MISKWABI

AREA

WATERSHED

PLAN

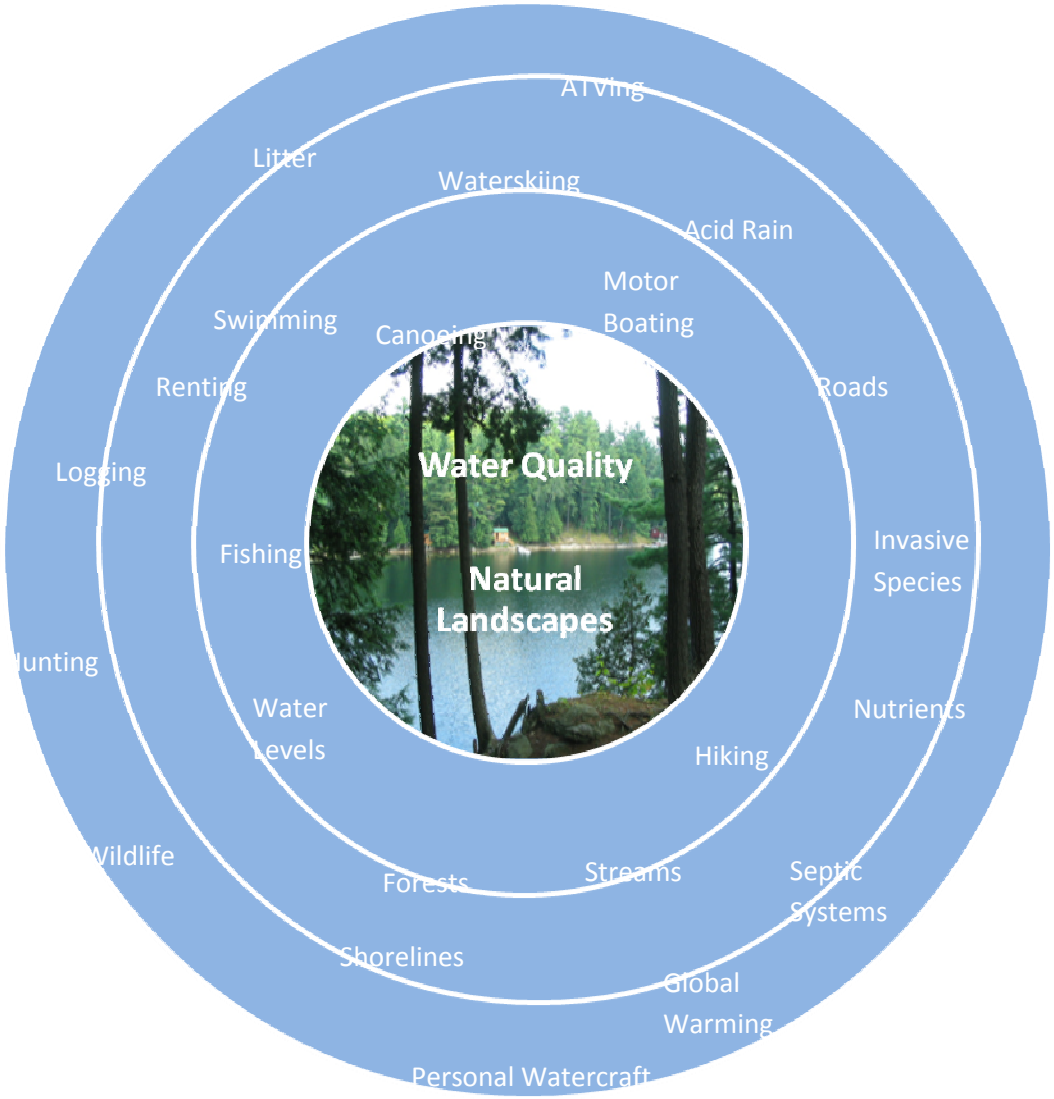
An Integral Vision for the

Lakes of Long, Miskwabi,

Negaunee and Wenona

- Everything interconnects.
- Everything affects every other thing.
- Everything brings change to all.
- Everything influences the entire web of the watershed.

Nothing is separate!



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Long Lake

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INTRODUCTION

The lakes involved in the Miskwabi Area Watershed Plan* are unique in that they form the head waters of the Burnt River system. They are fed by wetlands, springs and streams from a surrounding landscape that has, to date, remained naturally pristine. Outside of global climate and pollution influences there are no direct sources negatively impacting the area. The fate of the innate beauty and water quality is in the hands of the community – Municipality and County, federal and provincial agencies, property owners and visitors.

With this in mind a committee of twelve property owners, both part and full-time residents, formed a watershed plan committee in 2011 sponsored by the Miskwabi Area Community Association (MACA).

Together we established core objectives:

To determine at a grassroots level the values, ideas and concerns of all stakeholders; and to use these to fashion a watershed plan for the present day and the future.

In 2012, much effort was put in by committee members to develop a comprehensive survey; send it to all property owners; in many cases hand deliver additional copies; ask for returns; and finally, analyze the information.

Wenona Lake

The results from the 414 surveys received were very gratifying:

77% return rate for all waterfront owners
and overall, including backlots, 70%.

In addition to the survey, through four years of work, the committee received verbal comments and written submissions from property owners; consulted with Municipal and County officials, provincial and federal agencies as well as other experts; held discussions at lake association meetings and conducted watershed plan workshops. In total, this gave the committee an accurate knowledge of issues; a broad understanding of the values of stakeholders; and thus, a comprehensive basis for the development of this watershed plan.

It is a community plan based on input from the whole community and intended for use by all to preserve the water quality, natural features, enjoyed activities and property values for today's and future generations.

*The designation Watershed Plan was used instead of Lake Plan as four lakes are involved and these form the headwaters of the Burnt River.

Miskwabi Lake

Negaunee Lake

Replace with new picture of Miskwabi Wetland

VALUES and MISSION

THE WATERSHED PLAN SURVEY

Below are the results of the property owners' survey which give an inclusive summary of the ideas and values of those directly connected to the lakes.

OWNERSHIP DEMOGRAPHICS

- Length of ownership - average 19.1 years; longest 84 years
- Seasonal/Full-time - 79%/21%
- Future full-time + 17% = total 38%
- Average number in household - 3.7
- Average use of property - 130 days a year
- Winter use – 54% of owners
- Rentals – approximately 8% of owners
- Future rentals - + 5% = total approximately 12%

Length of ownership and future full-time residence show a strong commitment to the lakes individually, and to Haliburton generally.

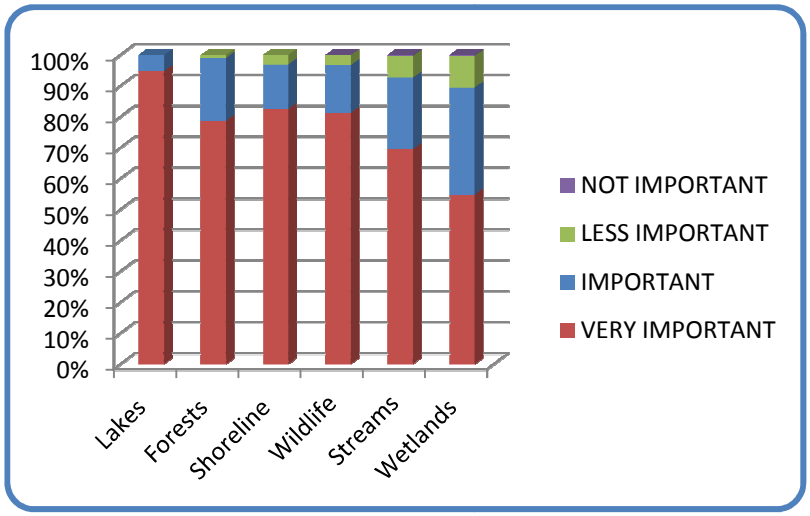
IT'S ALL ABOUT WATER

Clearly illustrated on these two bar graphs:

- Under Natural Features, lakes were considered very important or important by 100% of respondents.
- Under Issues, water quality was considered very important or important by 100% of the respondents.

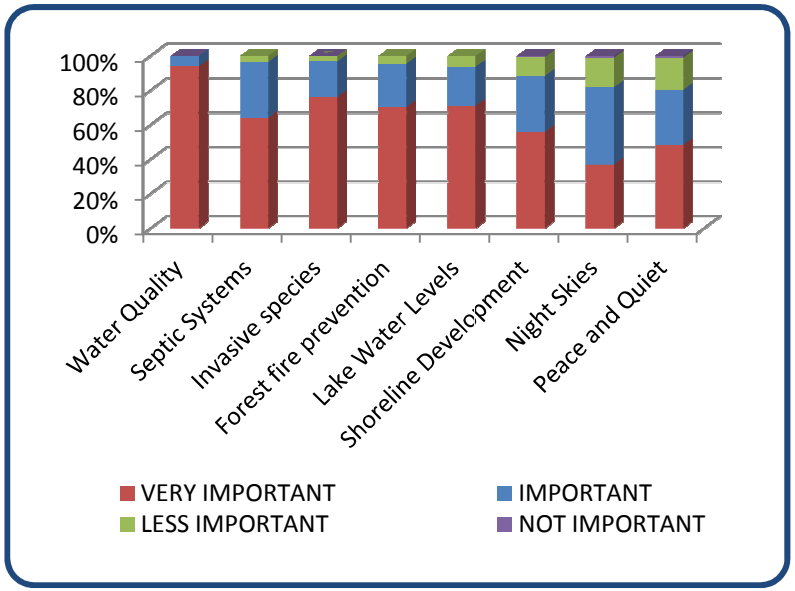
The importance of healthy septic systems was recognized by 96% of respondents.

NATURAL FEATURES

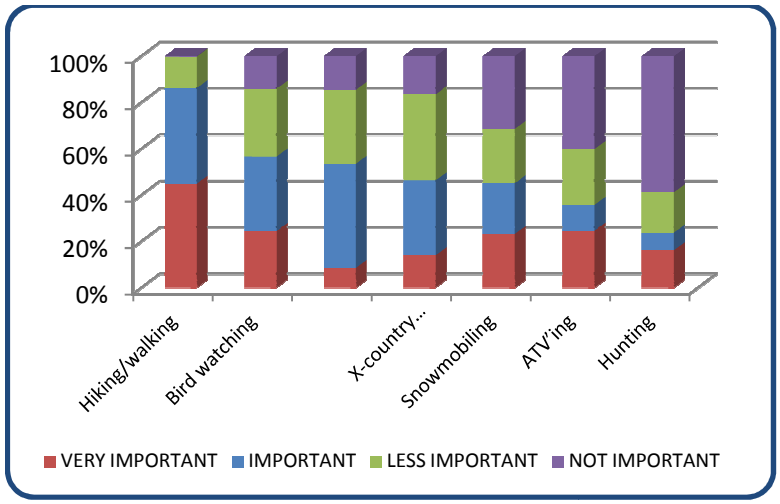


Note: All categories scored 80%+ as VERY IMPORTANT/IMPORTANT.

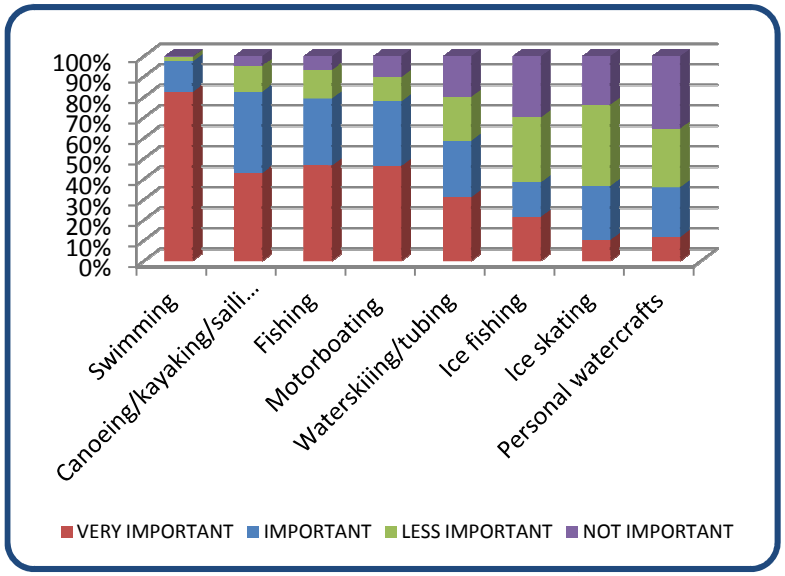
ISSUES



LAND ACTIVITIES



WATER ACTIVITIES



The consensus of what is Very Important/Important was high (between 80 and 100%) for Natural Features and Issues. However, when it came to Land and Water Activities the consensus of what was Very important/Important had a much wider range (20 to 90%).

People have the same values but like different activities. As such, it is important that governance and stewardship accommodate a multitude of activities while at the same time protecting the quality of the lakes.

MISSION STATEMENT

The mission statement was written by the committee based on the common ideas and values expressed in the stakeholder survey.

MISSION

Develop a plan to preserve the water quality, environmental integrity and natural landscapes of the lakes, and in so doing insure the lifestyle and property values for future generations.

SUMMARY OF STEWARDSHIP ACTION PLAN

For the Miskwabi watershed area and Haliburton County generally the quality of the environment is not only important in itself, but is the underpinning of the economy. Environmental health, in particular water quality and the economy go hand in hand. The economic basis of the Highlands is tied to natural landscapes and clean lakes. As well, for property owners not only their lifestyles but their property values are directly tied to the state of the water and land.

Our plan applauds and strongly supports Dysart et al in their recognition of the essential role of the environment for everyone in the Municipality, as expressed in the Official Plan:

> "The primary objective of this Plan is to enhance and preserve those environmental qualities which contribute to the attraction of the Municipality. All development proposals will be assessed for compliance with this objective.
> In particular, it is the objective of this Plan that development:
>
> - promote a healthy and sustainable natural environment;
> - protect the natural characteristics and visual aesthetics of shorelines and, wherever possible, improve and restore the natural state of shorelines and shorelands;
> - preserve the natural state of the shoreline as much as possible, and where the shoreline has been impaired by past activities, restore the shoreline's natural features including but not limited to native vegetation;
> - protect significant natural heritage features;
> - conserve significant cultural heritage resources and landscapes;
> - proceed only where any affected lakes have capacity for additional development.
>
> All new development and the redevelopment of existing properties will be considered within the context of sound environmental planning."

ISSUES WITH KEY ACTIONS

1. WATER LEVELS (Watershed Plan pg.20)

ISSUE: In Long (especially at the west end) and Miskwabi Lakes fluctuating water levels cause environmental issues, present navigational hazards and limit boat access.
ACTION: Work with the Coalition for Equitable Water Flow (CEWF) and support their initiatives with Parks Canada to develop an integrated water management system for the Trent-Severn Waterway (TSW) that includes individual lakes' preferred water levels for the reservoir lakes found mainly in Haliburton.

2. WATER QUALITY (Watershed Plan pg.24)

ISSUE: The stakeholder survey results confirmed that water quality is the number one priority for property owners. Strong stewardship within the community will help protect water quality.
ACTION:

- Suggest Miskwabi Area Community Association (MACA) develop a database to store all water quality historic and future tests as well as measure water quality trends.
- Continue to work with Ministry of Environment Lake Partners Program.
- Support the Coalition of Haliburton Associations (CHA) initiative to develop a cooperative approach to comprehensive water testing by associations that will meet the required protocols of Ministry of Environment (MOE) and Ministry of Natural Resources (MNR).
- Recommend the introduction by the Municipality of Dysart et al a by-law that eliminates or restricts the use of herbicides, pesticides and fertilizers in the watershed.

3. HEADWATERS (Watershed Plan pg.27)

ISSUE: Headwaters are becoming recognized as being as important as wetlands to the on-going preservation of water quality in watersheds.

ACTION:

- Through educational information and materials, communicate the role of headwaters and responsibility of owners to help preserve the headwaters of the Burnt River ecosystem.
- Recommend to the Municipality and County that their Official Plans give headwaters the same protection as environmental zones and wetlands now receive.

4. SHORELANDS (Watershed Plan pg.29)

ISSUE: Natural shorelines are considered key components in the maintenance of water quality and a lake's ability to remain healthy.

ACTION:

- Support the Municipality's recent by-law, Shoreline Tree Preservation, which governs the removal of trees within 30 metres of a watercourse.
- Support the shoreline inventory programme sponsored by the CHA, U-Links, Fleming College and Trent University.
- Through consultation with the Municipality take action to re-naturalize the construction site above the Rock Cut Wetland along Trapper's Trail Rd. on the north side of Miskwabi Lake.
- Work with the Municipality to establish a natural buffer zone to the Trapper's Trail Rd. causeway at the east end of Miskwabi Lake.

5. WETLANDS AND STREAMS (Watershed Plan pg.31)

ISSUE: Wetlands in the catchment area of a lake are considered critical to the lakes' water quality and general health.

ACTION:

- Work to have the five wetlands in our watershed that scored over 80% on the County of Haliburton Natural Heritage Mapping report assessed for Provincial Significance.
- Work with the Municipality and County to add the three wetlands and one stream not currently given environmental zoning protection to the Official Plan.
- Recommend that the current Municipal by-law governing development adjacent to wetlands be updated to disallow alterations to wetlands.
- Recommend that the Municipality support the use of the MNR *Environmental Guidelines for Access Roads and Waterway Crossings*.

6. FISH COMMUNITY (Watershed Plan pg.36)

ISSUE: It is well recognized that lake trout populations are in peril in Haliburton.

ACTION:

- Support the recommendations of Dr. David Evans regarding the importance of slot sizes and the protection of lake trout lakes that have good habitat for natural lake trout reproduction.
- Support the CHA initiative, now with the MNR, to close the lake trout season earlier to protect breeding trout.
- Support a "catch and release" policy for lake trout on Miskwabi and Long lakes.
- Encourage the use of lead-free fishing equipment.
- Work with MNR to build natural lake trout populations in Long and Miskwabi Lakes.

7. INVASIVE SPECIES (Watershed Plan pg.46)

ISSUE: Invasive species can cause severe, negative alterations to natural ecosystems as well as be very troublesome to people.

