Watershed Management Plan

Bolton River

December 2016

Central Algoma Freshwater Coalition

Who we are

The Central Algoma Freshwater Coalition (CAFC) is an incorporated not-for-profit organization dedicated to the protection, restoration, and improvement of watersheds throughout the Central Algoma Region, which stretches from the eastern boundaries of Sault Ste. Marie to the eastern boundaries of the Municipality of Huron Shores, including St Joseph Island. A vision of healthy sustainable watersheds guides our work.

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History of the Central Algoma Freshwater Coalition

The Central Algoma Freshwater Coalition (CAFC) was formed in 2007, to unite the voices of concerned landowners of the recurring blue-green algae blooms that were being experienced on multiple lakes in the region. These “trigger” events often create strong and growing public support for implementation of watershed management planning at the local watershed level.

The Approach

Watershed management is not so much about managing natural resources, but about managing human activities as it affects those resources. Because human activities include actions by governments, municipalities, industries and land owners, watershed management must be a cooperative effort.

The expense of undertaking watershed management is far less than the cost of future remediation.

This is a first generation watershed management plan for this area. Most of the research to date has centred on nonpoint source phosphorous nutrient loading.

Cover Photo – Bright Lake

Recognition

Ontario Trillium Foundation

Water Sampling Volunteers

Paul Perry – Bright Lake

Hugh Coverly – Desbarats Lake

Nancy Maltman – Caribou Lake

Consultants & Services

Gertrud Nurnberg

Testmark Laboratories

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Executive Summary

Central Algoma is a beautiful area in which to live work and play with a mix of agricultural, forested and lakeshore landscapes including Lake Huron. It is an important migratory bird stopover habitat and contributes to the biodiversity features of Lake Huron.

Bolton River's watershed is a rural watershed that ultimately contributes to the watershed of Lake Huron. 50% of the headwaters of Bright Lake are the deep clear Basswood Lake. The Day Lakes (Cranberry, Birch, Little Basswood and Brownlee Lakes) and areas of agriculture along the Pickerel Creek account for another 30%. The remaining 20% is a mix of forested and agricultural lands north and south of Bright Lake. Some of the agricultural areas are farmed by Old Order Mennonites and the Amish using work horses. The cottagers on Bright Lake have concerns about periodic algae and cyanobacteria blooms that began in 2008.

Basswood Lake is large, deep, and oligotrophic. It contributes about 50% of the inflow to Bright Lake via Harris Creek. The water is clear and nutrient poor. The flow out of Basswood Lake is controlled by a dam in late summer and early fall flows to Bright Lake can be reduced.

The other major source of water to Bright Lake is the Pickerel Creek and contributes about 30%. Its headwaters are in the Day Lakes, it passes through a large wetland and then through cleared and agricultural lands. The creek had average total phosphorous (TP) readings of 0.031 mg/l. The creek is a significant contributor of human caused TP loading to Bright Lake.

Bright Lake is not at all similar to Basswood Lake. The lake is mesotrophic, relatively shallow and subject to nutrient loading resulting in cyanobacterial blooms. The limiting nutrient factor for algae blooms is phosphorous.

Phosphorous can come from both internal and external sources. Internal sources of phosphorous in Bright Lake may be a major contributor to nutrients when lake is oxygen depleted at depth. There may be an opportunity to manage oxygen and nutrients by managing the Basswood Lake dam at the inflow and beaver dams at the out flow.

The major external phosphorous sources to Bright Lake are precipitation, natural run off from forests, agriculture and wetlands. Natural factors are beyond man's control so emphasis is placed on managing the man made external nutrient loading factors.

This plan recommends that the entire community work toward an improvement in water quality.

The plan places emphasis on improving water quality by encouraging cottage and agricultural riparian buffer zones; and managing cottage sewage disposal and agricultural nutrients to reduce human caused sources of TP.

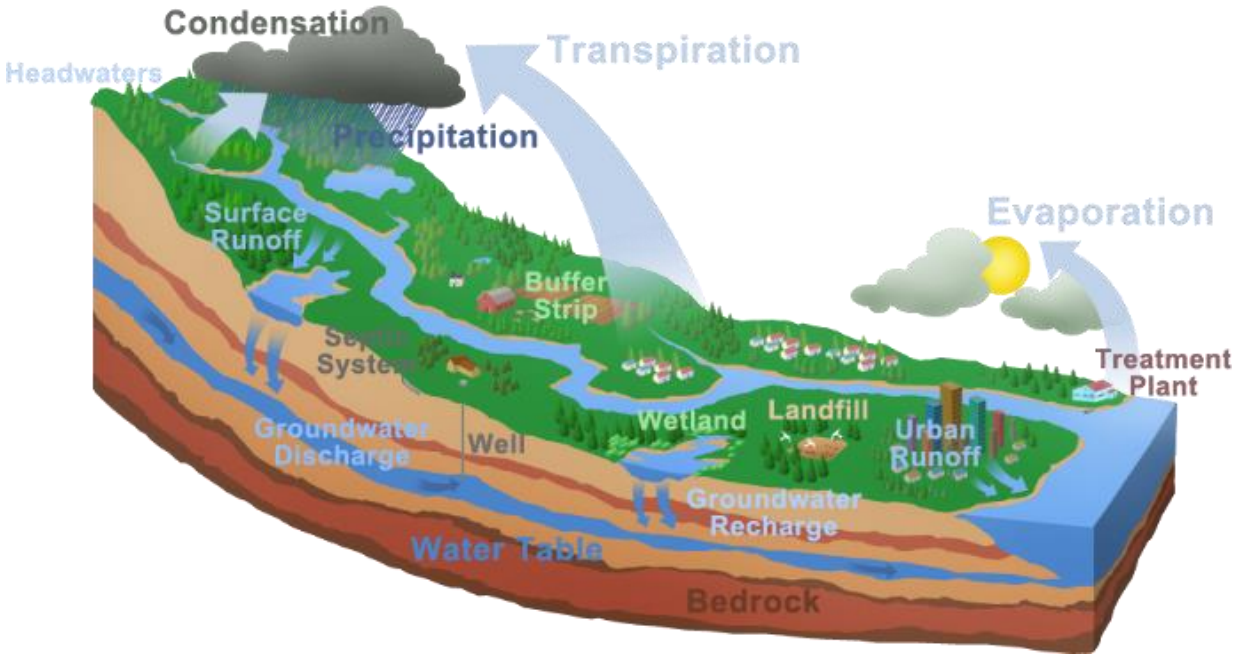
The plan recommends consultation with government agencies and the Basswood Lake community to determine if letting water out of Basswood Lake in a fashion that does not harm fish spawning or contribute to lake stratification in late summer and early fall is possible and that any such efforts should be associated with Bright Lake monitoring looking for water quality improvement. The plan further recommends that this occur without manipulation of the Bright Lake outflow.

Following the manipulation of late summer and early fall inflow changes this plan can support a consultation with government agencies and the Bright Lake community to determine if removing beaver impoundments at the Bolton River is possible and that any such efforts should be associated with Bright Lake monitoring looking for water quality improvement

1.0 What Is a Watershed

As water flows through an area, it comes into contact with many features of that environment – both natural and manmade. This area is referred to as a watershed. Specifically, "a watershed is an area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake or groundwater."

The boundaries of a watershed are formed by the highest points in the landscape – they are like the edges of a bathtub or sink – any water that falls within it will drain downwards to the same outlet. Homes, farms, cottages, forests, small towns, industries and more can make up watersheds. Some cross municipal, provincial and even international borders. They come in all shapes and sizes and can vary from millions of square kilometers that drain into an ocean to only a few acres that drain into a pond.



Conservation Ontario (2013). What is a Watershed

Each watershed is made up of many smaller sub-watersheds. The Central Algoma watershed is part of the Lake Huron watershed which forms part of the larger Great Lakes-St. Lawrence Watershed which then flows into the Atlantic Ocean.

The first step in protecting water quality is to better understand your place in the watershed. We all live in a watershed and water knows no political borders. Our environment, economy, and communities depend on healthy watersheds. A Watershed Management Plan is a guide to help us achieve healthy and sustainable watersheds.

2.0 What is a Watershed Management Plan

A Watershed Management Plan is the process of managing human activities and natural resources in an area defined by watershed boundaries.

These plans can range from one page memos to thousand - page engineering and environmental reports. These documents are meant to be an ongoing and evolving process to assist in sustainability of these valuable natural resource. Change occurs as research knowledge improves and needs of the area change. By protecting this natural resource, you are not only conserving our natural and cultural heritage but also protecting the legacy of clean water for future generations.

By protecting water quality, you are also protecting your investment as a property owner or resident in this landscape. You will notice that being a water quality steward and working with the environment will result in savings of time, money and frustration.

With funding provided by the Ontario Trillium Foundation, CAFC has built upon initial water quality data, scientific reports, municipal plans, and regional, provincial, and bi-national commitments to develop an initial Watershed Management Plan for Bright Lake.

This plan is designed to be a preliminary guidance document to shed light on the health of our local watersheds.

3.0 Stakeholder and Public Involvement

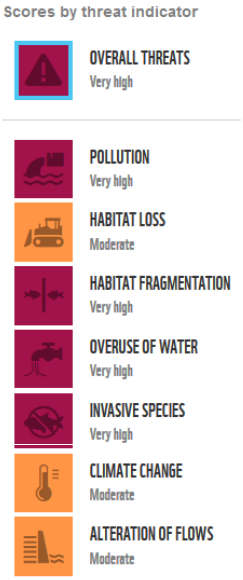
A public meeting was held in February of 2014 in Johnson Township. CAFC presented a brief overview of water quality discussions around the Central Algoma area regarding reoccurring cyanobacteria blooms; identification of the role phosphorus plays in the occurrences of these blooms; concerns for the rivers, creeks; streams and lakes; sedimentation; mechanical removal of beaver dams and the downstream effects; and invasive species.

