initiated. In the first year of operation in 2006, 30 properties around Kashwakamak Lake were inspected. The following year inspections were carried out on both Kashwakamak Lake and Big Gull Lake and in the third year (2008) the program expanded to include Mazinaw Lake. Since that time the program has continued to expand geographically in carrying out inspections on a number of other lakes in North Frontenac. Between 2005 and 2012, a total of 144 properties around Kashwakamak Lake have been inspected as part of the North Frontenac Septic Re-inspection Program. The results of those finding are summarized in Table 4.[18]

Condition of Septic System	Number of properties
No Concern	55
Remedial Work Required	74
System Replacement recommended	0
More Information required	15
Total inspected	**144**

Table 4: Kashwakamak Septic System Re-Inspections 2005 to 2012

(Source: Mississippi-Rideau Septic System Office, Eric Kohlsmith)

[18] North Frontenac Township On-site Wastewater Disposal System Re-Inspection Program Annual Reports (2005 to 2012), Mississippi-Rideau Septic System Office (MRSSO), (For more information about the program, contact the Mississippi-Rideau Septic System Office 1-800-267- 3504)

Based on re-inspection activities on the lake, it is assumed the primary sewage systems used on the lake is the Class 4 system (leaching bed systems) with some properties still maintaining a Class 1 system (privy/composting toilets). Class 2 systems (grey water pits) may also be used, particularly on sites serviced by Class 1 and Class 5 systems. There are very stringent requirements in the OBC for allowing the installation of a Class 5 system (holding tank). One of those requirements is that it can be installed only when no other type of Class 4 system, meeting the OBC requirements, can be placed on the property.

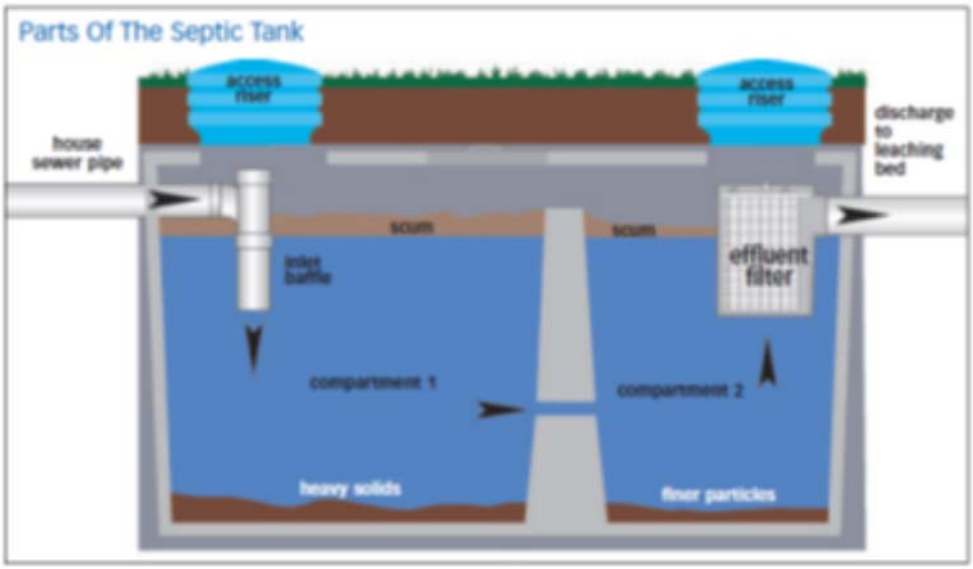
The results of the re-inspections show that 55 of the 144 systems inspected showed no cause for concern and, to date, in no cases was a system replacement required. Remedial work was required for about half of the systems inspected. This means that the time of inspection operational and/or maintenance issues were identified, but generally did not require a permit to remedy. Examples include that the tank was overdue for pump out, corrosion of the concrete tank, baffles requiring maintenance because of damage from tree roots, etc.

8.4 Regular Maintenance of a Septic System

One of the most frequent questions a homeowner asks is "How often should I pump my tank?" Most government documents and extension publications suggest that a septic tank should be pumped out every 3-5 years. For a home with three people and a standard 3600 L (952 US gal) tank, it is recommended that the tank is pumped out every 3.7 years. Guidelines provide little direction for seasonal owners, who might only be using their cottage for three months of the year.

The OBC requires that a septic tank be pumped out when the sludge and scum occupy 1/3 of the working capacity of the tank (8.9.3.4.(1)). This will prevent the sewage from traveling too quickly through the septic tank, not allowing the solids and fats to properly separate from the effluent. Through the septic re-inspection program, to give the homeowner, on an individual basis, an estimation of the frequency for pumping out their septic tank, the depth of sludge and scum is measured during the tank inspection.

Another component of septic system maintenance is the condition of the inlet and outlet baffles in the septic tank. Baffles prevent the re-suspension of solids in the tank, which can lead to premature bed failure. Roots around the baffle can block the sewage or effluent from entering or exiting the tank. This can cause a sewage back-up in the home, or can lead to a bed failure if the roots find their way to the distribution bed. When a septic system is inspected, the inspector will assess the condition of the baffles. Missing baffles are also noted, as they serve an important function in the septic tank, and are required by the OBC. A poor baffle typically results in a recommendation to the homeowner to watch the condition of the baffle at subsequent pump-outs should it reach a condition where it should be replaced.



Source: Septic Smart: Understanding Your Home’s Septic System

An effluent filter is another component that is very beneficial to the maintenance and long term life of a septic system. The effluent filter is a plastic screen which allows the effluent to pass through large slots that reduce the turbulence as the sewage exits the tank. The reduction in turbulence allows additional solids to settle, reducing the amount of solids entering the bed, and therefore increasing the life of the septic bed. Septic installers have started to put an effluent filter in every new system that they install, and will retrofit one into an old tank upon request. These relatively inexpensive additions (~$150) to your septic tank can prolong the life of a septic bed, which is an expensive component of a septic system to replace (~$6,000 -$15,000).

Property owners are responsible for maintaining and upgrading septic systems to meet requirements of the *Building Code Act* (1992). The *Building Code* now requires the installation of effluent filters in the outlet flow path of every system and that effluent filters are accessible at grade using access risers.

If property owners or renters become aware of septic system problems on the lake, concerns can be reported confidentially to the Kingston Frontenac Lennox and Addington Health Public Health office or the Mississippi Rideau Septic System Office.

8.5 Wells and Drinking Water

As part of the North Frontenac Township On-site Wastewater Disposal System Re-Inspection program, information is also collected on the water source and water testing practices of the homeowners. The residential water sources around Kashwakamak Lake is quite varied with some drawing their water directly from the lake, some with a dug well, some with drilled well. The method used treatment of the water supply is equally varied with water softener, UV filter, reverse osmosis, iron filter, being some examples of the methods used.

The Health Unit recommends that a residential property test their water three times a year, each time submitting three separate samples one week apart. For a seasonal property, only two tests are recommended, each time submitting three separate samples. The KFL&A Health Unit has free water testing available for residential properties, and water bottles are available for pick up at the satellite office in Cloyne.

9. Commercial Activity

9.1 Tourism

Tourism, which drives the current economy of the area, had its early beginnings around the end of the 19th Century. The completion of the Canadian Pacific Railway from Ottawa through Kaladar Station in 1882 made the area accessible to tourists from the cities. Bon Echo Inn was built on the Mazinaw in 1899, and under its second owner, Flora Dennison, became a center for artists of all kinds. The Inn drew wealthy tourists to the area for twenty years. Most would come by train to Kaladar station, then by coach up the Addington Road to Mazinaw and then completed their journey by boat. In 1933, Highway 7 was opened as a Provincial highway and in 1935 Highway 41 was completed incorporating parts of the Addington Road. Electricity reached the area in 1939.

Many American tourists were discovering the area for its pristine lakes and superb fishing and hunting. Camps and lodges were built on many of the lakes and the better roads and highways brought in more and more tourists. Bon Echo Provincial Park opened in 1965 on land donated by Merrill Dennison.[19]

Originally Kashwakamak Lake had 15 lodges and 3 campgrounds which provided recreational opportunities such as camping, hiking, fishing, hunting, boating and swimming for visitors to the lake, of which 4 continue to operate. The businesses were family owned and operated, welcoming guests, some of whom returned year after year. Some facilities provided full services such as meals, water crafts and fuel, and fishing and hunting guides as well as accommodations. A few of the original operations were accessible only by boat.