ACTION:

- Continue to work with the *Invading Species Watch* programme.
- Increase educational material and signage to prevent contamination of the lakes by boats and bait buckets.
- Join the new MNR/Federation of Ontario Cottagers Association (FOCA) *Invading Species Mapping* programme.

8. TRANQUILITY & NIGHT SKIES (Watershed Plan pg.49)

ISSUE: Over 80% of survey respondents indicated that "peace and quiet" and "night skies" were very important or important to them.

ACTION:

- Support the educational handout *Guidelines for Owners, Renter and Visitors* being developed by MACA. The one-page document, when finalized is to be made available for all to use.
- Develop separate educational handouts for owners who rent and renters. These would cover the environment, septic systems, waste disposal, noise and other topics related to renting.

9. RECREATIONAL BOATING & SAFETY and RECREATIONAL CARRYING CAPACITY (Watershed Plan pg.50)

ISSUE: With swimming enjoyed by 99% of survey respondents, various forms of boating by 80%, faster and more powerful watercraft, and crowded weekend conditions, safety has become a growing concern. This concern is supported by a review we conducted of U.S. studies regarding recreational carrying capacity of lakes.

ACTION:

- Develop a Boating Code of Conduct for property owners and lake users explaining the rules for safe and pleasurable operation.
- In addition to the slow speed sign at the narrows between Long and Miskwabi Lakes, add a new sign at each of the narrows further to the west on Long Lake.
- Recommend that the Municipality and County consider developing a Recreational Carrying Capacity Model that would give guidelines for Haliburton Lakes

10. LAND USE. (Watershed Plan pg.53)

ISSUE: Non-conforming land use or development on the lands adjacent to our lakes could threaten water quality, natural landscapes, and peace and quiet. This is particularly important as the lakes are a headwater area.

ACTION: Work with the Municipality to reinforce all zoning and environmental regulations. Ensure MACA is informed of all potential re-zoning applications and has the opportunity to engage in the re-zoning assessment process.

11. SEPTIC SYSTEMS (Watershed Plan pg.57)

ISSUE: Malfunctioning septic systems are considered one of the most significant threat to the water quality of our lakes. This fact is all the more important for our lakes because most septic systems on the lakes, excluding those on the north shore of Miskwabi Lake, were installed over 30 years ago.

ACTION:

- Support and work with the CHA education programme regarding pumping, inspection and maintenance of septic systems.
- Recommend that the Municipality pass a by-law prohibiting the renting of cottages to more occupants than the septic system is designed to accommodate.
- Recommend that MACA work with the Municipality to undertake a Septic Re-Inspection Programme.

LAKE DESCRIPTION

HISTORY

Pre-History

The Miskwabi watershed community is made up of the area surrounding the following four lakes in the Municipality of Dysart, east of the Village of Haliburton: Long, Miskwabi, Negaunee and Wenona.
Located on Precambrian rock of the Canadian Shield, it is the oldest of the earth's crust being at least 570 million years old.
In the last million years, glaciers have ripped and scraped across the landscape at least four times. A coarse grained rock known as "gneiss" was left behind. The last glacier, 15 000 years ago, created Lake Algonquin, which was made up of the basins of Lakes Erie, Huron, Michigan and parts of Superior. Our four lakes were created as the ice melted.

Native People's History

The Algonkian Indian tribes spent their summers by lakes like ours where the fishing was good, wood was readily available for fires, and where there would be an open patch of land for growing corn and potatoes. In winters, the tribe headed further north to trap beaver and other animals. The Algonkians traded their meat and furs for corn with the Hurons to the south. With the arrival of the Europeans, beaver pelts were traded for iron axes, brass kettles and beads. During this period the Iroquois gained control over the Algonkians and in the late 17th century, Europeans became more prominent. Many traditional Indian sites on sandy beaches were submerged as loggers built dams to raise water levels so that logs could be better transported.
Lake Miskwabi's name was likely taken from the Ojibwe word, "miskwes", which meant "red" and was often used to refer to a certain kind of dogwood bark which could be smoked..

The 1800'S

In 1819, Lieutenant Catty became the first white man to have set foot in Haliburton. In 1827, Lieutenant Walpole crossed Lake Miskwabi (then known as Owl Lake), made an extensive overland portage, and paddled down the York River to the Madawaska River. The Mississauga First Nations were not closely associated with Haliburton and on November 5, 1818, these Indians surrendered 1.9 million acres to the Canadian Land and Immigration Company including parts of Haliburton.
In 1856, the "IBO" (Irondale, Bancroft and Ottawa) rail line opened up the area for settlement and in 1857, James Fitzgerald surveyed Dudley Township. He wrote in 1858: "Dudley, along its western boundary, is broken. Drag Lake and its surrounding ridges are in the westerly part of the township. The easterly part is very good land and contains large tracts of excellent land. The soil is sandy loam, the timber, chiefly hardwood, with a good proportion of hemlock and pine - fully 40% of the township is good arable land and well suited for farms".(Muskoka and Haliburton: 1615 - 1875, A Collection of Documents, U of T Press, 1963)
On January 13, 1859, land in the townships of Dudley and Dysart was offered to the public at 50 cents per acre by the Canadian Commissioner of Crown Land, Philip van Koughnet. By 1869, the price of Crown Land in Dysart had tripled to $1.50 per acre.

Logging

From 1860 to 1890, settlement began and pine was the primary wood that was harvested. From 1908 to 1945, maple was the wood of choice and from 1920 to 1960, spruce and hemlock were harvested. Unfortunately we have extremely limited sources for that era.
Standard Chemical, located in Donald, owned large tracts of land in the Miskwabi area. They employed Kaufman and Edwards in the 1930's to log the area in order to make charcoal and alcohol from

the hardwood. The Miskwabi mill, located near the current boat launch, apparently burned in the 1940's.
There also was a gravel pit near the airstrip.
An additional mill (The King Mill) belonging to W. R. Curry was located on Long Lake.
Standard Chemical sold a large tract of land to Hasley Developments, who in turn created the cottage development on the four lakes that we see today.

Ethel Curry

Ethel Curry, the landscape artist, has a childhood link to the lakes. Born in a log cabin in Irondale in 1902, her family moved to Miskwabi Lake in 1906.

"When I was 4, we moved to Miskwabi Lake where my father was the cook at the Craig and Austin lumber camp. Our cabin was just a tiny little thing with bunkies in it." (Ethel)

After working at the camp for less than a year, W.R. Curry decided he wanted a less arduous life for his young family and decided that living in Haliburton Village would be better. Getting there would be a memorable journey. "He made arrangements with the steam tugboat, which normally pulled log booms, to tow the family on a raft across Miskwabi Lake and then the length of Long Lake, nearly 5 miles." (Ethel) Young Ethel was put in charge of the family cow and ended up, at age 4, holding the reins of the cow with one hand and her 2-year-old brother's hand with the other the whole length of the raft ride!

After graduating from the Ontario College of Art, she taught at Northern Secondary School in Toronto and painted many pictures of the Haliburton landscape which would become known as "Curry Country".

Many of the Group of Seven (Franklin Carmichael, Lauren Harris, A.J. Casson, J.E.H. MacDonald, Arthur Lismer and J.W. Beatty) worked and studied with her. She brought many of them to the Haliburton Highlands and specifically to the Miskwabi area to sketch. Her life-long friend, celebrated landscape artist Doris McCarthy, also made annual visits to Haliburton to paint in the spring.
The photo at the right shows Ethel (right) with Doris (left) and Noreen Masters in the summer of 1934.
The Ethel Curry Gallery in Haliburton is, of course, named for her.

Trent Severn Waterway connection

In 1879, the Federal Government authorized construction of the Trent Canal. The original sill dam was constructed on Long Lake in 1895 as part of the system. It was rebuilt of concrete in 1921 but as the concrete was of poor quality, it had to be rebuilt in 1939.
n 1905, control of the Trent passed from federal to provincial jurisdiction. Depletion of forests on the Trent watershed led to fierce spring flows.
From 1916 to 1950, the head water lakes (Long and Miskwabi to name two) were drained to late summer levels to ensure the lower part of the system was kept up. In the late 1950's, there was a demand for more equitable distribution of water. Various lake associations in the area agreed that the "equal percentage of

storage" basis should be adopted. This policy continues to today (water released from each reservoir lake be an equal percentage of all lakes).Currently, local reservoir lake associations are pushing for legislation that would allow for local lakes to determine an "optimal' draw down rate.

The Finnish on Long Lake

Insert text relating to their history on Long Lake – naming of roads, etc. May need another page added to document.

Cottage Development

In the early 70's Hasley Development mapped out cottage lots and sold them from an office located what is now the junction of Wenona Lake Road and Argillite Road. A payphone was located there – the only communication people had. Prospective buyers would be instructed on how to get to the "office" and from there they were shown the lots for sale. In those days Trapper's Trail went just as far as the "airstrip" so lots on Miskwabi were accessed by using an aluminum fishing boat, then getting out and tramping through the bush to determine which lot was for them. The average lot on Miskwabi originally sold for $4200 and a down payment of $100 was needed. Early cottagers had their own garbage dump located on Trapper's Trail near Wenona Lake Road. It was closed by the Ministry of the Environment in the early 80's.
The Airstrip is so named since there actually was a short landing strip that developers used when flying in prospective buyers.

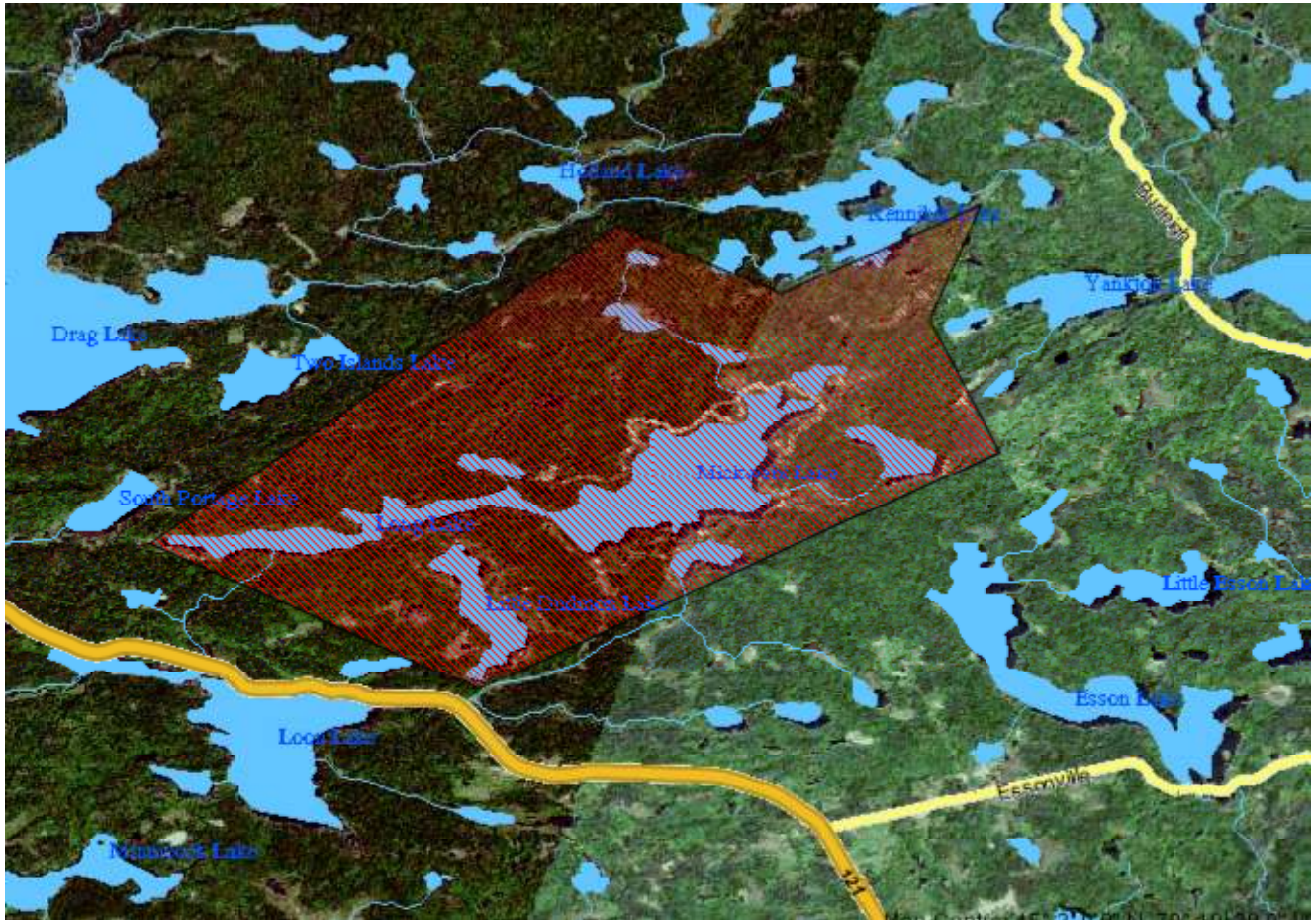
Miskwabi Area Cottager's Association (MACA)

MACA was formed in 1974 at a preliminary meeting held at a cottage on Trapper's Trail Road. The first president of the association, Jerry Strickland, set the environmental protection tone for the association that continues to today. He was instrumental in uniting the four lakes into 1 association and having representatives from all the lakes on the Executive: a practice that continues today. His environmental initiatives included ensuring that the Miskwabi Lake North Shore development happened only after all environmental aspects of the area had been carefully examined. He served as President until well into the late 80's and went on to become Executive Director of the Federation of Ontario Cottagers Association (FOCA). The "Jerry Strickland Award" is still presented each year by FOCA to worthy cottage associations for environmental projects.
Both Strickland Road and the Jerry Strickland Memorial Boat Launch are named after him.
In 2013, the Miskwabi Area Cottagers' Association changed its name to Miskwabi Area Community Association (MACA) to reflect the changing profile of the property owners and amalgamation with the Miskwabi Lake North Shore Cottager's Association.
With over 200 members, MACA continues to be a strong advocate for water quality, a well monitored environment and the local community.

GENERAL LOCATION

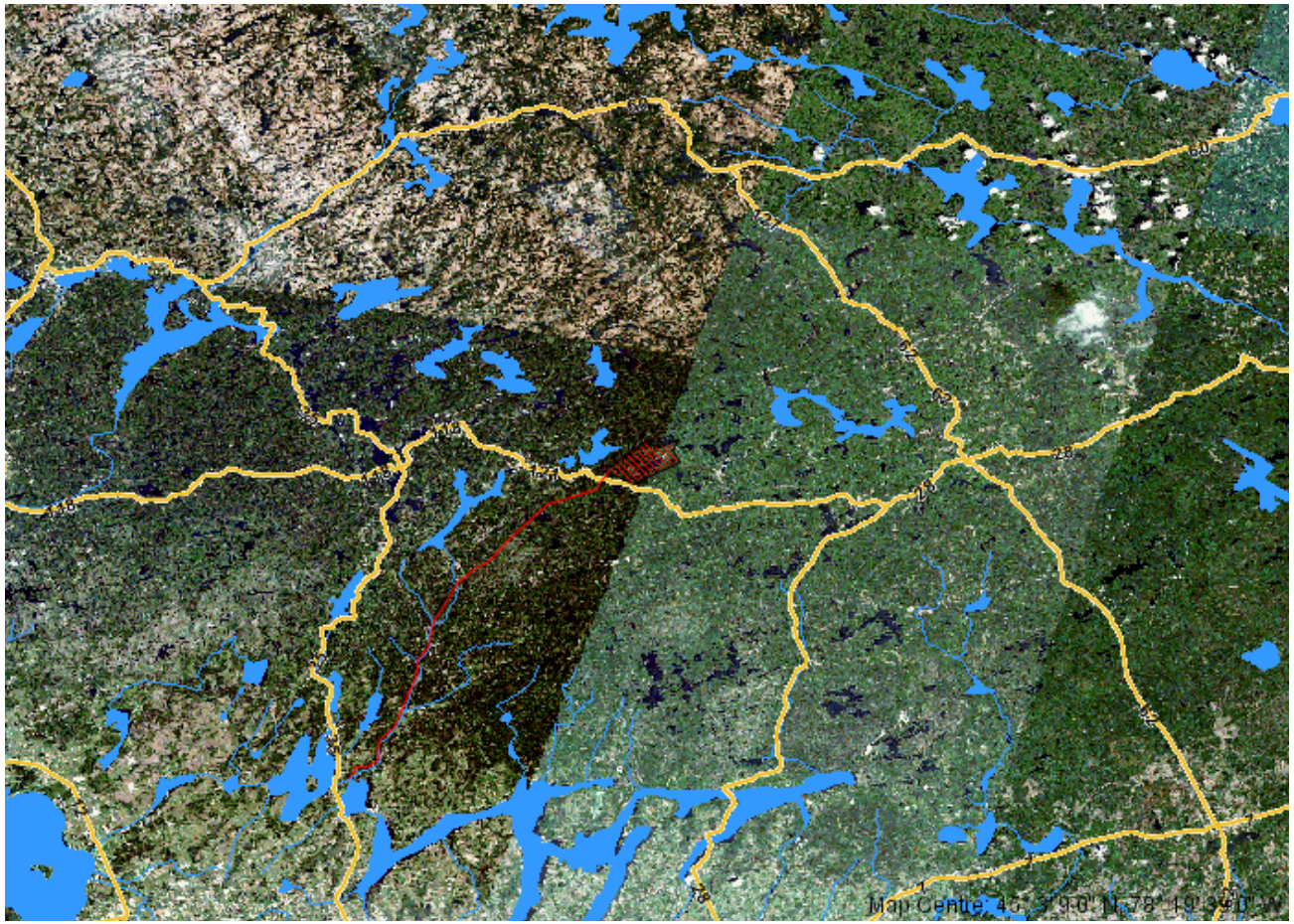
The Miskwabi area lakes are located in the Municipality of Dysart et al, County of Haliburton, about 12 kilometres east of the Village of Haliburton. Geographically speaking, Miskwabi Lake is at latitude 45˚02'06" and longitude78˚22′ 10″. The lake is located at the centrepoint between the Equator and the North Pole.