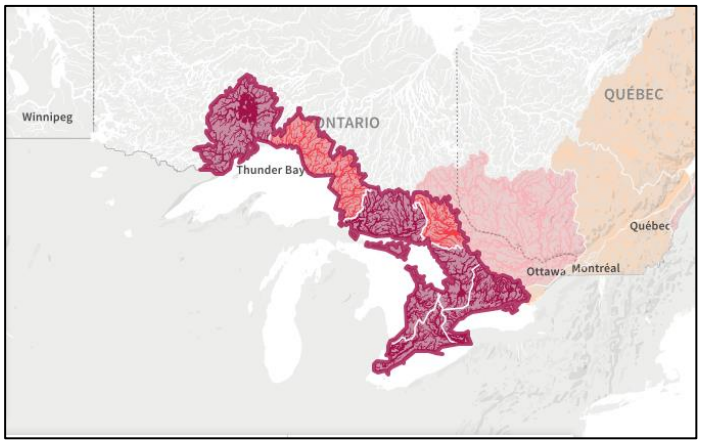
The major concerns identified related to flooding, maintaining traditional rural agriculture (including meeting water needs), and cyanobacterial blooms on Bright Lake

4.0 The Great Lakes Watershed

The Great Lakes Watershed spans an area that is 223,948 sq. km and includes thousands of tributaries and is the Earth’s largest freshwater ecosystem. Lake Huron’s surface area is 59,600 sq. km and has a drainage basin of 134,000 sq. km.

The overall threat to the Northern Lake Huron Watershed is rated as “very high” including pollution, habitat fragmentation, overuse of water and invasive species.





ww.awsassets.wwf.ca/downloads/wwf_watershed_report_greatlakes_16072015.pdf

5.0 Northern Lake Huron - Central Algoma Region

The Central Algoma Region, for the purposes of the Central Algoma Freshwater Coalition, stretches from the eastern boundaries of the City of Sault Ste. Marie to the eastern boundaries of the Municipality of Huron Shores, including St Joseph Island.

This region includes 12 municipalities, First Nation Communities, and is home to 10,000 individuals year-round and grows substantially in the summer months when tourists and cottagers come to experience any of the 30+ lakes in the area.

Central Algoma has a rich and unique history, including being home to the first copper mine. Both the Trans-Canada highway and the Canadian Pacific Railway (operated by Huron Central Railway) cross the area in a general east to west direction. No matter the season, tourists, outdoorsmen, and families flock to the area to enjoy the fishing, beaches, hunting, culture, history, landscapes, farmers' markets and lakes.

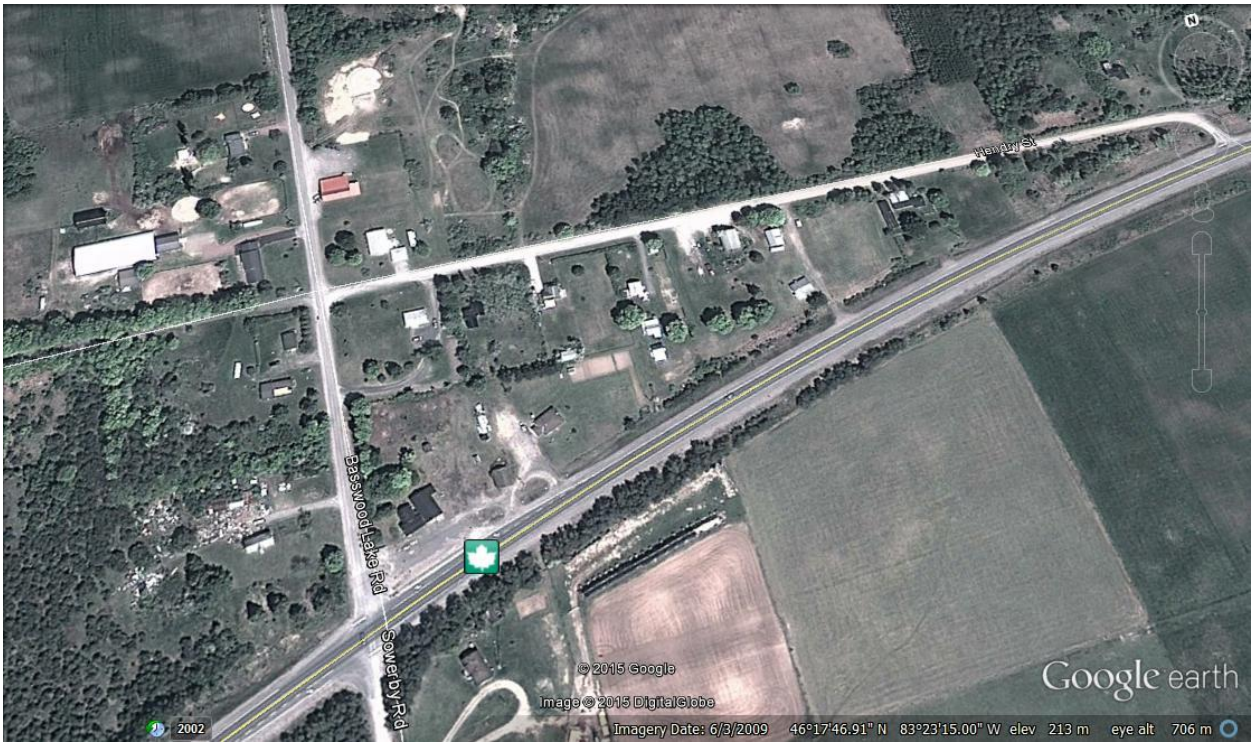
The largest industries in the region are agriculture, tourism and quarry operations. The agriculture and tourism industries both rely heavily on healthy waters to survive and thrive.

The coastal wetlands of the St Mary's River and the lands of the North Channel are important migratory bird stopover habitats along Lake Huron. The region is important habitat because it has much natural land cover, some coastal wetlands and relatively little coastal development.

6.0 Bolton River Watershed – Surface Water

Terrestrial / Land Use

The watershed is rural with cottage and home development on the lakes and includes the hamlet of Sowerby. The watershed is in the Municipality of Huron Shores.



Sowerby

Most of the land in the watershed area is privately owned with the exception being the provincially owned lake and stream beds. The forested areas are mixed woods. In agricultural

areas lands are used for cash cropping, pasture, hay fields and the newly emerging market gardening. Some farms are tilled and harvested using the work horse.

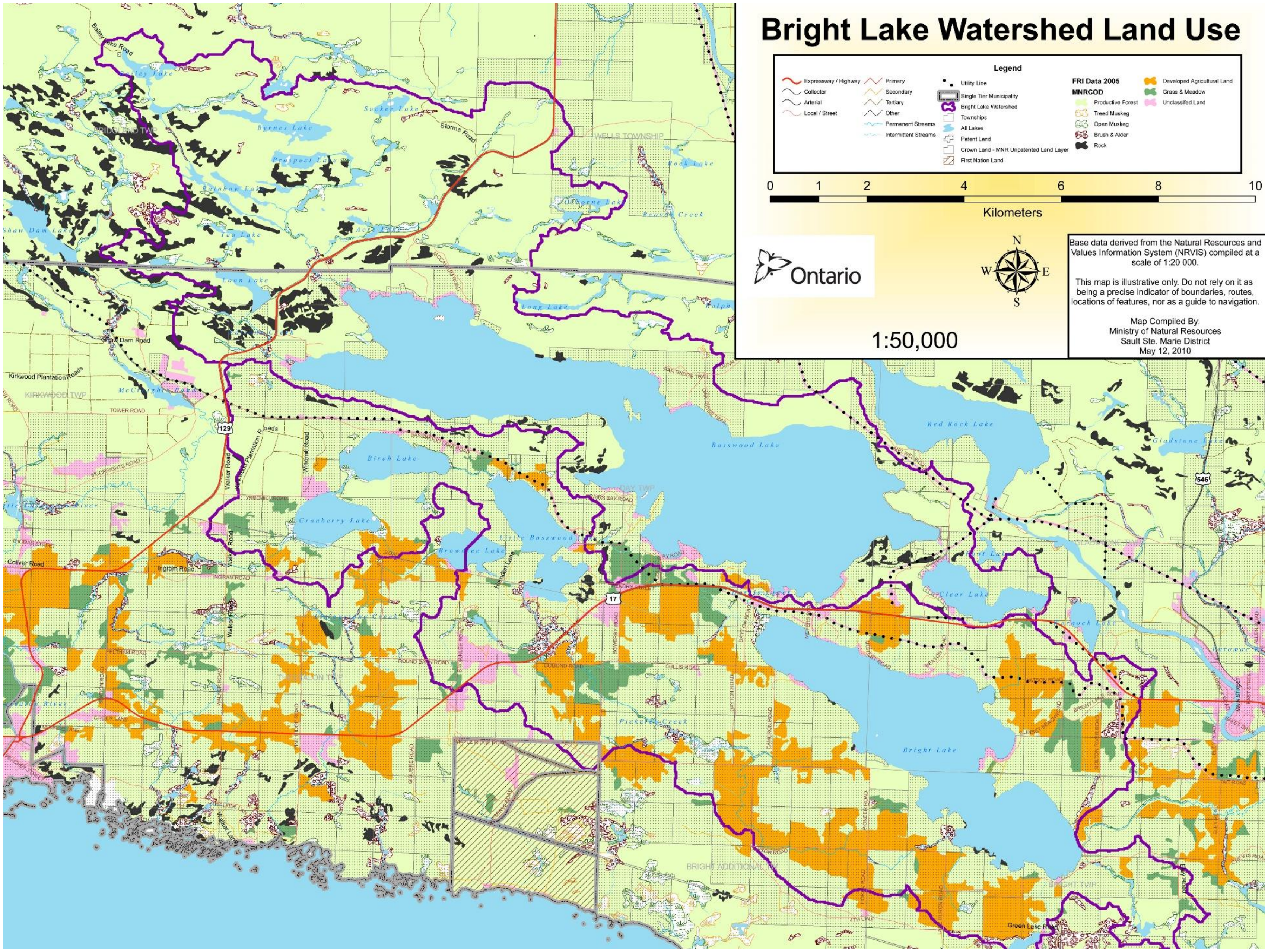
Shoreline development capacity studies for Bright Lake and Basswood Lake have been done by the Municipality of Huron Shores. Lake capacity is based on a factor of 1.5 times “pristine” load Basswood Lake has capacity for additional development based on water quality at 1.21 times. Bright Lake is significantly over developed based upon water quality at 4 times.

