Implications of the
Muskoka River Water Management Plan

Mary Lake

Appendices 1 - 7

Mary Lake Boathouse (circa 1945) @ 280.85 m. ASL – June 8, 2006
Structure in good repair, docks submerged by any wave action

Prepared for the
Mary Lake Association

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Table of Contents

Appendix 1 – Purpose and Study Methodology

PURPOSE OF STUDY

On April 1st 2006, the OMNR in conjunction with area hydro power-producers approved the Muskoka River Water Management Plan (MRWMP). The MRWMP has a ten-year term, and has established a new "rule curve" target for water levels in most of the lakes within the Muskoka River watershed.

In comparison to the "historic" rule curve by which Mary Lake had previously been managed under the Hackner Holden Agreement (HHA), the MRWMP has established the following general targets for Mary Lake:

- Higher targeted levels from early May to August 1st
- Lower levels from August to December 1st
- Higher levels from February 1st to mid April

Many of the waterfront property owners on Mary Lake are very concerned that the height and duration of the MRWMP's spring lake levels are negatively impacting both their unprotected shorelines and their built waterfront structures. In addition, the lower water levels in the late summer and early fall are creating drought conditions along some portions of the lake's shoreline, perching docks and creating access, navigation and dockage issues for boaters and residents.

French Planning Services was retained by the Mary Lake Association to review the Muskoka River Water Management Plan and to determine the effects of the new water management regime on Mary Lake especially related to erodable shorelines and the safe usability of shoreline infrastructure (docks and boathouses). The study concentrated on the following questions:

1. What portion of the shoreline of Mary Lake is "soft" and therefore susceptible to damage from high water?
   - What is the impact of high water on this "soft" shoreline?
   - What type(s) of water action damage occur on "soft" shoreline?
2. What wetlands areas exist in the Mary Lake basin and what impact does the new Plan water level targets have on these wetlands?
3. What is the maximum "sustainable" high water level for Mary Lake?
   - At what lake water level does the existing "soft" shoreline sustain damage from water action?
   - What is the maximum time duration that the "soft" shoreline of Mary Lake can tolerate lake levels above the sustainable level before incurring irreparable damage?
4. What is the impact of *both high and low water* on the built structures abutting Mary Lake?

- Inventory of the built structures on Mary Lake to establish:
  - The dock deck level of each structure – (expressed as height above sea level in meters, i.e. same scale as lake level measurements):
  - An analysis of the utility of all existing built structures *at the MRWMP Mary Lake Rule Curve targets of 281.00 on May 7th and 280.50 on Oct 9th; and*
  - The state of repair of existing structures.

Theses objectives were met through background research and consultation with lake association members, OMNR biologists and water resource technicians, as well as other local watershed managers, and from data collected on Mary Lake during our three-day shoreline field inventory.

METHODOLOGY - BACKGROUND RESEARCH

Prior to the field portion of this study a base map of Mary Lake was prepared using projected digital data (NAD 1983) collected from the Ministry of Natural Resource (OMNR) and information extracted from Ontario Geological Survey and Ontario Soil maps to identify the location of wetlands, streams, height of land (elevation contours), and areas with sand and gravel based soils, which have the potential of erosion (i.e., soft shorelines). The soft shoreline areas were geo-referenced in ArcView and shown in Map 3 (pg. 28). A base map and GPS unit was used in the field to verify location of wetlands, streams and soft shorelines, and to document information on shoreline infrastructure.

Further information pertaining to current and historical fisheries and water management data was collected from discussions with local experts (OMNR) and local residents and the review of Internet and published literature resources to provide scientific support for concerns about water levels on: the processes and impacts of erosion on lacustrine and riverine shorelines; annual water level fluctuations and management regimes for Mary Lake; and management and stewardship options to mitigate erosion. This information was used in collaboration with data collected in the field for further analyses and to formulate our recommendations.

METHODOLOGY - FIELD PROTOCOL

A three day inventory of the Mary Lake shoreline was conducted on October 30 and 31, and November 2, 2007 to verify the location of natural features and soft shorelines with the potential for erosion, as well as other areas of concern (i.e., areas with impacts from natural or human-made landscape alterations), and to inventory shoreline structures.

A Rapid Assessment Process (RAP) was implemented by boat of the entire shoreline, including islands. Portions of the Muskoka River and Lancelot Creek at their inflow to Mary Lake were also investigated. RAP is a quick but intensive collection and analysis of data to quickly develop a preliminary understanding of a situation from the insider's perspective (Source – Ramsar Wetland).

During the boat reconnaissance, qualitative and quantitative data were collected on the type of shoreline infrastructure present, dominant vegetation type, dominant substrate and/or

topographical features, presence/absence of human activities to manage erosion, evidence of natural and artificial processes encouraging erosion, major landmarks, access points, and location of reference stations and ground-truthing. The inventory excluded shoreline areas dominated by rockland (ELC – areas where more or less horizontal or rolling surfaces of bedrock are exposed or covered by thin soils) and rock cliffs, as well as cantilever and floating docks. Both the boat and the boat captain were provided by the Mary Lake Association (MLA).

Soft Shoreline Inventory – A preliminary ground survey was conducted along the shores of Mary Lake to determine the potential negative impacts from erosion; boat transects were conducted perpendicular to the shoreline, and walk-about transects were conducted only in areas with the highest potential or evidence of erosion.

From the walk-about, four control sites were chosen that best represented the two major soil conditions along Mary Lake's shoreline (i.e., low-profile, sand-based shorelines, and steep, clay-based shorelines), and the degree of exposure (weathering forces – fetch) influencing the soft shorelines on both the south-eastern and north-western shorelines of the lake. The location of the control sites is shown on Map 3. The following information was collected at each control site:

- Each monitoring station's location was geo-referenced using a GPS hand-held unit, and permanently marked using a stake. The GPS point was taken over the stake. The sampling was parallel to the stake. These control sites will enable monitoring of changes over time.
- The slope degree and aspect was calculated on site with a compass, and later converted to slope percent.
- A general description of the soil horizon was collected to determine soil-type.
- A general description of vegetative community was documented. Dominant vegetation type and species abundance is a good indicator of soil conditions. Growth pattern of tree species and topographical features were also documented. Topography and growth patterns are a good indication of microclimatic conditions, such as drainage and moisture patterns and processes. Vegetation is a stabilizing influence; the absence of vegetation means reduced soil stability.
- Evidence of ongoing erosion was identified, i.e., cracks and fissure; piles of debris at base (mass wasting); leaning trees or exposed roots; cracked foundations, retaining walls or pavement; and wave-cut notches (undercutting) at the base of slopes, evidence which helps to determine the nature and immediacy of the problem.
- Photo documentation of each site, including location and setting, showing permanent stake(s); examples of vegetation; extent and degree of erosion; extent of other disturbances; and presence of mitigation.
- An iron stake was driven into the substrate and a laser level placed on top at representational daily water levels, and directed towards the shore-bank. Where the laser-beam touched the shore a flag tape attached to a nail was placed into the bank. The laser was adjusted four times to represent the mean water levels for

the months of April, May, June, and July. The distance from the stake to each of these points was also documented.

  - High level - 281.1 m ASL (Above Sea Level)
  - May average level – 280.925 m ASL
  - June average level – 280.85 m ASL
  - July average level – 280.77 m ASL

- The information collected was transcribed into a Microsoft Excel spreadsheet and Access database. GPS points were incorporated into Map 3.

Shoreline Infrastructure Inventory

A preliminary boat survey was conducted along the shores of Mary Lake to verify location and type of shoreline infrastructure. Cantilever and floating docks were excluded from the survey; only in-water structures permanently fixed to the lake bed were documented. Boat transects were conducted perpendicular to the shoreline, and walk-about transects were conducted only in areas were accessibility was an issue.

The following information was collected for each structure:

- Each structure was geo-referenced using a GPS hand-held unit.
- The permanent, in-water structures were typed: boathouse, dock, boat port, etc.
- The structures were quantified and qualified by documenting any structural damage, construction material and ownership.
- Three measurements were taken in inches using a wooden stake marked in incremental units. The first measurement included the depth of water; in some instances the weather agitated the water levels too much and the measurements were averaged. The second measurement included the distance between the surface of the water and the stringer, and the third measurement represents the height of the dock.
- Photos were taken to document each infrastructure.
- The information collected in the field was transcribed into a Microsoft Excel spreadsheet and Access database. GPS points representing permanent shoreline structures were incorporated into Map 4 (pg. 36).
- The sum of permanent shoreline structures were calculated in Excel, and the percentile of each structure type and condition were also quantified. Calculations of structure height above or below the mean water levels for the new May, June, July, August and October water level regime was determined, and the percentage of structures submerged, 'wet' (portions of stringer below the surface water), or perched was calculated.

Appendix 2 – General Impacts of Water Level Fluctuations

During the planning process for the new MRWMP, Mary Lake residents expressed satisfaction with the existing water level regime under the Hackner Holder Agreement (HHA). After two years since the new MRWMP regime has been active, the waterfront property owners on Mary Lake are very concerned that the height and duration of the new MRWMP's spring lake levels are having a negative impact on unprotected shorelines and waterfront infrastructure, as well as the riparian community. In addition to the impacts of higher spring levels, the lower water levels during late summer and early fall from the new drawdown regime are creating concerns regarding access, navigation and dockage issues for residents and recreational boaters.

The issues on Mary Lake arise from a change in the water level management under the new MRWMP. These fluctuations are perceived to be accelerating shoreline erosion and negatively impacting private infrastructure – docks are submerged in the spring and perched in the fall. Our initial investigation included researching the general cause and impacts of fluctuating water levels.

The following provides background information on the accepted general impacts

Why do the Water Levels in Lakes Change?

Water levels are affected by many factors. Ontario lakes were created after the retreat of glacial ice caps over 10,000 years ago. Fluctuations in water levels have occurred in lakes since they were formed. Historically, Mary Lake may have looked vastly different than it does now. According to historical water management records, the first dam built in 1878 raised Mary Lake's water levels by 4 feet which would have flooded the shoreline and altered the water characteristics of the lake and the streams and rivers flowing into the lake.

Water level fluctuations are the result of several natural factors and in recent time have been increasingly influenced by human activities. The primary natural factors affecting lake levels include:

- precipitation on the lakes (rain and snowmelt);
- run-off from the drainage basin;
- evaporation from the lake surface (drought);
- inflow from upstream lakes; and
- outflow to downstream lakes.

Human factors that also affect the water levels include:

- diversions into or out of the drainage basin;
- consumption of water;
- dredging of outlet channels;
- the regulation of lake inflows and outflows;
- removal of shoreline vegetation; and
- the operation of dams.

Water levels fluctuate differently on each lake according to the character of the lake and the management regime. For example lakes that are managed to provide increased water

flow for downstream sources such as to improve navigation or provide for the generation of power may have water levels that fluctuate significantly (e.g. Kawagama Lake).

What Happens when Water Levels Change?

Changes in water level regimes can cause increased erosion, damage to shoreline infrastructure, and reduce navigability.

Fluctuations in water levels cause erosion and sedimentation, which may damage property and upland vegetation, and can wash contaminants into lakes and rivers. Wells and septic systems may develop problems when water levels change. Erosion is predominantly a natural weathering process which occurs everywhere; it is how soil is created. The impacts of erosion on a lake, however, is dependent upon a variety of environmental influences such as topography, soil composition, climate, fetch, the intensity and duration of storm events, groundwater seepage, surface drainage, land-use activities, and water management. The magnitude and relative importance of these factors differs for various stretches of the Mary Lake's shoreline because of the variability of these environmental factors. Different lake levels result in different erosion rates.

High Water Level Impacts

- During high lake levels, energy from breaking waves is dissipated directly on the bluff or beach leading to erosion or retreat of the shoreline through undercutting and mass wasting of shoreline banks. Water breaks weak soil bonds, especially those shorelines with 'soft' bank substrate of sand or gravel, which removes shoreline soil from the base of slopes or slowly dissolves bank faces. Undercutting reduces the stability of slopes, encouraging mass wasting of soil from the upper layers or warping of shoreline structures rendering them unsafe for human use.
- High lake levels accelerate the shoreline's natural recession rates above the long term average or background erosion rate.
- Flooding flushes nutrients, pollutants and sediment into the lake and streams. An influx of nutrients and flooded land is advantageous for revitalizing vegetation along the shoreline and in wetlands, and creating spawning, nursing and feeding habitats for some fish species. Sedimentation and pollution, however, may reduce water clarity and quality and negatively impact dissolved oxygen levels and lake trout spawning habitats.
- Shoreline structure damage through prolonged submerging of decks and stringers, and wave and ice damage.

Low Water Level Impacts

- A decrease in water level exposes areas of new shoreline to wave action. Waves, during times of low water levels, dissipate their energy on the lakebed causing undercutting or deepening of the lakebed along the shoreline, which suspends sand and other particles into the water column.
- Low water levels leave many docks and other shoreline structures exposed or perched, forcing property owners to extend docks further out which may impact views and near shore recreational use.