The lakes are Miskwabi, Long, Negaunee and Wenona (formerly Little Dudman). Two small lakes, Lost Lake (Hunter Lake) to the west and Lily Lake to the north, as well as a number of wetlands, drain into Miskwabi area lakes.



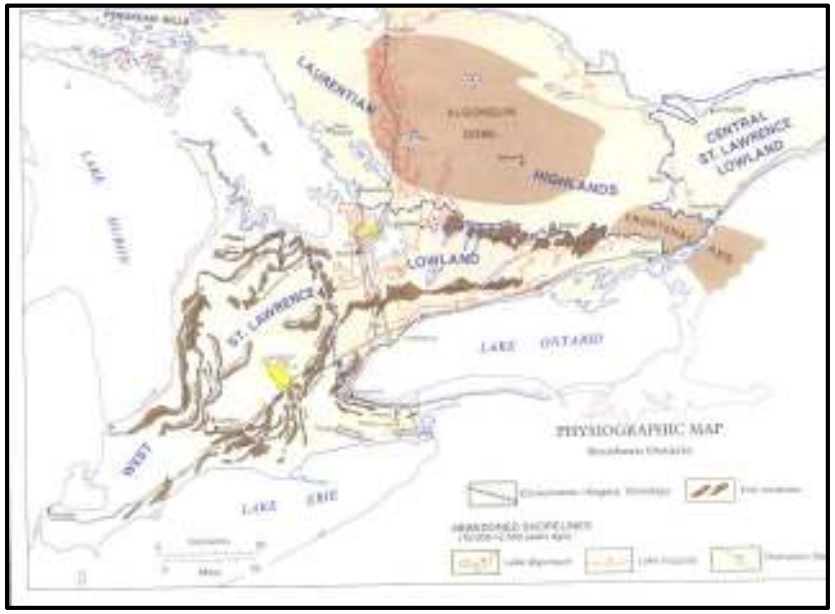
The lakes are the headwaters of the Burnt River system which is part of the Trent-Severn Waterway. The Burnt River flows from Miskwabi down through Kinmount and into Cameron Lake at Fenelon Falls. Here it joins the Trent River flowing into Lake Ontario at Trenton.

To the east and northeast of Miskwabi Lake is the Irondale River and to the north and west the Drag River. These two rivers flow south to join the Burnt River north of Kinmount. On the map below the Burnt River is indicated in red flowing from the Miskwabi headwaters to Cameron Lake.

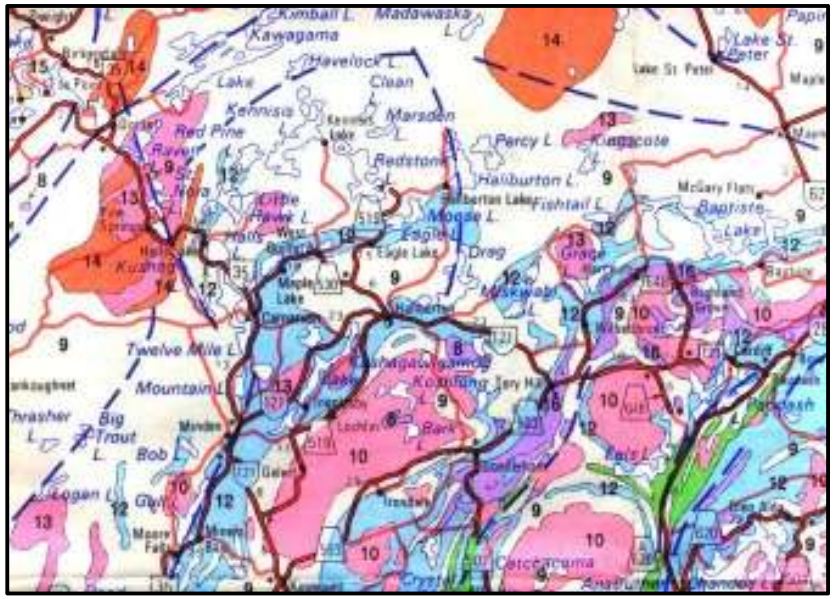


LAKE CHARACTERISTICS

Geologically speaking, the Miskwabi area lakes are part of the Canadian Shield located in the Algonquin Dome portion of the Laurentian Highlands.
The bedrock is granite gneiss often found as steep cliffs or outcroppings along the shorelines. The soil substrates are generally thin and shallow with some heavier glacial gravel deposits. The drainage basin is steep to gently rolling with a maximum elevation of approximately 80 metres (262.5 feet) above the lake levels.
The highest land elevation above sea level in the area is about 442 metres (1450 feet) and this compares to the highest elevation in Haliburton County at 563 m (1847 feet).
The lake surface elevation of Miskwabi and Long Lakes at 393 metres (1290 feet) above sea level is close to the highest in the Haliburton Highlands.



The geological age of the granite gneiss bedrock in the watershed is 570 – 1600 million years, Late to Middle Precambrian. The colour-coded and numbered map following indicates the types of rocks in the Miskwabi area:



Key to map:
9 (white) Conglomerate, greywacke, arkose, calcareous sandstone and siltstone, shale, and derived metamorphic rocks
12(blue) Marble, calc-silicate rocks, skarn
13(rose) Anorthositic to tonalitic rocks

Due to the makeup of the surrounding geology the lakes are characterized by soft water, a neutral PH, good calcium levels and not threatened by acid rain.

What type of Lakes do we live by?

Three basic types of lakes are found in Ontario.

Oligotrophic Lakes

- Generally deep
- Minimal aquatic plant growth
- Low nutrient levels
- Support cold-water fish such as lake trout and whitefish
- Low levels of phosphorus and chlorophyll
- Total phosphorus test indicates < 10ug/L

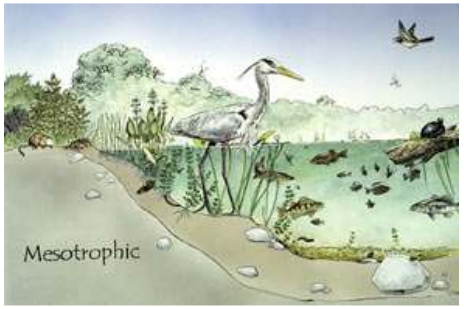
Mesotrophic Lakes

- Medium depth
- Usually good for fishing; supporting a wide variety of fish such as pickerel and bass
- More nutrients than oligotrophic lakes, but not nearly as much as eutrophic lakes
- Occasional algae bloom at the surface
- Total phosphorus test indicates 10 – 20 ug/L

Eutrophic Lakes

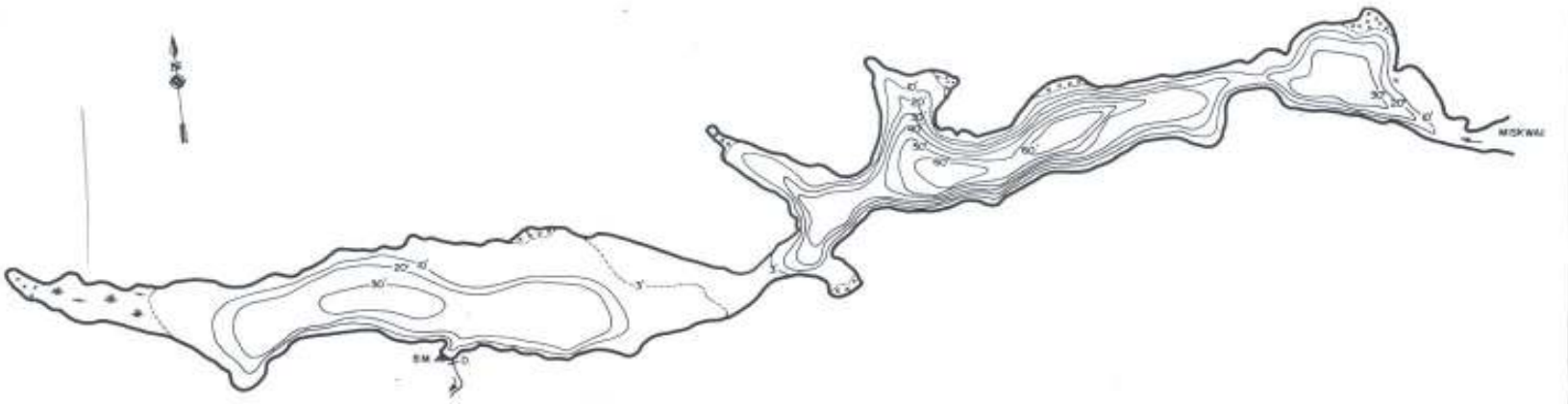
- Generally shallow with abundant vegetation
- Support warm-water fish such as perch, bass and pan fish
- Frequent algae blooms
- Susceptible to oxygen depletion
- High phosphorus or chlorophyll readings
- Total phosphorus test indicates >20 ug/L

Eutrophication is a lake's aging process. Sediments, erosion and the growth and decomposition of aquatic plants eventually fill up the lake bottom. Over time, the lake is converted to a wetland (e.g., a bog or marsh) and later, dry land. This process normally takes tens of thousands of years, but human activity can accelerate lake eutrophication by contributing excessive nutrients.



Long, Miskwabi and Wenona Lakes are oligotrophic lakes. Negaunee Lake, moderately enriched with good depth and temperature stratification, is on the border of oligotrophic and mesotrophic classifications.

Bathymetry Maps of the four lakes



Long Lake

Latitude 45˚03’10” Latitude 78˚22’50”

Height above Sea Level 388.6 m (1275 ft)

Surface Area 218 acres

Perimeter 10.62 km Volume 3901 acre ft

Maximum Depth 19.8 m (65 ft) Mean Depth 5.5 m (17.9 ft)

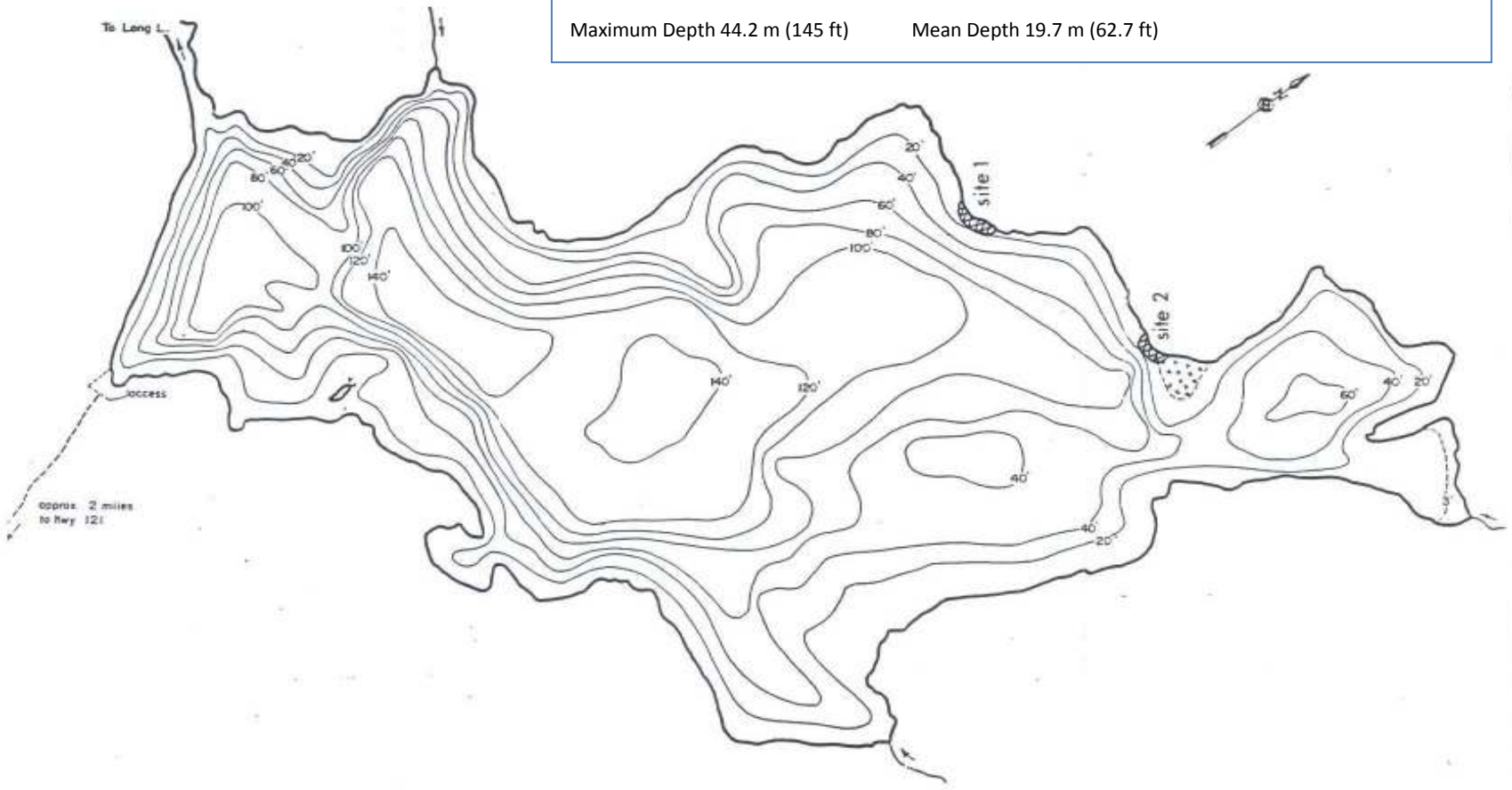
Miskwabi Lake

Latitude 45˚03’10” Longitude 78˚19’40”

Height above Sea Level 393.2 m (1290 ft)

Surface Area 662 acres Perimeter 10.6 km Volume 41530 acre ft

Maximum Depth 44.2 m (145 ft) Mean Depth 19.7 m (62.7 ft)



Negaunee Lake

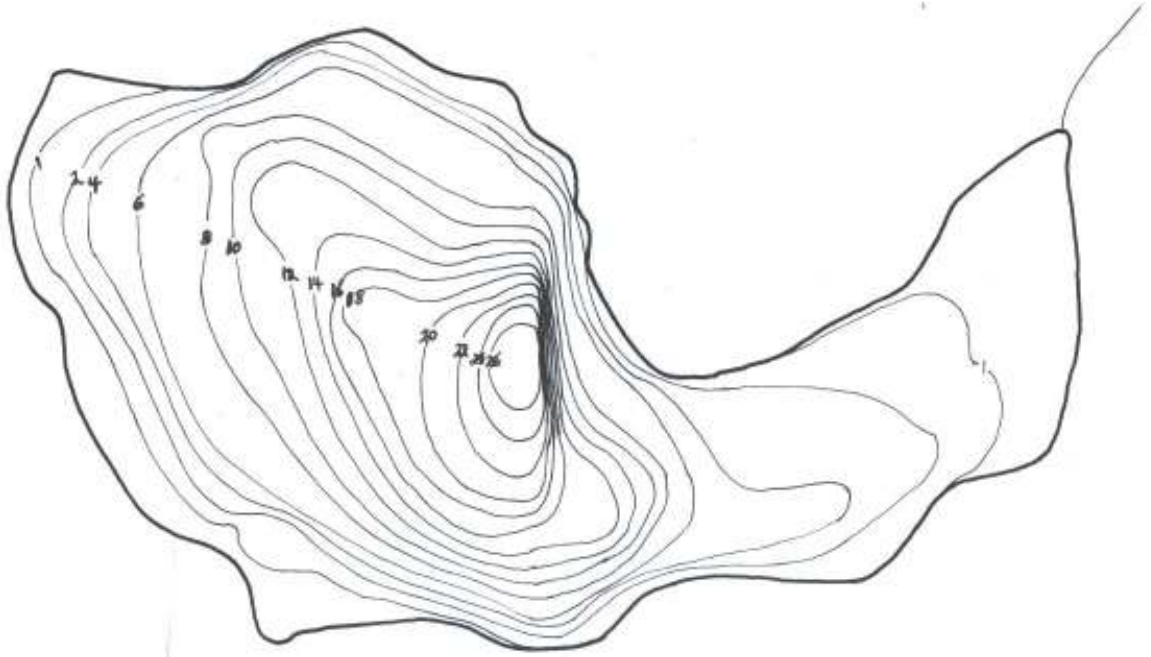
Latitude 45˚02’66” Longitude 78˚19’00”