In 2011, Basswood Lake had 22 permanent residents, 233 seasonal residents and 76 vacant lots. Cleared lands (agriculture grass and meadows) accounted for 1.7 % of the watershed.

In 2011, Bright Lake had 32 permanent residents, 121 seasonal residents and 57 vacant lots. Cleared lands (agriculture grass and meadows) accounted for 22.3% of the watershed.

The TransCanada Highway #17 and municipal roads with hard and gravel surfacing are the major transportation corridors in the area. The Huron Central Railway passes to the south of the watershed between Bright Lake and the North Channel of Lake Huron.

Historic Twelve Sided Barn and Sowerby Community Centre


Bright Lake Watershed Land Use
Legend
Expressway / Highway
Collector
Arterial
Local / Street
Primary
Secondary
Tertiary
Other
Permanent Streams
Intermittent Streams
Utility Line
Single Tier Municipality
Bright Lake Watershed
Townships
All Lakes
Patent Land
Crown Land - MNR Unpatented Land Layer
First Nation Land
FRI Data 2005
MNRCOD
Productive Forest
Treed Muskeg
Open Muskeg
Brush & Alder
Rock
Developed Agricultural Land
Grass & Meadow
Unclassified Land
0 1 2 4 6 8 10
Kilometers
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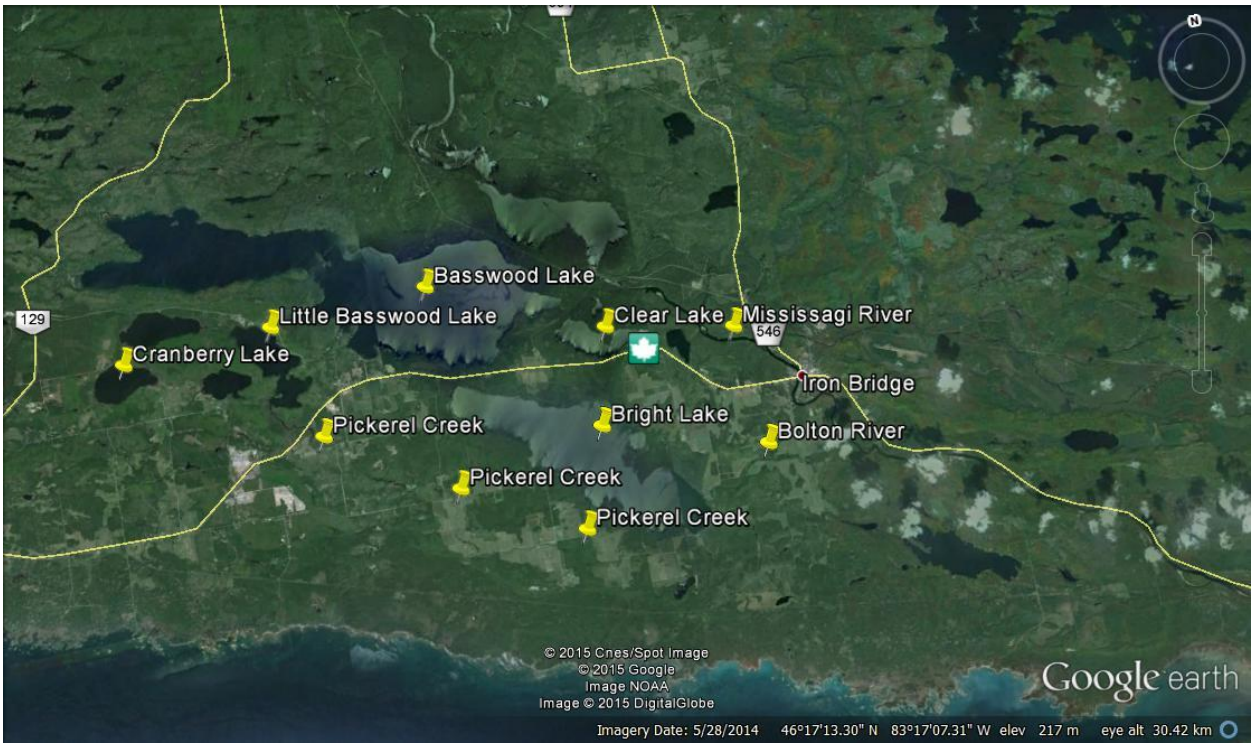
S
1:50,000
Base data derived from the Natural Resources and Values Information System (NRVIS) compiled at a scale of 1:20 000.
This map is illustrative only. Do not rely on it as being a precise indicator of boundaries, routes, locations of features, nor as a guide to navigation.
Map Compiled By:
Ministry of Natural Resources
Sault Ste. Marie District
May 12, 2010
Basswood Lake
Bright Lake
Red Rock Lake
Birch Lake
Cranberry Lake
Clear Lake
Byrnes Lake
Loon Lake
Storms Road
WELLS TOWNSHIP
Kirkwood Plantation Roads
KIRKWOOD TWP
Colver Road
Ingram Road
Green Lake Road
17
129
546

Aquatic



The headwaters of Pickerel Creek start at Cranberry Lake and flows north to Birch Lake to Little Basswood Lake and into the Pickerel Creek to Bright Lake. The Harris Creek connects Basswood Lake with Bright Lake. Bright Lake out flows into the Mississagi River and eventually Lake Huron.

Bright Lake has a watershed of 186 sq. km. 35% of this area is Basswood Lake watershed of which Basswood Lake itself accounts for 45% of the area. The Pickerel Creek sub-watershed accounts for another 30% of the watershed and Bright Lake (6%) and the northern and southern shorelines make up the final 25% of the watershed.

Basswood Lake is an oligotrophic lake which is large deep, stratified, with clear water and oxygen at depth. The lake supports cold water fish such as Lake Trout. The annual flushing rate for Basswood Lake is 0.047 times per year. Mean depth of the lake is 38 m. Since Basswood is upstream of Bright Lake much of the external TP load is retained in Basswood Lake and does not reach Bright Lake.

Bright Lake is a mesotrophic lake which is much shallower, periodically stratified, with low water clarity and sometime oxygen depleted at depth. The lake supports warm water fish such as Walleye, Pike and Bass. Bright Lake has had cyanobacterial blooms. The annual flushing rate for Bright Lake is 1.4 times per year. Mean depth of the lake is 4.9 m.

External TP loading in the Bright Lake Watershed 35% is from precipitation, 24% from forested areas, 25% from agriculture, 8% wetlands and 6% shoreline development. Of these sources agriculture and shoreline development are human caused.

Lakes accumulate phosphorous over time. Internal phosphorous loading from sediment occurs when low oxygen levels cause iron hydroxides in sediments to release phosphorous. This release in Bright Lake may approach levels nearing external loading but it is difficult to determine. Low oxygen levels are most likely to occur when the lake stratifies. Because Bright Lake is a relatively shallow lake stratification may not develop or be interrupted by winds mixing oxygen into the water. Controlling internal loading in a large lake like Bright Lake is cost prohibitive. Interrupting stratification with strategic water flows from Harris Creek may be a possibility but would need to consider needs such as the fishery.

Long standing wetlands not subject to fluctuating water levels generally are highly productive and help to hold phosphorous. Beaver ponds however can flood soils promoting soils to release phosphorous and can be associated with catastrophic failures during times of heavy rains.