- Exposed infrastructure which are normally below water, are subjected to wave, wind and ice damage, as well as deterioration from ultraviolet exposure. Wind and waves can topple exposed cribs, push concrete piers onshore, and warp pilings. Most shoreline infrastructure that exists on Mary Lake is built to reflect the water level regime that has existed throughout the Hackner Holden Agreement since 1940.
- Low lake levels at the end of summer expose the shoreline and wetland vegetation and lakebeds to drying conditions and which accelerates decomposition. Decomposing vegetation increases the nutrient influx to the lake, which may negatively impact cold water fish habitat, especially after fall turnover which mixes settled nutrients in the sediment and releases a new influx of nutrients.

The direct and indirect impacts of high and low water levels are shown and described in Table 1.

Table 1 – Issues Related to High and Low Water Levels

	Type of Issue	Issue Description
High Water Levels	**Public Safety**	Threats to public safety occur when water levels exceed the height of the dock and make it unsafe to use.
	Infrastructure Damage	Immersion - Damage to infrastructure occurs when water levels exceed the height of the bottom of the dock/boathouse stringers resulting in prolonged immersion. Wave and Ice Damage - Damage from waves can occur all year round during strong wind events. Damage from ice can occur when water levels during ice cover are raised, causing ice to lift the structure off its foundation or during storm events that cause the movement of ice against structures or shorelines.
	Shoreline Erosion	Increased erosion of 'soft' shorelines is accelerated when water levels constantly exceed past normal water levels. Erosion can also occur during low water levels.
Low Water Levels	**Access**	Access to shoreline structures is negatively affected when the draught is less than a preferred minimum depth of 0.75 m (30")
	Mooring	The mooring of boats to docks and boathouses or on separate moorings is negatively affected when the draught is less than a preferred minimum depth of 0.75 m (30")
	Navigation	Navigation of commercial and recreational boats is negatively affected when the draught is less than a minimum preferred depth of 1 m (39").

Water Levels and Ice Damage

When lake water freezes, it forms an "ice ridge" along the shoreline, and ice heaving or pushing, which can be more pronounced in years of insignificant snow cover, can cause significant damage to retaining walls, docks and other shoreline structures, as well as soil, banks and shoreline vegetation. During the winter and spring, water level fluctuations can raise and lower the ice cover which can result in lifting, pushing or scouring infrastructure and unprotected shorelines.

- In some cases, where winter water levels are higher, ice may form under decking, heaving it out of water.
- During ice melt and spring freshet, and strong winds ice can become jammed along shorelines and permanent structures can be damaged. Ice can also scour exposed lake bed and shorelines accelerating erosion. Increasing thaw and freeze episodes may have adverse effects on water temperature, incubating eggs and hibernating animals, the initiation of spring turnover, and the duration of the growing season.

Water Levels and Erosion

Erosion is a natural process that occurs at all water levels, high and low. Prolonged high water levels can accelerate shoreline erosion and storm events can lead to episodic and severe erosion. During high lake levels, energy from breaking waves is dissipated directly on the bluff or beach leading to increased toe erosion and retreat of the shoreline through undercutting and mass wasting of shoreline banks. High lake levels, especially for sustained periods, can accelerate the shoreline's natural recession rates above the long term average or background erosion rate.

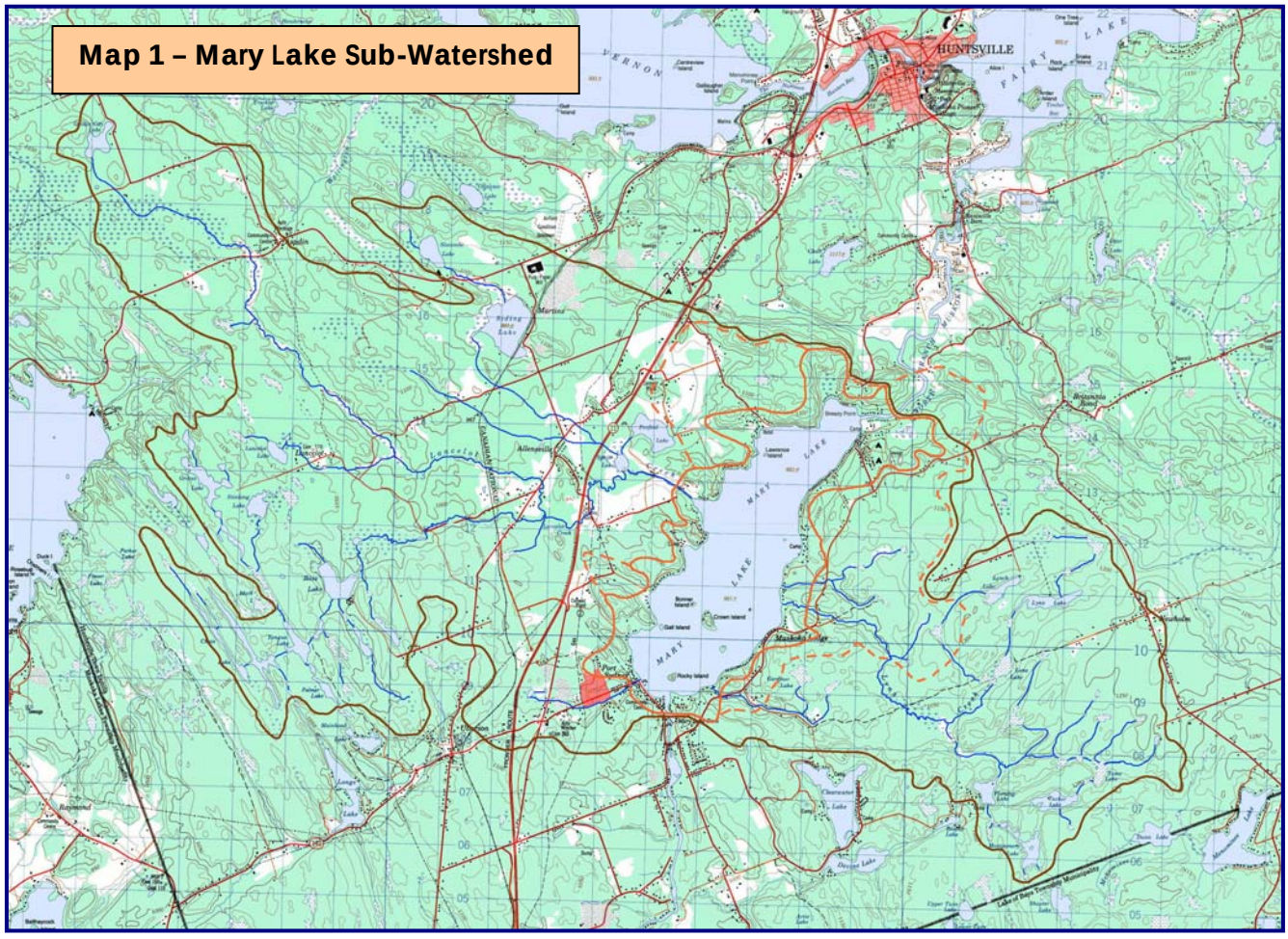
Water breaks weak soil bonds, especially those shorelines with 'soft' bank substrate of sand or gravel. Undercutting reduces the stability of slopes, encouraging mass wasting of soil from the upper layers or warping of shoreline structures rendering them unsafe for human use.

The causes of shoreline erosion are not restricted to water-based influences like waves and surge, but can also be affected by the adjacent land use (e.g. removal of vegetation or over watering). Human-made shoreline protection structures erected to prevent erosion along one stretch of shoreline can exacerbate the erosion problem on adjacent sections of shoreline.

Appendix 3 – Mary Lake Sub-Watershed
Past & Current Water Management Practices

MARY LAKE SUB-WATERSHED WATERSHED

Mary Lake is a sub-watershed of the Muskoka River Watershed (Map 1), encompassing 665.82 sq km of the North Branch area of the Muskoka River. Mary Lake receives water from its headwater lakes, which include Lake Vernon and Round, Buck, Fox and Fairy Lakes (Figure 1). Mary Lake itself can be classified as a riverine lake, indicating that the lake's characteristic features are influenced by the continuous movement of water, nutrients and finely eroded material from the inflow to the outflow of the river channel, which are controlled by dams up and downstream from the lake.



Map 1 – Mary Lake Sub-Watershed

The maximum depth of Mary Lake is 60 metres and its entire shoreline, including islands is 23.39 km.

WATER MANAGEMENT ON MARY LAKE

Figure 1 indicates the lakes and dams that are located upstream of Mary Lake. Dams control and maintain water levels on the lakes and river reaches during moderate flow periods, and attempt to reduce the effects of flood events by storing and redistributing water throughout the basin during high flow periods (Muskoka River MP, 2003 Exec Summary). Most regulated lakes in the watershed are drawn down during the fall and winter to provide additional storage capacity for the snowmelt and spring rains. However, even with this drawdown, most lakes do not have the capacity to store more than a small portion of the spring runoff, so the extra flow must be passed downstream through the dam. Removing stop logs during fall and early winter ensures that there is adequate capacity to pass spring flows through the structure.

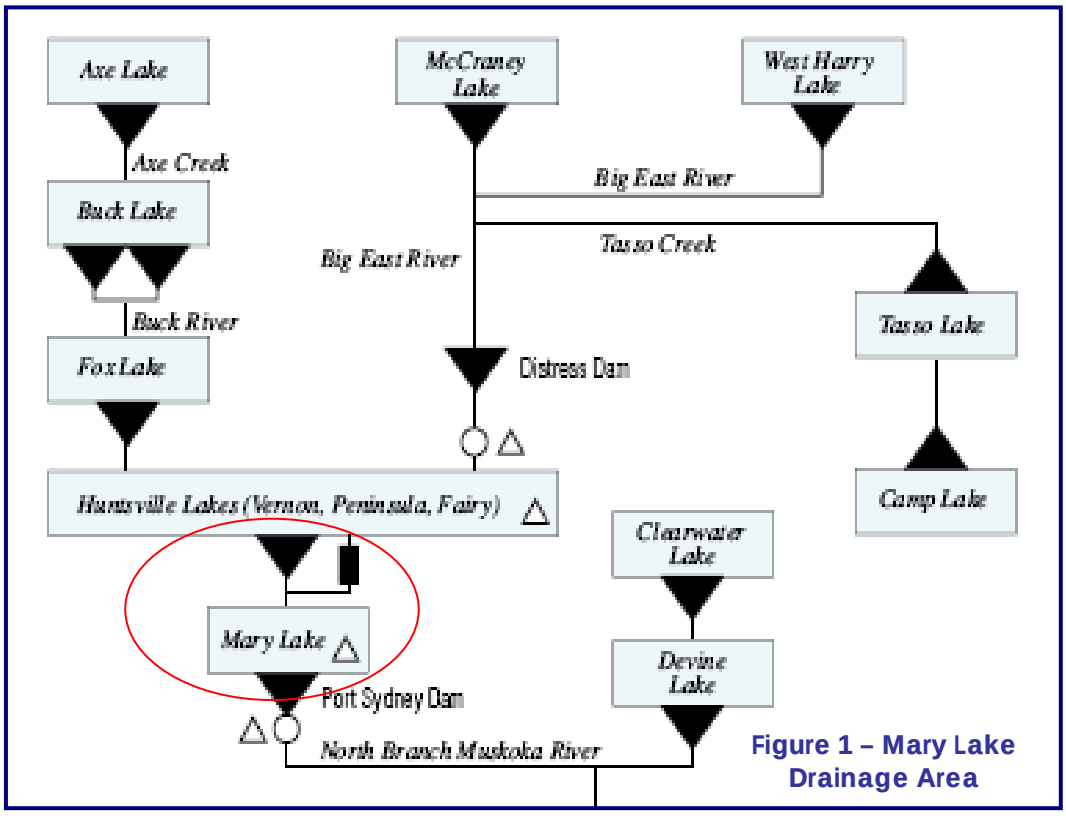


Figure 1 – Mary Lake Drainage Area

Over the past 130 years, Mary Lake has undergone four significant water level changes:

- 1878 – The first dam was constructed which raised the lake level by approximately 1.22m (4 ft);
- 1940 – The Hackner Holden Agreement was signed to aid the management of water for water power generation and navigation;
- 1969 – The Hackner Holden Agreement was amended to revise the drawdown limits on most lake trout lakes to encourage propagation; and
- 2006 – The MRWMP generally raised the water levels from the spring freshet to August 1 and generally lowered water levels until December 1st.

Hacker Holden Agreement (1940, 1969)

Many Muskoka Lakes (including Mary Lake) became regulated by the Hackner Holden Agreement in 1940. Under this agreement, water management was primarily focused on regulating lake levels for hydro production. In 1969, the HHA was amended to incorporate the needs of recreational users, fisheries and flood control by establishing the "rule curves" for the main storage lakes within the system.

The 1969 addendum revised the drawdown limits on some lakes and established fall and winter drawdown limits in most of the lake trout lakes to encourage lake trout propagation. A number of other water management goals (i.e., to enhance fish spawning opportunities in specific river reaches) were also integrated into the operational procedures over the years to create a more ecosystem-based approach to water management within the Muskoka River system. When the OMNR assumed responsibility for the majority of the control structures in the mid-1970's, including the dam on Mary Lake, they continued to strive for operational improvements in a manner that recognized the different and changing needs and uses of the waterway (e.g., fish and wildlife, navigation, electric power generation, recreation, flood control) while still respecting the terms and conditions of the Hackner-Holden agreement.