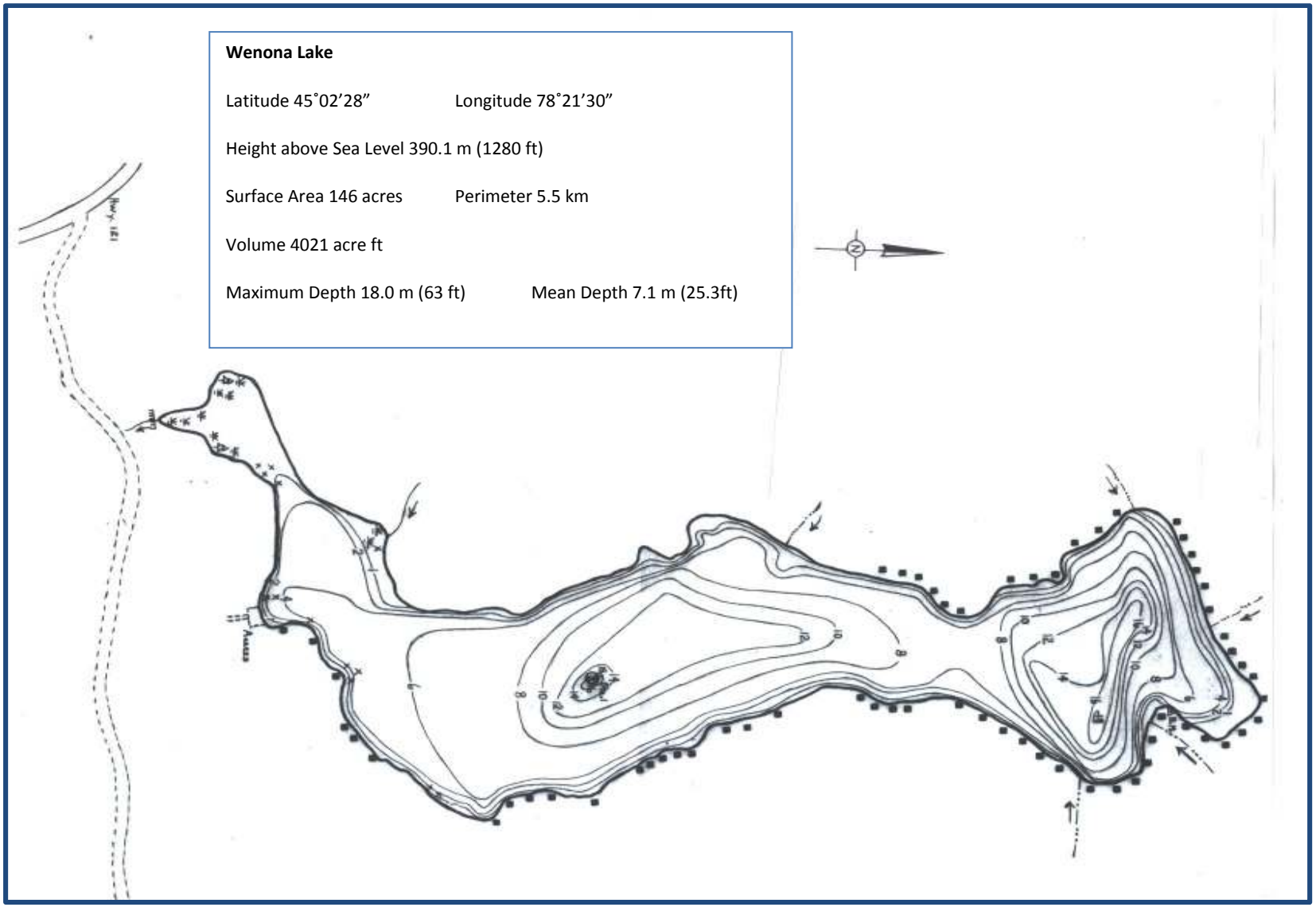
Height above Sea Level 404 m (1325 ft)

Surface Area 41.8 acres

Perimeter 2.1 km

Maximum Depth 14.6 m (78ft)





n.b. Due to scales changes map dimensions are not comparable

WATER LEVELS

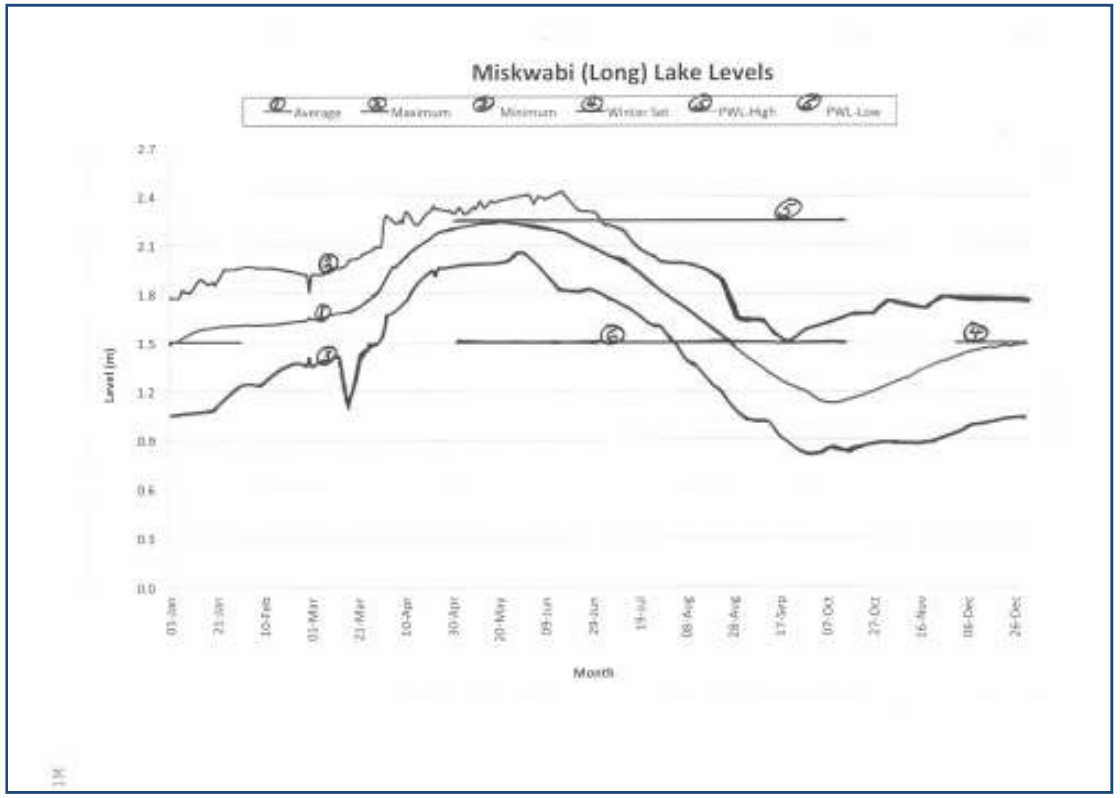
The water levels of Negaunee and Wenona Lakes are controlled by natural sills. Long and Miskwabi Lakes are controlled by the Long Lake dam of the Trent-Severn Waterway (TSW). This dam controls a drainage area of 20.2 sq. km. and has a storage capacity volume of 664 ha/m. The maximum depth is 1.98m above the natural sill.

As seen in the chart at the right seasonal water-level fluctuations can vary substantially: on average, 1.1 metres. Properly controlled water levels are important for a number of reasons:

- Boat navigation and safety on the lakes
- Water access
- Removing boats and docks from lakes
- Water intake for property use
- Lake Trout spawning
- Loon and other water bird nesting
- Reptile and amphibian hibernation

The Coalition for Equitable Water Flow (CEWF), representing the Trent-Severn reservoir lakes, has been working with the Ontario Waterways (Parks Canada) for a number of years.

Our committee strongly supports their efforts to achieve an integrated water management system with lake-specific preferred water levels.



ACTION: Work with the Coalition for Equitable Water Flow (CEWF) and support their initiatives with Parks Canada to develop an integrated water management system for the Trent-Severn Waterway (TSW) that includes individual lakes' preferred water levels for the reservoir lakes found mainly in Haliburton.

Miskwabi – Long Lakes Preferred Water Levels

Key Lake and Dam Statistics:

Drainage area:	20.2 sq. km.
Lake area:	335 ha
Full control level of dam:	2.29 m
Target full level :	100%
Sill or deduction:	0.31 m
Maximum storage depth:	1.98 m
Maximum storage volume:	664 ha-m
Log number & dimension:	7 @ 0.305 m plus 1 metal “half-log” @ 0.15 m
Normal winter-set:	5 logs
Water level fluctuation:	0.76 m

Most significant Impacts of fluctuating Water Levels:

Water levels “too high”: • shoreline erosion Lake levels rising in June: • breeding difficulties for aquatic birds	Water levels “too low”: • difficulty navigating between Long and Miskwabi Lakes • unmarked navigational hazards created • difficulties in removing boats and docks from lake • difficulty in accessing some bays in the lakes • water intake problems Lake levels falling in October: • possible negative effect on lake trout spawning beds
Upper preferred water level limit: 7 logs to minimize shoreline erosion (2.29 m)	**Lower preferred water level limit:** 5 logs (1.53 m) to maintain adequate water levels for safe navigation

Miskwabi Area Community Association supports a range between 2.29 m (7 logs) and 1.53 m (5 logs) during the navigational season.

Winter-set Level: Miskwabi Area Community Association understands that the Long Lake dam traditional winter set level is 5 logs(1.53m).

ACCESS (replace current map with final from road sign)

All lakes can be accessed on a year-round basis from Hwy. 118 using Trapper's Trail Rd. As well, Long Lake can be accessed from Hwy. 118 via Kennaway Road. This map shows road and recreational boat access points.

Denotes Boat Launch site

LAND OWNERSHIP

Except for municipal access lots, the lands adjacent to the Miskwabi area lakes are privately owned.
There are no Crown Land, Conservation Reserves, Industrial or Commercially-zoned properties.

NATURAL HERITAGE

WATER QUALITY

The response to our lake survey question regarding water quality was unanimous; not 80 or 90%, but every one of the 414 respondents, 100%, said water quality was “very important” or “important”.
“It is all about water” – aesthetically, recreationally, and economically.
The lakes of the Miskwabi area have been tested over many years, some more than others. Our lakes have participated in the Ministry of Environment (MOE) Lake Partners Program. As well, the MOE and Ministry of Natural Resources (MNR) have conducted tests that we have been allowed to review. In addition, both Long and Miskwabi Lakes have been extensively examined by the MOE Lakeshore Capacity Assessment. The test results are outlined in the table on page 25. What follows is an explanation of each test.

Water Clarity – SECCHI Depth

The visual clarity of the water in a lake is measured by SECCHI depth readings. Changes in the clarity are a useful tool in tracking the nutrient status of a lake along with other tests.

Total Phosphorus (TP)

These readings are used to interpret the nutrient status of a lake. Increases in TP cause algae growth, decrease water clarity and, in extreme cases, lead to algae blooms. These can affect the aesthetics of a lake as well as cause taste/odour problems, and in rare cases, be a serious health hazard.
Lakes are placed in three categories with respect to trophic (nutrient) status: those with less than 10ug/L TP are considered oligotrophic and characteristically are clear, deep and un-productive; lakes with TP between 10 and 20 ug/L are called mesotrophic and can be clear and unproductive at the lower end of the scale or susceptible to moderate algal blooms at the upper readings; and lakes over 20 ug/L PH are classified as eutrophic and may be subject to persistent, nuisance algal blooms.

Dissolved Oxygen

Dissolved oxygen is critical to life in a lake. During the summer and early fall oxygen levels in water below the thermocline (about 7 m) impact the survival of lake trout. The larger the volume of deep water with greater than 6 mg/L of oxygen, the better for lake trout.

pH

This is a method of measuring the acidic levels of the water. Since acids release ions, the acid content is determined by measuring the amount of hydrogen ions. The pH scale ranges from 0 (extremely acidic) to 14 (extremely basic/alkaline) with 7.0 being neutral. Most aquatic plants and animals can survive in ranges 6.5 to 8.0.

Alkalinity

Alkalinity testing measures the acid-neutralizing (buffering) capacity of a lake by determining its carbonate-bicarbonate concentration. Many Haliburton lakes have low buffering capacity and are sensitive to acid rain. Lakes with less than 10mg/L may be subject to acidification.

Calcium (Ca)

In aquatic systems calcium is necessary for growth of crustaceans as they shed and rebuild their exoskeletons. Recent studies in Haliburton and Muskoka have documented declines in calcium in area lakes. Zooplanktons, like Daphnia (native water fleas) are an integral part of the ecosystem and provide food for fish. Declines in calcium, and subsequently plankton, can lead to negative impacts on the lake food webs. Daphnia species may be jeopardized by lake calcium levels below 1.5 mg/L

WATER QUALITY PARAMETERS				
PARAMETER	**LONG**	**MISKWABI**	**NEGAUNEE**	**WENONA**
***SECCHI Depth (m)** >5 oligotrophic 3-5 mesotrophic <3 eutrophic	Average over 2 years 2003 & 2005 4.25	Average over 15 years 1998 – 2012 8.5 No trend over 15 yrs.	Average over 5 years 2000 – 2004 4.82 No trend over 5 yrs.	Average of 11 years from 1992 – 2012 5.1 No trend over 11 yrs.
***Total Phosphorus (ug/L)** <10 ug/L oligotrophic 10-20 ug/L mesotrophic >20 ug/L eutrophic	Average over 2 years 2006 & 2008 6.95	Average over 11 years 2002 – 2012 5.7 No trend over 12 yrs.	Average over 2 years 2002 & 2004 10.5	Average over 8 years from 2002 – 2012 8.85
****Dissolved Oxygen (mg/L)** >6 excellent for lake trout	Average over 5 years 09/86, 08/89, 09/94, 08/99, 09/07 10 metres 2.4 20 metres .79 Trend to lower D.O. at both depths	Average over 4 years 09/75, 10/86, 09/01, 09/07 10 metres 8.7 20 metres 6.9 40 metres 4.1 Trend to lower DO at 40 m.	Average over 2 years 09/83 and 08/89 10 metres 1.0	Average over 3 years 08/79, 08/83, 08/84 10 metres 3.4 20 metres .1
** **pH** >6.5 excellent 5.5 – 6.5 good <5.5 poor	Average over 2 years 1970 & 2007 7.5	Average over 8 years 1970,75,95,96,97,98,2001,07 7.3	Tested 09/83 8.0	Average over 2 years 08/83 & 08/84 7.9
** **Alkalinity (mg/L)** <10 sensitive	Average over 2 years 33.9	Average over 8 years 32.6	Tested 09/83 47.9	Average over 2 years 08/83 & 08/84 37.6
Calcium (mg/L) >1.5 mg/L necessary	Recent testing 13.3	Recent testing 13.9	Recent Testing 21.4	Recent Testing 13.9
*MOE Lake Partner Program	**Tests completed by MOE or MNR personnel			

Water quality conclusions

With regard to pH, Alkalinity and Calcium, the results for all four lakes are very positive.
Water Clarity and Total Phosphorus tests indicate that Negaunee is tending toward being mesotrophic; whereas Long, Miskwabi and Wenona are oligotrophic.
Concerning Dissolved Oxygen, the figures signify that Long, Negaunee and Wenona are not suitable habitat for lake trout. This is of concern for Long Lake which has traditionally supported a lake trout population. The Dissolved Oxygen tests for Miskwabi vary substantially from test-to-test years but generally are acceptable above 30 metres. The bottom reading (40 m) has been trending downward. Even though the TP tests are good with no negative trends, the lower oxygen levels at depth along with the depleted oxygen levels in Long Lake give cause for concern.

Lakeshore capacity assessment

With the opening of Miskwabi Lake to cottage development in the late 1960's and early 70's, both Miskwabi and Long Lakes were assessed under the Lakeshore Capacity Model and deemed at capacity.
Subsequently, the north shore of Miskwabi was opened to development with covenants involving increased lot sizes, deeper setbacks and special regulations regarding the shoreline buffer area.

In the Dysart et al Official Plan both lakes are considered at capacity.

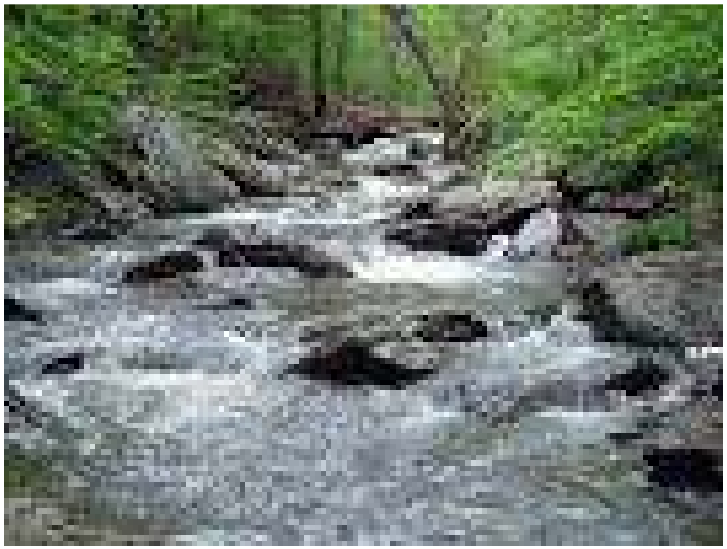
Harrison Point, Lake Miskwabi

ACTION:

- Suggest that the Miskwabi Area Community Association (MACA) develop a database to store all water quality historic and future tests as well as measure water quality trends.
- Continue to work with MOE Lake Partners Program.
- Support the Coalition of Haliburton Associations (CHA) initiative to develop a cooperative approach to comprehensive water testing by associations that will meet the required protocols of MOE and MNR.
- Support the introduction by the Municipality of a by-law that eliminates or restricts the use of herbicides, pesticides and fertilizers in the watershed.

HEADWATERS

The catchment area of our four lakes is at the headwaters of the Burnt River. On the one hand, being at the headwaters our lakes are not impacted by any upstream sources; on the other hand, these lakes are the source of water that flows into the downstream waterways.



It is very important that from a stewardship point of view we do everything possible to protect the headwaters ecosystem and the quality of water that flows out of our area.
The essential importance of headwaters is just starting to be realized and studied. To quote the Ontario Headwaters Institute:

> "The well-being of Ontario's headwaters – flows that recharge groundwater, create wetlands, and provide the base-flow for our streams and lakes – is fundamental to maintaining our freshwater capital."

Among other benefits, headwaters:

- filter, store and drain water from two-thirds of the land in our watershed.
- provide the bulk of the flow to our watercourses
- nurture more of Ontario's biodiversity than any other type of habitat.

Poorly understood, in particular, are the innumerable small, temporary streams, swales and wet areas. These are especially vulnerable to impacts from crossings, channelization, flow diversion, grade lowering and realignment.
The Toronto Regional Conservation Authority has been studying headwaters and states "there is a growing body of evidence to suggest that headwaters are important sources of food, sediment, nutrients and flow to downstream aquatic systems…they provide water quality, storage and attenuation functions."

ACTION:

- Through educational information and materials, communicate the role of headwaters to property owners and their responsibility to help preserve the headwaters of the Burnt River ecosystem.
- Recommend to the Municipality and County that their Official Plans give headwaters the same protection as environmental zones and wetlands now receive.