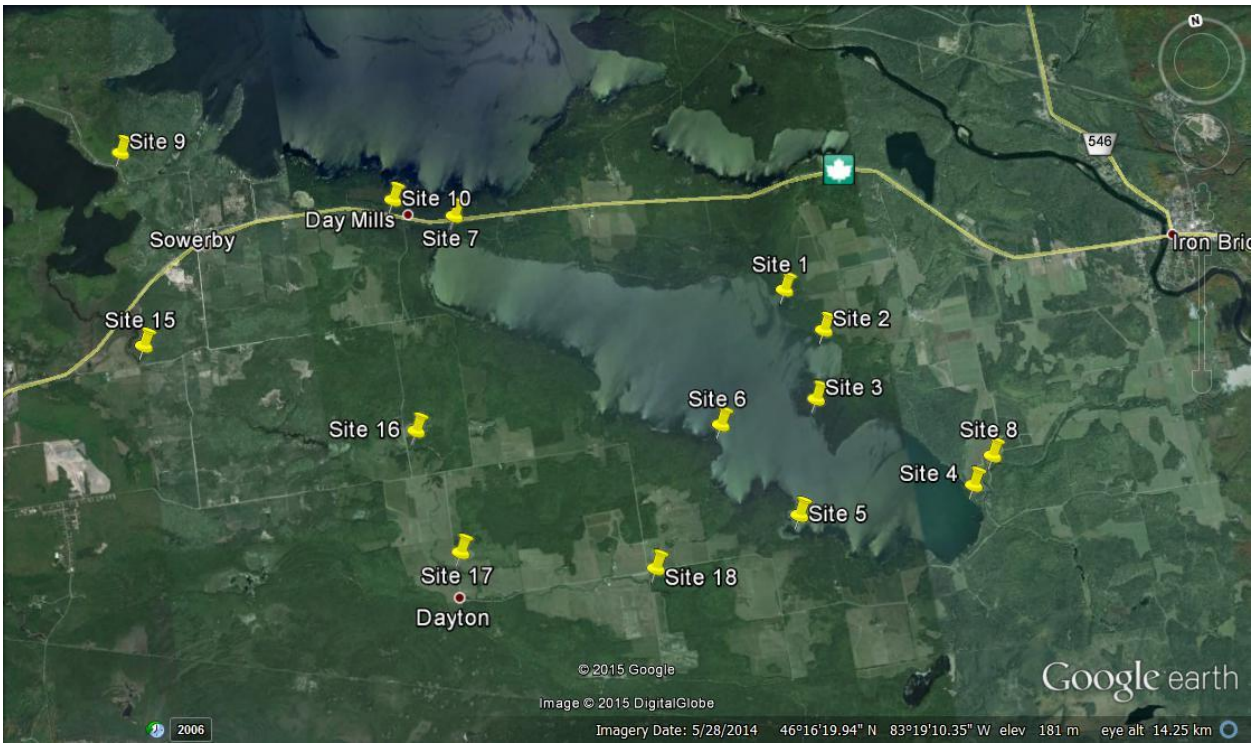
Municipal ditches and agricultural field drains have been established in the watershed. These drainage systems may increase stream flow volumes but this has not been adequately investigated. Increased flow into watercourses can cause stream bank erosion.

The sub-watersheds are Basswood Lake – Harris Creek, Day Lakes, the Pickerel Creek, and the Bolton River. The Bolton River enters into the Mississagi River south east of the community of Iron Bridge.

Bright Lake

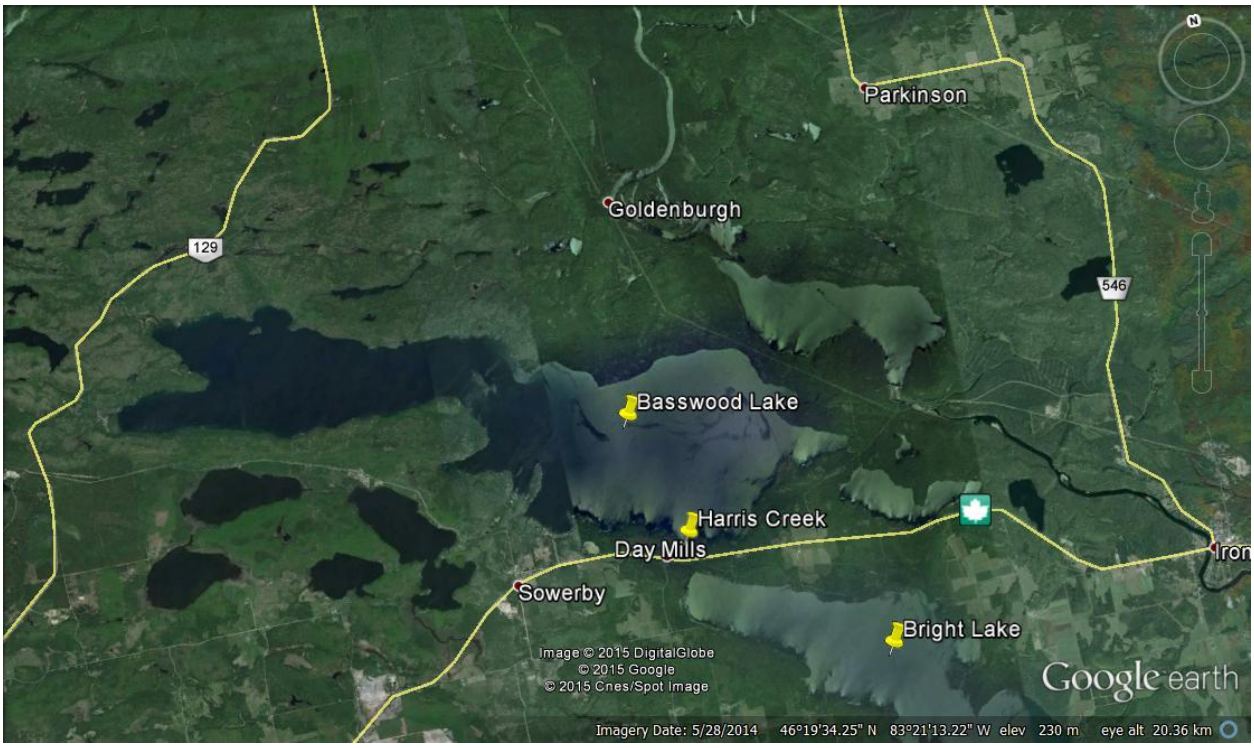
Water sample were taken monthly over a two year period during the open water season and TP recorded. The average TP values are in the following table.

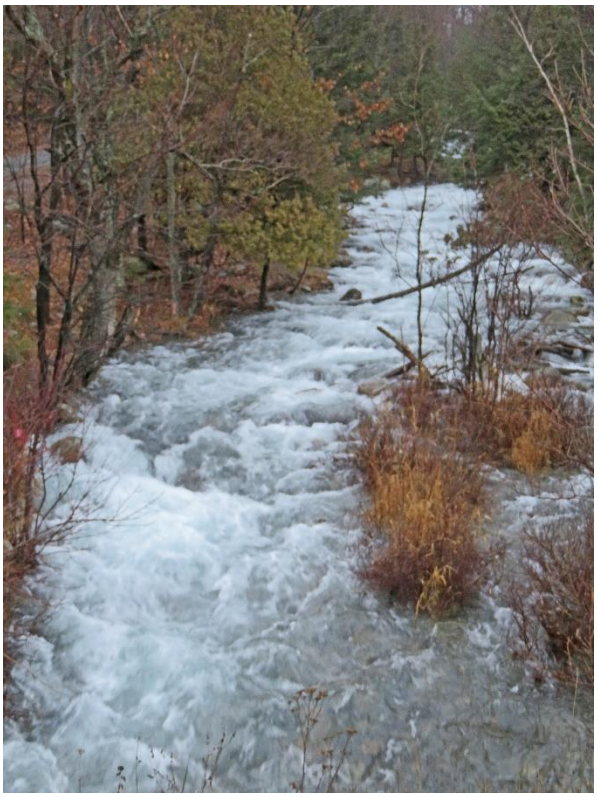
Average Total Phosphorous (TP) - in (mg/L) 2014-2015		
Site Number	Site Name	Average TP
1	Mud Bay	0.011
2	Sunset Beach	0.008
3	Bright Lake Public Boat Launch	0.008
4	East End – Bolton River	0.009
5	Pickerel Creek Bay	0.011
6	Deep Spot in Bright Lake	0.010
7	West End – Harris Creek Inlet	0.007
8	Bolton Bridge	0.010
9	Public Boat Launch at Little Basswood	0.015
10	Harris Creek	0.002
11	Brownlee Park Boat Launch	0.011
15	Pickerel River 1 HWY 17 to Dumond Rd	0.011
16	Pickerel River 2 Dayton Rd to Maple Rd	0.028
17	Pickerel River 3 Dayton Road / Dayton Station	0.031
18	Pickerel River 4 Horan / Dayton Road	0.031
Exceedances respective MOECC river quality objectives of 0.030 mg/L TP- shaded **Exceedances respective MOECC lake quality objectives of 0.020 mg/L TP**		



CAFC Water Sampling Sites 2014 -15

6.1 Basswood Lake – Harris Creek





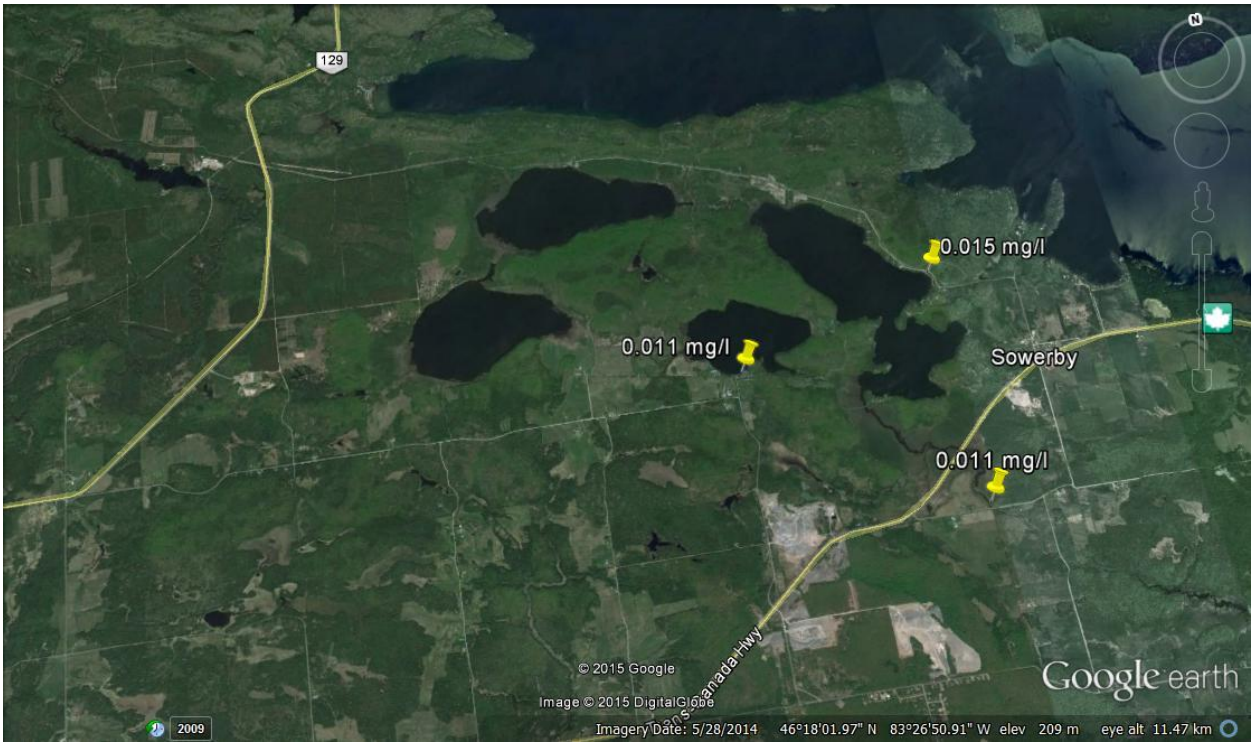
Harris Creek – High Water

Basswood Lake has an area of 27 square km, a maximum depth of 73 m and mean depth of 38 m. It is a clear ultra-oligotrophic lake. It is 50% of the Bright Lake watershed and contributes 50% of the water to Bright Lake.