[19] The Oxen and the Axe ,Gene Brown, Nadine Brumell; The Mazinaw Experience, John Campbell; The Frontenac News; Elma MacLachlan April 2008

The following are original Kashwakamak Lake recreational facilities along with the founding owner/operators where known. In operation with their founding and current owner/operators in 2012 are:

Aragain Lodge - Fred Lehmon. Current owners/operators – Hans and Beth Weisshaupt
Fernleigh Lodge - John Ayr. Current owner/operators – Kevin and Melissa Phillips
Twin Oaks Lodge – Anton (Tony) Weiss – Current owner/operators – the McNeil Family
Woodcrest Resort Park – John Baker. Current owner /operator– Arnold Colton

Lodges and their founding owner/operators from previous years include:

MacGregor Lodge – Duncan and Madge MacGregor
Birch Lodge – Bill Birch
Kings Cottages and Marina – Jim Wright
Boreham's Cottage – Bill Boreham
Happy Landing Lodge – Chuck Johnson
Don & Anne Lodge – Don and Anne Perry
Perry's Point Cottages – John and Madelaine Perry
Evergreen Lodge – McKittrick Family
Little Acres Cottages – Basil Grey
Cuddy's Pine Cove Cottages – George Cuddy
Credicott Cottages – Credicott Family
Hideaway Camp
Kai Ora Camp
Camp Kashwakamak

Camping, hiking, backpacking, canoeing and kayaking activities are supported by commercial outfitters from as far away as Kingston and the Kawarthas and public campsites, most of which are water accessible only, are busy in season. Local marinas provide for sale and maintenance of watercraft as there is no longer a marina on Kashwakamak Lake. In addition, the area is well known for its old mining sites, some of which are visited regularly by archaeology students and rock hounds.

The real estate market is an ongoing commercial activity due to the increase in privately owned properties and public interest in the clean, beautiful surroundings found at Kashwakamak.

9.2 Land O'Lakes Tourist Region

Land O' Lakes Tourist Association (LOLTA) was founded in 1943 by a group of visionary business people. At that time the end of World War 2 was in sight and tourist operators knew there would be a huge influx of Americans to the Land O' Lakes in the coming years. They agreed that a collective effort in marketing the region would be essential to attracting tourists. Initially it only served Tweed and the northern townships of Frontenac and Lennox and Addington Counties.

Today LOLTA has grown to encompass nine municipalities. Incorporated in 1976 as a not-for-profit corporation, it is the "Destination Marketing Organization" for the region. Their vision and mandate remain the same as it was over 60 years ago – to collectively market and promote tourism in the Land O' Lakes Region to the world.[20]

9.3 Commercial Logging

Kashwakamak Lake is blessed with a large amount of Crown Land keeping the lake in a natural and pristine state that is envied by many. With Crown Land comes a Forestry Plan that includes the logging off of mature trees, replanting and renewing resources.

The plan is managed by Mazinaw-Lanark Forest Inc., and the Ministry of Natural Resources. Mazinaw-Lanark Forest Inc. is fully owned and funded by a group of five sawmills, one pulp mill and an association of 14 independent logging companies. Many of the logging companies hire and use local area workers. Mazinaw-Lanark Forest Inc. developed a Forestry Plan the covers a ten year period.

The primary objective of the Forestry Plan is to ensure the long-term health of the forest ecosystem. Both the forest canopy and wildlife habitat is taken into consideration. The current 10 Year Cutting Plan 2011-2021 includes areas at the south east end of Kashwakamak Lake and on the north shore in two areas around Brown's Bay. In the southeast, at the junction of Kashwakamak Lake Lane and Gull Lake Estates Lane a thinning operation is being done in a 60 year old Red Pine Plantation (every third row).[21]

[20] http://www.travellandolakes.com/about-us/

[21] Matthew Mertins, RPF. Forestry on Crown Lands, The Naturally Rich Frontenacs. Frontenac Stewardship Council. www.naturallyrichfrontenacs.com

Further east at the termination of Kashwakamak Lake Lane to the south east of the lake, an operation of selection and shelterwood cutting is being carried out. Of special note, within each of these areas, the shoreline of Kashwakamak Lake is protected by a reserve buffer, retaining the natural look and state of the lake. Reforestation and seeding has been done on completed areas on the north shore near Brown's Bay.

With the desired results, the forest will provide excellent opportunities for recreational activities such as hunting, fishing, camping, bird watching, ATVing, or simply a peaceful escape for a drive or walk in these cut over areas.

10. Boating, Buoys, Safety and Impact of Boating

The 2011 KLA Lake Planning Survey findings showed:

- 85.3% of the 170 surveyed participate in boating;
- 46.5% participate in water skiing
- 8.2% participate in jet skiing.

In terms of boat traffic, the survey also identified the following:

- 43/166 significant impact
- 63/166 moderate impact
- 38/166 light impact.

In terms of the impact of Personal Water Craft, (PWC/Jet Skis) participants reported:

- 69/166 significant impact
- 50/166 moderate impact
- 25/166 light impact.

10.1 Boating Safety

All operators of recreational powered watercraft who operate within Canadian waters require a Pleasure Craft Operators Card, regardless of age, engine size, or length of boat. For more information on how to receive your Pleasure Craft Operators Card see www.boaterexam.com.

Transport Canada's marine safety programs provide Canadians with a safe and efficient marine transportation system. For information about the Acts and Regulations that regulate boating activity, see http://tc.gc.ca/eng/marinesafety/menu.htm.

For more information about boating safety, refer to Transport Canada's Safe Boating Guide at http://www.tc.gc.ca/eng/marinesafety/tp-tp511-menu-487.htm.

10.2 Buoys

For information about proper buoy marking, see Canadian Coast Guard's publication at http://www.ccg-gcc.gc.ca/folios/00017/docs/navigation-eng.pdf.

Citizens can mark anything with appropriate private buoys, which must meet the Private Buoy Regulations, which include requirements for size, shape, color and symbols. See the Transport Canada Guide "An Owner's Guide to Private Buoys", at

http://www.foca.on.ca/xinha/plugins/ExtendedFileManager/demo_images/Transport_Canada_Presentation_FOCA_AGM_2010.pdf.

The Federation of Ontario Cottagers' Associations also has a 2010 update on Private Markers (Buoys), at http://www.ccg-gcc.gc.ca/folios/00017/docs/navigation-eng.pdf.

10.3 Shoreline Erosion

Shoreline erosion is a common and natural process that many waterfront properties encounter. There are various causes for shoreline erosion that all have the same outcome: a loss of valuable waterfront property that can result in unsafe shorelines and a deterioration of the natural shoreline environment. The article *"The Importance of Healthy Shorelines,"* details the various natural causes of erosion and human disturbances causing erosion.

Some human disturbances include boating activities. "Boat wakes not only erode the shoreline, they can disturb aquatic ecosystems, swamp the nests of loons and other waterfowl, damage docks and boats, upset canoes and small boats and create danger to swimmers. The best way to reduce the effects of boat wash and wake on shorelines is simply to slow down. In Ontario, by law, boats must slow down to 10 km/hr within 30 m of shore. If the boat doesn't have a speedometer, remember that at 10 km/hr there will be little or no wake." [22]

The extent to which boat wake contributes to shoreline erosion around Kashwakamak Lake is currently not documented.

10.4 Noise, Air and Water Pollution

Based on the results of the 2011 Kashwakamak Lake Planning Survey, 85.3% of those responded participate in boating activities. 129 of 166 participants indicated that peace and tranquility are very important to their personal enjoying of Kashwakamak Lake.

There is no information available to determine if current boating activity is a significant source of air, noise and water pollution for the lake.

[22] http://www.natureindeed.com/PDFs/Healthy_Shorelines.pdf

10.5 Boating and the Environment

According to the article "*Clean-Marine-and-Boaters,"* "We are lucky to have thousands of beautiful lakes and rivers to enjoy in Ontario, and boating is an important part of our heritage and history. Boating allows for an appreciation of our natural areas, and can be a great family activity. We have a shared responsibility as boaters to keep our waterways safe and clean.

Conventional two-stroke marine engines in boats and personal watercraft emit proportionally more volatile organic compounds (VOCs) and other air pollutants than more fuel efficient, direct injection two-stroke and four-stroke engines. Emissions from these engines can contribute to ozone (photochemical smog) formation in summer. They also emit particles, carbon monoxide (CO) and a range of water and air toxins including benzene.

Older style outboard engines that do not comply with US EPA 2006 limits can emit as much as ten times the amount of pollution compared to newer engines. Boat operation can also impact the sensitive shorelines, and can directly impact the success of certain species, including the loon. Protecting loon nesting sites and nursery areas, especially during the breeding season, can make a difference." [23]

11. Fishing

11.1 Survey Findings 2011

The 2011 KLA Lake Sustainability survey findings regarding fishing showed the following:

- 61.8% participate in fishing and 12.4% participate in ice fishing
- 39/161 report a significant impact regarding fish depletion
- 37/161 report a moderate impact regarding fish depletion
- 85/161 report a light or no impact regarding fish depletion

11.2 MNR Fisheries Assessment 2000

According to the MNR Biologist, the most recent fisheries assessment was conducted on Kashwakamak Lake in 2000. Excerpts from the summary include the following:

"Fall Walleye Index Netting assessments were conducted throughout the province between 1993 and 2002 on a randomly selected suite of lakes in FMZ 18 (33 lakes were completed). Although the overall abundance of walleye in Kashwakamak Lake was relatively high (second highest in FMZ 18), several indicators suggest the walleye population may be stressed as values are below

[23] http://www.foca.on.ca/clean-marine-and-boaters

the mean FMZ 18 values for the maximum age, mean total lengths and weights, and length and age at 50% maturity for females. This would suggest that fewer than average large fish are surviving and females are maturing earlier to compensate.