Over the 66 years of the HHA Mary Lake residents became accustomed to the annual water levels and accordingly constructed shoreline structures (docks and boathouses) within those expected seasonal levels and fluctuations.

Muskoka River Watershed Management Plan

On April 1st 2006 the OMNR in conjunction with area hydro power producers approved the new Muskoka River Water Management Plan (MRWMP). The MRWMP established a new "rule curve" target for most lakes in the Muskoka River watershed to establish target, normal and high and low water operating levels (MRWMP pg. 5). Table 2 (from Table 11.2.7, of the MRWMP) provides a comparison of the water level targets with comments on the effect of the proposed plan. Table 3 is an extract of this information to provide a comparison of water level targets for both the Hackner Holden Agreement and the new water regime under the MRWMP.

The new MRWMP has established higher targeted water levels from early May to August 1st, lower water levels from August to December 1st, and higher levels from February 1st to mid April on Mary Lake. The consistent and gradual release of water in the river is intended to mimic the "run of the river" (a natural base flow) to preserve ecological integrity in the entire river watershed, and provide additional storage capacity during spring freshet.

According to Table 2, the difference in operating levels between the amended Hackner Holden Agreement and the approved plan are as follows:

1. NOZ (Normal Operation Zone) remained the same throughout all seasons
2. TOL (Target Operating Level) has changed
   - Spring Freshet – 12 cm higher and 10 days later

Table 2 – Mary Lake Present and Proposed Water Levels (Table 11.2.7, MRWMP)

Component	Operating Characteristics	Present Plan	Proposed Plan	Comments
Spring Water Level (freshet to May 30)	Upper NOZ (m) Lower NOZ (m) TOL (m) Peak Date* TOL Change WL Direction	281.1 - 281.0 280.03 - 280.6 280.88 – 280.73 April 26 0.15 Down	281.1 - 281.0 280.03 - 280.6 281.0 – 280.9 May 6 0.1 Down	Same NOZ, but slightly higher (12 cm) spring peak and early summer level with a gradual decline during the summer to a 0.08 cm (3") lower September 15 level.
Summer Water Level (June 1 to Sept 15)	Upper NOZ (m) Lower NOZ (m) TOL (m) TOL Change WL Direction	281.0 – 280.88 280.6 – 280.55 280.73 0 -	281.0 – 280.88 280.6 – 280.55 280.9 – 280.65 0.25 Down, over summer	
Fall Water Level (Sept 16 to Nov 30)	Upper NOZ (m) Lower NOZ (m) TOL (m) TOL Change (m) WL Direction	280.88 – 280.79 280.55 – 280.45 280.73 – 280.51 0.22 Down, Sept 15 to Oct 15, followed by natural rise to 280.67 by Dec 1.	280.88 – 280.79 280.55 – 280.45 280.65 – 280.45 0.2 Down, Sept 15 to Oct 15, followed by natural rise to 280.67 by Dec 1.	Slightly more fall drawdown (0.06 m) during fall spawning to protect lake trout habitat.
Winter Water Level (Dec 1 to March 15)	Upper NOZ (m) Lower NOZ (m) TOL (m) TOL Change (m) WL Direction	280.79 – 280.39 280.51 – 280.03 280.67 – 280.06 0.61 Down, Jan 15 to March 15	280.79 – 280.39 280.51 – 280.03 280.67 – 280.3 0.37 Down, Jan 15 to March 15	Less winter drawdown to reduce fall/winter water level differential (from 0.45 m to 0.15 m) to protect incubating lake trout eggs at spawning shoals.
Downstream River Reach and Lake Outflow Characteristics	Planned flow release Median Wkly Flow -Summer -Winter Minimum Daily Flow (7-d average) Maximum Daily Flow (50 yr average) 7Q2 (2 yr min) 7Q10 (10 yr min)	3 m^3/s, summer 11 m^3/s, winter 14.92 m^3/s 20.47 m^3/s 5.61 m^3/s 136.55 m^3/s 4.91 m^3/s 3.0 m^3/s	3 m^3/s, year round 11 m^3/s, winter 13.57 m^3/s 17.77 m^3/s 5.89 m^3/s 140.55 m^3/s 5.09 m^3/s 3.0 m^3/s	Consistent summer, fall and winter minimum flow to maintain social and ecological habitat values in North Branch leading into Mary Lake.

- Spring/Summer - Constantly higher levels throughout May, June and July.
- Mid Summer (Aug 1) – Target level for August 1st is the same level as that held from June 1st to September 15th under the amended HHA. Aug 1 marks the transition point from higher to lower water levels (in comparison to previous years).
- Late Summer (Aug 2 to Sept 15) – Lower levels starting Aug 1 to Sept 15. Sept 15 is 8 cm (3") lower.
- Fall - Slightly more fall drawdown on Oct 15 (6 cm (2.36 ') for lake trout habitat
- Winter - Less winter drawdown to reduce fall/winter water level differential (from 45 cm to 15 cm) to protect incubating lake trout eggs at spawning shoals.
- Down stream minimum flow to be consistent through summer, fall and winter to maintain social and ecological habitat values in North Branch leading into Mary Lake.

The general effect of the new regime is higher levels sustained longer in the spring to Aug 1; and lower levels following Aug 1 to December 1 15. As well, it has extended the duration of high water from 31 days under the HHA to 87 days under the new plan.

Table 3 – Water Level Targets under the HHA and MRWMP

			CHANGE*	
Date	**Historic Target (HHA)**	**MRWMP Target**	**Cm**	**Inches**
Jan-01	280.67	280.67	0.0	0.0
Jan-20	280.67	280.67	0.0	0.0
Feb-01	280.5	280.57	7.0	2.8
Feb-15	280.35	280.48	13.0	5.1
Mar-01	280.22	280.39	17.0	6.7
Mar-15	280.07	280.3	23.0	9.1
Apr-01	280.07	280.3	23.0	9.1
Apr-15	280.47	280.3	-17.0	-6.7
May-01	280.87	280.83	-4.0	-1.6
May-06	**280.85**	**281**	**15.0**	**5.9**
May-15	**280.81**	**280.97**	**16.0**	**6.3**
Jun-01	**280.73**	**280.9**	**17.0**	**6.7**
Jun-15	**280.73**	**280.86**	**13.0**	**5.1**
Jul-01	**280.73**	**280.8**	**7.0**	**2.8**
Jul-15	**280.73**	**280.78**	**5.0**	**2.0**
Aug-01	**280.73**	**280.73**	**0.0**	**0.0**
Aug-15	**280.73**	**280.71**	**-2.0**	**-0.8**
Sep-01	**280.73**	**280.68**	**-5.0**	**-2.0**
Sep-15	**280.73**	**280.66**	**-7.0**	**-2.8**
Oct-01	280.62	280.55	-7.0	-2.8
Oct-15	280.5	280.46	-4.0	-1.6
Nov-01	280.57	280.53	-4.0	-1.6
Nov-15	280.62	280.6	-2.0	-0.8
Dec-01	280.67	280.67	0.0	0.0
Dec-15	280.67	280.67	0.0	0.0

*Note - Highlighted indicates Navigation Season, p*ositive change indicates an increase and a negative change indicates a decrease in the level of Mary Lake and in both cases the Changes is relative to the "Historic Target" Level.

Following the approval of the MRWMP, the Standing Advisory Committee (SAC) made a decision (June 7, 2007) to apply a Best Management Practice (BMP) to lower the high targeted spring level on May 3 from 281.00 to 280.95, in effect lowering the high targeted spring level by 5 cm (1.97 inches). The May 3rd level is still 10 cm (3.94 inches) above past levels under the Hackner Holden Agreement. This BMP resulted in slightly lower water levels from May 5 to June 20, as shown on Table 4, but did not adjust the water levels for the rest of the summer or fall season.

Table 4 – Best Management Practice
Recommended and Approved Changes (2007)

	McMullen	Cm	Inches	SAC June 7 Letter	Cm	Inches
3-May	280.90	10.00	3.94	280.95	5.00	1.97
				280.93	4.00	1.57
				280.89	1.00	0.39
20-Jun	280.80	4.50	1.77	280.86	0.00	0.00
5-Jul	280.78	1.20	0.47			

Why New Water Levels?

The MRWMP rationalizes that:

1. Less differential water levels between fall and winter drawdown will increase the amount of available aquatic habitat and protect incubating lake trout eggs.
2. The higher spring levels will improve ecological conditions for wetlands and spring spawning fish species (northern pike and walleye).
3. The new regime will also maintain and/or improve access to and continued enjoyment of lake-based shoreline recreational structures.

These management goals are not lake-specific but watershed-based, which means that some of these management goals will not apply to all lakes, and that some lakes will benefit from these changes while others may be negatively impacted.

On the other hand, Mary Lake's water levels have been subject to human management for the past 130 years, and the Hackner Holden Agreement has managed to establish a steady state within the lake for the past 66 years, including a species adaptation and an erosion rate. Changes to water levels alter the equilibrium of the lake, which may take years, if not decades, to re-establish. Humans, like all species, have adapted to their habitats according to the lake's characteristics and have made a substantial investment in docks, boathouses and shoreline protection works in accordance with a management regime for the past 7 decades.

Appendix 4 – Review of Muskoka River Water Management Plan

A review of the MRWMP was necessary to understand the planning process, the decision making criteria (goals, objectives and issues) for changing the 'rule curve' on many Muskoka Lakes. A complete copy of the MRWMP is on the CD in the envelope at the back of this report.

WATER MANAGEMENT GOAL AND RATIONALE

The goal of water management "is to contribute to the environmental, social and economic well being of the people of Ontario through the sustainable development of waterpower resources and to manage these resources in an ecologically sustainable way for the benefit of present and future generations" (pg. 2-3, MRWMP 2006).

One of the selected Ecological Objectives that supports this goal is through the implementation a 'natural flow regime' (Section 9, pg 9.2, MRWMP). This approach allows for a 'reasonable amount of annual and inter-annual variability in lake levels' (pg. 9.3, MRWMP) to reflect natural conditions. The new "rule curve" would allow spring levels to rise 30-50 cm above the level of established shoreline vegetation to allow for:

- Recharging of groundwater supplies:
- Inundation of wetlands and shoreline vegetation and associated transfer of flood water nutrients to these areas: and
- Provision of access to spawning grounds and flooded shoreline vegetation for spring spawning species.

The intent was to simulate the storage and release of water in a multipurpose, multi-reservoir/lake system. While this is a good management regime on some lakes to protect the ecological functions in low-lying areas that are not receiving adequate recharge, it is not appropriate for all lakes, especially if there is not a definable positive environmental benefit that overrides the additional cost to the social and economic well being of people. A discussion on the effect of the water management regime on lake trout, wetlands and riparian areas and infrastructure is found further in this section.

MRWMP PRINCIPLES

The MRWMP followed the Ontario Ministry of Natural Resources (OMNR) Water Management Planning Guidelines for Waterpower (May 14, 2002), adopting the following "Guiding Principles" (page 2-4, MRWMP) for the "preparation, review, approval, and implementation" of water management plans in the Muskoka River watershed. The following are the approved principles of the MRWMP:

1. Maximum Net Benefit to Society: "Water management plans should strive to maximize the net environmental, social and economic benefits derived from the management of water levels and flows by waterpower facilities and other water control structures on a river."

2. Riverine Ecosystem Sustainability: "At a minimum, the water management plan should stop any on going degradation of a riverine ecosystem and seek to improve and, where possible, restore riverine ecosystems."
3. Planning Based on Best Available Information: "The best available information at the time of decision making must be used in water management planning. A key task in the planning process is to collate all existing baseline data and identify data gaps (this task was undertaken in A&A 2003a, Background Information Report)."
4. Thorough Assessment of Options: "A thorough assessment of options for management of water flows and levels in a river system must be undertaken in an open and participatory way (this is explained in detail in Acres, 2004a Options Report)."
5. Adaptive Management: "Changing the operation of water control facilities may affect complex ecological processes and interaction. These effects can be estimated but the actual degree of impact is not necessarily known. Adaptive management is a long-term process which allows for adjustments to the system on a continual basis to obtain improvements to resource management and limit failures. Monitoring of the system is essential to ensure that the anticipated effects of changes to flows and levels are realized. Information from the monitoring program will be used to determine whether further refinements to the plan are required."
6. Timely Implementation of Study Findings: "If study findings arise after the water management plan has been approved that are likely to improve social, environmental or economic benefits without having adverse impacts, they should be implemented in a timely manner."
7. Aboriginal and Treaty Rights, and Public Participation: "Water management planning will be undertaken without prejudice to the rights of Aboriginal people."
8. Public Participation: Public participation is required to ensure accountability and transparency in the planning process.

There are three key principles that must be reconsidered in light of the recommendations of this study:

- Adaptive Management, which enables a WMP to change management strategies as new information is made available;
- the Maximum Net Benefit to Society, finding the right balance between environmental, social and economic benefits; and
- Timely Implementation of Study Findings.

Adaptive Management – Adaptive Management means that the MRWMP management practices are based on the best available information and that management practices will be adapted as new information is collected. Therefore, adaptive management encourages the addition of new information and altering past management decisions if warranted.