Basswood Lake's out flow is controlled by a dam and flows out Harris Creek to Bright Lake. The Harris Creek outflow at Basswood Lake had a TP of 0.002 mg/l and at the inflow to Bright Lake had a TP of 0.007 mg/l. Some samples at the Basswood Lake outflow were so low in TP that they below the detection level for testing.

Basswood Lake

6.2 Day Lakes (Cranberry, Birch, Little Basswood Lakes)



The flow is from Cranberry Lake to Birch Lake to Little Basswood Lake and outflows into the Pickerel River. The Pickerel River drains 30% of the Bright Lake watershed. The headwater surface areas and maximum lake depths are Cranberry 1.4 sq km / 2.4 m, Birch 1.4 sq km / 2.5 m, Little Basswood 2.14 sq m / 12 m and Brownlee 0.7 sq km / 5.5 m. These lakes in Day Township are referred to as the Day Lakes. Brownlee and Little Basswood Lake are mesotrophic lakes and have not had cyanobacterial blooms.

Little Basswood Lake

Little Basswood Lake however has the potential for late summer early fall cyanobacterial blooms due to potential internal phosphorous loading. There is a large wetland at the outflow of Little Basswood Lake that can been seen from Highway #17.

Pickerel River Wetland at Highway #17

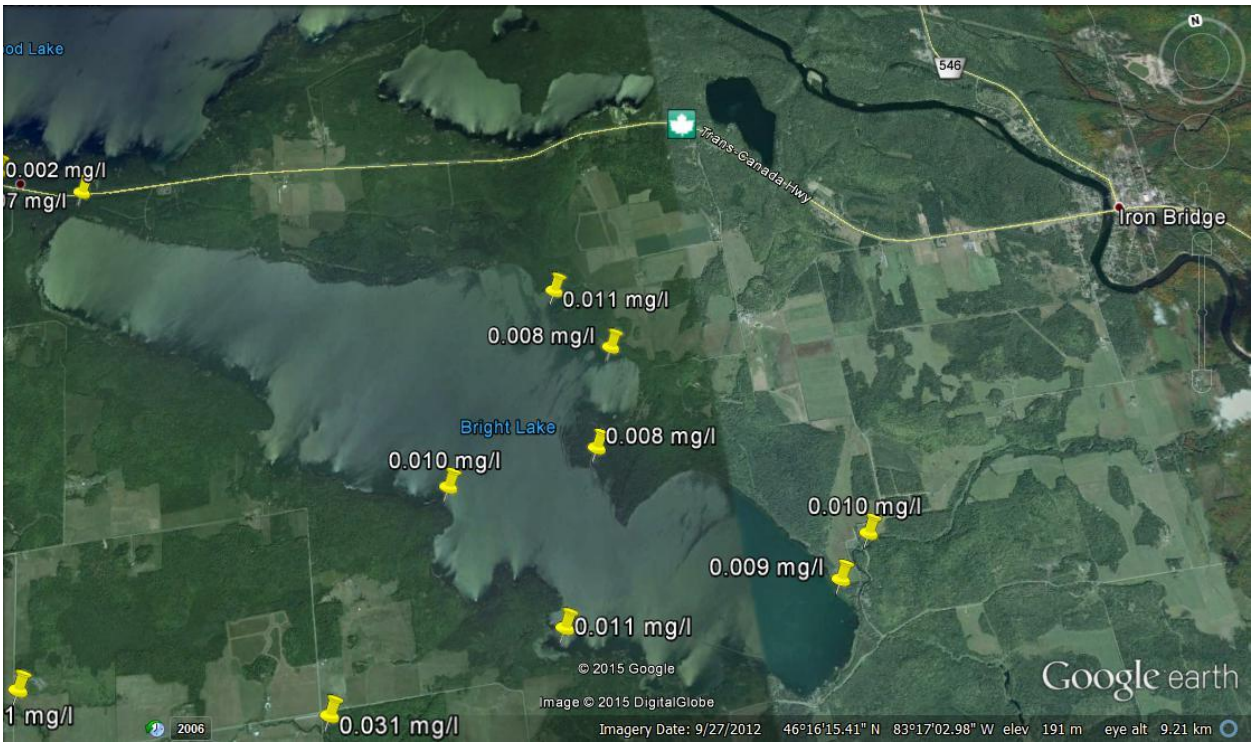
6.3 Pickerel Creek

There were 4 sampling sites in 2015 along the Pickerel River with only two samples from each site. As one moves downstream the TP increases from 0.011 mg/l to 0.031 mg/ l likely the effects of nutrient loading from the surrounding agricultural lands. The Pickerel River is a contributing factor to Bright Lake nutrient loading.

The Bright Lake Association worked with area farmers to fence cattle out of parts of Pickerel Creek by establishing electric fencing and solar powered water stations. In May 2010 TP in Pickerel Creek was measured at a high of 0.39 mg/l. The recent changes of cattle access to the creek has reduced the nutrient loading from the Pickerel Creek.

Pickerel Creek – Electric Fence to Keep Cattle Away From Creek

6.4 Bright Lake



Bright Lake is 12.3 sq km and has a maximum depth of 12 m and a mean depth of 4.9 m.

Bright Lake has had variable water quality with summer average TP concentrations from 0.013 to 0.026 mg/l. The lake has had periodic cyanobacterial blooms including the summer of 2015.

The north-west corner of the lake has the benefits of the clear water from Harris Creek originating from Basswood Lake and had a summer average TP of 0.007 mg/l.

The south-eastern part of the lake had TP averages of 0.008 to O.011 mg/l. The Pickerel Bay where the Pickerel River enters Bright Lake averaged 0.011 mg/l.

The reason for variable water quality on Bright Lake is likely a combination of nutrient loading from agriculture, shoreline dwellings, and internal loading from bottom sediments combined with factors of variations in the Harris Creek flow and beaver dams in the Bolton River outflow.

Logs were historically floated down Bright Lake and there was speculation that bark and sawdust may have been a contributing factor to poor water quality however based on sediment samples taken this does not appear to be a significant factor.

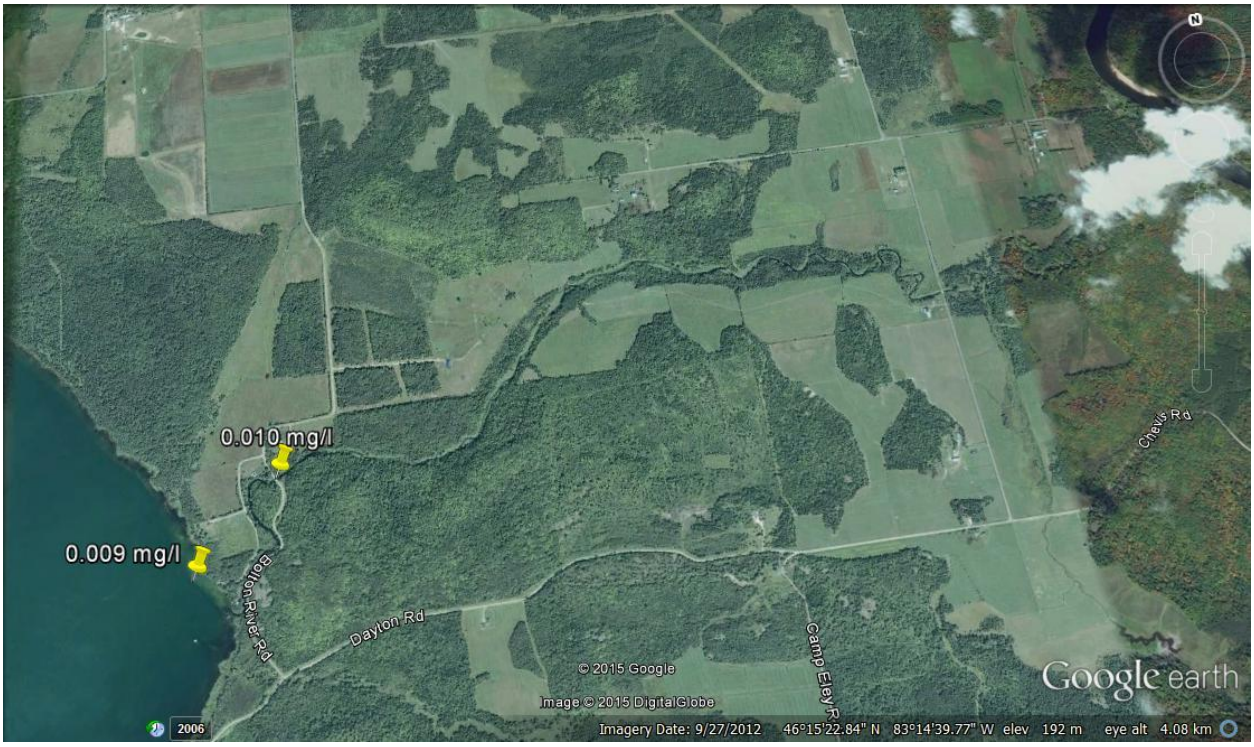
Roadside ditches and municipal drains in the Watson Road area north of Bright Lake were maintained by the Municipality of Huron Shores and the Bright Lake Association in 2015.