In 2000, Kashwakamak Lake was classified as a "stressed or unstable" walleye fishery. There are several stressors on walleye populations in the region that may account for low relative abundance including: high exploitation (harvest rates), shoreline development and alterations, decreased water quality, invasive species introductions (both exotics such as zebra mussels and native introductions such as rock bass, crappie, smallmouth bass), excessive water level fluctuations, and changes in fish community structures (e.g. more predators or less prey)."[24]

The FMZ 18 fisheries advisory council is currently assisting MNR in developing a fisheries management plan for FMZ 18, which will also include a background report and status of each species within FMZ 18. The report is not completed at this time.

12. A Social History of Kashwakamak Lake

12.1 The Lake with Rocky Shoals

(Editor's Note: The Social History section of the *Kashwakamak Lake "State of the Lake" Report* is a "living" one. We fully acknowledge that we do not have a complete history of our lake, how it was settled, early families and commercial operations. To that end we are asking for your help in filling in the blanks. We will keep the Social History section on the KLA website up-to-date with new information as we get it. To that point, some observations have been collected anecdotally and others researched, so some memories may differ. We ask for your latitude as we share the Kaskwakamak Lake story and are open to clarification and new information. Please visit www.kashwakamak.ca for the latest version.)

Kaskwakamak Lake, or "Long Lake" as some long-time residents call it, is one of a chain of several lakes in the upper watershed of the Mississippi River. However, its true name comes from its native origins according to Chief Perry of the Ardoch Algonquins. "Kashwakamak" is derived from three Algonquin words: "kash" means "jagged"; "awak" means "all around (the bottom)"; "amik (amak) means "beaver" or "body of water". Loosely translated it would mean "the lake with rocky shoals". For the aboriginal people this would have been an identifying feature to distinguish it from all the other lakes in the area because in the early days the level of the lake was lower than it is today and rocks would have been more of a hazard. [25]

[24] Summary of the assessment from 2000 (Summary of Fall Walleye Index Netting FMZ 18; prepared by Erin MacDonald, biologist Bancroft District MNR)

[25] History of Kashwakamak, Elma MacLachlan, 2008

Kashwakamak Lake is located in eastern Ontario, just south of Bon Echo Provincial Park and the town of Cloyne. Situated in North Frontenac Township, it is about a one hour drive north of Belleville and Kingston. The lake is 15 kilometres (9 miles) long with a rocky shoreline and a maximum depth of 22 metres (72 feet). The primary inflow and outflow is the Mississippi River, upstream from Marble Lake over the Whitefish Rapids, and downstream, controlled by the Kashwakamak Lake Dam.[26]

Today there are about 450 seasonal cottages and year-round residences and four commercial operations. The lake has 19 campsites which are "back country" campsites (no facilities) located mostly on the north shore or on islands; however, the south shore of the lake is populated with cottages and a rustic lodge. Kashwakamak Lake is also part of the popular "Mississippi River Canoe Route" which has been popular for several decades. Canoeists can gain access from the west end of the lake through Marble and Mississagagon lakes at Myers Cave or up into Mazinaw Lake in Bon Echo Provincial Park or from the south shore to Shoepack and Big Gull Lakes with relatively minor portages. From the east, Kashwakamak flows into the Mississippi River offering miles of tranquil waterways to explore. Kashwakamak Lake is a popular location for those who want to experience a back country campsite setting yet prefer to "stay in contact". With good roads that can accommodate bus access, Kashwakamak is also a favourite for group outings, canoeing and other activities for youth organizations and summer camps.[27]

12.2 The Story of Our Lake: Regional background

Kashwakamak Lake is one of several lakes in the upper watershed of the Mississippi River. This area is part of the southern extension of the Canadian Shield and was considered very rugged and remote. The Mississippi River and its watershed were well known by the native peoples from the earliest times. They travelled the area hunting, trapping and fishing. The Iroquois and the Algonquin held the area at different times, but latterly the Algonquin were dominant. The Mississippi also brought the French fur traders to the upper reaches of the watershed in the early 18th century. Apart from a few trappers' cabins, the region was relatively untouched until the 1800s when the lumber industry began. [28]

[26] Wikipedia, http://en.wikipedia.org/wiki/Kashwakamak_Lake

[27] http://www.northfrontenacparklands.com/index.php?option=com_content&task=view&id=40&Itemid=46

[28] History of Kashwakamak, Elma MacLachlan, 2008

12.3 Kashwakamak Lake Dam

Development of this area began in the early 1800s, primarily to support the lumber industry. The area was heavily timbered with millions of board feet of pine, spruce and other species of trees being cut and transported by river to the sawmills on the Ottawa River. The lower Mississippi River, around what is now Almonte and Carleton Place saw numerous textile and grist mills built in the early 1820s. Shortly thereafter, sawmills came into prevalence as the timber trade exploded in the Ottawa Valley. In order to get the product to market a number of log dams were built along the system in the early 1860s. The original dams at Mazinaw, Crotch, Big Gull and Kashwakamak Lakes were all built during this period, solely for lumbering purposes.[29]

12.4 Lumbering in the Area

While the British considered this region to be total wilderness as it was 90% forested, their military started surveying for lumbering potential in the 1830s. The logging of the huge pines began in the 1850s. These pines were estimated to be about 400 years old, with a diameter of a metre or more. All the timber was squared to at least 30 cm (12 inches) before being hauled out to the river or lake. This left behind a lot of waste, which fuelled many local brush fires throughout the area. The lumber companies built logging camps in the centre of the area they were going to cut. Logging required a large number of men, with horses and equipment. Crosscut saws and axes were used to fell the trees. Drivers with teams of horses or oxen hauled the logs out. In winter, the logs were "skidded" out to the river or lake to await the "spring drive." The companies built log chutes and dams on the lakes to simplify floating the logs downstream. Steam driven boats were used to pull large booms of logs down the large lakes.[30] Then they were released through the dams to travel downriver. In the 1870s a man named R.T. Haskell lived near Ardoch and operated a steamship on Kashwakamak Lake. [31]

In "The Oxen and the Axe", Donald Perry, in his history of the Addington Road, reports that in 1860 alone, 23,000 white pine and 2,000 red pine were cut in the Mississippi watershed. The lumber went to Britain for construction and shipbuilding and in later years to New York City and Chicago.[32] "River Drives", or the floating of logs down to the Ottawa River during the spring run-off, were the only means of delivering their product to market. These drives continued until just after World War I. In fact, the last river drive on the Mississippi was in 1921. The shipyards of England were the first big users of Kashwakamak pine logs, 16-24 feet long and one-foot square. The demand for this pine continued until about 1880, when steel plate replaced wood. At the same time, railways were expanding and the need for railway also ties grew. Kashwakamak was able to provide hemlock, cedar and tamarack.

29 Mississippi River Water Management Plan, June 2006 pp 15

30 History of Kashwakamak, Elma MacLachlan, 2008

31 "Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p.4

32 History of Kashwakamak, Elma MacLachlan, 2008

There is a photograph which was taken in 1896 that shows a group of large thatched buildings and a crowd of loggers near the dam. Many logs were either rejected or escaped and can still be found, cut and ready for market, at the bottom of the lake around Weiss Point at the east end of the lake. The work was hard and dangerous; monuments in local cemeteries attest to the memory of those who lost their lives in the pursuit of lumber for a far off land.[33]

By the 1880s however, the timber industry was in steady decline and by the turn of the century had virtually stopped and the dams used to transport the logs fell into disrepair. The Mississippi River Improvement Company Limited (MRIC) was formed in 1909. Its purpose was to hold title to the dams at Crotch, Big Gull and Kashwakamak Lakes and operate them to maintain storage capacity in the associated lakes. In 1938, the Commission assumed the management of MRIC and became the majority shareholder in MRIC. Over the first half of the twentieth century, MRIC rebuilt most of the dams they owned.[34]

Lumbering returned to the area in the late 1930s. The Sawyer Stoll Company began operations in 1939 and other companies followed. Lumbering enjoyed a boom after the Second World War and the Annual Lumberman's Picnics drew large crowds in the 1940s and early 1950s.[35]

There are still remnants visible of a log chute made of hemlock, used at the time of the spring run -off to float the logs into Kashwakamak Lake. There is a rock, again still visible, bearing the names of three men who died in the logging operation. The chute and the rock are located near the dam at the east end of the lake.

One of our local residents, Russel Gray of Harlowe, spent the first winter of his life (1950) in his grandfather's logging camp, (Basil Gray), where his mother was the camp cook. The logging camp was known as "The Basswoods" and was located on South Kashwakamak Lake Road, about one kilometer beyond the present dump site. According to Russel they were still logging virgin forest at that time in the logging camp,[36] but by the late 1950s the virgin trees were running out and lumbering again went into a decline.