VEGETATION

The landscape around the lakes at the head of the Burnt River is representative of the Great Lakes – St. Lawrence Forest and is now covered with mature forest. Logging at the turn of the twentieth century eliminated all the old growth and as the topography was not suitable for farming regeneration naturally occurred.
There are four forest regions in Ontario: Deciduous Forest Region, Great Lakes-St. Lawrence Forest, Boreal Forest and Hudson Bay Lowlands. The Haliburton Highlands are part of the Great Lakes – St. Lawrence Forest. It is the transitional zone between the deciduous forest of south-western Ontario and the predominately coniferous boreal forest north. Throughout this region coniferous trees such as Eastern White Pine, Red Spruce, Eastern Hemlock and White Cedar commonly mix with deciduous broad-leaved species such as Sugar and Red Maple, Basswood and Red Oak. Species more common in the boreal forest such as White and Black Spruce, Jack Pine, Aspen and White Birch are also here. As well, this transitional forest region contains many species of fungi, ferns, mosses, shrubs and wildflowers.

The forests around the Miskwabi area lakes are mixed with hardwood species dominating overall. The buffer zones along the lakes are made up of Eastern Cedar, Balsam fir, Eastern Hemlock, White Spruce, Paper Birch, Red Maple, Black Ash, American Basswood and Tumbling Aspen.
In the more well-drained uplands Sugar Maple, American Beech, Ironwood, American Basswood, White Pine, White Spruce, Eastern Hemlock, some Black Cherry, Yellow Birch and Red Oak are found.

SHORELANDS

The shorelands of a lake are an essential component in the maintenance of water quality and the lake's ability to remain healthy. They are critical in providing habitat for many of the lake's life forms during some form of their life cycles. As well, shorelands can act as buffer zones to filter out nutrients such as phosphorus before they enter the lakes and cause weed growth, algae blooms, oxygen depletion and stressed fish populations.

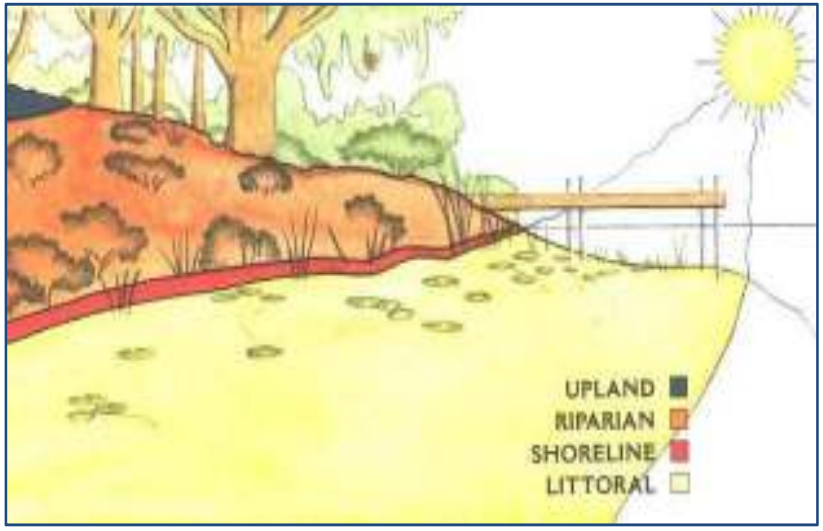
The natural shoreline can be divided into three components; beginning underwater and extending upland.

The *littoral zone* is the area from the water's edge to roughly where sunlight no longer penetrates to the lake bottom. As much as 90% of the species in the lake either pass through or live in this zone.

The *riparian zone* is the transitional land that forms a buffer along the water's edge.

The *upland zone* is the higher, drier ground adjacent to the riparian zone and is typically forested with the kinds of trees that take advantage of better drainage like Poplar, Spruce and White Birch.

The natural vegetation of the riparian and uplands zones help to stabilize the soils, reduce erosion and act as a barrier to help filter out "undesirables" before they enter the lake. These can include natural runoff, septic tank seepage, fertilizers, pesticides, pet deposits and oil or gas spills. One of the main problems is phosphorus which occurs naturally and also in human-made products and wastes. Naturally-occurring phosphorus helps to nourish life in the lake, but when added to the man-made load, phosphorus over-feeds the lake causing excessive plant growth and algae blooms that consume the water's oxygen, resulting in poor water quality.



Shoreline Tree Preservation By-Law

In 2012, the County of Haliburton, recognizing the importance of natural shoreline buffers, passed the Shoreline Tree Preservation By-Law.(Preservation By-law No. 3505) This by-law applies to all lands within 30 metres of lakes, rivers and navigable waters. Its purpose is to:

- minimize the destruction or injury of trees
- regulate the removal, maintenance and protection of trees
- sustain a healthy natural environment by maintaining and improving the ecosystem services provided by trees
- maintain water quality
- prevent soil erosion and reduce airborne pollution
- protect fish spawning beds

The new by-law also encourages the rehabilitation and naturalization of shorelines which, over the years, have been altered.

The Miskwabi Area Watershed Plan committee believes that natural shorelines are essential for the preservation of the water quality and related natural environment, and accordingly strongly supports the by-law.

Shoreline Inventories

Monitoring and renaturalizing lake shorelines is one of the two most important actions shoreline property owners can take to protect water quality (the other being maintaining septic system health). During 2014-15 the four Miskwabi area lakes are being offered the opportunity to participate in a shoreline inventory programme sponsored by the CHA, U-Links, Fleming College, and Trent University.

Trained students from environmental studies and geography, using GIS mapping, will study each lake. Based on a Wisconsin model and a categorized rating system developed for Kennisis Lake, all the shorelines will be analyzed.

ACTION:

- Support the Municipality's recent by-law, Shoreline Tree Preservation, which governs the removal of trees within 30 metres of a watercourse.
- Support the shoreline inventory programme sponsored by the CHA, U-Links, Fleming College and Trent University.
- Through consultation with the Municipality take action to re-naturalize the construction site above the Rock Cut Wetland along Trapper's Trail Rd. on the north side of Miskwabi Lake.
- Work with the Municipality to establish a natural buffer zone to the Trapper's Trail Rd causeway at the east end of Miskwabi Lake.

WETLANDS AND STREAMS

We all are indeed fortunate to be part of the Haliburton Highlands and a pristine lake group. There are 4 main area lakes and over 20 wetlands and streams within the boundaries as illustrated on the map below.

As part of the head waters for the Burnt River watershed, our concerns about our natural habitat are slightly different than many other lakes as we do not receive flows from other water bodies. Being head water does carry a serious responsibility: for what happens in our water affects all other water downstream in the system.

Wetlands and streams provide substantial ecological, social and economic value to the lakes by maintaining and improving water quality. Retention of rain and runoff assists in flood control and provides habitat for wildlife, nesting areas for birds, spawning sites for fish, nesting grounds for turtles, and homes and nurseries for various other species, as well as conditions that support a wide variety of vegetation.

Wetlands

These are areas where land is wet either seasonally or permanently The result is water-logged soils and growth of water-tolerant plants. Wetlands occur along edges of lakes, rivers and streams where water pools for at least part of the year.
There are five classes of wetlands: bogs, fens, swamps, marshes, and shallow water. This classification system recognizes that hydrological processes, dictated by climate and landscape factors, largely determine wetland form. (National Wetlands Working Group 1997). In the watershed area we find all except bogs which are usually found further north in thinner soils.
Four different types of wetlands are recognized by MNR: lacustrine (associated with lakes), riverine (associated with rivers), palustrine (occurring upslope from previously mentioned types), and isolated (receiving nutrients from precipitation, overland flow and groundwater). All types are present in the watershed.

Wetlands play a vital role in maintaining high quality water supplies by collecting rainfall, snowmelt and runoff; storing it; and then discharging it as surface runoff or groundwater flow. They act as buffer zones for various types of nutrients and pollutants. Other vital roles include providing wildlife corridors for seasonal breeding, migrations and habitat for many species.

Wetland Mapping

In the catchment area of the lakes we have identified 13 wetlands and in the Dysart et al Official Plan 9 of these are designated as Environmental Protection Areas. As well, some of the wetlands are possibly complex ones. Under the Ontario Wetlands Evaluation system, wetland complexes are ones where the topography of the landscape, the short distances between some wetlands and the density of wetlands per unit of areal landscape may be so complex that delineation of the wetlands into individually recognized units would not be an ecologically or functionally sound process.

In the Haliburton Highland Land Trust report, *County of Haliburton Natural Heritage Mapping* (prepared by Glenside Ecological Services Ltd.) 5 of the wetlands are part of those in the County of Haliburton with the highest potential for provincial significance. In the study, County wetlands were ranked between 1and 100 with those ranking between 80 and 100 considered having the highest potential for being Provincially Significant Wetlands (PSW).

To make identification simpler, we have named the 14 wetlands and noted their score on the above-mentioned study. The map number refers to the wetlands map on the following page.

Miskwabi Area Wetlands		
NAME	**Score**	**No. on Map**
South Negaunee Lake	90 -99	1
Miskwabi East Causeway	80 -89	2
Miskwabi North	80 -89	3
Miskwabi Rock cut	80 -89	4
Miskwabi Downdraft	Under 80	5
Lily Lake	Under 80	6
Miskwabi Lake Road	Under 80	7
Inkinnen Trail	Under 80	8
South Wenona Lake	Under 80	9
West Wenona Lake	Under 80	10
Wenona Lake Rd	Under 80	11
Lost Lake East	80 - 89	12
Lost Lake North	Under 80	13
Burnt River	Under 80	14

In any case, PSW or not, the wetlands surrounding the Miskwabi area catchment are essential for the health of the lakes and water quality.

MISKWABI AREA WETLANDS

LEGEND

Contours

Freeways

Highways

Arterial Roads

Collector Roads

Local Roads

Wetlands

Rivers and Streams 20K

Lakes and Ponds 20K

Province

0 1 2 3 4 km

Scale: 1:65,000

Streams

Streams are channels of water that are either intermittent or permanent in nature and can include deltas and flood plain areas. Streams provide transportation of surface water, connect chains of lakes, help control erosion, silting and assist in flood abatement. They provide spawning, nursery, rearing, seasonal and adult habitat to a broad range of fish, turtles, other amphibians, reptiles and wildlife.

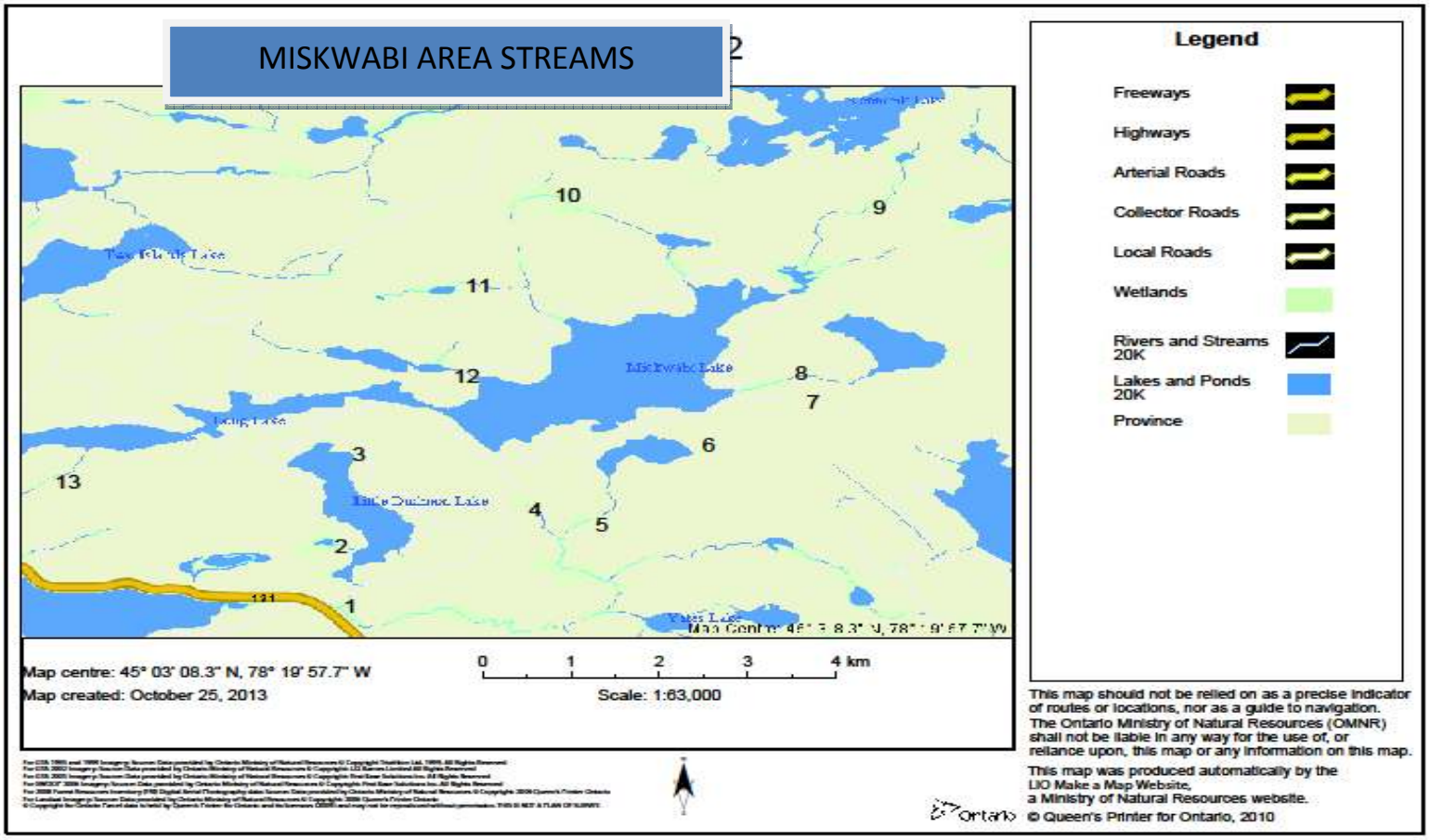
Intermittent streams control water in peak seasons and contain structure to help control channeling and silt abatement. Permanent steams flow year round and can be connecting channels between bodies of water. These streams can be either warm or cold water. In most cases cold water streams are, to a certain extent, spring fed. Consistent with past usage and policy within MNR, the definition of a coldwater stream is one supporting or capable of supporting coldwater fishes.
Surveys have shown that all three stream types are within the catchment area.

With the size of the area it is most likely that all the streams have not been found. The following is a listing of the permanent streams that have been located to date. They are named for a connection to a lake, wetland, road or other recognizable location and categorized as cold or warm water. The number of the stream indicates its location on the streams map on the following page.

MISKWABI AREA PERMANENT STREAMS

NAME	Classification	No. on map
Dudman Creek	?	1
Wenona West Creek	?	2
Wenona East Creek	?	3
West Negaunee Creek	?	4
Lower Negaunee Creek	?	5
Upper Negaunee Creek	Cold water	6
Causeway Creek	Cold water	7
Lost Lake Creek	?	8
Miskwabi East Wetland Creek	?	9
Miskwabi Rock Cut Creek	?	10
Miskwabi Downdraft Creek	?	11
Lily Lake Creek *	?	12
Burnt River	Warm water	13

*On older topo maps this creek is shown flowing into the north-east end of Long Lake but, in fact, it flows into the north-west end of Miskwabi Lake



ACTION:

- Work to have the five wetlands in our watershed that scored over 80% on the County of Haliburton Natural Heritage Mapping report assessed for Provincial Significance.
- Work with the Municipality and County to add the three wetlands and one stream currently not given environmental zoning protection in the Official Plan.
- Recommend that the current Municipal by-law governing development adjacent to wetlands be updated to disallow alterations to wetlands.
- Recommend that the Municipality support the use of the MNR *Environmental Guidelines for Access Roads and Waterway Crossings*.

FISH COMMUNITY

The MNR is responsible for the management of fish stocks and fishing regulations in Ontario, including monitoring fish populations, stocking, surveying, protecting habitat, collecting data and long-term planning.
The Miskwabi area lakes are under the auspices of the Minden District Office. Local staff were very generous with their time and provided our committee access to their testing, stocking and survey information for the four lakes.
According to MNR records, when first surveyed, no native game fish were found in any of the four lakes. The surveys located a wide variety of minnow species as well as perch and white suckers. Negaunee was never stocked but beginning in the 1930's Long, Miskwabi and Wenona were, over the years, individually stocked with one or more of the following species.

Lake Trout are freshwater char living mainly in northern North American lakes. About 25% of the world's lake trout lakes are found in Ontario (many in Haliburton County). However, only 1% of Ontario's lakes contain lake trout. Lake trout require deep, cold lakes with well-oxygenated water. They spawn in the fall, at night, scattering their eggs over rocky shoals. The eggs remain among the rocks and hatch in the late winter.

Haliburton Gold Lake Trout is a strain of lake trout unique to the Highlands. It has been studied by Dr. John Casselman, a senior scientist with MNR. His findings indicate that it is one of the oldest and purest strains of lake trout in the world. It appears to be more adapted to smaller lakes and matures at a young age.
Although Lake Trout have been a very successful species by adapting to the conditions caused by the last glaciers, they are now potentially vulnerable to conditions of climate changes, invasive species, water level changes and development. This makes the maintenance of the lakes that now have the conditions to support self-sustaining Lake Trout populations that much more important.

The *Rainbow Trout* is a member of the salmon family and native to the rivers in North America and Asia which flow into the Pacific Ocean. On the West Coast it is called Steelhead.
Like salmon, the rainbow is anadromous, meaning it returns to its original hatching stream to spawn. However, unlike the Pacific coast salmon that die after spawning once, the rainbow can spawn several times. First introduced in 1894 in Ontario, it has become an important sport fish of the Great Lakes and their tributaries, as well as many inland lakes and rivers.

The *Smallmouth Black Bass*, a member of the Sunfish family, is native to eastern and central North America. It is usually found in moderately shallow water near rocks or submerged logs. They spawn in late spring or early summer when the male builds a circular nest in gravel. After spawning the male fans the eggs, protects the nest, and guards the young when they are born. This fish is considered by many to be the best-fighting freshwater sports fish.

The *Largemouth Black Bass*, another member of the Sunfish family, mainly populates the southern part of central North America. Its habitat is the upper levels of the warm water of shallow bays with abundant aquatic vegetation. Nesting is in the early summer and the male guards the nest and young up to one month after birth. Largemouth Black Bass can grow large – the unofficial record is over 25 lbs. This fish can be distinguished from the Smallmouth Black Bass as its upper jaw extends past its eye.