Drainage – Watson Road Area

Roe Park Bright Lake

Agricultural Landscape – Watson Road Area – Bright Lake North

6.5 Bolton River



The Bolton River is the outflow of Bright Lake and flows into the Mississagi River which flows into Lake Huron near the community of Blind River. TP measured in the river at its outflow from Bright Lake had an average of 0.010 mg/l which is considered an accurate representation of the lake TP and could be used as a convenient future monitoring location.

Bolton River

6.7 General Patterns and Trends

TP enrichment of Bright Lake is a complex issue where not all the answers are known. The shoreline development, agriculture and possible internal phosphorous loading are some of the human caused nutrient loading factors that may be controlled. The variation in nutrient loading is uncertain but may be related to beaver activity in the Bolton River outflow and in variations to the Harris Creek inflow influencing internal phosphorous loading.

MOECC river water quality objectives for TP are set to 0.030 mg/l “to avoid excessive plant growth” and can be used as a threshold that indicates stream water deterioration. TP concentrations in Pickerel Creek at times did exceeded this threshold on all sampling occasions and therefore impact the lake, but also exhibit low water quality themselves.

Assuming rising temperatures and more severe storms (more sedimentation in runoff) with global warming, and given that Little Basswood Lake is on the threshold of a cyanobacterial bloom efforts should be made to reduce TP loading.

Experimenting with the management of beaver dams at the Bolton River outflow of Bright Lake or the late summer early fall inflow at Harris Creek to improve the aesthetic quality of the lake for recreational use and to prevent potentially toxic cyanobacterial blooms could be done with close monitoring to determine if this is an effective strategy and paying attention to the needs of the lakes fish. To determine which factor is effective they should be experimented with separately and then perhaps in combination.

Warmer temperatures due to global warming and more frequent severe storms; lakeshore development and agriculture are also human driven factors that have altered natural processes in the lake.

Exceedances in TP load along Bright Lake eventually contribute to Lake Huron TP loading.

Lack of over storey vegetation along streams in some areas contributes to elevated stream temperatures.

There was a severe rainstorm in the fall of 2013 that washed out roads and broke beaver dams that may also be a factor in TP concentrations in lakes.

7.0 Bolton River Watershed - Groundwater

Groundwater in the Bright Lake watershed needs additional research and groundwater recharge areas have not been documented. Groundwater recharge areas are typically in areas of permeable sands and gravels. Typical threats to ground water include waste disposal sites, salt storage, snow storage, fuel storage, fertilizer, chemical, hazardous waste, and sewage hauling. Abandoned wells have not been inventoried – but anecdotal discussion suggest there are some abandoned wells in need of proper closure to restrict ground water contamination. Anecdotally there are natural springs contributing to the water quality of both Basswood and Bright Lakes.

8.0 Recommendations

That the current interest in continuous community based improvement in water quality and environmental conditions be supported. By using best practices to manage human activities within the watershed boundary the aim is to protect natural resources for future generations, while reflecting the social context, and economy of the community. The plan proposes a partnership approach, and adaptive management that aim for continuous improvement.

The goals of this plan are to maintain healthy water system including ground water (clean drinking water for rural watershed residents) and surface water (clean water that contributes to the health of Lake Huron – healthy terrestrial and aquatic ecosystems, sustainable human use of surface water for non-drinking water purposes), and protection of the public from flooding and erosion.

- That water quality research continues and that plans are adapted to meet new understanding of the relationship between activities and water quality

- That a beaver management toolkit be created to establish best management practices for beaver. That these tools be used on a test basis with monitoring to determine if they are effective.

- That a reasonable approach to existing shoreline development would seek to have owners improve their relationship of their property to water quality.

- That a reasonable approach to existing agricultural development would seek to have farmers improve their relationship of their property to water quality by fostering an understanding of nutrient impacts on water quality and where appropriate have the larger community contribute to watershed improvements on farms.

- That major redevelopment of shoreline lots or development of existing undeveloped lots occur in a manner that effectively manages TP and shoreline disturbance.

- That consultation with government agencies and the Basswood Lake community be held to determine if letting more water out of Basswood Lake in late summer and early fall is possible and that any such efforts should be associated with Bright Lake monitoring looking for water quality improvement and further that this occur without manipulation of the Bright Lake outflow.

- That following the manipulation of late summer and early fall inflow changes that if needed a consultation with government agencies and the Bright Lake community be held to determine if removing beaver impoundments at the Bolton River is possible and that any such efforts should be associated with Bright Lake monitoring looking for water quality improvement.

- The target for TP is less than .030 mg/l for streams and less than .020 mg/l for lakes or a minimum a decreasing trend.

- That creeks in the area be continued to be monitored for elevated TP

- That all lakes be monitored with blooms including profiles of temperature and dissolved oxygen, Secchi disc readings and TP. This should occur at least once in Aug and once in September or if funds are not available as a minimum measure TP at the lake outflow

- That a groundwater and significant aquifer recharge area study be undertaken.

- That existing forests and wetlands are maintained at current percentages of land use by encouraging general tree planting across the watershed.

- That over storey vegetation along streams areas be increased by 75% where it is currently absent.

- Establish buffer strips along streams including fencing where cattle grazing occurs on adjacent land.

- Develop a centre for *Love Your Lakes* shoreline assessment and educational stewardship program.

- That best management practices be encouraged to be adopted by private land owners across the watershed.

- That an inventory be taken of abandoned wells and that a plan be established to properly close these abandoned wells

9.0 Best Practices

The implementation will involve partnerships with conservation organizations, the cottage associations, municipal government and the agricultural sector.

We all share responsibility for the protection of natural resources particularly water.

Well planned, healthy buffers demonstrate a landowner's due diligence and civic mindedness.

Buffer Strips and Riparian Zones

A buffer strips is a strip of vegetation – usually a mix of trees, shrubs and grasses either planted or naturally occurring along watercourses and natural areas to protect them from surrounding land uses. Width is a key factor in buffer strip design. For bare soil conditions on adjacent land and 10 percent slope an effective buffer strips would be: 5 m for bank stability, 10-30 m for sediment and soil bound nutrient removal, and 10-300 m for nesting waterfowl.

A riparian zone has no definite boundaries, but is the larger transitional area between water surfaces and uplands. It includes the area immediately adjacent to water bodies; it includes streambanks, plant and animal communities, and the floodplain.

General

- Long term wetlands provide the best protection and play an important role in managing both water quality and quantity. Wetlands collect surface water; prevent flood, store water and release water into streams as well as shallow aquifers. The vegetation and soils in wetlands can use excessive crop nutrients and assimilate bacteria and organic pollutants from farm runoff. Wetlands support an incredible number of plants, animals and fish. Land use around wetlands can be important as the wetland itself as many species use this adjacent area including nesting birds, frogs and salamanders. Although any buffer around wetlands is beneficial consider just keeping it a wetland – don't dump fill or debris, avoid damaging soils, waterways and vegetation, seek all approvals before manipulating water levels.

- Beaver dams create wetlands that generally retain sediments and phosphorous. The dams are not permanent and when breached especially with high flow volumes it flushes sediment into downstream rivers and lakes. Care must be exercised to not destroy wetlands and should be done with some selection where there is a downstream lake. Consideration must also be given endangered species habitat, to pond hibernating habitats (e.g. turtles freezing), and breeding habitats. At Bright Lake upstream cottagers on shallow bays are also impacted by beaver dam breaches at the lake outflow. Seek all

approvals before manipulating water levels. There is potentially significant legal liability to breaching beaver dams if you cause property damage to others.

- Have licenced trappers remove beavers and key dams only if necessary to protect human values and with proper planning and permits. Seek all approvals before manipulating water levels.

- The plan recommends consultation with government agencies and the Basswood Lake community to determine if letting more water out of Basswood Lake in late summer and early fall is possible and that any such efforts should be associated with Bright Lake monitoring looking for water quality improvement. The plan further recommends that this occur without manipulation of the Bright Lake outflow.

- Following the manipulation of late summer and early fall inflow changes if necessary a consultation with government agencies and the Bright Lake community might be held to determine if removing beaver impoundments at the Bolton River is possible and that any such efforts should be associated with Bright Lake monitoring looking for water quality improvement.

- CAFC is working on a Beaver Management Toolkit – with best practices for Central Algoma.

Waterfront Property / Recreation

- Maintain a minimum 30 m buffer along shorelines

- Surface runoff needs to be controlled to prevent erosion from roads and ditches

- Surface runoff needs to be controlled to prevent roads and ditches from discharging directly into the lakes

- Septic systems need to be properly maintained and installed a minimum of 30 m from shorelines and 15 m from wetland area or swales draining to the lake

- Waste water systems should be inspected and decommissioned if not working properly including trailers and accessory buildings such as saunas.

- On lakeshores as a general rule don’t make hard surface shorelines soft and don’t make soft shores hard.