12.5 Settlement: Addington Colonization Road

The First Nations people had many trails through the area, but the first record of European intrusion is of a squatter, Thomas Prendergast, near Fernleigh around 1836. By the 1840s a survey of the area had been made, and squatters, lumbermen and their families were identified at the eastern end of the lake. Access to the area was by water only. During this period Kashwakamak Lake and Ardoch were a hive of activity. By the 1930s the next wave of settlers, the seasonal visitors, were starting to arrive. One of the first cottagers, a resident of Rochester, New York, recalled driving a dirt road from Belleville. The lodges also started to appear.[37]

33 "Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p.4

34 Mississippi River Water Management Plan, June 2006 pp 16

35 History of Kashwakamak, Elma MacLachlan, 2008

36 Social History Report, Eleanor Belfry-Lyttle in conversation with Russel Gray, February 2013

37 "Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p.4-5

While lumbering brought the first settlers into the area, because of its remoteness, few settled permanently until the Addington Colonization Road was built (1864–1867) from Napanee to Denbigh which opened up the country for settlement. A.B. Perry was the surveyor and contractor and his brother Ebenezer was the land agent responsible for encouraging settlement. The new road was only a rough, rocky, rutted track with corduroy through the swampy areas. Travel was easier in the winter using sleighs on the snow. In fact, it could take two days to travel from Kaladar to Denbigh. Five years after the road opened, free land grants were given to 179 settlers. These settlers built log cabins for their families and cleared land for agriculture. The men had winter work in the logging camps and by all accounts the early farming was fairly successful. They grew wheat, corn and vegetables and were able to provide for themselves with enough to sell to the camps in the winter. They stored crops in root cellars in the winter and many cut blocks of ice from the lake to use in ice houses with sawdust insulation for summer storage.

Over the years oxen were gradually replaced by horses, there were more cattle (which led to cheese factories) and at one time there were large flocks of sheep, which were better suited to the poor thin soil. The settlers knitted the yarn into hats, mitts, socks etc. However raising sheep gradually died out mainly due to losses from wolves, bears and wild dogs.

From 1870 to 1890 the area enjoyed prosperity based on lumbering and farming. However, when the pine was gone, the lumber companies moved on, taking away the only source of income. At this point the soil was depleted and many settlers moved to the cities or out west. Those who stayed were often on patches of better soil.

In these hard times, the sense of community was strong. Churches and schools were built; general stores, hotels, livery stables, blacksmiths etc. were all established. Many social gatherings were held.

Throughout this time the Addington Road was constantly being repaired and upgraded. In 1902 the trip from Kaladar to Cloyne was reduced from eight hours to only two to three hours. By 1920 the Kaladar to Cloyne trip time decreased further to one and three quarter hours.

Despite the road improvements over this time period, in general the remote location, rugged landscape and lack of suitable farming land delayed the improvement in economic conditions that other parts of southern Ontario were experiencing in the early 1900s.

12.6 Mining in the Area

In the late 1800s and early 1900s, promising surface deposits of gold and other minerals led the settlers to believe that mining might take over the economy as the logging declined. Although several shafts were sunk, most prospectors were disappointed with the results as the quality of ore obtained was too poor to sustain any long term operation.

Despite this, prospecting carried on into the late 1930s with small mines and shafts being opened up. However, none of the mines lived up to expectations and all were abandoned. During this time there were three main gold mines in the area.

Golden Fleece Mine

After the first discovery of gold near Flinton in 1881, the Golden Fleece Mine (later named the Addington Mine) was opened up and in production in the early 1900. In its heyday, the mine employed thirty men.

Star of the East Mine

Situated on a ridge above Marble Lake, this gold mine was in active production from 1903 to 1907. It employed twelve men and produced a few thousand dollars' worth of gold.

Ore Chimney Mine

The Ore Chimney Mine near Northbrook was the largest in the area. It was in operation from 1909 – 1936 and at its peak production employed eighty men. Gold was found associated with pyrites. During the 1920s and 30s, mining was both a social and economic advantage to the area. However in the late 1930s the mine was closed when the owners were unable to obtain financing to continue its operation.[38]

12.7 Settlement: Land Grants and Local Growth

Any settlers in the area prior to 1860 were referred to as squatters. By the 1840s residents were petitioning to be able to purchase land. In 1847 a surveyor named Harper defined timber limits or grants along the Mississippi River. The following year a group applied for the construction of a school. In 1852-53 Thomas Gibbs conducted a survey for the construction of the Frontenac Road and reported settlers in present-day Ardoch. Further surveying was done along the Frontenac Road (T.F. Gibbs, 1859), in Miller Township (Harper, 1857-1862) and in Clarendon Township (J. Snow, 1862). All Free Land Grants in Clarendon and Miller were quickly snapped up. An application to the Commissioner of Crown Lands in Montreal was required in order to obtain a Location Ticket. Applicants were required to settle on the land within a month, clear twelve acres and erect buildings. After four years the applicant received a patent entitling him or her to full ownership and right to sell.

[38] History of Kashwakamak, Elma MacLachlan, 2008

Clarendon

One of the first applicants was Bramwell Watkins, arriving in 1860; he was Reeve when the two townships were incorporated in 1867. Clarendon was named after George Villiers, 4th Earl of Clarendon, a British Cabinet Minister. Miller was named after Hugh Miller, a Scottish geologist. Typically the first true settlers were either from Upper Canada or were Irish, English or Scottish. A few were American or German. Mostly they were farmers. Census data show that the largest crops were wheat, oats, potatoes, turnips and maple syrup. There were no roads in the area prior to 1859. The railway never came to Ardoch or Plevna, but there were stations at Lavant, Clarendon and Robertsville, with the line opening on December 29, 1884 and running until 1960.

Ardoch

The village of Ardoch was originally called Millburn, Milltown or Melbourne, after the British Prime Minister. But when the Post Office was opened on June 25, 1865 the records show it officially located in Ardoch. The name was linked to the birth towns of both Scottish (Stevenson) and German (Jacobi) settlers. Ardoch quickly became a thriving community and was the centre of many services. The first official settlers in the area were the Watkins and the Hendersons (1860). The Henderson family operated a tannery in Ardoch. A sawmill was operating on the Mississippi by 1865. Many hostelries were established. The Watkins family was well known for their hospitality. They, near Malcolm Lake, and the McDonalds and the Dunhams all ran small hotels in the vicinity. Most settlers arrived by horse or on foot. Progress was slow, and there was much need for meals and overnight accommodation. Watkins and Smith built an Orange Lodge, selling it to a cheese maker in 1895. It was productive until 1939. By 1865 there was a sawmill and a gristmill on Malcolm Lake Creek. A smithy was set up in 1885 and operated for many years. By 1909 one of the largest sawmills in Ontario was operating in Ardoch but it burnt down on September 6, 1924. Also in 1909 a by-law was passed allowing for the construction of a telephone line through the township. A garage was in business in the village by the early 1920s. The first school was built south of Ardoch in 1867, eventually to be replaced by one on Smith Road. It can still be seen to the north at the top of the rise at the beginning of Smith Road; it is now used as a seasonal residence. St. Killians Roman Catholic Church was established in 1894, with the summer church, big enough to accommodate the seasonal influx of cottagers, being built in 1967. St. John's Anglican Church was established in 1894.

Ardoch was in the eye of the national news in August and September 1981 in what became known as the "Manomin", or Rice War. In 1979 a naive civil servant in Ottawa granted a commercial company a wild rice harvest permit for the Mississippi River, downstream from Ardoch. The wild rice seed had been brought from Rice Lake many generations earlier by Mary Whiteduck of the Algonquin First Nations, the Manomin Aboriginal Kayaba, or Rice Guardians who harvested and re-seeded using traditional methods. When the commercial harvester arrived in 1981 it was greeted by a determined group of First Nation and other local resident protesters. For 27 days, in an attempt to defuse the situation, Ardoch was in the national eye and temporary home to numerous negotiators, OPP cruisers, helicopters and reporters. The harvester finally retreated when no local person, First Nation or otherwise, would grant launching rights for the machine over their private land. The event was commemorated in a plaque, erected next to the bridge in Ardoch in 2004.[39]

[39] Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p.5, 6

Kaladar

Kaladar, like Sharbot Lake, sits at the intersection of highways and once boasted a railway. The name is based on Scottish Gaelic, the English version of which is Cawdor. The construction of highway 7 as a make-work project in the 1930s meant the death knell for the railroad, though it continued into Kaladar until the 1960s. Gold and sulphur were mined in the area until 1964. It is interesting to note that local village names such as Actinolite and Sulphide reflect this heritage.

Flinton

Flinton, named after the lumber baron and Senator Billa Flint, who died in 1894, is the heart of blueberry country and is home to an Annual Bluegrass Festival. It is home to a large Catholic Church and a Ministry of Transport Office.

Northbrook

Northbrook was originally known as Dunham's Place in the 1840s and was a stop for travellers on the Addington Road. Northbrook continues to be the main shopping area with a grocery store, a bar, a motel, medical services, restaurants and other amenities for permanent and seasonal residents.

Cloyne

Cloyne, named after Cloyne in Cork, Ireland, was founded in the 1820s. Now the location of a school, municipal office, hardware and grocery store, it was a centre of tourism dating back to 1889 when Doctor Weston Price bought the famous rock and built the Bon Echo Inn. The Rock, a natural fault line in the earth's crust, stands 120 m above the Mazinaw and is an impressive sight from the highway and the air. Legend has it that the river name is a corruption of "Mazinazeebi" meaning Painted Image River. This may refer to the petroglyphs found on the Rock on Mazinaw Lake. Bought by Flora Denison in 1910, the hotel became an exclusive resort and the hub of the Walt Whitman Society. The American poet visited frequently, and many other authors and artists (including members of the Group of Seven, John Labatt, Yousuf Karsh) were attracted by the ambience of Bon Echo. The hotel burnt down in 1936. Cloyne is the closest village to Mazinaw Lake and the headwaters of the Mississippi River, which flows 169 km to the Ottawa River. In 1959, Denison donated the 2000 acres of Bon Echo to the Province of Ontario and it subsequently became the Provincial Park. John Savigny assisted him in the severance and sale of some other properties on the Mazinaw, effectively starting a new career which grew to become Savigny Real Estate.