Long Lake

Lake Trout have been stocked in Long Lake on three occasions: 1987, 1991 and 1993.

When last assessed in 1994 MNR stated that the lake only had 13% optimal lake trout habitat and did not warrant further stocking. On the other hand, the assessment did show a large proportion of the population (39%) were natural trout and concluded that both stocked and natural lake trout were moving between Miskwabi and Long Lakes.

As indicated in the Water Quality section, there is reason to be concerned about habitat deterioration for Lake Trout in Long Lake. Although Total Phosphorus readings are good, Dissolved Oxygen below 10 metres of depth has been on a downward curve.

Currently, Long lake is considered “at capacity” for development under the MOE Lakeshore Capacity Assessment, the MNR Dissolved Oxygen criteria and in the Municipality of Dysart et al Official Plan.

In 1968, Largemouth Black Bass (199 adults) were stocked in Long Lake (the first and last time) and their progeny are still hitting lures. Smallmouth Black Bass were never directly stocked in Long Lake but migrated from Miskwabi Lake and over the years, especially in the 1970’s and 80’s, produced a great fishery.

During the 1980’s Rock Bass, an invasive species, were unfortunately introduced into Long and Miskwabi Lakes and are abundant today.

As well, over the last five years Pike have been caught in both Long and Miskwabi Lakes.

Miskwabi Lake

Miskwabi was first stocked in 1934 with 10,000 lake trout fry. It is thought that these fish did not prosper and between 1965 and 1977 20,000 lake trout were introduced. From all accounts these lake trout produced a fishery that was second to none in the Highlands during the 1970’s and 1980’s.

The following is a chronological listing of some interesting details from the MNR records:

- 1970 – Department of Lands and Forests fact sheet indicates a strong lake trout fishery.
- 1980 – MNR assessment states Miskwabi is the prime lake trout lake in Minden District. "The best producer of lake trout in terms of pounds per acre …produces at least 3.9 times more lake trout per hectare of water than any other lake surveyed in the Minden District."
- 1986 – Assessment of habitat conditions, spawning beds and stocked vs. naturally reproducing fish. Results indicated that the natural fish made up 87% of the population. Miskwabi was estimated as having 61% optimal habitat (volume of the lake colder than 10˚C and >6 mg/L of Dissolved Oxygen). The report recommended that Miskwabi be managed as a naturally self-sustaining lake trout lake.
- 1988 – Assessed with recommendations for improving natural lake trout populations.
- 2000 – First stocking of Haliburton Gold Lake Trout in Miskwabi.
- 2000-2010 - Dr. David O. Evans, research scientist of MNR's Aquatic Research and Development Section, initiates Haliburton Lake Trout Adoptive Management Study (2000 – 2010). Miskwabi selected as one of the four Haliburton lakes used to evaluate the effects of slot-size regulations and stocking using Haliburton Gold on fishing effort, catch, harvest and population responses of the exploited lake trout stocks.
  For Miskwabi, Haliburton Gold was stocked and the slot size for lake trout was removed.
  Although Dr. Evens' results have not yet been formally published, the MNR website summarizes the findings of the study:
  - "*Slot-size regulations* – By reducing fishing mortality, researchers saw that slot size regulations clearly protected lake trout of prime spawning ages (6 to 10 years). This shows that regulations are an effective management approach for ensuring the long-term sustainability of wild lake trout stocks.
  - *No slot-size regulations* – After slot size regulations were removed in two lakes (including Miskwabi), the rate of people catching and keeping their fish dramatically increased during the first few years. The total harvest of fish then fell back to pre-slot amounts showing that high fishing pressure has depleted these populations.
  - *Stocked and no size limits* – Stocking in the absence of a slot-size regulation provided some incentive for anglers but could not counteract the impacts of high fishing pressure and high mortality rates, placing the population at risk.
  - *Stocked…but with size restrictions* – Stocking has not proved to be a "hook" for anglers when slot-size regulations are in place, because what anglers are allowed to keep (based on size) is restricted to provide protection for the highly vulnerable, mature adults."

The report concludes that "a management strategy that combines slot-size protection with stocking of lakes with poorer habitat seems to be the best approach for providing both angling opportunities and ensuring the long-term future for Ontario's native lake trout."

With regard to habitat and water quality, Miskwabi Lake is well suited for natural trout populations. It is buffered from acid rain and has strong calcium levels which allow for diverse and abundant phyto- and zooplankton populations necessary for the survival of young lake trout. As well, the Dissolved Oxygen readings continue to be very good although the bottom readings (40m) are declining. Under the MOE Lakeshore Capacity Assessment the lake is at capacity and this is reflected in the Dysart et al Official Plan.

For this reason, when the north shore of the lake was developed in the 1990's the number of building lots was reduced by about 60%, lot sizes were substantially increased, building setbacks were increased and special rules introduced regarding tree removal. As well, four environmental zones were created to protect fish habitat.

Negaunee Lake

According to MNR files Negaunee has never been stocked with fish. It was first assessed by the Department of Lands and Forests in 1958 with the notation that there were an "exceptionally large number of minnows of all sizes up to 6 inches". As well, the lake was measured to be 23.75 m (78 ft.) deep with good temperature gradient. At the time, the District Biologist indicated that "the lake should be particularly suitable for speckled trout". A creel census in 1984 indicated a large number of perch and minnows being caught but no game fish. Today, residents of the lake indicate that there is a self-sustaining Smallmouth Bass population in the lake.

Wenona Lake

When first assessed in 1958, Wenona was found to have a heavy population of Smallmouth Bass and a variety of non-game species including perch, pumpkinseed, suckers and minnows.
Based on an assessment in 1971 that found Wenona to be 19.2 m (63 ft) deep with good temperature stratification and reasonable dissolved oxygen, lake trout were stocked on four occasions between 1972 and 1979. Unfortunately, that did not produce a sustainable fishery.
In 1988 Largemouth Bass were stocked in the lake and have continued to survive to this day.
Starting in 1999 Rainbow Trout were introduced to Wenona and between that time and the present, 20,000 fish have been stocked. This has produced fishing excitement for many over the years. As there are no streams entering Wenona suitable for spawning, the rainbows do not reproduce.

ACTION:

- Support the recommendations of Dr. David Evans regarding the importance of slot sizes and the protection of lake trout lakes that have good habitat for natural lake trout reproduction.
- Support the CHA initiative, now with the MNR, to close the lake trout season earlier to protect breeding trout.
- Support a "catch and release" policy for lake trout on Miskwabi and Long lakes.
- Encourage the use of lead-free fishing equipment.
- Work with MNR to build natural lake trout populations in Long and Miskwabi Lakes.

WILDLIFE AND WILDLIFE HABITAT

The Miskwabi area is surrounded by hundreds of square kilometres of relatively pristine wildlife habitat. This includes many lakes, rivers, large wetlands and abundant highlands.
Only to the south and east is the landscape bordered by paved highways, and is not intersected by any. This gives the wildlife population a very large, natural ecosystem with good travel corridors extending into Algonquin Park.

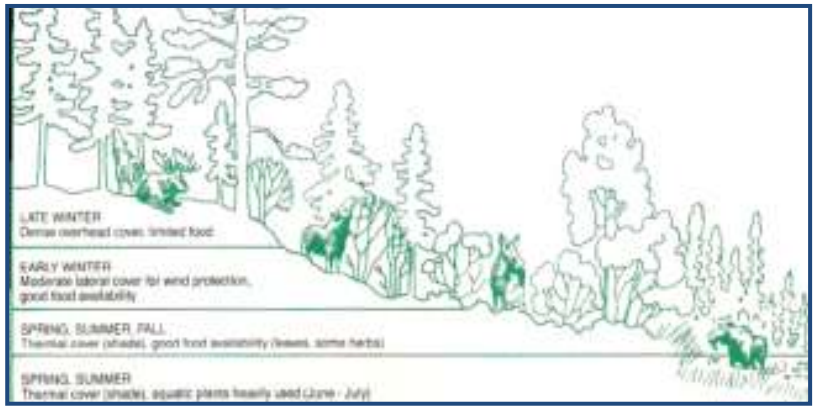
Mammals

The chart on the right is a listing of the mammals of the Haliburton Highlands. The Miskwabi area has a population of most, if not all, of the Haliburton mammals.
Some mammals of note:
The *Eastern Wolf* is now recognized as a distinct subspecies of the Grey Wolf. Prior to European contact the Eastern Wolf and the Red Wolf of the Eastern U.S. were likely the same species. Owing to habitat fragmentation, hybridization with the Coyote and Grey Wolf, and genetic drift, the Eastern Wolf and Red Wolf now exhibit genetic differences.

There are probably fewer than 500 Eastern Wolves in Canada with the highest population found in Algonquin Park. Wolf packs require relatively large, unbroken forests with home ranges as large as 500 sq. kms. The Eastern Wolf is listed as a species of Special Concern under Ontario's Endangered Species Act.

Haliburton Highlands Mammals	
Beaver	Northern Flying Squirrel
Big Brown Bat	Northern Long-eared Bat
Black Bear	Northern Short-tailed Shrew
Coyote	Muskrat
Deer Mouse	Porcupine
Eastern Chipmunk	Pygmy Shrew
Eastern Cottontail	Red Fox
Eastern Pipistrelle	Red Squirrel
Eastern Wolf	River otter
Ermine	Rock Vole
Fisher	Silver-haired Bat
Grey Squirrel	Small-footed Bat
Hairy-tailed Mole	Smoky Shrew
Hoary Bat	Snowshoe Hare
Least Chipmunk	Southern Bog Lemming
Least Weasel	Southern Flying Squirrel
Little Brown Bat	Southern Red-backed Vole
Long-tailed Weasel	Star-nosed Mole
Lynx	Striped Skunk
Marten	Virginia Opossum
Masked Shrew	Water Shrew
Meadow Jumping Mouse	White-footed Mouse
Meadow Vole	White-tailed Deer
Mink	Woodchuck
Moose	Woodland Jumping Mouse

Another species of note is the *Moose*. According to the Ministry of Natural Resources, the Haliburton Moose population has been increasing since 1998 and is now within the desired ecological density of 20 – 40 moose per 100 km^2.
Moose travel over large areas and have seasonal ranges. The chart below shows their seasonal preferred habitat.



The large green zone around Miskwabi Lake and to the north-east in the chart below indicates a Moose late Wintering Area as designated by MNR.

The expanse to the north and west sides of Miskwabi Lake is considered preferred habitat for the *Southern Flying Squirrel.*
Also of interest is the *Cougar* which by the early 20th Century was mainly confined to the Rockies and the West Coast. Due to conservation efforts during the past 40 years the Cougar has moved eastward. Are they extending their range into central and southern Ontario in pockets of undisturbed forest with healthy deer populations? Over the last five years, 4 members of our community, on different occasions, have reported seeing a cougar.

Birds

The Miskwabi area, with its mixed habitat of hardwood uplands, coniferous lowlands, lakes and wetlands, is ideal for a large variety of bird species. Many migrate long distances from Central and South America; whereas, others are year-round residents.
The following chart outlines a number of uncommon birds that are in the spaces around the lakes. Reference is given to the preferred habitat of each and the likelihood of each species breeding in this region.

Common Name	Natural Heritage Mapping – Preferred Habitat	Breeding Bird Atlas of Ontario Indications of Breeding
Red-shouldered Hawk	Deciduous forest	Confirmed
Veery	Deciduous forest	Probable
Wood Thrush	Deciduous forest	Probable
Canada Warbler	Deciduous forest	Confirmed
Black-throated Blue Warbler	Deciduous forest	Probable
Northern Cardinal	Deciduous forest	Probable
Blackburian Warbler	Coniferous forest	Probable
Black-throated Green Warbler	Coniferous forest	Confirmed

In addition to the birds listed above, in recent years, Bald Eagles have spent the winter in the area of the lakes and there have been reported sightings of Golden Eagles. The Double-crested Cormorant, a bird expanding its range, has made appearances on the lakes in the past few summers. Their colonies kill trees and vegetation.
One of the birds most associated with cottaging is the Common Loon. They are seen and heard on all four lakes and normally have successful young on Long, Miskwabi and Wenona Lakes.

In the case of Wenona and Miskwabi, the nests have been built on platforms installed and maintained by local property owners. Ideally, loons nest on peninsulas and islands as the set-back placement of their feet makes walking on land difficult. Platforms provide easy access which might be otherwise threatened by lowered water levels occurring during the early-June to mid-July nesting season. On Miskwabi and Wenona Lakes the platforms have helped produce very successful breeding rates over the years. According to Bird Studies Canada, an average reproductive success of one young every other year is considered good. Based on this, Long, Miskwabi and Wenona Lakes would be considered very successful loon lakes. Miskwabi, surveyed for the Canadian Lakes Loon Survey since 1995, has often reported better than average results. Frequent sightings of large young on Long and Wenona Lakes late in the season would also confirm this.

Bird Studies Canada reports the reproductive success of loons is still declining in Ontario due to lingering effects of mercury and acid rain precipitation. As the geology of our area has protected the lakes from the effects of acid rain, this could be a second reason for the reproductive success.

The *Atlas of the Breeding Birds of Ontario (ABBO)* is an outstanding document of bird research in Ontario. It is based on 150,000 hours of field time and 1.2 million individual breeding bird records. The atlas divides the province into 10km^2 areas and details the current distribution of each breeding species in the province and how its distribution has changed over the past 20 years. The table on the following page lists the results for the Miskwabi area.

Atlas of the Breeding Birds of Ontario Breeding Evidence in Miskwabi Area	
Alder Flycatcher	Probable
American Bittern	Possible
American Black Duck	Possible
American Crow	Confirmed
American Goldfinch	Probable
American Redstart	Probable
American Robin	Confirmed
American Woodcock	Probable
Baltimore Oriole	Possible
Bank Swallow	Confirmed
Barn Swallow	Confirmed
Barred Owl	Probable
Belted Kingfisher	Confirmed
Black-and-white Warbler	Confirmed
Black-backed Woodpecker	Possible
Black-billed Cuckoo	Possible
Blackburnian Warbler	Probable
Black-capped Chickadee	Confirmed
Black-throated Blue Warbler	Confirmed
Black-throated Green Warbler	Confirmed
Blue Jay	Confirmed
Blue-headed Vireo	Probable
Broad-winged Hawk	Confirmed
Brown Creeper	Confirmed
Brown-headed Cowbird	Possible
Canada Goose	Possible
Canada Warbler	Confirmed
Cedar Waxwing	Probable
Chestnut-sided Warbler	Confirmed
Chipping Sparrow	Confirmed
Common Grackle	Confirmed
Common Loon	Confirmed
Common Merganser	Confirmed
Common Nighthawk	Possible
Common Raven	Possible
Common Snipe	Probable
Common Yellowthroat	Confirmed
Downy Woodpecker	Possible
Eastern Bluebird	Confirmed
Eastern Kingbird	Probable
Eastern Phoebe	Possible
Eastern Towhee	Possible
Eastern Wood-Pewee	Confirmed
European Starling	Confirmed
Evening Grosbeak	Probable
Golden-crowned Kinglet	Probable
Gray Catbird	Possible
Gray Jay	Possible
Great Blue Heron	Confirmed
Great Crested Flycatcher	Probable
Great Horned Owl	Probable
Green-winged Teal	Probable
Hairy Woodpecker	Confirmed
Hermit Thrush	Probable
Herring Gull	Possible
Hooded Merganser	Probable
House Sparrow	Possible
House Wren	Possible
Indigo Bunting	Confirmed
Killdeer	Possible
Least Flycatcher	Probable
Lincoln's Sparrow	Possible
Magnolia Warbler	Confirmed
Mallard	Probable
Marsh Wren	Possible
Merlin	Possible
Mourning Dove	Probable
Mourning Warbler	Probable
Nashville Warbler	Confirmed
Northern Cardinal	Probable
Northern Flicker	Possible
Northern Goshawk	Possible
Northern Parula	Possible
Northern Saw-whet Owl	Possible
Northern Waterthrush	Probable
Olive-sided Flycatcher	Possible
Osprey	Confirmed
Ovenbird	Confirmed
Philadelphia Vireo	Possible
Pileated Woodpecker	Probable
Pine Warbler	Probable
Purple Finch	Probable
Red-breasted Nuthatch	Confirmed
Red-eyed Vireo	Confirmed
Red-headed Woodpecker	Possible
Red-shouldered Hawk	Probable
Red-tailed Hawk	Possible
Red-winged Blackbird	Probable
Ring-necked Duck	Probable
Rock Pigeon	Confirmed
Rose-breasted Grosbeak	Confirmed
Ruby-crowned Kinglet	Possible
Ruby-throated Hummingbird	Confirmed
Ruffed Grouse	Confirmed
Savannah Sparrow	Probable
Scarlet Tanager	Probable
Sharp-shinned Hawk	Possible
Song Sparrow	Probable
Spotted Sandpiper	Confirmed
Swainson's Thrush	Possible
Swamp Sparrow	Probable
Tree Swallow	Confirmed
Turkey Vulture	Possible
Veery	Probable
Warbling Vireo	Confirmed
Whip-poor-will	Possible
White-breasted Nuthatch	Confirmed
White-throated Sparrow	Confirmed
White-winged Crossbill	Confirmed
Wild Turkey	Possible
Willow Flycatcher	Possible
Winter Wren	Confirmed
Wood Duck	Probable
Wood Thrush	Probable
Yellow Warbler	Probable
Yellow-bellied Sapsucker	Confirmed
Yellow-rumped Warbler	Confirmed
Yellow-throated Vireo	Probable

Reptiles and Amphibians

The numerous wetlands, riparian zones and shorelines in the Miskwabi Lakes area offer habitat for a variety of reptiles and amphibians. In Ontario, the populations of many reptiles and amphibians have declined significantly over the past 30 years. The reasons are not fully understood but habitat loss is considered to be a major factor in the decline.