- Prevent the removal of shoreline vegetation including trees, shrubs and wetland vegetation.

- Prevent the planting of invasive plant species.

- Fertilizer runoff from grassed areas of a lakeshore development can contribute significant amounts of nutrients especially if combined with irrigation. Reduce lawn cover and reintroduce natural vegetative cover.

- Restrict intensive recreational uses to appropriate areas (e.g. ATV's, boating). Keep ATV's from destroying vegetation, creating water crossings and causing excessive erosion.

- Encourage anglers to use access point toilet facilities.

Municipal

- Municipal ditches are often in flat areas and are grassed – because maintenance is required – trees may be considered for planting on one side to allow continued access for maintenance.

- Municipal ditches are best with a minimum 5 m grassed buffer

- Where possible clean ditches in the early part of the growing season so that grasses can re-establish.

Typical Trees Shade Ditch on One Side

Typical Sediment Control

- Municipal ditches when cleaning occurs establish silt barriers to prevent erosion and prevent sedimentation.

- Where tile drain enters a ditch ensure the energy of the moving water is dissipated where it drops into the ditch with materials such as silt barrier and rocks.

- That municipalities respond when residents raise concerns about the effects of development on water quality by updating Official Plan based on lakeshore capacity assessment that is scientifically established.

- That municipalities enforce water-related regulations and by-laws.

- That municipalities use the Lakeshore Capacity Assessment Handbook prepared by the Ministry of Environment – while municipalities are not required to carry out lakeshore capacity assessment, this planning tool is strongly recommended by the Ontario

government as an effective means of being consistent with the Planning Act, the Provincial Policy Statement (2005), the Ontario Water Resources Act and the federal Fisheries Act.

- That municipalities use the Lakeshore Capacity Assessment Handbook prepared by the Ministry of Environment as a basis for training resource managers in municipalities.

- That Official Plans specify a lake development policy – that development shall be determined by and be consistent with approved Lake Development Plans including capacity calculations using the Lakeshore Development Capacity Model or an alternative acceptable to the Ministry of Natural Resources and the Ministry of Environment

- That municipalities develop shoreline protection by-laws (see examples - appendix for Elliot Lake)

- That municipalities encourage cottage associations to join in the Ministry of Environment and Climate Change – Lake Partners Program to monitor lake phosphorous.

Agriculture

- The best management practice is to fence livestock out of stream beds and buffer zones.

- The best management practice for intensively pastured (feed imported) areas is to restrict access from riparian (seasonally flooded) areas. In most cases a permanent fence is best.

- Livestock holding areas with an increased density of deposited manure need to have runoff managed to reduce the risks to adjacent surface and ground water.

Typical Fenced Stream Buffer

- Soil management – healthy soils play an important role in water management. Healthy soils build resistance to erosive forces by adding organic matter, improving soil structure and increasing infiltration rates.

- Practice tillage conservation to control erosion by reducing the effects of slope and increasing the time period of soil cover. These can reduce wind and water erosion.

- Good knowledge of plant nutrient requirements and soil testing before fertilizing is effective in controlling nutrients in all areas but is of significant importance in areas with tile drainage

- Time of nutrient application to avoid to heavy rain events or placing nutrients on snow. If it is impossible to avoid winter nutrient spreading it should occur well away from water bodies and drainage areas on vegetated fields.

- Nutrient application at least 30 m from wells.

- Prevent application of nutrients on cropland adjacent to surface water unless there is a vegetated buffer strip with a minimum width of 3 m from the top of the bank.

- Prevent application of commercial fertilizer or agricultural source material (manure) within 13 m of surface water on bare soil unless it is incorporated into the soil within 24 hours.

- Prevent application of non-agricultural source materials (bio solids) within 20 m from the top of the nearest bank of surface water.

- Pesticide must be applied as directed. Prevent application within 15 m buffer strip between your treatment area and the top of the bank along a watercourse.

- Maintain greater than 150 m between nutrient (manure piles) and chemical storage and the nearest surface water.

- Wetland habitat drainage has resulted in habitat loss across Ontario. Any wetland drainage projects of a large wetland should undergo an environmental assessment.

- Buffers of 50 to 300 m at wetlands provide the best protection and play an important role in managing both water quality and quantity. Wetlands collect surface water; prevent flood, store water and release water into streams as well as shallow aquifers. The vegetation and soils in wetlands can use excessive crop nutrients and assimilate bacteria and organic pollutants from farm runoff. Wetlands support an incredible number of plants, animals and fish. Land use around wetlands can be important as the wetland itself as many species use this adjacent area including nesting birds, frogs and salamanders. Although any buffer around wetlands is beneficial consider just keeping it a wetland – don't dump fill or debris, avoid damaging soils, waterways and vegetation, seek all approvals before manipulating water levels.

10.0 CAFC's Role

Champion a Regional Approach for Continued Stewardship in Central Algoma

Short Term

- Become a forum where local stakeholders can come for support and guidance to carry out their stewardship initiatives.

Long Term

- Operate an office, meeting space and resource centre open to the public.
- Employ full time staff dedicated the Central Algoma Freshwater Coalitions Initiatives.

Develop Environmental Education and Public Awareness Campaigns

Short Term

- Maintain a website with quarterly newsletters, information resources, local environment scientific reports, and related links**.**

- Develop brochures on Septic Management, Agriculture, Nutrient loading, natural shoreline buffers and algae blooms – make the brochures available to community partners and at CAFC events.

- Develop videos on the Central Algoma Freshwater Coalition, Natural Shorelines, Agriculture Best Management Practices and Invasive Species Prevention.

- Develop four signs at access points to public lakes in Central Algoma – encouraging watershed stewardship.

CAFC – Healthy Habitats Sign

Long Term

- Provide 6 (bi-monthly) presentations reflecting the topic of environmental stewardship in the Central Algoma area.
- Develop a centre for Love Your Lakes shoreline assessment and educational stewardship program.

On-the–Ground Projects

- Provide a forum for groups to present their water quality concerns.
- Assist in developing project plans.
- Support and guide local stewardship initiatives

Administrative Role

- Assist partners in leveraging funds, resources and connections to allow partner projects to flourish.
- Provide coordination services for the project such as website maintenance, meeting facilitation, agenda and logistics development, tracking progress and supporting communications and networking.

Fundraising

- Work with a diversity of funding sources to secure funds for the start-up of the project.
- Work with partners to secure funds for local community projects.

11.0 Adaptive Management and Plan Review

Every 10 year review this plan to reflect management activities that have been implemented as well as changes in environmental conditions, scientific understanding or stakeholder priorities.

Evaluate new or changing threats

Celebrate successes.

Photo, Map & Diagram Credits

Figure 2 - Conservation Ontario (2013). What Is A Watershed,

Figure 4 – www.awsassets.wwf.ca/downloads/wwf_watershed_report_greatlakes_16072015.pdf

Watershed Map – Ontario Ministry of Natural Resources

All satellite Images - Google Earth – CAFC Water Sample Sites

All Photos CAFC Staff and Board Members

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The Corporation of the City of Elliot Lake, Official Plan (2006) and Shoreline Protection By-laws Consolidated Excerpt from Zoning By-law, By-law No.03-8 being a by-law to amend Zoning By-law No. 87-40 Elliot lake, Ontario www.cityofelliotlake.com/en/cityservices/zoningbylaws.asp

Appendix 1

THE CORPORATION OF THE CITY OF ELLIOT LAKE

Consolidated Excerpt from Zoning By-law

BY-LAW NO. 03-8

Being a by-law to amend the Zoning By-law of the Municipality No. 87-40.
(05-5; 05-63; 08-33)(09-81)(15-47, 15-59)

The Council of the Corporation of the City of Elliot Lake **ENACTS AS FOLLOWS :**

1. **THAT** By- law No. 87-40, as amended, is hereby further amended by adding to Section 4. **ZONES**, 4.1 Classification of Zones after Limited Services Residential "L" Zone, the following:

"Shoreline Residential	"RS" Zone
Rural Estate	"RE" Zone."

2. **THAT** By- law No. 87-40, as amended, is hereby further amended by adding to Section 5. **GENERAL REGULATIONS FOR ALL ZONES**, the following after 5.13:

"5.14 Water and Sewage Disposal Services-Municipal or on-site (private) services
No building permit shall be issued for any building or structure which requires municipal or on-site (private) sanitary sewage services unless the building permit application is accompanied by a Certificate of Approval issued under the Building Code Act or the lands are serviced with municipal water and sewer services, whichever is applicable for the proposed method of sewage disposal. The servicing of lands with municipal sewer and water services is intended to include lands for which the services have not been installed but which are subject to a valid subdivision or development agreement providing for such services. Wells (on-site water services) shall be constructed in accordance with the requirements of Ontario Regulation 903.

3. **THAT** By- law No. 87-40, as amended, is hereby further amended by adding to Section 20. **RURAL "A" ZONE**, Permitted Uses, after Horse stables and horse riding facilities the following:
"Public Boat Launch"

4. **THAT** By- law No. 87-40, as amended, is hereby further amended by adding thereto the following new section after section 21. **Rural "B" Zone**:

"Section 21.A **SHORELINE RESIDENTIAL "RS" ZONE**

Limited municipal service standards apply to this zone.

21A.1 Permitted Uses

No person shall use any land or erect or use any building or structure for any purpose except one (1) or more of the following uses:

Single Family Dwelling
Seasonal/Recreational Dwelling
Structures accessory to the above uses

Shoreline residential uses are permitted on the following lakes:

McCarthy Lake, Pecors Lake, Depot Lake, Marshland Lake, Popeye Lake, Trout Lake, Rossmere Lake, Grandeur Lake, Dunlop Lake and Quirke Lake.