The MRWMP indicates that it will "utilize, as a guiding principle, adaptive management to obtain incremental improvements over time" (p 2-9, MRWMP). Due to the likelihood that not all issues and concerns were addressed during the preparation of the plan, ongoing monitoring and data collection programs are to be utilized to verify that changes implemented are appropriate and effective in meeting the MRWMP objectives. Adaptive management will, in effect, implement an "effectiveness monitoring program" during the plan's term to compare post-implementation lake levels with pre-MRWMP levels. However, to date, the analyses have not been initiated and

will occur only twice (2009 and 2014) during the ten year planning term to compare data collected from 2006-2008 and 2009-2013 with pre-plan data.

Maximum Net Benefit to Society – "Water management plans should strive to maximize the net environmental, social and economic benefits derived from the management of water levels and flows by waterpower facilities and other water control structures on a river." Maximizing the net environmental, social and economic benefits requires an assessment of the effect of altering water levels and implementing a balance to ensure that one action, for example to improve environment quality, does not affect other social and economics factors. If altering the management of water levels does not significantly improve the benefit to all sectors, then new approaches must be considered. In the case of Mary Lake the hypothesis that the increased water levels in the spring and early summer significantly benefits the environment (wetlands, fish and riparian areas) has resulted in impacts on the use and integrity of shoreline infrastructure, increased the potential for erosion to accelerate and negatively affected access to docks and boathouses.

Timely Implementation of Study Findings – "If study findings arise after the water management plan has been approved that are likely to improve social, environmental or economic benefits without having adverse impacts, they should be implemented in a timely manner." (pg. 2-5MRWMP) New information is available from this study and from 2 OMNR reconnaissance inspections of wetlands and fish habitat (2007) that must be considered in a timely manner.

Observations:

- *Revisiting and revising the water level regime for Mary Lake to seek a better balance between environmental, social and economic benefits is essential based on three key principles inherit in water management planning processes*

PUBLIC PARTICIPATION

The MRWMP promotes "effective communication with, and education of, the public", however, in hindsight local residents are now concerned that there was a lack of awareness building during the preparation of the plan regarding several management issues on the lake including fisheries, wetlands, competing interests for base river flow vs. lake water levels and assessment of erosion impacts.

During the MRWMP planning process 5 Mary Lake residents expressed satisfaction with the existing water level regime under the Hackner Holder Agreement (HHA). Table 5 – Public Perception – Effectiveness of Water Management (Table 7, MRWMP, Appendix D) indicates that people were happy (i.e. adequate, good or excellent) with the effectiveness of the current water management approach (under the HHA). This may have been misinterpreted to mean that the Association was satisfied with the new regime.

Table 5 – Public Perception – Effectiveness of Water Management

Table 7
Public Perception of Current Water Management Effectiveness
Phase 1

River Reach/Lake	Rating								Total
	Excellent		Good		Adequate		Poor		
	#	%	#	%	#	%	#	%	
General					4	67	2	33	6
North Branch									
General			3	5	2	33	1	17	6
Big East River					1	100			1
Fox Lake					1	50	1	50	2
Lake Vernon							1	100	1
Peninsula Lake					1	100			1
Fairy Lake							2	100	2
Mary Lake	2	40	2	40	1	20			5
Subtotal	**2**	**11**	**5**	**28**	**6**	**33**	**5**	**28**	**18**

Table 6 summarizes the survey comments received from Mary Lake residents and the Association during Phase 1 of the planning process (2003), before the new regime was in effect.

Table 6 – Summary of Public Comments – Phase 1

River Reach/ Lake System	Issues/Comments	Number of Comments	Resolution of Issue by Preliminary Preferred WMP Strategy*1
Mary Lake	Satisfied with current management	1	Noted
	Water level fluctuation and impact on docks (i.e., water level too high or too low)	3	Number of high water exceedances will decrease, however, summer seasonal 80th percentile range will increase by 0.14m and median daily level range will increase by 0.19m
	Water pollution	3	Higher early summer flows and levels will provide greater assimilation
	Low water impacting fish and wildlife habitat, recreation, docks	1	Lake levels improved for aquatic habitat
Mary Lake to High Falls	Water levels fluctuate 5-6" affecting shoreline erosion, fish and wildlife, water quality and aesthetics	2	More consistent summer flows to be targeted.
	Poor water quality in river	2	Slightly higher base flow to improve river reaches.
	Low water levels	1	Slightly higher base flow to improve river reaches

Only one person noted that they were satisfied with current management (under the HHA) and 3 comments were received regarding concerns about water level fluctuation and impacts on docks. The response given to these concerns was the "number of exceedances will decrease, however the summer seasonal 80th percentile range will increase by 0.14 m and median daily level range will increase by 0.19 m" and "more consistent water flows to be targeted". The comments were described in a manner that did not explain the true effect of the recommended change in water levels.

Near the end of the planning process comments on the draft plan were reviewed and noted. Table 7 indicates that a comment was received by OMNR from the Mary Lake Association on October 14, 2005. The comment "noted very little change in water levels from May to October and no change to the NOZ, therefore no concerns with this proposal. "

Table 7 – Draft Plan Comments, Consultation Period September 7-October 7, 2005 (Table 9.1, MRWMP)

Date	Name	Comments
October 14, 2005	Mary Lake Association	• Noted very little change in water levels from May to October and no change to the NOZ, therefore, no concerns with this proposal

A complete copy of this email is provided on page 125 of Appendix D of the MRWMP and it states:

> "I have reviewed the Draft Plan as you requested (at least the section pertaining to Mary Lake). I also visited with Kim Benner at the OMNR office at High Falls to talk to her about the Draft Plan and to ask what effect the plan would have on the water levels of Mary Lake during the May to October period. I came away from our meeting feeling there would be very little change during this period. There will be no change to the NOZ (see attached pdf) with a gradual decline in water levels over the summer season, all within the NOZ. If you have any questions or comments, please call or email me, Regards , Doug Johnson."

This email was addressed to Jane Earthy (MLA President, 2006) and copied to Kim Benner on behalf of Doug Johnson, a resident of Mary Lake and member of the Mary Lake Association. The email did not indicate that it was provided on behalf of the Mary Lake Association, nor is the comment currently supported by the Mary Lake Association. The comments on the letter indicated that "I came away from our meeting feeling there would be very little change during this period" (May to October). The understanding at that time was that if the new MRWMP would sustain "very little change in water levels from May to October, including no change to the noz" as it was intended to do, then there would be no concerns with the proposed plan. However, according to Table 2 and 3, water levels have increased as much as 17 cm in May and decreased as low as 7 cm in August.

The waterfront property owners on Mary Lake have two years experience with the new water level regime and are concerned that the height and duration of the new MRWMP's spring lake levels are having a negative impact on unprotected shorelines and waterfront infrastructure, as

well as the riparian community. In addition to the impacts of higher spring levels, the lower water levels during late summer and early fall from the new drawdown regime are creating concerns regarding access, navigation and dockage issues for residents and recreational boaters.

Observations:

- *Comments expressing satisfaction with water levels under the HHA may have been misinterpreted to mean satisfaction with the new management regime;*
- *Comments regarding the impacts of high and low water levels during Phase 1 have not been properly addressed;*
- *There is an email on record that claims MLA is satisfied with the MRWMP, however, this email was not from the MLA and was based on the understanding that there would be very little change; and*
- *The lack of response and misinterpretation of the residents' concerns has increased frustration and mis-trust of the managing agency.*

ISSUES CONSIDERED IN MRWMP

The MRWMP rationalizes that:

- Less differential water levels between fall and winter drawdown will increase the amount of available aquatic habitat and protect incubating lake trout eggs.
- The higher spring levels will improve ecological conditions for wetlands and spring spawning fish species (northern pike and walleye).
- The new regime will also maintain and/or improve access to and continued enjoyment of lake-based shoreline recreational structures.

The follow are our observations:

Fish Community and Lake Trout

Mary Lake is historically a natural lake trout lake, and had additional populations of lake whitefish and lake herring. The loss of the latter two species and the decline of naturally-reproducing lake trout in Mary Lake have eluded fisheries managers. It has been speculated that the cold water species populations began to decline after the introduction of rainbow smelt to the lake because this stocking event may have introduced a viral infection, or increased predation and competition in the aquatic community which affected the native fish. Pollution, warming water temperatures, and loss of spawning habitat and sedimentation may also be contributing to their decline.

Smallmouth bass, northern pike, rainbow smelt and white sucker are also part of the community, and walleye are predicted to be additions to the community in the future as they migrate downstream. Rainbow smelt and white sucker are stream spawners and the spawning habitat for northern pike is unknown (pers. Comm. S. Scholten, OMNR 2008).

According to the OMNR report Inland Ontario Lakes Designated for Lake Trout Management (May 2006), Mary Lake is categorized as a Put-Grow-Take (PGT) lake trout lake and according to

information from the Assessment Unit (Sandstrom, September 2007) there are no natural lake trout or herring present in Mary Lake.

Lake trout has been stocked in Mary Lake by the province since the 1920s to supplement the recreational fishery; stocked fishes have clipped fins which helps to decipher them from native individuals during netting assessments. According to a mid-1970s (1975-1977) OMNR fisheries assessment of Mary Lake, no fin clipped adults were netted, which would signify that natural reproduction is occurring. During the same timeframe, fall lake trout spawning (October 20th) activity was observed in a few feet of water. It was assumed at the time that the ice and snow which cover the spawning shoals was not providing sufficient insulation to prevent freezing of the lake trout eggs during the "under ice" drawdown period when compared to Bella Lake (unregulated lake) spawning activity (Source: Wilton 1978 – OMNR LT Annotated Bibliography, January 2001).

Rehabilitation of spawning shoals occurred in the 1980s on Mary Lake to ameliorate conditions and help to support or encourage reproduction (personal comments, S. Scholten, OMNR January 8, 2008). This past fall, lake trout adults were observed on potential spawning shoals, and deposited eggs were located on one shoal at an approximated depth of 1 m although exact measurements or counts were not taken (S. Scholten).

Under the new "rule curve", winter drawdown is not to exceed fall drawdown on lake trout lakes (preferably 20 cm higher than the height of any known shoals) so that the spawning shoals are not dewatered during the winter. Whether or not this change in the winter draw down will have a positive impact on lake trout spawning shoals is unknown, however it is unlikely that this proposed change would have a significant impact on the ability to manage late spring and summer water levels to lessen the impacts on erosion and improve navigation.

Northern pike require wetland or temporarily flooded low-lying areas in the spring to spawn; their eggs attach to aquatic vegetation. Northern pike are residents of Mary Lake but their spawning habitat has never been mapped. It is assumed that they may be spawning upstream in creeks connecting to wetlands or the vegetated areas near the mouth of the river. There is no conclusive evidence to state that these species and their habitats were negatively impacted in the past.

On May 24th, 2007 a reconnaissance by OMNR staff was conducted "to scope the potential impact of water level management on wetlands and their use by fish". The report found that although Spider Lake was not visited, in the "remaining areas, the water depth and scope (close access to deeper water) are such that these areas do not appear greatly susceptible to stranding or dewatering of pike eggs and fry and that 'there is no clear benefit of one rule curve over the other with regard to pike spawning'; and

Observations

- *Mary Lake is a Put and Grow Lake Trout lake with no natural lake trout.*
    - *According to information from the Assessment Unit (Sandstrom, September 2007), there are no natural lake trout or herring present in Mary Lake and almost no*

whitefish (only two caught over the past 5 years). The reason for the loss of these species in Mary Lake has not been determined.

- *There is no data to indicate that higher spring and summer water levels will improve fish habitat or that these levels will have any impact on meeting the higher targets for winter lake levels.*
- *In the absence of natural Lake Trout regeneration the rationale for the drawdown of Mary Lake to the October 15th low of 280.46 may need to be reassessed.*

- *It was assumed that winter ice and snow, which cover the spawning shoals, was not providing sufficient insulation to prevent freezing of the lake trout eggs, and the effect of this change is not known.*
- *According to an OMNR reconnaissance report 'there is no clear benefit of one rule curve over the other with regard to pike spawning' (Appendix 7, pg. 58).*
- *It is unlikely that the proposed winter change would have a significant impact on the ability to manage late spring and summer water levels.*

Wetlands and Riparian Areas

Wetlands are permanently or seasonally flooded areas, or land where the water table is close to the surface. Wetlands are dominated by water tolerant plants and hydric (wet) soils. Swamps, marches, fens and bogs are all types of wetlands. Wetlands assist with controlling and storing surface and ground water; improve water quality; protect shorelines from erosion; trap sediments and other pollutants; provide fish and wildlife habitat; and provide recreational opportunities.

Wetlands are dynamic ecosystems which are highly dependent upon disturbance and changing conditions. Hydrology is perhaps the most important factor in determining wetland type (marsh, swamp, fen, bog) and water quality (availability of nutrients). For example, when wetlands are flooded nutrients and heavy metals are released into the water, including Phosphorus which encourages plant growth; during low water levels, these nutrients become unavailable to plants. Changes in water levels influence species composition, structure, and distribution of plant communities.

According to page 2-8 of the MRWMP the ecological conditions in Mary Lake were generally good prior to the new water level management regime. From our inventory there were very few lowland or wetland areas along the shoreline; only the inflow of the Muskoka River and Lancelot Creek are dominated by wetland vegetation, and Spider and Penfold Lakes and as a result there is very little storage capacity on Mary Lake due to the minimal wetland and floodplain areas.