Myers Cave

Myers Cave is located close to the beginning of Kashwakamak Lake. Named after an early squatter (Myer or Meyer), its claim to fame is a mythical hidden cave of silver, searched for by many but found by none. The rate of flow in the river, however, is an early indicator as to the height of water in downstream Kashwakamak.

Fernleigh

Fernleigh, known as the Gateway to Kashwakamak, is the earliest settlement in Clarendon and Miller Township. Settlers arrived via squatter trails in the 1840s. Shortly after it boasted a store, sawmill, turpentine production facilities and a cheese factory. The cheese factory burnt down in 1907. There are now no businesses operating in Fernleigh, though it still provides access to the Lake.[40]

12.8 Settling Kashwakamak Lake

Many cottagers were brought to the area in the late 1950s and 1960s when the Province sold Crown Land waterfront lots on many of the lakes and Kashwakamak Lake's history is no different. While there was some settlement in the early years, the growth of seasonal cottages was tied largely to the opening up due to the sale of Crown Land by the provincial government. From that time the lake's development was piecemeal, created largely through severance of the individual parcels of land from larger holding or larger Crown Land severed lots. The latest figures show well over 500 dwellings on the lake, most of which are seasonal.[41]

12.9 Settlement on the Lake

Weiss Point Settlement

Early settlement on the lake can be traced to the eastern portion of Kashwakamak Lake. Weiss Point is located at approximately 45o 52' N latitude and 76o 57'W longitude, at an elevation of about 266 m. Now called the Township of North Frontenac, the area was formally known as the Townships of Clarendon and Miller. The Karl Weiss (1856-1930) family arrived from Germany via the United States in 1912. There were four children: Joseph (1884-1963), who eventually moved to Detroit; Catherine (1896-1972) who married a Gutheinz, (hence the name Gutheinz Road off Hwy 506); George; and Anton (Tony) (1900-1975**).** Most of the properties and their access routes belonged to the Weiss family for most of the period 1930 - 1970. No record of an official naming of Weiss Point was found; presumably as a result of family ownership the name came into common use.

[40] Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008

[41] Mississippi River Water Management Plan, June 2006,

The Weiss Point and farm property was originally purchased by George Weiss in the early 1930s. The farm consisted of a barn, farmhouse and sugar shack. The farmhouse eventually burnt down, the barn collapsed and only the metal parts of the sugar shack remain. George planted apple trees. The maple syrup produced on the property was sent to relatives in Kitchener for sale. The date of the buildings is unknown, but nails found around the sugar-shack were of the old hand-made square variety, so they may well have preceded George's ownership. The property had some shoreline to the north and to the west. Many of George's descendants remain in the Ardoch area. By the early 1970s, however, the farm was owned by Mary Savigny, who over the next thirty years or so gradually severed lakeshore lots and sold acreage to existing adjacent owners. She and her husband, John retained one lot for their own use and were frequent summer visitors until 2003.[42]

Twin Oaks Lodge

By 1935 Tony Weiss had purchased the property across from the Point, and built the original Twin Oaks Lodge along with a couple of cabins. Other cabins were built in subsequent years. Tony Weiss continued to play an active role at Twin Oaks Lodge until his death in 1975. The original lodge building was enlarged; more cabins were built, along with a boathouse and accommodations for seasonal workers. During the early years, Tony's daughter Mary and her husband Arnold McNeil ran the Lodge. They both passed away (Arnold 2004, Mary 2007) and Tony's granddaughter Carla, assisted by her brother Donnie, took over the operation. Tony's other daughter Rosie continued to assist a few days a week in the kitchen well into her 80s and was the mastermind behind the traditional Friday Night Fish-Fry. Starting in the mid 1970s, dinner was available at the lodge for non-residents by prior reservation.

In its heyday Twin Oaks Lodge was a busy place, often serving well over a hundred meals to guests and staff three times a day. Visitors came from all over North America, some even arriving by floatplane. Many were returning visitors, drawn by the hunting, guides, fishing, good food, fun and poker, often late into the night. Lesley McCambridge, then a teenager living in Madoc, spent the summer of 1962 working at Twin Oaks with her two friends, Marie Foley and Bev Ketcheson. She described it as hard work, but said it was a well-run and nice looking resort with a likeable boss who retained a slight German accent. She also described how a German singing group came from Kitchener and entertained in the lounge. The signatures of many such workers from decades ago are still to be seen on the walls of the residence. Rosie recalls a Thanksgiving when, under Arnold's direction, about a hundred and thirty were served a Turkey Dinner, first the guests, then they, in turn, served the staff. According to Lesley, Arnold made the best beer batter in the world. [43]

The Watkins

Bramwell Watkins first settled at Malcolm Lake where the family still owns property, and then acquired property on Smith Road. Bramwell was Reeve and Township Warden for many years, reading the official address of welcome to Queen Victoria's daughter Princess Louise on the occasion of her visit to Kingston in 1879. Great grandson Doug and his wife June (nee James) were fixtures on Smith Road from the time the first Weiss Point residents arrived. The Watkins family still lives in the Ardoch community.[44]

[42 ,43] "Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p.2,3

[44] "Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p. 8

The Savignys

John Savigny (RCAF, from St. Catharines, Ontario) and Mary (WAAF, from Sheffield, England) met in Dover, England where they both worked on radar in the tunnels of the famous White Cliffs, which was the first line of defense in the Battle of Britain. They married and started their family in Dover and moved to Toronto at the end of the war. A year of sedentary life in the big city convinced them that a more rural existence was for them. They moved to Northbrook in 1947, where John opened a radio repair and refrigeration service business. There was much demand for walk-in fridge and freezer service in the many lodges in the area. Soon after their arrival, John was doing some repairs at Bon Echo. The owner, Merrill Denison (commemorated with an historic plaque on Highway 37 at Tweed), was a well-known author of radio plays for NBC and CBC, and wrote definitive histories of many Canadian companies, including Ontario Hydro, Massey Harris, the Bank of Montreal and Molson's Brewery. He needed a copy typist. Mary had worked for Dame Edith Sitwell in England, so she was hired immediately and they became good friends. In 1959 Denison donated the 2000 acres of Bon Echo to the Province of Ontario and it subsequently became the Provincial Park. John assisted him in the severance and sale of some other properties on the Mazinaw, effectively starting a new career which grew to become Savigny Real Estate. It was first located in Northbrook and later moved to the corner of highways 41 and 506. John was also a founding member and sponsor of the Land O'Lakes Tourist Board.

As the old Weiss Farm landowner, Mary Savigny sold property to many of the current property owners. John and Mary were to been seen frequently on the Point in a business capacity, at the annual meetings or just enjoying life at their spot on the lake which they kept up until 2003. Mary was an avid and accomplished artist and was a founding member and exhibitor at the Bon Echo Annual Art Show, which is still held each July.[45]

Weiss Point Residents' Association

In 1976 local residents formed the Weiss Point Residents' Association (WPRA) with its main goal of shared road maintenance. Leading up to this development, when the current wave of settlers (cottagers) arrived, the road from the end of Smith Road to the Road Allowance between Concessions X and XI was owned by Mary Savigny. Each property owner had right of way, but was also responsible for maintenance. As soon as it was formed, this responsibility was vested to the WPRA.[46]

Smith Road

According to the census of 1871, Napoleon Lacouline was the first settler on the road. Mrs. John Smith, with her four sons and a daughter, arrived in Canada in the mid 1800s. She was Irish and her husband was British. He was supposed to follow her to Canada, but never arrived. The Smiths were in the area by 1868. Charles Smith (1843-1913), presumably a son, obtained about 200 acres on the road and an island in the river on September 29, 1875. Subsequently, William Smith (1836- 1902) built a house on his brother's farm.[47]

45 "Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p. 9
46 "Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p. 3
47 "Weiss Point: The History, The Place, The People, A Personal View", Dave Bouttell, 2008 p. 5

12.10 Watershed Control

The most significant development of the upper lakes took place from the early 1950s to the end of the 1970s as Crown land around the lakes was sold to private individuals. This led to changes in the operating regimes of most of the dams, especially during the summer months as tourism and recreational interests became more prevalent. More recently, the upper lakes have seen a conversion of many dwellings from seasonal to year round use. Crotch Lake remains the only significant lake on the main channel of Mississippi River that is predominantly undeveloped as the surrounding lands are largely owned by the Crown or Ontario Hydro.

The Mississippi Valley Conservation Authority (MVC) was formed in the late 1960s. Through the 1980s, MVC continued to take on greater responsibility for managing the watershed's dams when MNR contracted MVC to operate all MNR owned dams and when Ontario Hydro contracted MVC to provide field operations and monitor water levels at the MRIC's Crotch Lake Dam and the Ontario Hydro's High Falls Generating Station.