21A.2 Requirements

Each lot may contain not more than one single family dwelling or seasonal/ recreational dwelling, but not both.

Lot area, minimum	0.4047 ha
Lot width, minimum	45 metres
Building line from the lot line adjoining a lake or river, minimum	20 metres from High Water Mark
Building line from street lot lines (non-waterfront properties)	12.0 metres
Building line from rear lot line	12.0 metres
Building line from another lot line, minimum	6 metres
Building height (main building), maximum	10.5 metres
Ground floor area of single family dwelling and Seasonal /Recreational dwelling on lots of .81 hectares or less, minimum	65 sq. metres,
Ground Floor Area of single family dwelling and Seasonal/Recreational dwelling on lots greater than .81 hectares, minimum	111.48 sq. metres

Despite the above, the minimum ground floor area dwelling size of 65 square metres applies to the following residential shoreline lots: Site 9, lot 7; Site 12, lot 13; Site 13, lots 1 and 12; Site 20, lot 13; Site 21, lot 34; Site 23, lots 2 and 10; Site 26, lots 17, 18, 19, 21, 23, and 30 and Lot 17, Plan 1M-581 on Popeye Lake.
(By-law No. 05-5; 06-63, 15-47)

Lot coverage, maximum	main building	10%
	accessory buildings	10%
	all buildings	15%

Balconies, canopies and unenclosed porches/decks may project beyond any building line adjoining a lake or river, a distance of not more than 5 metres including eaves, stairs or any part of the structure. For the purpose of allowable encroachments for accessory structures, lot coverage for the above structures shall not be included in the calculation.

The parking of not more than (1) one Commercial vehicle as defined under section 5.11.3 will be permitted.

Recreational vehicles used as seasonal dwellings on vacant lots are prohibited unless authorized by a Temporary Use By-law under section 39 of the Planning Act.

1) Requirements for Buffer Areas:

Each Lot shall have a buffer area in which:

a) no trees shall be removed;

b) no roots or root systems, herbs, grasses, or the duff layer shall be removed;

c) no lawn shall be established or maintained.

A Buffer Area shall be maintained around the perimeter of each lot, and having the following minimum depth:

Buffer Area:	NB All lands lying on the opposing side of the High Water Mark (ie. seasonally inundated shorelands and beds of water bodies) shall not be altered without the authority of the Crown.
Shoreline Buffer: From the lot line adjoining a lake or river, minimum	15 metres measured horizontally inland from the High Water Mark
Perimeter Buffer: From the rear lot line, minimum	10 metres

Perimeter Buffer: From any other lot line, minimum	5 metres (15-59)

2) EXCEPTIONS:

Prior to submission of a Lot Development Plan, exceptions (1) i) and ii) may be undertaken. The following exceptions are permitted within the required Buffer Area upon approval of a Lot Development Plan:

(1) Buffer Area Exception along the side or rear lot line	**i) Up to a maximum of** 9 metres width for driveway(s) may be permitted to cross or occupy the Buffer Area to provide vehicular and pedestrian access from the road onto the lot.
Water Access Only properties	ii) **Up to a maximum of** 4.5 metres width for access from the water may be permitted.
	iii) Encroachments may occur for an accessory building where the structure has a lesser setback than the required buffer.

(2) Shoreline Buffer Area Exception	The lands located in a shoreline buffer area shall be maintained in a natural state except for the following:
	i)Dead or decaying vegetation shall not be removed unless it poses a safety hazard. Dead or decaying standing trees that pose a risk to safety may be felled and left to decay on the forest floor on the subject property. Other dead or decaying vegetation may be relocated within the buffer area so that it no longer poses a safety risk.
	ii)maximum 2 metre wide pedestrian pathway from the dwelling to the shoreline
	iii)a maximum 4 metre wide utility access route including minimal removal of the duff layer for underground utility installations (may include hydro, cable, internet, natural gas, water). This area shall be restored immediately to original grade and native vegetation must be planted.
(3) In addition to the above exceptions:	Trees within the shoreline buffer area may be removed, as shown in a *Lot Development Plan* to alter the Buffer

	area or to allow construction of an accessory structure or building that is otherwise permitted within the required front yard as follows: i)a maximum of 20% of the trees within the Buffer Area may be removed; ii)the maximum width of disturbance within the Shoreline Buffer shall be a maximum of 10 metres width in total for road-access lots and 12.5 metres in total for water-access lots. iii)outside of the areas described in 2(2)ii, 2(2)iii and 2(3)(ii) above, shrubs will not be removed from the shoreline buffer but may be selectively pruned.

(08-33)(15-59)

Accessory Buildings

Detached Private Garage

Notwithstanding any other provision in this By-Law, one(1) detached private garage only may be erected per lot as follows:

- Building line from street lot line: same as main bldg.
- Building line from side lot line and rear lot line: 3 metres
- Building height, maximum: 6 metres and may contain intermediate floors
- Ground floor area, maximum: 111.5 sq. metres and not to exceed ground floor area of main building.

Sleep Cabin – Not more than (1) one cabin will be permitted per lot

- Floor area , maximum 25 sq metres
- Location, minimum behind main bldg.
- Building line from other lot line 3 metres
- Height, maximum 5 metres

Land-based Boat House (storage only)

- Distance from high water mark, minimum 3 metres
- Floor Area, maximum 25 sq. metres
- Height, Maximum 1storey
- Building line from other lot line, minimum 3 metres

Water-based Boat House (storage only)

- Subject to approval by the Ministry of Natural Resources
- Projection from private lot benefitting from the structure 3 metres
- Height, Maximum 1.5 storeys

- Building line from other lot line, minimum	6 metres

Gazebos, Saunas, Decks on Waterfront properties only

- Location	unrestricted
- Distance from high water mark	3 metres
- Building line from other lot line	6 metres
- Building height	1 storey

Other accessory buildings

- Building line from street lot line	same as main bldg
- Building line from other lot line	3 metres
- Building height	1 storey

21. A.3 Definitions

For the purposes of Section 21A, the following definitions shall apply:

Boat House: means a building or structure or part thereof, used for the storage, shelter of private boats, personal watercraft or other forms of water transportation and equipment accessory to their use, but shall not be used for human habitation nor be equipped with pressurized potable water or sanitary facilities.

Buffer Area: means a portion of a lot around the perimeter of the lot where existing vegetation is maintained or re-established in its natural predevelopment state, or native vegetation is planted for the purpose of protecting natural vegetation and minimizing the visual impact of any buildings or structures on the lot.

Buffer Area, Shoreline: means the portion of the Buffer Area adjacent to the High Water Mark.

Disturbance: means removal, damage or destruction in any way of trees and/or the placement of accessory buildings within the Buffer Area.

Duff Layer: means forest floor cover including organic matter on the forest floor such as leaves, needles, and mosses.

Grasses: means many species of grass such as quack grass, timothy and sedge.

Herbs: includes many species of weeds and flowers such as trillium, lily, cattail, buttercup.

Dwelling- Seasonal/Recreational: means a single detached dwelling containing one (1) dwelling unit constructed as a secondary place of residence and is not the principal place of residence of the owner or occupier thereof.

High Water Mark: means the mark made by the action of water under natural conditions on the shore or bank of a body of water, which action has been so common and usual and so long continued that it has created a difference between the character of the vegetation or soil on one side of the mark and the character of the vegetation or soil on the other side of the mark and as established by an Ontario Land Surveyor.

Lawn: means an area of cultivated grass or any area of mowed grass.

Lot Development Plan: means a Plan submitted in accordance with the Municipality's Site Plan Control By-law.

Lot Line, Street: means any lot line or high water mark that divides a lot from the street.

Public Boat Launch: means public land designated by the appropriate authority and developed and maintained by the authority as a public access to a navigable water body.

Shrubs: immature trees and/or low vegetation or bushes including but not limited to Dogwood, Cranberry, Alder, Elder, Willow, Blueberry, Labrador-Tea.

Sleep Cabin: means an accessory building or structure located on the same lot as the principal building or structure, the accessory use being for sleeping accommodations in which neither cooking or sanitary facilities or pressurized water shall be provided.

Street: means a public highway, or a private thoroughfare of not less than 15.24 metres in width, which affords a principal means of vehicular access to the abutting lots, or in the case of a water frontage lot, only the lake or river frontage is to be considered the street.

Tree: means a self supporting woody plant with a diameter of 10.2 cm (4") measured by caliper or more measured from outside the bark 1.4 m (4'7") above existing grade of the ground adjoining its base or where there are multiple stems on a tree, means the total of the diameters of the three largest stems measured approximately 1.4 m above existing grade.

5. **THAT** By- law No. 87-40, as amended, is hereby further amended by adding thereto the following new section after section 21.A **SHORELINE RESIDENTIAL "RS" ZONE**:

"Section 21.B **RURAL ESTATE "RE" ZONE**

Permitted uses

Any use permitted in the 21.A Shoreline Residential Zone subject to the requirements of such zone except that the **minimum lot size shall be 1 hectare**."

6. **THAT** Schedule "A" to By-law No. 87-40, as amended, is hereby further amended by deleting the Rural Zoning Map inset and replacing with the inset map showing the additional Residential Shoreline "RS" and "RE" Zone areas, attached hereto and forming part of this by-law.

7. **THAT** this by-law shall come into effect on the date it is passed by the Council of The Corporation of the City of Elliot Lake, subject to the applicable provisions of The Planning Act, 1994.

PASSED this 24th day of March, 2003.

Note: This document is a consolidation of the Shoreline Residential Zone requirements, an excerpt of the Municipality's Zoning By-law. The full document and Official Plan consolidation are available at the Office of the City Clerk, City of Elliot Lake, 45 Hillside Drive North, Elliot Lake, Ontario P5A 1X5.