Siding Lake, which is identified as a Provincially Significant Wetland is located approximately 4 km up the north tributary of Lancelot Creek. Siding Lake's elevation is 302.66 m. (993 ft) which is 22 m. (72 ft) above Mary Lake's elevation of 280.72 m. (921 ft), according to the topographic map of Huntsville.

Two subsequent reports on wetlands were prepared by OMNR (May 24th, 2007 Reconnaissance and August 29th, 2007 Reconnaissance) "to scope the potential impact of water level management on wetlands and their use by fish". (See Appendix 7, pg. 56) The first report found that:

- Mary Lake proper has very little wetland habitat and the vast majority are found on tributary streams;
- 7 Wetlands were inventoried and with the exception of Spider Lake, the wetlands were either found to be 'not influenced' by Mary Lake Level or "not susceptible to impact';
- Spider Lake was not visited, however the "Remaining areas, the water depth and scope (close access to deeper water) are such that these areas do not appear greatly susceptible to stranding or dewatering of pike eggs and fry and that 'there is no clear benefit of one rule curve over the other with regard to pike spawning'; and
- In conclusion 'Wetlands by nature are adapted to changing water levels and the differences between the two rule curves are relatively small and we should 'not expect to see any significant changes to wetland communities.'

On August 29th, 2007, another reconnaissance was held to explore Lancelot Creek and Spider Lake and the findings were:

- 'The new curve was devised without specific knowledge of the wetland areas on Mary Lake';
- 'The Spider/Penfold Lake wetland would likely be provincially significant, judging from its size;
- Penfold Lake is not impacted at all by the water management on Mary Lake because of a beaver dam that has been in existence for some time; and
- 'It is unlikely that the relatively small difference between the old and new rule curve would have any impact on these communities' (wetlands).

The August 29th, 2007 report also provides comments on the impact of managed water levels on wildlife populations that use wetlands, such as reptiles (turtles), amphibians (mainly frogs), and mammals (beaver, muskrat, meadow voles). The report states that:

> 'In general, the principal of allowing water levels to fluctuate in a way that would emulate nature is the best approach. Most of these animals go into hibernation by burrowing in to the mud below the frost line (turtles, frogs), or prepare winter quarters based on the fall water level. A water level regime that varies from natural can threaten the survival of these animals. For example, drawdowns of about 40 cm that typically occur over the winter may cause frost to penetrate into the substrate where reptiles and amphibians are hibernating, causing mortality. Similarly, falling water levels when animal such as beaver and muskrat are in their dens could have a negative impact on these animals.
>
> In the spring, as a general principle, it would be better to allow water levels to return to normal summer levels in a way that would emulate nature; that is, gradually, rather than abruptly. A short duration peak during the freshet is probably not important. '

The conclusions of the reconnaissance reports prepared in 2007 by the OMNR indicate that there was no significant benefit to wetlands between the old and new rule curves. With respect to pike habitat the report found that exclusive of Penfold and Spider Lake that for the "remaining areas, the water depth and scope (close access to deeper water) are such that these areas do not appear greatly susceptible to stranding or dewatering of pike eggs and fry and that 'there is no clear benefit of one rule curve over the other with regard to pike spawning'. With respect to amphibians and mammals the report also found that 'a water level regime that varies from natural can threaten the survival of these animals'.

Observations:

- *The Hackner Holden Agreement established a consistent water level regime for 66 years on Mary Lake, upon which all surrounding wetlands, riparian and littoral areas have adjusted to;*
- *The new rule curve was devised without specific knowledge of the wetland conditions on Mary Lake;*
- *The findings of the recent OMNR work was that the shoreline wetlands were 'not influenced' by Mary Lake Level or "not susceptible to impact';*
- *The findings of the recent OMNR work was that there is no clear benefit of one rule curve over the other with regard to pike spawning;,*
- *Penfold Lake is not impacted at all by the water management on Mary Lake because of a beaver dam that has been in existence for some time.*
- *It is unlikely that the relatively small difference between the old and new rule curve would have any impact on these communities' (wetlands).*

Assessment of Impacts on Infrastructure and Access

An infrastructure survey (Muskoka River Water Management Plan Infrastructure Survey of Selected Muskoka Lakes and River Sections, Acres 2003) was conducted on nine lakes within the Muskoka River watershed to investigate the elevation of existing shoreline infrastructure (i.e., docks and boathouses) in relation to lake water levels. The nine lakes included Lake Muskoka, Lake Rosseau, Lake Joseph, Tasso Lake, Camp Lake, Lake Vernon, Peninsula Lake, Fairy Lake, Mary Lake, and North Muskoka River (south of Huntsville).

On each lake, a random sampling of infrastructure (docks and boathouses) was measured to determine the amount of freeboard to the top of the deck surface and the bottom of the splashboard, and the water depth/level at the entrance to the boathouse or at the end of the dock (if shallow water depth was considered to be a constraint to access to the structure). The average, minimum and maximum freeboard values were calculated and correlated to lake elevations.

On Mary Lake, a total of 32 structures were inventoried including the Huntsville locks and 5 other structures on the Muskoka River north of Mary Lake. Measurements were taken from the lake level (280.83 m.) on the day of the survey (June 12, 2003) to both the top of the dock and the bottom edge of the structure fascia board. Table 8 provides a summary of the distances from the lake level to the top of the dock and the bottom of the fascia relative to the HHA summer

level 280.73 m. Table 9 provides the actual height above sea level of the top of the dock and the bottom of the fascia.

Table 8 – Infrastructure Survey Mary Lake – Relative to Summer Rule Curve Elevation 280.73 m

	Top of Dock (m)	Bottom of Fascia (m)	Water Depth
Average	0.48	0.23	-
Maximum	0.9	0.66	-
Minimum	0.22	0.08	-

Note – Table 3.7, Infrastructure Survey (pg 24)

Table 9 – Results of Mary Lake Infrastructure

	Top of Dock	Bottom of Facia	Water Depth
Average	281.21	280.96	-
Maximum	281.63	281.39	-
Minimum	280.95	280.81	-

Notes – Extracted from Table 3.7 Infrastructure Survey (24)

Observations:

- *The random sampling did not include every structure and assessed the height of docks but not the depth of entrances to boathouses or the ends of any docks. The Regulated Summer Water Level (280.73 m.) to which structure height was compared is the August 1st target water level under the 2006 MRWMP;*
- *The 'Survey results were compared to the present regulated summer water level (RSWL)" (page 2, Acres Report, July 2003) and does not appear to assess the impact of higher or lower water levels that were proposed by the MRWMP;*
- *There were no actual measurements taken for the depth at docks or boathouses, but it was determined that 'depth was not a constraining factor at the entrances to any of the boathouses or the ends of any of the docks';*
- *According to section 12.1.7 the random survey identified that the infrastructure elevation on Mary Lake ranged from 280.985 to 281.63. As per our field inventory (see Appendix 5), the permanent infrastructure ranges from surface of water to top of decking for docks, boathouses and boat ports are 280.476 to 281.9365 m.; and*
- *The District of Muskoka, has undertaken shoreline inventory of infrastructure and riparian management practices on many lakes across Muskoka. Although they have not completed an inventory of Mary Lake, they would 'consider completing this inventory in partnership with lake associations, where the association can use this information to improve shoreline stewardship practices.' (personal communication, Judi Brouse, October, 2007).*

SHORELINE EROSION NOT CONSIDERED IN MRWMP

Table 10 provides a summary of 'Issues Considered and Not Considered for Mary Lake by the MRWMP' (Table 9.1 (pg. 9-13, MRWMP). It indicates that shoreline erosion, littoral and riparian

habitat, and ice damage were not considered during the development of the new water management plan.

The new operating plan for the Mary Lake Dam is shown in Figure 2 on the following page (Section 12.1.7, MRWMP). At the time the plan was approved, erosion issues were not identified and corrective actions were not recommended, however, the MRWMP implemented management actions on other lakes where shoreline erosion was considered to be an issue (i.e., Buck, Fox, and Kawagama), such as:

- Lower spring peak or not increasing high spring peak levels (i.e. maintaining previous levels or lower); and
- Quicker reduction to summer TOL.

Table 10 – Summary of Issues Considered and Not Considered for Mary Lake by MRWMP

Issues Considered	Issues Not Considered
Lake Trout	Brook Trout
Cold Water and Warm water fishery	Walleye Spawning
Downstream Baseflow	**Littoral and Riparian Habitat**
Recreational Lake	**Shoreline Erosion**
Infrastructure Requirements	Rapidly Fluctuating Water Levels
Flooding	**Ice Damage**
Navigation	Low Winter Water Levels
Water Quality	Aesthetics
Drought – Low Water Levels	Difficult Operation
Flow for Water Power (Hackner Holden Agreement)	

Source: Extracted from Table 9.1 pg. 9-13, MRWMP)

The following is a summary of the management actions taken on lakes with erosion problems:

1. Buck Lake
   - The Target Operational Level (TOL) for spring freshet remained the same at 301.00 m., not increased (Table 11.2.4, MRWMP).
   - Spring erosion is a concern during high water events and the action taken was "no change to elevation of spring peak and a quicker reduction to summer TOL" (Section 12.1.4, MRWMP).
2. Fox Lake
   - TOL for Spring Freshet lowered by .05 m from 294.65 m. to 294.6 m. (Table 11.2.5, MRWMP).
   - Concerns were expressed by residents regarding summer water levels and shoreline erosion – summer TOL of 294.37 m. reflects traditional level to reduce shoreline erosion and changing shoreline vegetation patterns (Section 12.1.5, MRWMP).

- A slightly higher (0.1 m) and earlier (11 days) spring water level peak will improve habitat conditions for wetlands and spring spawning fish species.
- A quicker reduction to summer TOL to address resident concerns over early summer high water concerns and shoreline erosion.

3. Kawagama Lake
   - A lower spring peak to mitigate shoreline erosion.
   - Summer levels are approximately 0.1 m lower, and will follow the same drawdown pattern during normal or below normal rainfall and runoff years. When sufficient inflows are available, the lake will be operated to the higher and longer summer operating level (Table 11.3.5 and Section 12, MRWMP).
   - Shoreline infrastructure ranged from 355.83 m. to 355.93 m., and high spring water levels may cause ice damage and shoreline erosion are social constraints (Section 12.2.5, MRWMP).
   - Given the fact that the "lake is often hard to fill in the spring if snowmelt and rainfall is less than normal", a reduced NOZ and TOL with less difference between seasonal levels, and a lower spring peak to address shoreline erosion concerns on east end of lake (windward).

Figure 2 – Mary Lake Dam Operating Plan

12.1.7 Mary Lake – MNR

The operating plan for Mary Lake is shown in Figure 12.1.7, and has the following characteristics:

Target Operating Level Range:	280.3 to 281.0 m
Normal Operating Zone Range:	280.03 to 281.1 m
Absolute Range:	279.95 to 281.15 m
Summer* Range (Typical):	280.9 to 280.65 m
Winter Drawdown:	280.67 to 280.3 m
Flood Allowance:	281.1 to 281.15 m/141.6 m^3/s
Maximum Daily Flow:**	140.6 m^3/s
Minimum Daily Flow*:**	3 m^3/s, year round target 11 m^3/s, winter target
Natural Environment Constraints:	Several lake trout spawning shoals located within the current late winter/early spring drawdown zone.
Social Constraints:	Lake has extensively developed shoreline, with water-based recreation activities continuing well into fall. Infrastructure elevations ranged from 280.95 to 281.63 m.
Other:	Dam is operated in conjunction with the Huntsville Dam to provide summer recreational opportunities, a minimum downstream flow, and a winter release for infrastructure protection and waterpower generation.

Benefits and Resolution of Issues

- No change to NOZ. Summer water levels will decline gradually over the summer season to simulate a natural flow regime and provide more natural ecological conditions.
- Slightly higher spring water level to improve ecological conditions for wetlands and spring spawning fish species.
- Fewer High Water Zone exceedances.
- Less differential between fall and winter drawdown levels to improve lake trout spawning habitat conditions. Decreased winter drawdown will increase the amount of available aquatic habitat.

Observations:

- *The MRWMP did not identify or assess erosion issues on Mary Lake;*
- *65% of Mary Lake mainland shoreline is soft or erodable (see Appendix 5);*
- *The MRWMP included strategies to address strategies on lakes where erosion was identified (Buck, Fox, Kawagama), including:*
  - *Lower spring peak or not increasing high spring peak levels (i.e. maintaining previous levels or lower); and*
  - *Quicker reduction to summer TOL.*
- *The Operating Plan for Mary Lake recognizes 'Lake has extensively developed shoreline with water-based recreation activities continuing well into fall'. The MRWMP has not addressed this.*

Appendix 5 – Field Research – Erosion and Infrastructure Inventory

French Planning Services, along with a volunteer from the Mary Lake Association, conducted a three day rapid assessment process by boat to inventory soft shoreline areas and set-up control sites in areas with eroding banks, and to inventory all permanent shoreline structures (exclusion of floating and cantilever docks), including structure type, condition of building material, and height above water. The following are our observations.