Substantial rehabilitation of the Shabomeka Lake Dam was completed by MRIC in 1989. The cost of this work raised concerns with the MRIC shareholders as to the ongoing costs versus the benefits of operating and maintaining control dams at Shabomeka Lake, Mazinaw Lake, Kashwakamak Lake, Big Gull Lake, Mississagagon Lake and Crotch Lake.

In 1991, the MRIC decided that continued operation and maintenance of the control dams were beyond its financial capabilities and negotiated agreements to shift responsibilities to MVC (for Shabomeka, Mazinaw, Kashwakamak, Big Gull, and Mississagagon) and to Ontario Hydro (for Crotch Lake Dam). After these transfers, MRIC was formally dissolved. MVC constructed automated lake level gauges on Shabomeka, Mazinaw, Kashwakamak, Big Gull and Crotch Lakes in 1991 to collect detailed water level information and initiated a dam rehabilitation program with the reconstruction of Mazinaw Lake Dam in 1992.[48]

The number of seasonal residents in the Mississippi River Watershed is significant, given that there are over 250 lakes found throughout the watershed, with 75% of these in the western portion of the watershed. From the 1950s to 1970s much of the Crown land around the upper watershed lakes (Shabomeka, Mazinaw, Kashwakamak, Mississagagon, and Big Gull lakes) was sold to private individuals. More recently, these areas have seen a transition from seasonal to permanent dwelling.[49]

Today local area resident Russel Gray still has a trap line in the Kashwakamak Lake area. He primarily traps beaver, muskrat, and fishers, although he also has some otter furs. Russel reports that if otters move into a small lake, they will completely wipe out the fish population in a short period of time. Russel dries the furs and takes them to North Bay where they are sold in an international auction. He also works with Ducks Unlimited. He places duck boxes in various locations in the Kashwakamak/Gull Lake area and monitors the various types of birds that use these boxes and regularly reports back to them.[50]

48 Mississippi River Water Management Plan, June 2006 pp. 15-16

49 Mississippi River Water Management Plan, June 2006, p. 5

50 Social History Report, Eleanor Belfry-Lyttle in conversation with Russel Gray, February 2013

12.11 Kashwakamak Lake Association

The Kashwakamak Lake Association was originally formed in 1993 to represent the interests of property owners in Barrie Township at the west end of Kashwakamak Lake. In July 2000, it was voted at the Annual Meeting to include all of Kashwakamak Lake. The Association represents the interests of its members at township meetings, and with federal and provincial politicians. Areas of interest include the environment, water safety, public health, lake stewardship and member education. Issues on which the KLA has lobbied include: market value assessment, lakefront purchase, proxy voting, and municipal services.

The KLA members are also members of Federation of Ontario Cottagers' Associations (FOCA). FOCA is a non-profit, voluntary organization that represents 600 cottage associations. It represents cottagers in dealings with government and industry, to ensure cottaging will remain a way of life in Ontario. It also serves as an information centre for cottage associations and provides assistance and leadership on many crucial issues affecting cottagers while encouraging good environmental stewardship. www.foca.on.ca

The KLA works closely with the Mississippi Valley Conservation (MVC) on water quality testing and lake stewardship. The MVC is a community-based environmental agency established under the Conservation Authorities Act in 1968. To maintain recreational lake levels and control flooding, MVC operates a series of dams, including one at the east end of Kashwakamak Lake. MVC works to protect the natural resources of the Mississippi watershed, a jurisdiction of 4,450 square kilometres. www.mvc.on.ca [51]

Adding Your Local Stories

Part of our social history of the lake is telling our own stories. To that end, this portion of the State of the Lake Report is a "living" section and the Kashwakamak Lake Association website www.kashwakamak.ca will host a Social History section where we will house your photos and stories. An interactive map will indicate the areas where we have personal histories and photos from people on or associated with the lake. www.kashwakamak.ca/index.php/map

Current local histories:

Weiss Point

[51] http://www.kashwakamak.ca/index.php/kla-board/history-of-the-board

Share Your History

Please take the time to submit your cottage's history and we will gladly add it. You can submit your copy to Sue MacGregor, suemacgregor@comcast.net

Historical Photos and Documents Wanted

Please submit your historical photos and documents to our Online Gallery by contacting Don Cory, dcory.sit@gmail.com

13. Conclusion

The Kashwakamak Lake State of the Lake Report, July 2013 is designed as part of the process in developing a Sustainability Plan for Kashwakamak Lake. The information and base line data and observations are intended to identify the current state of the lake in terms of the water, environment, and development as well as the thoughts of a sample of residents and cottagers in terms of what they like about the Lake environment as well as future issues.

The next step in the process will be to share this report widely with permanent and seasonal residents, business owners, government agencies and other interested parties, using a variety of communication strategies. Please take the time to complete the feedback form at the end of the Summary and return it to the Lake Planning Committee.

The Planning Committee will then prepare a final State of the Lake Report by July 2014 which will include any missing information and data. From there, a further report will be developed to outline steps that can be taken as part of the Kashwakamak Lake Sustainability Plan.

It is expected that the plan will identify areas of strength to be maintained and areas of need in order to preserve the lake and the environment around the lake. Further discussion, education, and implementation of these strategies will be the next step. The plan will be a living document, to be monitored, revised, and updated on a regular basis, about every five years.

Appendix 1: 2011 Kashwakamak Lake Planning Survey Results

The Kashwakamak Lake Plan Steering Committee conducted a survey of lake users to obtain views of how they use the lake, what they value about the lake and to better understand the issues and concerns facing the health of the lake.

The survey was conducted through the summer and fall of 2011 (July 7th to early December 7th). It was posted electronically on Survey Monkey and on the KLA website. Copies of the survey were also distributed at the Kashwakamak Lake Association (KLA) Annual General Meeting and wherever practical, the survey was delivered by hand. In order to promote survey participation, emails were sent to KLA members, and an article was posted in the October volume of the Kash Kourier (KLA Newsletter).

A total of 170 surveys were completed. The respondents were primarily the owners, or related to the owner(s) of a seasonal cottage located on the lake. They averaged a 29 year association with Kashwakamak Lake spanning an average of 2 to 3 generations. Clean water, peace and tranquility and recreational enjoyment were identified as the top three things that respondents value about the lake. Personal water craft, boat traffic and fish depletion were cited as the three top issues, potentially impacting those values.

Summary of Resident Survey Findings

A summary of survey results is presented below, followed by a more detailed outline of the results. The weighted score was determined by assigning a value of 3 for all responses of "very important" a value of 2 for "important" and a value of 1 for "not important", and determining the overall total of the calculated values.

Characteristics of Respondents:

- 88% owners/family, 10% visitors, 1% renters, 1% business operators
- 80% stay at a seasonal cottage, 17% a permanent home, 3% a lodge/resort,
- 98% stay on the lake, 2% stay within 5 km
- Average respondents have a 29 year association with Kashwakamak Lake
- The number of generations in a cottage:
  - ⇒ one - 34%
  - ⇒ two - 33%
  - ⇒ three - 23%
  - ⇒ four - 7%
  - ⇒ five – 3%

Use of Lake:

Top 5 activities:	***Next 5:***
Swimming (95%)	Walking/hiking (74%)
Reading (87%)	Fishing (74%)
Boating (85%)	Kayaking (52%)
Nature appreciation (77%)	Water Skiing (47%)
Canoeing (75%)	Ice skating (25%)

Values (weighted score):

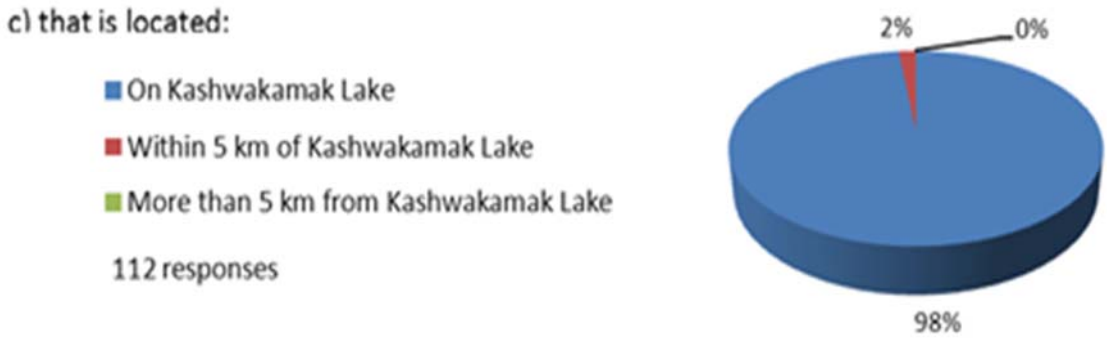
Top 5 values	***Next 5***
Clean, clear water (503)	Night skies (419)
Peace and Tranquility (460)	Natural Shorelines (412)
Recreational Enjoyment (455)	Cottage safety/Property Security (401)
Appreciation of Wildlife, Birds etc. (446)	Landscapes (391)
Retention of Crown Land (428)	"Cottage Country" Characteristics (334)

Issues/Concerns (weighted score):