The following is a list of herpetofaunal (reptiles and amphibians) whose range includes our area of Haliburton County:

Haliburton Herpetofaunal	
Turtles	**Amphibians**
Blandings Turtle	**Frogs and Toads**
Midland Painted Turtle	American Toad
Snapping Turtle	Bull Frog
Spotted Turtle	Green Frog
Stinkpot Turtle	Grey Treefrog
Wood Turtle	Leopard Frog
Snakes	Mink Frog
Dekay's Brownsnake	Pickerel Frog
Eastern Gartersnake	Spring Peeper
Eastern Hog-nosed Snake	Western Chorus Frog
Eastern Milksnake	Wood Frog
Eastern Ribbonsnake	**Salamanders and Newts**
Eastern Smooth Greensnake	Blue-spotted Salamander
Northern Red-bellied Snake	Eastern Red-backed Salamander
Northern Watersnake	Four-toed Salamander
Ring-necked Snake	Northern Two-lined Salamander
	Red-spotted Newt
	Spotted Salamander

Blandings Turtle

Blue-spotted Salamander

Spring Peeper

Northern Watersnake

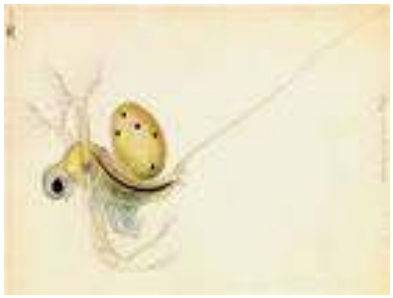
SPECIES AT RISK

The picture above of a Snapping Turtle that has just hatched in the gravel at the side of a Miskwabi Lake road depicts a species at risk. Habitat depletion is one of the main threats but other important causes, in particular for reptiles, include road kill and illegal harvesting. This makes educational efforts and habitat stewardship essential in helping to prevent the decline of these species.
The Species at Risk in Ontario (SARO) listing is produced by the Ontario Ministry of Natural Resources to give status designations for species at risk in the province.
The table opposite is a list of a number of species whose range includes the Miskwabi Lakes area and which are on the SARO (updated May 2013) list.

Miskwabi Lakes Area Species at Risk	
Endangered *	Cougar
	Golden Eagle
	Little Brown Rat
	Wood Turtle
Threatened **	Blandings Turtle
	Eastern Hog-nosed Snake
	Spotted Turtle
	Stinkpot Turtle
	Whip-poor-will
Special Concern ***	Bald Eagle
	Canada Warbler
	Common Nighthawk
	Eastern Milksnake
	Eastern Ribbonsnake
	Eastern Wolf
	Monarch Butterfly
	Snapping Turtle

*Endangered – lives in the wild but is facing imminent extinction or extirpation.
**Threatened (THR) - lives in the wild, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it.
***Special Concern (SC) – lives in the wild, is not endangered, but may become threatened or endangered if steps are not taken to address factors threatening it.

INVASIVE SPECIES



Invasive species can be those that are exotic (non-native), and those that are native to Ontario but not native to the local area. The introduction of such species to a local ecosystem can bring widespread, unpredictable, and in many cases detrimental effects to habitats. Being at the headwaters of the Burnt River system, the lakes cannot be easily affected by upstream invaders. On the other hand, we have the additional responsibility of not introducing invaders to the headwaters of the system.

Invasive species that have become a concern in the Haliburton Highlands can be categorized as follows:

- *Aquatic animals* – Zebra Mussels, Spiny Water Flea, Rusty Cray Fish, Rock Bass, and Round Goby have all been introduced to many water bodies. All the Miskwabi area lakes have been tested for years through involvement in the Invading Species Watch Program of the Ministry of Natural Resources and the Federation of Anglers and Hunters. To date, the only species that has been introduced is the Rock Bass.

As boats and bait buckets are the main means of transferring foreign species, it is essential that the steps listed below are followed to keep the lakes free of other invasive species.

1. Drain all water from bilges and wells on land.
2. Empty bait buckets on land.
3. Never release live bait.
4. Inspect, wash and dry boats, trailers and equipment before launching in a new water body.

- *Aquatic Plants* – Purple Loosestrife, European Frogbit, Eurasian Milfoil, Fanwort and Flowering Rush are affecting Haliburton lakes. To date, we have not confirmed any of these invaders.
- *Cottage plants* – Cottage country is susceptible to the introduction of plants such as goutweed and periwinkle that can be brought from suburban areas. Here they compete with native species, including tree seedlings, for light, nutrients and water. Goutweed is highly shade-tolerant and competitive once established, reproducing by seed and by spreading underground. Its vigorous nature can choke out native groundcovers. Periwinkle also thrives in dry shade and has few pests or diseases outside its native range of Europe.

The Ontario Invasive Plant Council created the "*Grow Me Instead Campaign*" to inform gardening enthusiasts about some of the popular invasive plants that can cause problems in the landscape. They highlight a variety of non-native plant alternatives found to be non-invasive in Ontario. Information about native and non-invasive plant choices can be found at www.ontarioinvasiveplants.ca.

Invasive Species Mapping

EDDMaps is a web-based mapping system launched in 2005 by the University of Georgia to document invasive species distribution. EDDMaps Ontario was developed through the support and funding provided by the Canadian/Ontario Invasive Species Centre, the Federation of Anglers and Hunters and the Ontario Ministry of Natural Resources. In Ontario there are numerous agencies and monitoring programmes in place to collect information. Involvement in the programme is now being offered to those currently participating in the Invading Species Watch.

ACTION:

- Continue to work with the *Invading Species Watch* programme.
- Increase educational material and signage to prevent contamination of the lakes by boats and bait buckets.
- Join the new MNR/Federation of Ontario Cottagers Association (FOCA) *EDDMaps* programme.

PHYSICAL ELEMENTS

Physiology refers to the physical geography of an area involving the landscape, its various landforms, makeup and gradients. The Miskwabi area of lakes is located in the Pre-Cambrian Shield physiographic region which is characterized by granite bedrock with thin overburden. The area's bedrock is mildly fractured, moderately dipping granite gneiss and often found as steep cliffs or outcroppings along the shorelines.

SOILS

The soil substrates are generally thin and shallow with some areas of heavier glacial gravel deposits. The topography of the drainage basin is steep to gently rolling hills which have a maximum elevation of approximately 80 m above the level of the lakes.
Unusual for the Haliburton Highlands, the lakes of the Miskwabi area have good calcium levels due to the composition of the surrounding geology. For this reason the lakes are not threatened by acid rain and have strong zooplankton populations.

MINERALS AND AGGREGATES

There are no mining claims or aggregate operations in the area of our lakes. It is well understood that mining and aggregate operations in proximity to wetlands, streams or lakes can have a detrimental impact on the water quality and natural environment.

STEEP SLOPES

Developments in areas of steep slopes can result in unwanted alterations to the natural landscape, negative visual impact, as well as increased erosion, slope instability, heavier storm water run-off and potential damage to fish and wildlife habitat.
Steep slopes are present on all four lakes, but particularly on Long and Miskwabi Lakes. During the years of development these presented a substantial challenge in completing the required infrastructure while at the same time maintaining natural and environmentally-friendly landscapes.

NARROW WATER BODIES

There are three narrow waterways in the lakes, all with lakefront lots. The first is located at the narrows between Long and Miskwabi Lakes and the other two are farther to the west on Long Lake. They require special caution when used by motorized boats for three reasons: safety concerns; helping to reduce shoreline erosion; and minimizing disturbance to the lakefront owners.
Stewardship efforts are required to encourage all motorized boat operators using these narrow zones to maintain the legal 10km/hr (6mph) or less boat speed within 30 metres (100ft) of shorelines.

It is well worth noting that Negaunee Lake, which is the smallest of the four lakes at 41.8 acres, has no public boat launch and has an understanding among the property owners that motorized boats are not used on the lake.

SOCIAL ELEMENTS

SOCIAL CULTURE

The definition of the word "social", according to the Merriam-Webster dictionary is "relating to or involving activities in which people spend time talking to each other or doing enjoyable things with each other". For the purpose of our watershed plan we could also say there is a "social" involvement with people and the environment.
Our four lakes do not have the reputation of being "party" communities like some others in the area. People prefer to "do their own thing" with family, friends and lake neighbours. This was attested to in the survey where very few people ranked Social Activities as even important.
However, over the past 40 years there has been active involvement by residents and cottagers in the Miskwabi Area Community Association, formerly the Miskwabi Area Cottagers' Association.

Over half of property owners on the lakes, back lots and roadways are currently members, many of them since 1974.
The association has an environmental as well as social agenda: planned activities range from an annual road clean-up and BBQ held in May to an annual association meeting and BBQ held in July to give members the opportunity to share issues and concerns for the directors to address on their behalf.
As a result of this type of input, and reflecting the stakeholder survey results, MACA is developing a new "*Owners, Renters and Visitors Guide*" to remind all of the respect needed for the social and environmental community.

LANDSCAPE AND AESTHETICS

Survey respondents clearly indicated the importance of maintaining the special nature of the four lakes. In the Natural Features section, "Lakes" scored 100% as Very Important/Important. "Forests and Shorelines" came a close second and third. Development can seriously impact the enjoyment of these values. The water's edge is impacted by the building of waterfront structures or the removal of vegetation. The skyline is impacted by the construction of buildings, power lines or communication towers.

TRANQUILITY AND NIGHT SKIES

A natural dark sky was rated as Very Important/Important by over 80% of respondents as adding to their enjoyment of the lakes. Outdoor lighting adds to the enjoyment of evening activities and provides safety. Both needs can be met if lighting is kept to a minimum, installed to light only local areas, and off when not in use. Over 80% of respondent cited Peace and Quiet as Important to their enjoyment of cottage life. Again, respect for others is important.

Fireworks have been cited in a MACA survey as being a source of light and noise pollution and the majority of respondents to that survey thought they should be limited to statutory holiday events. Safety and the possible starting of forest fires, as well as the prospect of chemicals and debris dropping in the water are issues of concern, as are the noise effect on humans, wildlife and the environment. While survey results were made available to the Municipality, at this time there are no municipal by-laws regulating the sale or use of fireworks. Dysart et al does have a noise pollution by-law that requires noise levels to be reduced after 11p.m.; however, enforcement is difficult.

ACTION:

- Support the educational handout *Guidelines for Owners, Renter and Visitors* being developed by MACA. The one-page document, when finalized, is to be made available for all to use.
- Develop separate educational handouts for owners who rent and renters. These would cover the environment, septic systems, waste disposal, noise and other topics related to renting.

RECREATIONAL ACTIVITIES

People on the lakes enjoy a wide range of activities –land or water based.
Most important seemed to be non-motorized ones: land-based (walking, hiking, bird watching) or water-based (swimming, canoeing/kayaking/sailing or fishing) as evidenced by preferences cited in the stakeholder's survey.

Land-based

From the survey, snowmobiling is an activity important to approximately 40% of respondents. Haliburton County has an active snowmobile association (HCSA). They have a large involvement in grooming of trails and have 370 km of groomed trails with spectacular scenery. There are also trails maintained in close proximity to the four lakes that are groomed by the Paudash Trailblazers Snowmobile Club (east and north behind Miskwabi Lake, and southeast of Negaunee Lake). There are no trails marked over ice covered lakes and few alongside the roadways included in this watershed plan.
ATVing is also important to about 30% of respondents. Currently they also use snowmobile trails but do not have a governing body to regulate use and safety.

Water-based

An activity receiving a high rating of importance was fishing. As set out in the recommendations in the Natural Features section a catch and release policy and the use of lead-free equipment could help ensure an active fishery for future generations.

RECREATIONAL BOATING and SAFETY

Residents and visitors to the four lakes enjoy many types of activities in watercraft; from kayaking, to fishing in a “tinny”, to skiing behind a wakeboard boat.
Property owners and visitors can make use of two public launch points: one at the end of Wenona Lake and the other at the “airstrip” on Miskwabi Lake. Of note though, through common agreement motorized boats are not used on Negaunee due to its small size.

Like most lakes, the Miskwabi area lakes have seen an increase in the number and type of boats over the years. Newer boats are often pontoon type used to tour the lakes or pull tubes. There are several wakeboard boats and personal watercraft. The latter, as well as any boat driven at high speeds too close to shore, have recently caused concern to property owners along narrow water bodies on Long Lake and the channel between Long Lake and Miskwabi. The impacts of large wakes and inappropriate boat speeds can damage the environment and cause safety concerns. Large wakes travel long distances and increase the potential for damage to both floating docks and people on them. As well, the erosion of shoreline affects spawning beds and weed beds resulting in the loss of fish habitat and encouraging the spread of invasive species.
Responsibility rests with residents and visitors to report serious infractions to the Ontario Provincial Police (OPP) Marine unit as the OPP’s presence is restricted to occasional visits to the lakes.
Currently signs regarding boat speed near shoreline are posted only at the boat launches and the narrows between Miskwabi and Long Lakes.

RECREATIONAL BOATING CARRYING CAPACITY

Recreational carrying capacity generally refers to the number of watercraft that can simultaneously operate on a lake without:

- compromising user safety
- causing significant user displacement and dissatisfaction
- causing environmental harm to the resource
- causing significant dissatisfaction to non-boaters

The topic has not yet received much study in Canada but has been analyzed by a number of studies in the United States going back to the early 1970's.
We believe the subject is an important one and should not be left unreviewed.
For Haliburton County, recreational carrying capacity is important for at least two reasons:

1. The Highlands are within easy access of the burgeoning metropolitan populations of southern Ontario.
2. Overall, the lakes of Haliburton County are smaller than those to the south and west. Smaller lakes generally have relatively less surface area than do larger lakes.

The following table demonstrates this using a perimeter factor of 33 metres representing an average lakefront lot.

COMPARISON OF LAKE SURFACE AREA and PERIMETER			
LAKE	SURFACE AREA (acres)	PERIMETER (metres)	LAKE SURFACE acres per 33m lot
Long Lake	218	10620	.68
Wenona Lake	146	5500	.88
Miskwabi Lake	662	10600	2.1
Kennisis Lake	3501	41000	2.8
Lake Muskoka	29990	269000	3.7
Lake Simcoe	716358	303000	78.0
Lake Ontario	4,685,114	1,146,000	134.9

Smaller lakes can be more rapidly challenged for boating space that is safe and enjoyable. This was demonstrated in Wisconsin by the *Lake Ripley (418 acres) Watercraft Census and Recreational Carrying Capacity Study* of 2003.

Calculating Carrying Capacity

In the many U.S. carrying capacity studies there is a common method of calculating for capacity:

1) Calculate the usable surface of the lake. This normally takes the lake's surface area and deducts a shoreline buffer, narrow passages, shallow areas, islands and environmentally sensitive areas.

2) Determine the suggested density or minimum space required for end use. Space requirements are to a great extent been tied to end use. Based on a review of many studies approximate minimum surface acreages required by use are:
    a. All motorized (including PWC, tubing, Etc) 30 acres/boat
    b. Mixed use (50% motorized/50% non-motorized) 20 acres/boat
    c. Non-motorized 10 acres/boat
3) Multiply the minimum spatial requirements for user type (e.g. high speed) by the proportion of boats engaged in this activity. Add up the spatial requirements for each use to estimate the Optimum Boating Density (or average number of acres each boat needs).
4) Determine the Recreational Carrying Capacity of the lake by dividing Usable Lake Area by Optimum Boating Density.
5) Compare the Recreational Carrying Capacity to the actual level of use found in the lake.

The following tables, using this model, give the results for 3 of the 4 lakes included in this watershed plan. Negaunee Lake was excluded as it has no public boat launch and a self-regulated no-motorized boat policy.

LONG LAKE CARRYING CAPACITY CALCULATION			
Lake Use Mix	Surface Acres Required	Available Surface Area	Carrying Capacity
100% non-motor	10	127	13
50%/50%	20		7
100% motor	30		4

WENONA LAKE CARRYING CAPACITY CALCULATION			
Lake Use Mix	Surface Acres Required	Available Surface Area	Carrying Capacity
100% non-motor	10	97	10
50%/50%	20		5
100% motor	30		3

MISKWABI LAKE CARRYING CAPACITY CALCULATION			
Lake Use Mix	Surface Acres Required	Available Surface Area	Carrying Capacity
100% non-motor	10	529	53
50%/50%	20		26
100% motor	30		18

Concrete examples of what the above table indicates for optimal use on Miskwabi Lake are:

- Lake can handle 18 motorized boats (multiple use, tubing, personal watercrafts, etc) with no other non-motorized use.
- Lake can handle 13 motorized and 13 non-motorized boats at one time.

Use on Lakes compared to Carrying Capacity Calculation

There are two ways to do this calculation:

1. Conduct surveys of lake activity on summer weekends. The results of our surveys indicate the following:

Survey to be completed in July

2. Use percentage based on the number of boats available at shoreline. The peak use rate from studies range between 3.6 – 25% with 15% being considered an average peak rate.[1] Surveys indicate that there are 2 – 4 watercrafts per cottage on most recreational lakes.[2] Using very conservative estimates of 1.5 per waterfront property and 0.3 for backlots, and not including a visitor use factor the following table was developed.

Use Compared to Carrying	50%/50% Carrying Capacity	No. of Available Watercraft	Peak Use 15%	+/- Optimal Capacity
Capacity				
Long	7	228	34	+27
Wenona	5	150	23	+18
Miskwabi	26	281	42	+16

Based on the above data, it appears that especially during peak use all three lakes are above their optimal capacity level for safe and enjoyable boating.

This is important for the future as most survey trends indicate:

a. More boats per property
b. More large, powerful or fast watercraft
c. Increased variety of lake activities
d. Higher percentage of rental cottages
e. Greater use of public boat launch facility

ACTION:

- Develop a Boating Code of Conduct for property owners and lake users explaining the rules for safe and pleasurable operation.
- In addition to the slow speed sign at the narrows between Long and Miskwabi Lakes, add a new sign at each of the narrows further to the west on Long Lake.
- Recommend that the Municipality and County consider developing a Recreational Carrying Capacity Model that would give guidelines for Haliburton Lakes.

[1] ERM, 2004; Jaakson et al, 1990; Warbach et al 1994.
[2] Koshog, 2005 1.66 non-motorized & 1.25 motorized, total 2.91
Kennisis 2005 2.66 non-motorized & 1.34 motorized, total 4.

LAND USE

This section of the lake plan provides a description of the current land uses around the lakes as well as the various policies, provisions and zoning by-laws governing land use.