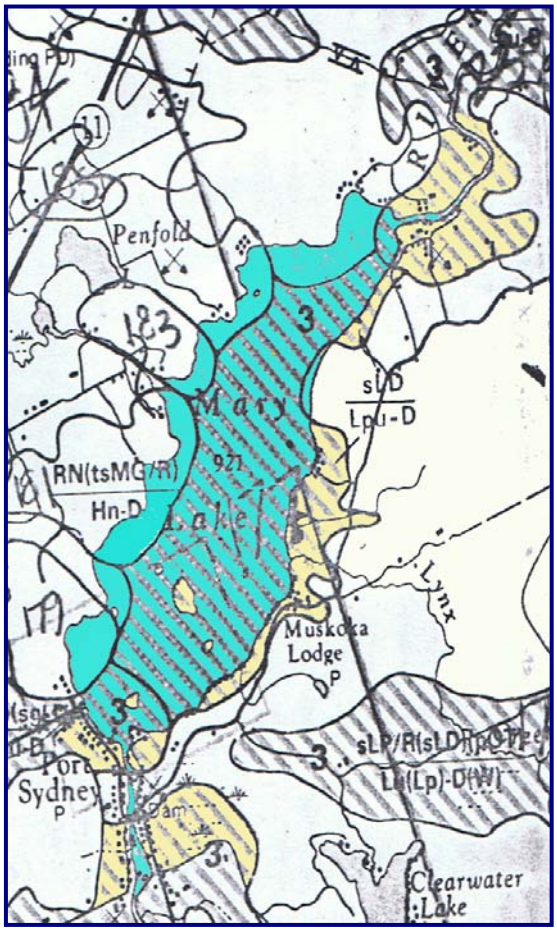
INVENTORY OF 'SOFT' SHORELINES

The majority of Mary Lake is underlain with glacio-lacustrine deposits of well stratified fine sand, silt, clay and mixed gravel as shown in beige and stripped areas on Map 2 (Muskoka Area Ontario Geological Survey (Open File Report 5323)).

When the glaciers retreated, melt water deposited these fine particles and the on-going influences of a riverine system continue to move finely eroded materials into and out of Mary Lake. Fine silt and clay tend to have strong cohesive resistance which make them almost impermeable to erosion, ground water seepage, and/or surface water drainage. However, water and other erosion agents (i.e., wind; repeated freezing and thawing; wetting and drying) tend to cut into areas of weak soils, such as unconsolidated particles including sand and gravel (soft shorelines), to dissolve these bonds.

During the boat reconnaissance, qualitative and quantitative data were collected along the entire 23.39 km shoreline area of Mary Lake, including 2.88 km of islands, as well as additional shoreline transects along the inflows of Muskoka River and Lancelot Creek.

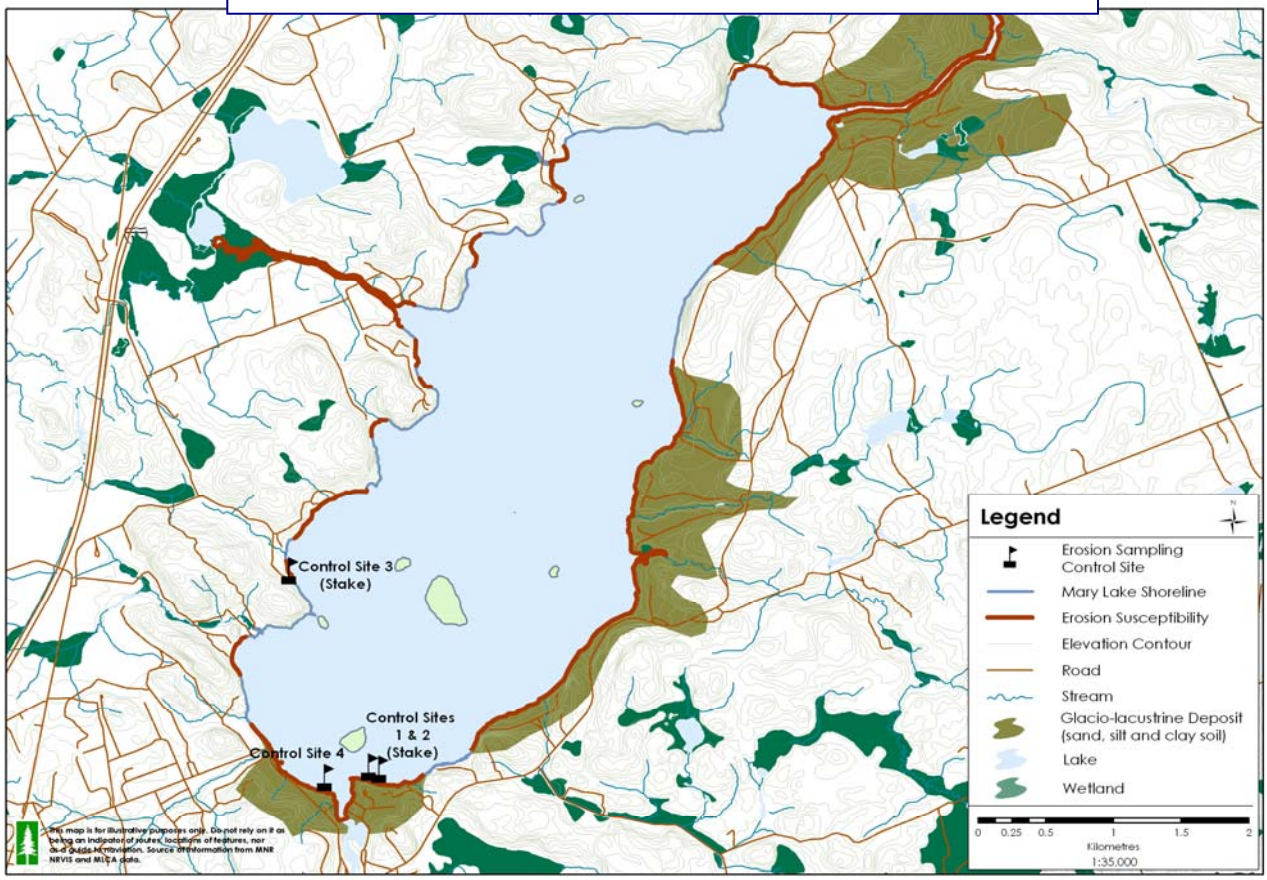
Map 2 – Location of Glaciolacustrine Soils – Ontario Geological Survey



Map 3 was produced to show the location of all soft erodable shorelines on Mary Lake. The brown polygons are described as glacio-lacustrine areas translated from the Ontario Geological Survey Map. Some smaller pockets of soft shorelines are also found along the north-western shoreline usually in bays or associated with local drainage and are shown by a red line. Soft erodable shorelines represent 56.4 % of the entire 23.39 km of shoreline area or 65 % of the mainland shoreline (excluding islands). The remaining mainland shoreline (35.6 %) is dominated

by exposed granite bedrock and steep rocky outcrops. Approximately 92% of the south-eastern shoreline from the river delta at the inflow to the outflow in Port Sydney is comprised of soft shorelines. Shoreline slopes vary from low gradient, where natural sandy beaches are found, to steep high gradient slopes in the form of rock cliffs and, in some locations, sand and clay bluffs.

Map 3 – Soft Erodable Shorelines on Mary Lake



During our field research undercutting and mass wasting was observed at the four control sites and along several transects of the soft shoreline areas along the south-eastern and north-western shorelines of Mary Lake. Many shoreline areas that were not protected by natural bedrock or manmade protection works (e.g. shorewalls, rocks, gabian baskets) showed signs of undercutting.

Photos 1 and 2 provide examples of typical shorelines that are being undercut. Measurements taken ranged on average from 0.1 m to < 1m deep, with some areas exhibiting undercutting depths of 1 to 2 m. Photo 1 is located on the east side of the Mary Lake outlet and shows areas being undercut by 0.8 m (23') and Photo 2 is located in the same area and shows large hollow areas that are up to 2 m deep that are carved out by prolonged undercutting. Photos 3 and 4 show the backshore impacts of shoreline undercutting where the ground above the hollow areas is opening (Photo 3) and stress lines running parallel to the shoreline are occurring and the

shoreline portion will eventually break away. Note the angle of the trees located between the stress line and the shoreline in Photo 3, this area has already started to break away.

Photos 5 to 8 were taken at two control sites (#2, #4) where undercutting is occurring (see Map 3). The first control site (#2) is in an area with hummock and hollow topography and the second control site (#4) is along a steep well drained sandy bank in the Village of Port Sydney. Hummock and hollow topography is a good indication of improper drainage and these types of features are often found in wetland areas with clay-based soils which trap moisture in the hollows. At both locations four measurements were taken to identify where the water level would strike the shoreline during the spring freshet, average May, June and July. Photos 6 and 8 indicate that during the period of high sustained water levels from the spring freshet, May and June that the water would hit the higher portions of the shoreline edge which would accelerate toe erosion and undercutting of the shoreline edge.

Photos 9 to 12 were taken at control sites (#1, #3) with well defined banks comprised of layers of clay and sand. At these sites, 4 ft metal stakes were driven into the ground to help establish future rates of erosion. In both cases there are signs of toe erosion and this appears to have led to mass wasting of soil layers (photos 10, 12) above the toe area being eroded. This type of erosion is directly related to water levels.

Erosion is a naturally occurring process on Mary Lake, and most of the evidence indicates that undercutting is resulting from lake water levels and wave action. There were some adjacent riparian areas where properties were landscaped with lawns and the removal of trees, however, these inappropriate shoreline actions do not appear to be a key factor in the examples of undercutting that was evidenced.

Shoreline erosion has been occurring for years on Mary Lake. Under the Hackner Holden Agreement, the past target summer regulated water level was 280.73 m., and this regime has created a constant state of erosion on Mary Lake for 66 years. New water levels are now sustained at higher levels from the spring freshet to August 1, which results in water levels and wave action hitting areas above past established levels and this will accelerate undercutting of shoreline edges and cause increased erosion.

Many property owners have constructed shore walls, or put in place boulders and other shoreline protection works in order to protect their shorelines, while shorelines of areas left unprotected have an established erosion rate. The higher sustained water levels will require many property owners to improve existing infrastructure or put in place new protection works in order to protect shorelines, docks and boathouses.