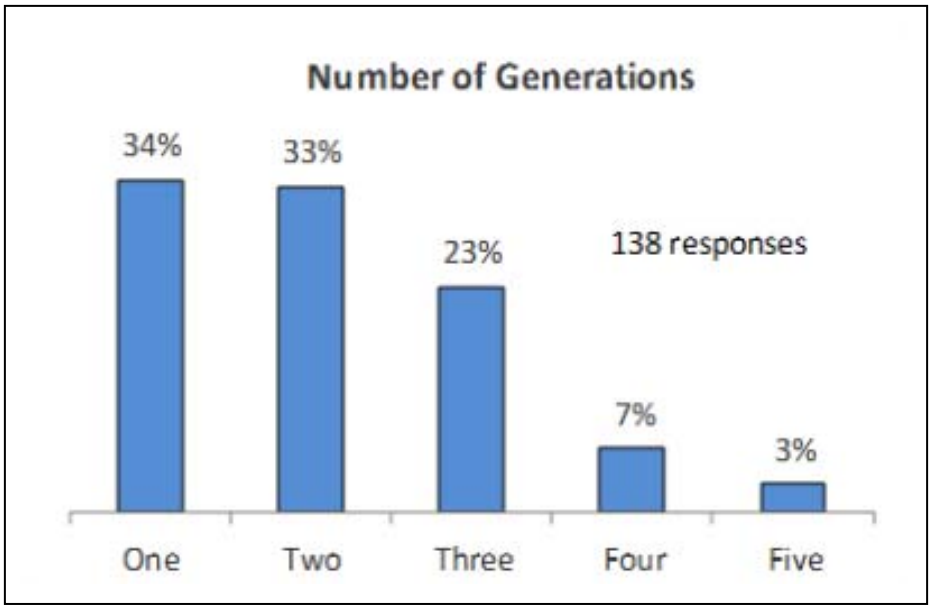
Top 5 Issues/concerns	***Next 5***
Personal Water Craft (498)	Water Levels (357)
Boat Traffic (459)	Residential/Commercial Development (349)
Fish Depletion (383)	Water Pollution (332)
Weeds/Algae (379)	Night time Noise (311)
Daytime Noise (372)	Tree and Vegetation Removal (308)

Full Resident Survey Results

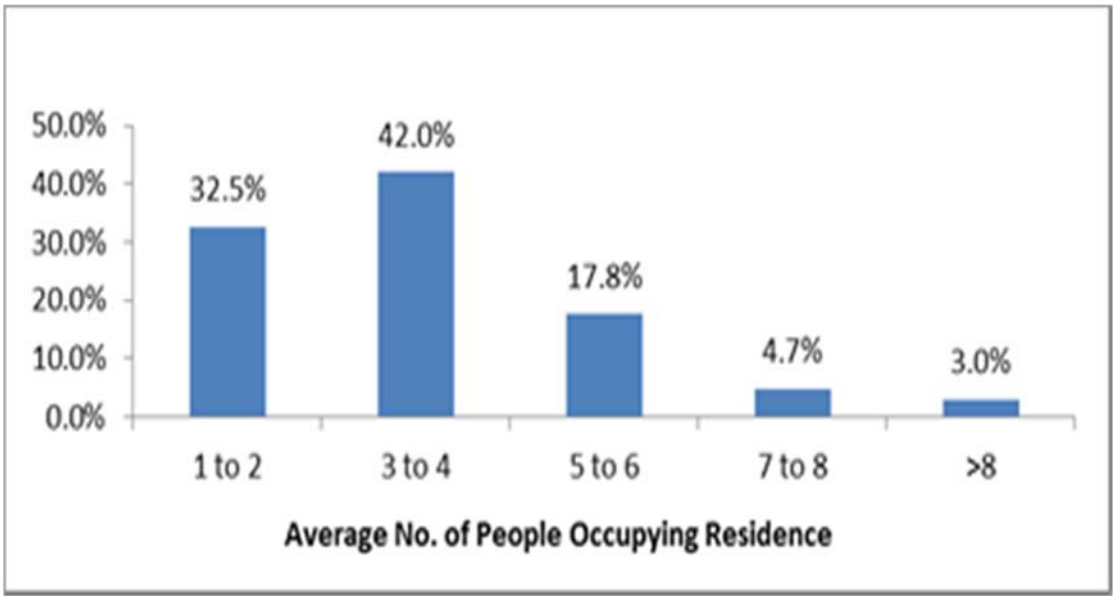
Question 1: What is your connection to Kashwakamak Lake?



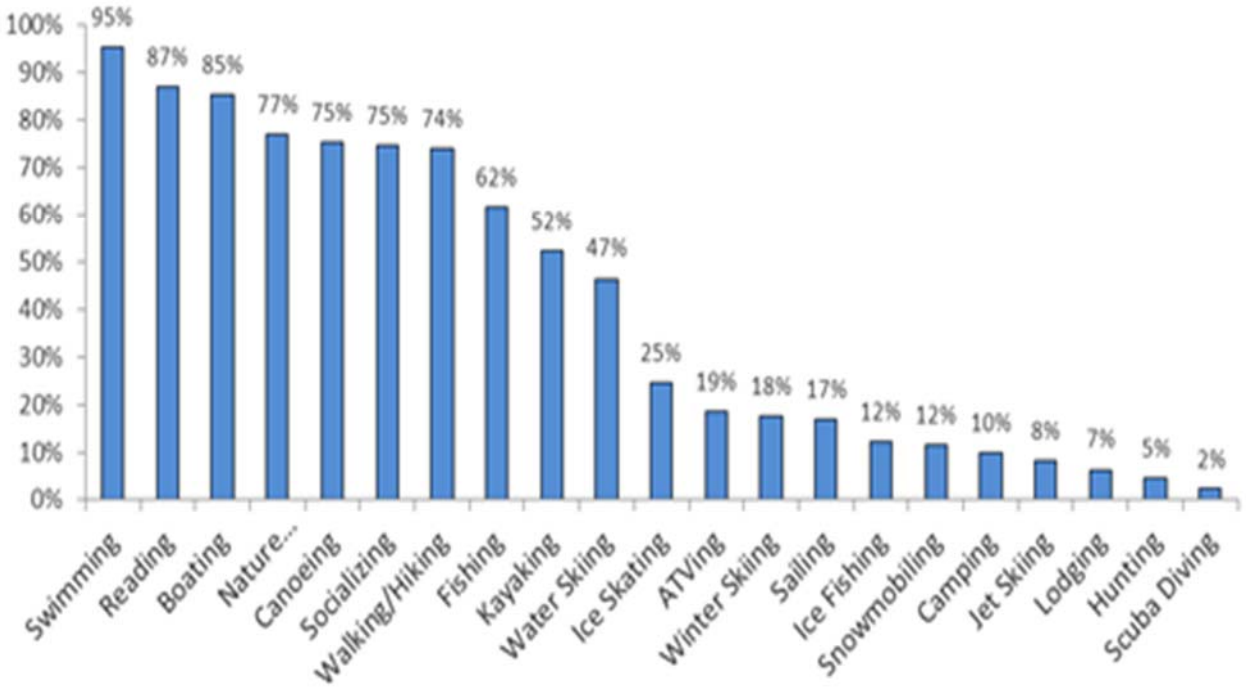
Question 2: How long have you or your family been a resident, renter, visitor or business owner on or near Kashwakamak Lake?