SUMMARY

Miskwabi area watershed is characteristic of typical cottage country. As such, it is used predominantly for residential and recreational purposes with most of the development occurring along the shoreline of the four main lakes.

In fact, all land in the region is zoned for use as residential, rural or open/environmentally protected space. There is no commercial, industrial or institutional land use in the region. There is also no Crown Land. This is because the Crown sold the entire area to the Municipality in the 1860s.

Forestry has and continues to be an important economic activity and source of employment within the Municipality. There continues to be modest logging and forestry activity occurring in the watershed. Land uses are governed by zoning regulations administered by the Municipality of Dysart et al (as described below).

In the early 1960's there was very little development on the lakes, but growth of seasonal and permanent residences has been steady over the past 5 decades. As of January 2014 there are 385 occupied waterfront properties and 66 vacant waterfront lots. There has also been a steady growth of backlot residencies.

Nine separate Environmentally Protected areas are connected to the main four lakes.

There are also a number of important references to confirm that Miskwabi and Long Lakes are at capacity (as defined by the Province of Ontario Lakeshore Capacity Assessment Handbook and as referenced in the Dysart et al Official Plan).

As such, no additional building lots can be provisioned or subdivided without seriously jeopardizing water quality.

Based on the Dysart et al Municipal zoning maps and manual measurements, an approximate land use profile for the MACA lakes was created. The data shows that the four main lakes have approximately 30 kms of waterfront. There are over 451 residentially zoned waterfront lots. Approximately 25% of the waterfront is zoned Open Space or Rural and therefore should see little development. Approximately 70% of the lots are served by public roads and therefore could become permanent residences.

Summary of Water Front Regulated Land Use

	Lake Area sq/km	No. of Lots	Waterfront Meters	% of Total
Miskwabi	2.604	171	11,141	100%
WR4		109	5,372	48%
WR4 Special		62	5,156	46%
Open Space			36	0%
Rural			577	5%
Long	0.8492	142	11,341	100%
WR4		72	2,693	24%
WR4L		70	4,557	40%
Open Space			639	6%
Rural			3,452	30%
Wenona	0.6236	93	5,641	
WR4		37	1,485	26%
WR4L		55	2,296	41%
WR3L		1	371	7%
Open Space			625	11%
Rural			864	15%
Negaunee	0.1934	27	2,398	
WR4		21	775	32%
WR4L		6	275	11%
Rural			1,348	56%
Total of 4 Lakes	4.2862	433	30,521	100%
WR4		239	10,326	34%
WR4L		131	7,128	23%
WR4 Special		62	5,156	17%
WR3L		1	371	1%
Open Space			1,300	4%
Rural			6,241	20%

← Zoning Legend

- WR4 - Waterfront Residential Type 4
  residential uses; 45 m lot frontage, 20 m water building setback on lots developed as of 2004

- WR4L -Waterfront Residential Type 4L
  residential uses; 45 m lot frontage, 20 m water building setback on lots developed as of 2004, limited services (no public road)

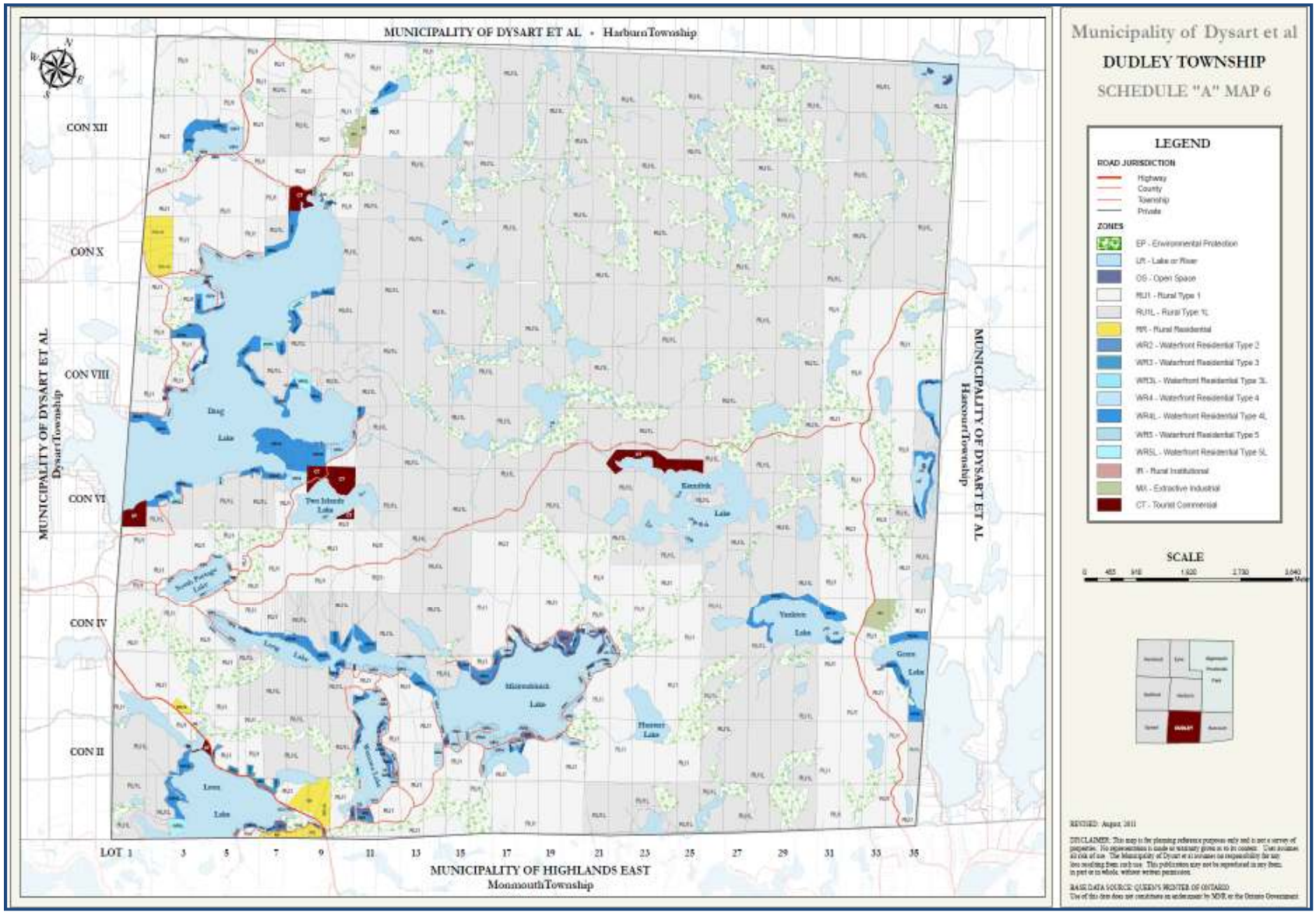
- WR4 Special -Waterfront Residential Type 4 Special
  residential uses; WR4 with an additional building set back

- WR3L - Residential Type 3L
  residential uses; 45 m lot frontage, 30 m water building setback, limited services (no public road)

- Open Space/Environmental
  no construction or use any structure for any purpose except for a private or public park

- Rural
  20 ha lot area, with a limited range of rural uses; permitted uses include a single-family dwelling, a bed and breakfast establishment, a hobby farm and a home business.

Land Use Map


MUNICIPALITY OF DYSART ET AL - HaburnTownship
CON XII
CON X
CON VIII
CON VI
CON IV
CON II
MUNICIPALITY OF DYSART ET AL
DysartTownship
MUNICIPALITY OF DYSART ET AL
HaburnTownship
Dag Lake
Two Islands Lake
Kinnish Lake
Yankee Lake
Green Lake
Miramichi Lake
Hoover Lake
Long Lake
Loon Lake
LOT 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35
MUNICIPALITY OF HIGHLANDS EAST
MonmouthTownship
Municipality of Dysart et al
DUDLEY TOWNSHIP
SCHEDULE "A" MAP 6
LEGEND
ROAD JURISDICTION
Highway
County
Township
Private
ZONES
EP - Environmental Protection
LR - Lake or River
OS - Open Space
RU1 - Rural Type 1
RU1L - Rural Type 1L
RR - Rural Residential
WR2 - Waterfront Residential Type 2
WR3 - Waterfront Residential Type 3
WR3L - Waterfront Residential Type 3L
WR4 - Waterfront Residential Type 4
WR4L - Waterfront Residential Type 4L
WR5 - Waterfront Residential Type 5
WR5L - Waterfront Residential Type 5L
IR - Rural Institutional
MX - Extractive Industrial
CT - Tourist Commercial
SCALE
REVISED: August, 2011
DISCLAIMER: This map is for planning reference purposes only and is not a survey of properties. No representation is made or warranty given as to its content. User assumes all risk of use. The Municipality of Dysart et al assumes no responsibility for any loss resulting from such use. This publication may not be reproduced in any form, in part or in whole, without written permission.
BASE DATA SOURCE: QUEEN'S PRINTER OF ONTARIO
Use of this data does not constitute an endorsement by MNR or the Ontario Government.

RESIDENTIAL OCCUPANCY

Occupancy refers to the number of residential users and the duration of their stay at the lake. The number of people living on or using the lake has a direct impact of water quality. More cottages, longer visits, as well as conversion of seasonal to permanent residences will increase the amount of phosphorus generated from human waste and sewage and from increased incidence of swimming and washing in the lakes. There will also be more contaminants entering the lakes as a result of increased use of fertilizers, increased boating, increases in the number of trees along the shoreline being cut down and from more water runoff being channeled directly to our lakes. In addition, there is a growing concern about increased littering, noise and general mistreatment of the environment from increased occupancy. Development of water quality models often calculate estimates of phosphorus loading based on the total number of shoreline lots and whether the lot is used permanently or seasonally. They also consider information on the amount of time people stay on the lake as well as the estimated household size. More detailed information on residential occupancy will help to provide more accurate predictions of future water quality.

The property owners' survey indicated that 79% of property owners are Seasonal versus 21% that indicated Full-Time occupancy. However, many property owners have reported that they are considering moving to the lake permanently and thus Full-Time occupancy could reach 38% in the future. The Average Number of Individuals in the Household was reported at 3.7 persons, much higher than the provincial average of 2.6 persons. Property owners use their property an average of 130 days a year and 54% use it in the winter. Approximately 8% of owners rent their dwelling and it was reported that this rate could increase to approximately 12% in the future.

SEPTIC SYSTEMS AND WASTE DISPOSAL

E-coli bacteria from untreated human waste can represent serious health threats to humans, and phosphorus reaching the lake from malfunctioning sewage disposal systems will speed lake eutrophication and threaten cold water fish (lake trout) populations and other inhabitants.

While there are a number of methods of treating waste water, by far the most common in our region is through a septic tank and leaching bed.[3] Although the Province sets the building code for septic disposal systems and takes care of licensing new technologies, permitting and inspections are handled by local health units. In our case, the Haliburton Kawartha Pine Ridge Health Unit is contracted by the Municipality to enforce Part 8 of the Ontario Building Code. The Health Unit issues the permit and conducts inspections to ensure proper installation of on-site sewage systems[4].

Since 1973 all building permits in the Haliburton area require a comprehensive inspection and compliance with waste water system regulations prior to occupancy. As such, and given the rapid residential development since that time, the vast majority of properties on our lakes would have waste water treatment systems that at least at one time were compliant with government regulations.

In addition, the soil of the Canadian Shield surrounding the Haliburton area is rich with iron that acts as a natural buffer to phosphorus emissions. This further helps mitigate the risk of lake contamination.

[3] Other methods include composting toilets, outhouses and holding tanks.

[4] However, the Health Unit is in the process of transitioning responsibility for Septic System inspection to the Municipality as of June 30, 2014.

Nevertheless there are certainly some older properties which would contain older waste water treatment systems [5]and research from other similar cottage jurisdictions has demonstrated that a relatively significant portion of septic systems required some form of remedial action.[6]

A malfunctioning septic system is one that allows untreated sewage effluent to enter the lake. This could be a result of:

- a damaged and leaking old tank
- a tank that has NOT been pumped in so many years that it is allowing solids to enter and clog the tile bed
- all soil pore space in a tile field becoming "clogged" with effluent minerals, and the effluent is now pooling on the surface of the bed and running overland into the lake
- the tile bed and perhaps underlying pipes/tiles have been damaged by being driven on.

There is no formal programme administrated by either the Health Unit or the Municipality to re-inspect septic systems. The onus rests with property owners to manage and maintain their septic systems and to ensure that the remnants of untreated human waste are not entering the lake water.

Caring for your Septic System in Haliburton, published by the Muskoka Watershed Council, lists a variety of practices property owners may undertake to help care for their systems:

- Obtain and review the permit for your septic system.
- Keep accurate records of pumping, maintenance and repair.
- Locate and prepare a sketch of components. Ensure all fixture drains are connected (as per design).
- Ensure all fixture drains are connected (as per design).
- Conserve water flowing to the system (i.e. low flush toilets).
- Repair any leaking plumbing fixtures.
- Do not put grease, paint or petroleum products down the drain.
- Flush only biodegradable products like toilet tissue; not sanitary napkins, flushable wipes, cigarette butts, or paper towels.
- Avoid high water flows that may overload your system.
- Install an effluent filter to the outflow pipe leading from your septic tank to your leaching bed. An effluent filter will prevent suspended solids from entering the leaching bed and must be cleaned as prescribed by the manufacturer.
- Maintain vegetation on top of your leaching bed to aid in evaporation and prevent erosion; but don't allow trees or shrubs to grow too close to the bed or tank as their roots can clog or damage your system.
- Ensure renters/guests are aware of your system's proper use.

ACTION:

- Support and work with the CHA education programme regarding pumping, inspection and maintenance of septic systems.
- Recommend that the Municipality pass a by-law prohibiting the renting of cottages to more occupants than the septic system is designed to accommodate.
- Recommend that MACA work with the Municipality to undertake a Septic Re-Inspection Programme.

[5] According to the survey, over 16% of property owners have owned their property for more than 40 years. As well, research from other cottage municipalities indicated that almost a third of septic systems are outdated.

[6] Algonquin Highlands municipality (immediately northwest of Dysart et al) completed a 3-year-long re-inspection of all septic systems within their boundaries and found that 14% of approximately 5000 systems needed some form of remedial action.

LAND USE REGULATIONS

Land-use planning in Ontario is regulated by the Planning Act of 1990 (as amended) under the Ministry of Municipal Affairs. However, regional and local issues are dealt with at the county and municipal level. In our territory, the County Official Plan sets the framework for the Municipal Official Plan, out of which flow the regulatory zoning by-laws.
The purpose of the Official Plan is to establish a broad planning policy framework for the County, and is intended to guide the official plans and development approvals of the local municipalities.

In 2004, the Municipality of Dysart et al updated its Official Plan http://www.dysartetal.ca/PDFs/DysartOPConsolidationDec2010.pdf

In December 2005, as a fallout of the Official Plan, the Municipality updated its zoning by-laws http://www.emmersonlumber.com/pdf%20files/dysart_bylaw.pdf. The scope of this document, which gets updated periodically, is to define the land uses through well articulated zoning provisions, requirements for building permits and compliance. They stipulate the type and number of buildings that can be constructed on the lot and where they can be situated on the lot. Except for on the north shore of Miskwabi Lake, the minimum setback for building structures is 20 meters and 30 meters for leaching beds. Miskwabi Lake North Shore lots have an extra setback, varying by lot, averaging between 20 to 40 meters.
Through enforcement of the zoning regulations the Municipality of Dysart et al has been successful in preventing the construction of any new boat houses on our lakes.
While there is a very specific process that needs to be followed to have zoning regulations changed or lot specifications split, changes do occur from time to time.

ACTION: Work with the Municipality to reinforce all zoning and environmental regulations. Ensure MACA is informed of all potential re-zoning applications and has the opportunity to engage in the re-zoning assessment process.

OTHER REGULATIONS AND GOVERANCE

Waterfront properties are subject to a number of other legislative controls enforced at the federal, provincial and municipal levels. The Department of Fisheries and Oceans enforces the Fisheries Act and the Navigable Waters Protection Act. The Fisheries Act makes it illegal for a person to do anything that harms fish habitat, or to deposit a harmful substance in waters containing fish. The Act provides for significant fines to be levied for infractions.

The Ontario Ministry of the Environment regulates water quality through its Environmental Protection Act, which addresses public health concerns resulting from water contamination. Under the Act, spills must be reported, stopped and controlled. The Ministry is also responsible for the approval of waste disposal systems greater than 10,000 litres. The Ministry also oversees and grants permits for substantial water extractions.
The Ministry of Natural Resources regulates the province's natural resources in lake areas in accordance with the Public Lands Act and the Lakes and Rivers Improvement Act. These Acts require a work permit before work around water bodies can occur, including dredging; filling; blasting; removal of vegetation; and construction of retaining walls, docks and boathouses.

CONCLUSION and GOING FORWARD

The multi years of consultation brought the four lakes of the Miskwabi community together for a common cause. The process gave a genuine understanding of the core values, ideas and concerns of those tied to the area as well as a specific action plan to guarantee the values are upheld, the ideas put in place and the concerns dealt with.

The individuals of the community vary substantially economically, in interests and activities; however, all concur that it is essential to maintain the water quality and natural features which are the body and soul of the community.

The Miskwabi Area Watershed plan is a living document based on the input of the members of the community and intended for use by all. It is a beginning, not an end; a report not to be put on a shelf but to be used and updated on a regular basis.

Miswkabi

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LIST OF FIGURES (to be numbered)

LIST OF MAPS (to be numbered)

ACRONYMS and ABBREVIATIONS (incomplete)

ABBO	Atlas of the Breeding Birds of Ontario
CHA	Coalition of Haliburton Associations
GIS	Global Information Systems
MACA	Miskwabi Area Community Association
	formerly Miskwabi Area Cottagers' Association
MNR	Ontario Ministry of Natural Resources
MOE	Ontario Ministry of the Environment
OPP	Ontario Provincial Police
PSW	Provincially Significant Wetland
SARO	Species at Risk Ontario
TSW	Trent-Severn Waterways

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Miskwabi Lake

Wenona Lake