Photo 1
Undercutting of Shoreline

Photo 2
Hollow Areas Carved by Undercutting

Photo 3
Stress Ridges Resulting from Undercutting

Photo 4
Surface Holes Resulting from Undercutting

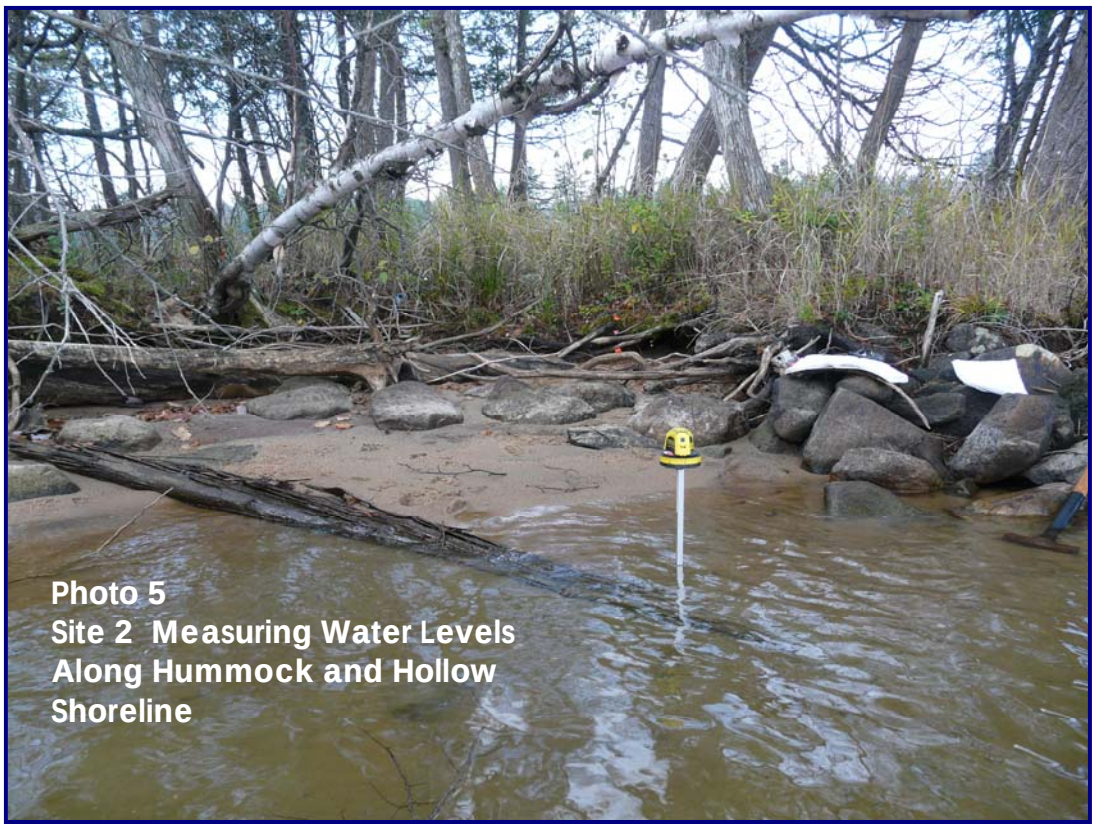


Photo 5
Site 2 Measuring Water Levels Along Hummock and Hollow Shoreline

Photo 6
Station 2 Measuring Water Levels Along Hummock and Hollow Shoreline

Photo 7
Site 4 - Measuring Water Levels Along Soft Shoreline

Photo 8
Measuring Water Levels Along Soft Shoreline

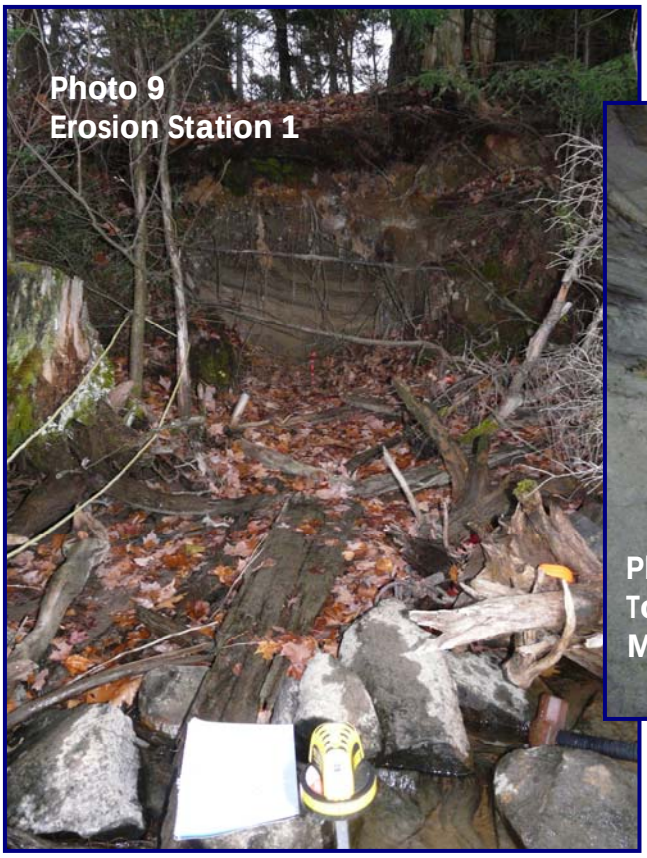


Photo 9
Erosion Station 1

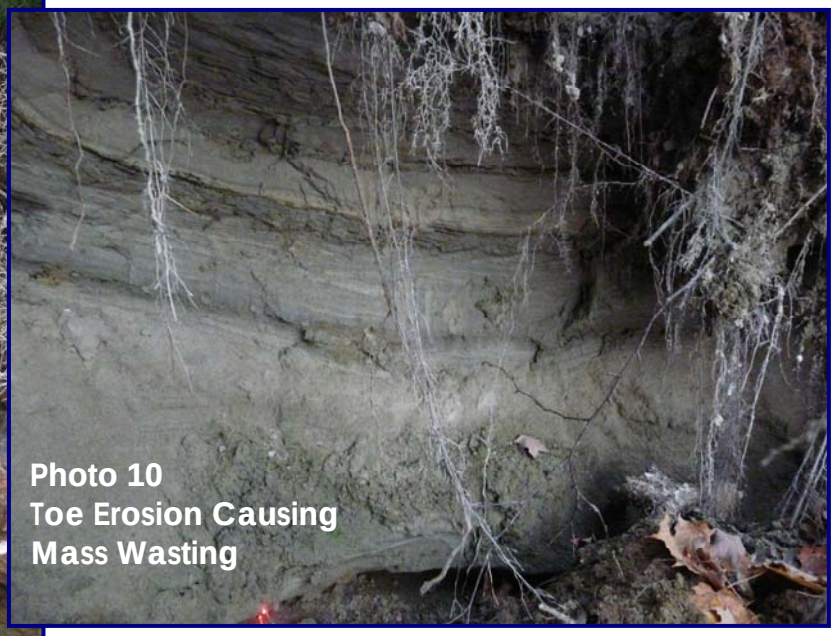


Photo 10
Toe Erosion Causing
Mass Wasting

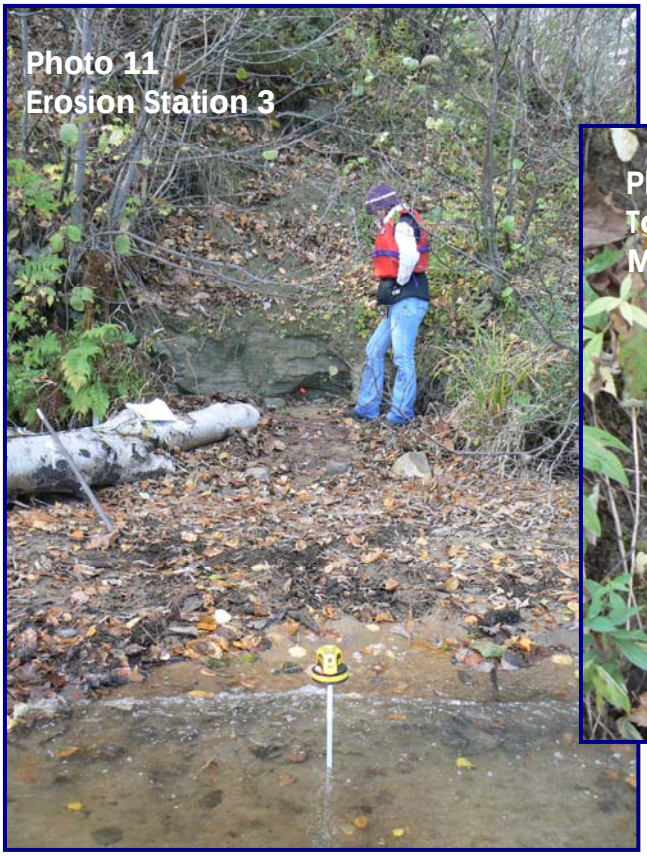


Photo 11
Erosion Station 3

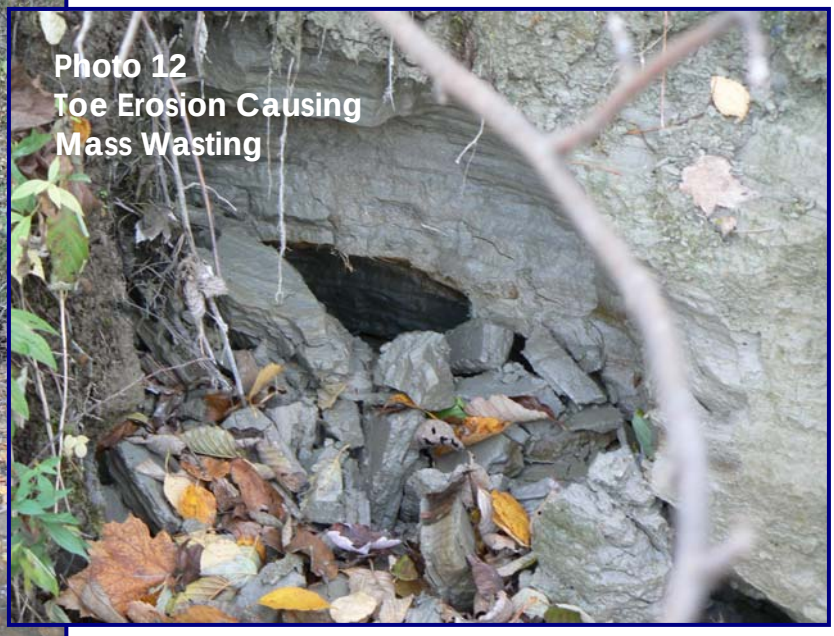


Photo 12
Toe Erosion Causing
Mass Wasting

Observations

- *Soft erodable shorelines represent 56.4 % of the entire 23.39 km of shoreline area or 65 % of the mainland shoreline (excluding islands). The remaining mainland shoreline (35.6 %) is dominated by exposed granite bedrock and steep rocky outcrops.*
- *Approximately 92% of the south-eastern shoreline from the river delta at the inflow to the outflow in Port Sydney is comprised of soft shorelines.*
- *Undercutting and mass wasting was observed at the four control sites and along several transects of the soft shoreline areas along the south-eastern and north-western shorelines of Mary Lake. Many shoreline areas that were not protected by natural bedrock or manmade protection works (e.g. shorewalls, rocks, gabian baskets) showed signs of undercutting.*
- *Erosion is a naturally occurring process on Mary Lake, and most of the evidence indicates that undercutting is resulting from lake water levels and wave action.*
- *Under the Hackner Holden Agreement, the past target summer regulated water level was 280.73 m., and this regime has created a constant state of erosion on Mary Lake for 66 years.*
- *New water levels are now sustained at higher levels from the spring freshet to August 1, which results in water levels and wave action hitting areas above past established levels and this will accelerate undercutting of shoreline edges and cause increased erosion.*
- *The higher sustained water levels will require many property owners to improve existing infrastructure or put in place new protection works in order to protect shorelines, docks and boathouses.*

INFRASTRUCTURE INVENTORY

A complete inventory of all permanent shoreline infrastructure including docks, boathouses, boat ports and retaining walls for Mary Lake was conducted on October 31st and November 1st, 2007. Cantilever, pole and floating docks were excluded and most of these structures were removed from the lake at the time of the survey. Only structures in the water that were permanently fixed to the lake bed (e.g. wood or concrete cribs or fixed piles) were documented. A total of 146 structures were inventoried for structure type, condition, location and height above water. Map 4 indicates the location of each shoreline structure. The following points summarize the main conclusions.

The majority of permanent shoreline structures were found along the south-eastern shoreline of Mary Lake and located in the area of soft shorelines. While the north-western shoreline had very few permanent structures, the majority of permanent structures were found in areas with soft shorelines as shown on Map 3. This may be due to the fact that most soft shorelines have shallow littoral zones, while hardened shorelines (rock) have deep water closer to the shoreline and therefore construct floating or cantilever structures instead of the traditional wood or concrete crib. No floating boathouses were found on the lake.

Map 4 – Shoreline Infrastructure on Mary Lake

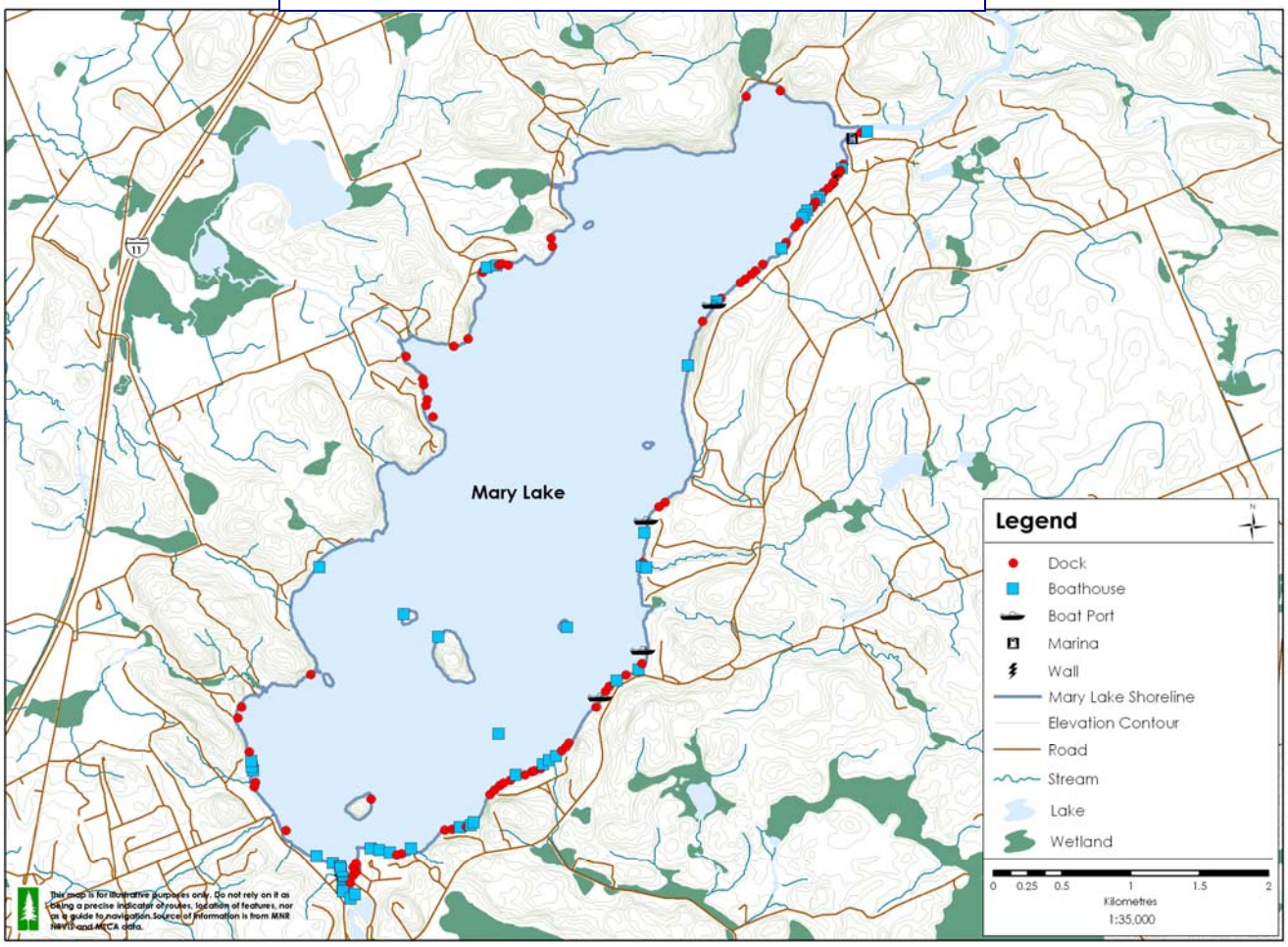


Table 11 indicates the condition of shoreline infrastructure. Generally there were very few (10) docks and boathouse that were considered to be in a poor to very poor condition that would require structure work in the near future. Most docks and boathouses were in good to fair condition.