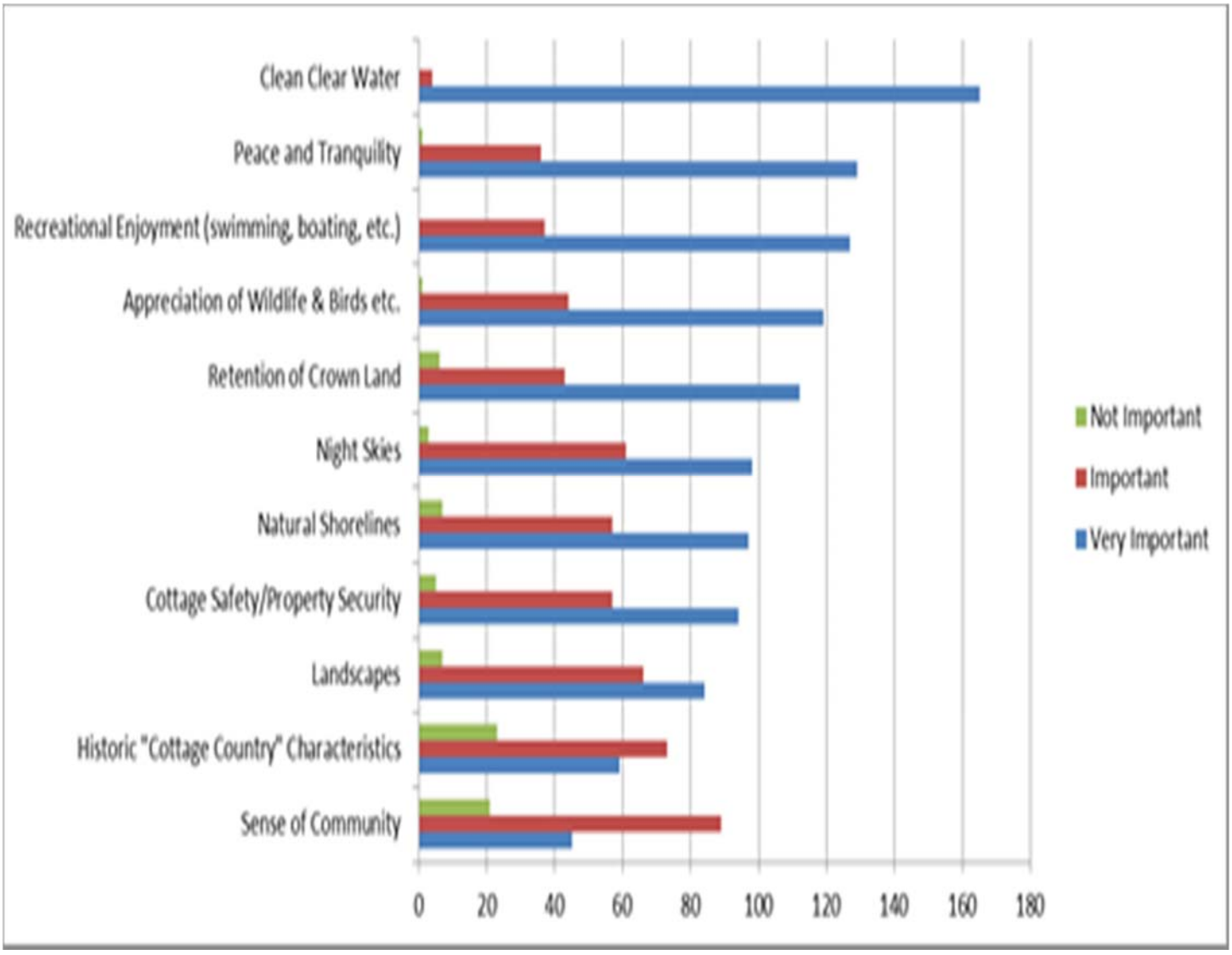
Question 4: On average how many people stay at the residence at one time?



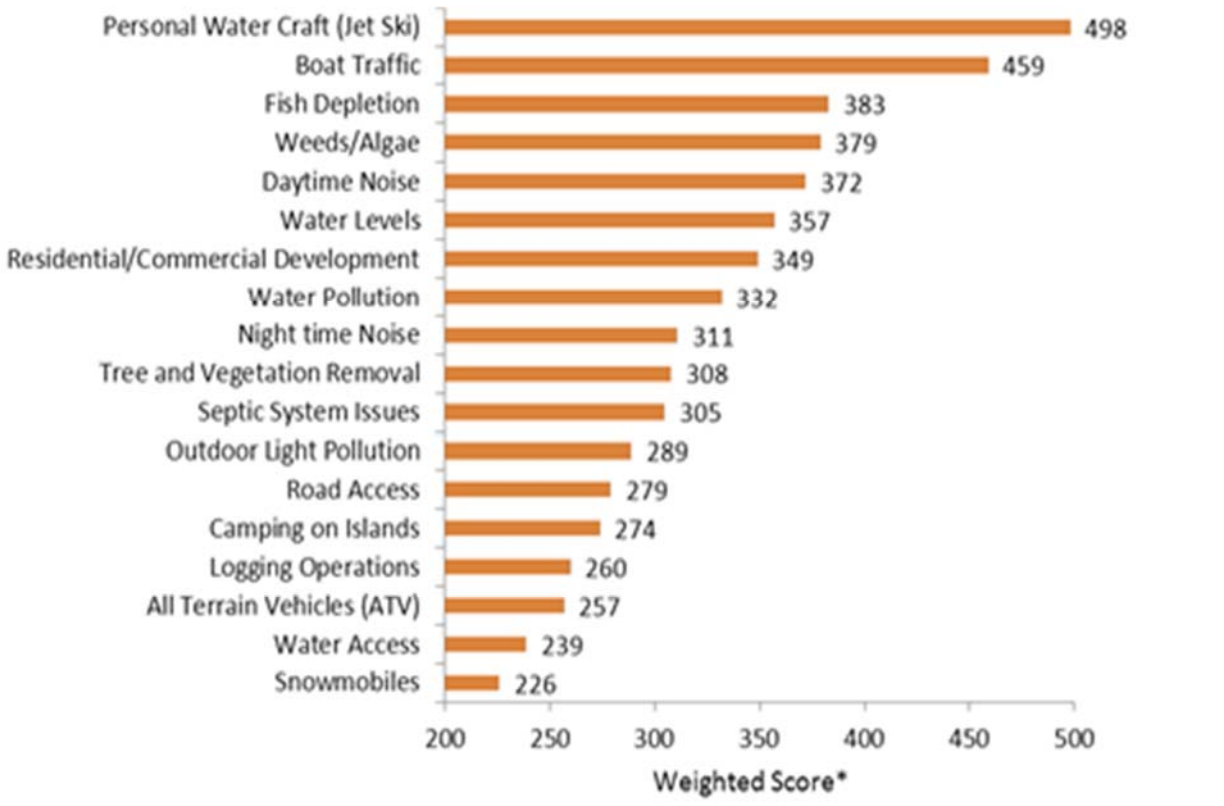
Question 5: What recreational activities do you participate in at the lake?



Question 6: Values - Please rate how the following values add to your personal enjoyment of Kashwakamak Lake. In the last column please rate the **top 5 values** that are most important to you, using a scale of 1 to 5 with 1 being the most important:



Question 7: Issues and Concerns - How much negative impact has the following had on the enjoyment of your property or time at the lake?



*total score based "significant impact" responses being given a value of 4,"moderate impact" a score of 3, "light impact" a value of 2 and "no impact" a value of 1

Business Survey Findings

In April 2012, 38 businesses were selected for the survey based on information provided by North Frontenac Township. There was an excellent 82% response rate with 31 businesses participating. These businesses represented a good cross section and included retail, construction, accommodation, services and forestry. Of interest is the fact that 74% of the businesses surveyed want to be kept updated on the Lake Sustainability Plan. The businesses were surveyed by telephone interviews and responses reported in aggregate.

About the Business Survey Participants:

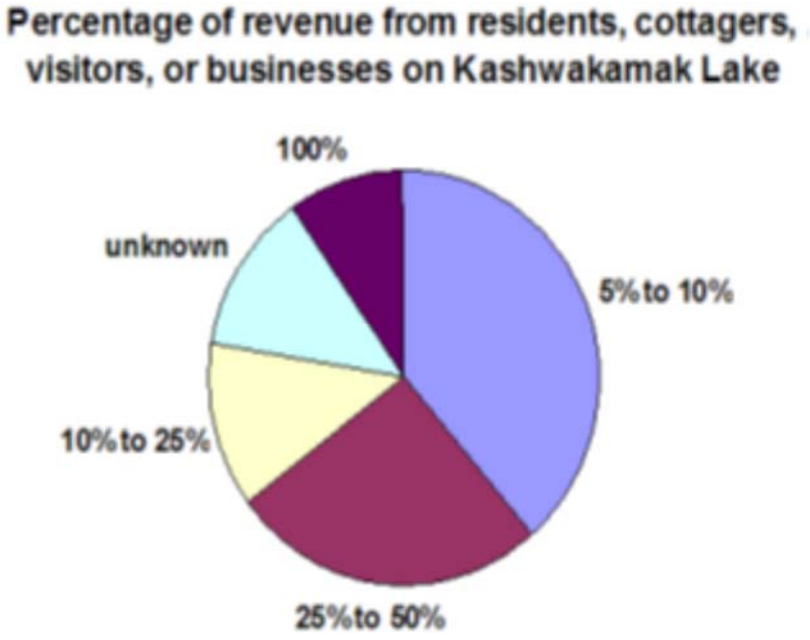
It is interesting to note that 73% of businesses have operated more than 20 years and the 31 businesses employ 130 people full time. 50% of business owners use the lake for recreation and report that their business is very seasonal, with a peak in summer.

Values:

The top values that businesses identified:

1. Customers (75%)

2. Good roads to customer’s property (7%)



Summary Comments:

It was noted during the conversations that several businesses may close this year. They also brought up the point that local business is competitive and encourage cottagers to ask if they’re seeing a better deal in the city because they can probably match it. Of interest as well is the fact that local businesses offer delivery of products as well as on-site service.

Kashwakamak Lake State of the Lake Report

We want to hear from you!

Please read the full **Kashwakamak Lake State of the Lake Report** and get back to us. We need to know:

⇒ Any information that we are missing (that you can provide or know where we can get it)

⇒ Your thoughts, social history, photos and old documents you can scan and ad etc.

How do you prefer to provide your input?

Please select all that apply by checking the appropriate box(es) below.

Group Setting

□ Road association meeting
□ Focus group discussion meeting
□ Winter webinar or conference call

1-on-1

□ Phone discussion
□ Fire side chat
□ In writing

How do you prefer the KLA contact you?

□ by email: _____
□ by telephone: _____
□ by mail: _____

Please provide your comments here and email back to ritchiemcintyre@rogers.com, or drop it in the mail to the **KLA, RR #1, Arden ON K0H 1B0**

Comments: I am a member of the KLA □ yes □ no

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