Table 11 – Condition of Shoreline Infrastructure

STRUCTURE	COUNT	EXCELLENT	GOOD	FAIR	POOR	VERY POOR
Dock	86	5 (6%)	50 (58%)	26 (30%)	5 (6%)	0
Boathouse	54	6 (11%)	30 (56%)	13 (24%)	4 (7%)	1 (2%)
Boatport	4	1 (25%)	2 (50%)	1 (25%)	0	0
Marina/Wall	2	0	2 (100%)	0	0	0
TOTAL	**146**	**12**	**84**	**40**	**9**	**1**

Table 12 shows the number of built structures with stringers above or below the high spring, and average May and June water levels. The stringer is the main horizontal beam that lies across the cribs to support the boathouse foundation or the deck boards. High water levels that are sustained for long periods will inundate the stringers and can affect the long term stability and safety of the structure from prolonged saturation and from wave action.

Table 12 – Structural Stringer Height in Metres Above Sea Level

		HIGH WATER LEVELS		MAY WATER LEVELS		JUNE WATER LEVELS	
STRUCTURE	No.	Above 281 m	Below < 281 m	Above 280.925 m	Below 280.925 m	Above 280.85 m	Below 280.85 m
Dock	86	25 (29%)	61 (71%)	45 (52%)	41 (48%)	64 (74%)	22 (26%)
Boathouse	54	10 (18%)	44 (82%)	18 (33%)	36 (67%)	33 (61%)	21 (39%)
Boat Port	4	1 (25%)	3 (75%)	1 (25%)	3 (75%)	2 (50%)	2 (50%)
Total	144	36 (25%)	108 (75%)	64 (44%)	80 (56%)	99 (69%)	45 (31%)

Note - 2 structures included a wall which did not have a stringer

Table 13 indicates the number of built structures with the top of docks above or below the high spring, and average May and June water levels. High water levels that are sustained for long periods will inundate the dock and affect safe use and the integrity of the structure.

Table 13 – Dock Height in Metres Above Sea Level

		HIGH WATER LEVELS		MAY WATER LEVELS		JUNE WATER LEVELS	
STRUCTURE	No.	Above 281 m	Below 281 m	Above 280.925 m	Below 280.925 m	Above 280.85 m	Below 280.85 m
Dock	86	82 (95%)	4 (5%)	83 (96%)	3 (4%)	86 (100%)	0
Boathouse	54	43 (80%)	11 (20%)	47 (87%)	7 (13%)	50 (93%)	4 (7%)
Boat Port	4	4 (100%)	0	4 (100%)	0	4 (100%)	0
Marina	1	1 (100%)	0	1 (100%)	0	1 (100%)	0
Wall	1	0	1 (100%)	0	1 (100%)	0	1 (100%)
Total	146	130 (89%)	16 (11%)	135 (93%)	11 (7%)	141 (97%)	5 (3%)

Observations

- *During high water level conditions (>281.0m) 71 % of dock stringers and 82% of boathouse stringers are inundated. In May this decreases to 48 % of dock stringers and 67 % of boathouse stringers. And in June, there are still 26% of dock stringers and 39% of boathouse stringers inundated.*
- *During spring high water levels (~ 281 m), 5 % of docks and 20 % of boathouse decks were completely submerged.*
- *In the months of May and June, high water levels respectively), 4 % of docks and 13 % of boathouse decks remained submerged in May, and 7 % of boathouse decks continued to be submerged in June.*

ACCESS INVENTORY

According to the Acres 2003 Inventory Survey 'depth was not a constraining factor at the entrances of any of the boathouses or the ends of any of the docks". However, this statement was based on an assessment in accordance with the water level the day the survey was taken (280.83 m.). Further analysis was required to determine if the depth of water was a factor affecting access and navigation to/from docks/boathouses during times of low water levels. Table 14 indicates the rule curve target for August 1, September 15th and October 1.

Table 14 - MRWMP Rule Curve "Target Lake Levels"

Date	Mary Lake Rule Curve Target Level in Meters ALS
August 1st	280.73
September 15th	280.66
October 1st	280.55

There is no "mandated" minimum required depth for dock based marine operation. In the absence of a clear definition of acceptable levels, the following have been assumed for analysis purposes:

Minimum Depth for Marine Operations – 0.5 m of bottom clearance (<20 inches)
Preferred Minimum Depth for Marine Operations – 0.75 m of bottom clearance (<30 inches)

Based on the above "Rule Curve" targets and the assumed minimum depth requirements, Table 15 illustrates the maximum "End of Dock" bottom levels required at each Rule Curve lake level target from August 1 to October 1.

Table 15 – Minimum Lake Level Required To Moor Boats at Docks

Date	Rule Curve Target Lake Level:	Maximum Bottom Level @0.50 Meters Clearance	Maximum Bottom Level @0.75 Meters Clearance
August 1st	280.73	280.23	279.98
September 15th	280.66	280.16	279.91
October 1st	280.55	280.05	279.80

From our fall 2007 Survey of Mary Lake Built Structures, there were 146 sites with measured "water depth at end of built structures". Table 16 provides an analysis of this depth data.

Table 16 – Percentage of Docks and Boathouses with 0.5 m and 0.75 m of Bottom Clearance

Date	Rule Curve Target Level	# of Sites < 0.5 m Bottom Clearance	% of Total Sites	# of Sites < 0.75 m bottom Clearance	% of Total Sites
August 1st	280.73	11	7%	52	35%
September 15th	280.66	26	18%	65	44%
October 1st	280.55	44	30%	72	49%

Observations:

- *Mary Lake water levels below 280.73 are an issue for over one third of all waterfront built structures*
- *The overwhelming majority of Mary Lake waterfront "built structures" were constructed in anticipation of a continuation of the 280.73 Rule Curve Target that had prevailed since 1940.*
- *Much of the "soft" shoreline of Mary Lake has an accompanying lake bottom profile characterized by a gradual slope – this is particularly apparent on the south-eastern shoreline of the Lake*
- *To accommodate a gradual bottom profile, many built structures extend into the lake to gain sufficient minimum depth for marine operations*
- *35% of Mary Lake built structures have less than 0.75 meters(<30inches) of end of structure bottom clearance at the historic May to October target lake level of 280.73 meters ASL*
    - *7% of built structures have less than 0.5 meters (<20inches) of bottom clearance at 280.73*
- *At the MRWMP September 15th target of 280.66, 44% of waterfront built structures have less than 0.75 meters of bottom clearance and 18% have less than 0.5 meters clearance.*
- *The 2003 Acres Infrastructure Survey did no analysis of the impact of reduced lake levels on built structures on Mary Lake, yet concluded that depth was not an issue.*
- *The Mary Lake waterfront property owners who's built structures are most impacted by low water are, in many cases, the same people incurring erosion damage during periods of high water*

Appendix 6 – Standing Advisory Committee Minutes

Standing Advisory Committee Meeting Minutes

First Meeting
August 30, 2006

In Attendance: Stewart Martin, David Servos, Ben Boivin, Don Currie, Tim Clarke, Rebecca Crockford, Patricia Arney, Kim Benner, Steve Taylor, Cortney Oliver

Special Guests: Doug Johnson, Ted Johnson, Paul Johnson from the Mary lake Association

Summary

David opened the meeting with greetings and an introduction. He is looking forward to seeing how the process goes from this point.

Patricia nominated Stewart as Chair of the SAC. Stewart agreed to become Chair, and Ben agreed to sit in the position of Vice-chair.

Steve went over the terms of reference and proceeded to briefly address the issue of Mary Lake. Stewart asked that the information on the types of calls/complaints OMNR is receiving regarding the MRWMP be shared with the SAC.

Steve addressed the letter from Huntsville stating that they had a lot of public pressure and that the letter was vague. Stewart wanted to know about OMNR's response to the situation. Steve mentioned his involvement at a council meeting a month and a half ago.

There was some discussion regarding the new operation plan. Steve highlights the old rule curve in relation to the new rule curve showing that the old spring level is much higher in the lake and that this is where the concerns are coming from. Tim mentioned that they were trying to narrow the differential between the fall draw-down and the spring draw-down. Steve commented that OMNR didn't get up to the target level and that there was significant snow melt but no post freshet rains. As a result the line never got to the top (target level) and that it would have been even higher if normal rains occurred.

Patricia mentions that erosion, as an issue, wasn't addressed on Mary Lake.

The three Johnson's arrive. Paul introduces himself, Doug and Ted.

Their purpose was to field questions on the presentation they previously made on July 28th. They are concerned about the substantial amount of unprotected shoreline as seen in the photos. They claim that there are a substantial number of trees in the water and that they have remained in the water through the August cross over. They address the Town of Huntsville's motion to revert to the previous timetable, post freshet.

Key comments and issues addressed by the Johnson's:

- several miles of sensitive shoreline
- upsetting a peaceful co-existence between power-generation and the environment.
- increased shoreline erosion- high water levels are the catalyst
- The old rule curve was close to lake capacity
- erosion from wake boats tearing up the shoreline
- trees that are submerged will die

Tim asked if there was a general consensus that water levels are too high.

Paul stated that a number of people responded saying that they liked it high but the positives came with negatives. He said "our lake consensus, without fear of contradiction, is that high lake levels are not sustainable because of the irreparable damage."

Discussion followed regarding the protection of fish spawning levels and Lake Trout eggs and fry. Tim stated that rivers have to meet bank flow capacity and that none of them were full.

Paul wants more analysis on data from previous year's heavy rainfall in spring months as well as summer. He continued to say that in addition to environmental concerns, the other problem is that at higher water levels, there is no storm water management.

Steve commented that the problem is duration of targeted higher water level periods. Stewart said there might be some tweaking needed as this is the first year of implementation. Patricia then asked about specific areas of concern. Paul indicated the mouth of the river and low lands. He claimed that anything that is not granite is at risk. Patricia then asked if the association has addressed the issue of wake-boarding. Paul stated that there is no speed limit but they have to stay 30 metres off shore and that is not enough to prevent erosion. He then points out that boats are not the only cause of erosion and that they are in fact a minor part compared to wind action, and that anything above the 287.73 (previous summer target level) limit loses beaches.

Ben commented that he had the opportunity in the first part of August to look around the lake. One thing he noticed was that many of the trees have been diseased. Claiming that this was not caused by this years increased water levels and that there was siltation caused by a beaver dam in a creek. Ben felt that there was no dramatic erosion occurring. Ted disagreed stating that wind action is a concern.

Stewart asked to see historical rule curves so that this can be mitigated the best it can be.

Tim commented that the plan was not done for the hydro people and that they had the least voice in determining the levels. Doug proceeded to read the MRWMP mandate and point out that what OMNR is doing is contrary to the mandate.

MRWMP with Kim Benner—Presentation

Don asked what happens when a hydro plant goes out of compliance.

Dave said that there is a self reporting process where operations report to OMNR. It can be investigated by OMNR and charges could be laid. Steven talked about compliance and listed

examples from this year and their causes etc. Discussion around the details relating to events followed. There were questions over whether an operating plant has to report equipment failures and also about hourly reporting during Walleye spawning season.

Discussion continued around changing the green line in late spring and summer.
Steve explained what could be done post freshet. Stewart pointed out it wouldn't make a difference. Patricia said that to entertain an amendment is premature. Tim said that if there is an obvious problem it should be addressed.

Steve pointed out that had there been normal spring rains, the levels would have been higher. Don asked if there was there any logging done. Steve said there was but OMNR is doing less logging because they are trying to let natural osculation occur.

Stewart said it will be dealt with at a later time and asked what frequency should the SAC meet.

Steve asked if they wanted the average trend. Rebecca pointed out that a lot of concern was with regard to trees and maybe the opinion of a forester would be helpful.

Patricia made a comment with regard to erosion & water levels asking for some background on what point (on the rule curve) has significant impacts on erosion. Stewart said he wants to see what the rest of the year looks like. Steve asked that it would be resolved before spring. Stewart said that only gives the SAC a year. Steve asked if that could be aimed for. Ben said he'd like to see it longer than a year. Steve said Peterborough should be involved to risk manage it. Stewart said he didn't want to make decisions after one year.

Patricia wanted to know why did the PAC settle on that line (with regard to Mary Lake) and that there must have been a reason. Kim suggested going back to the PAC minutes.
Patricia asked if the SAC was going to respond to Huntsville.
Discussion followed regarding a secretary. Stewart said only to acknowledge the letter.

A decision was made to look at the first week of October for the next SAC meeting.

The meeting was adjourned at 8:30 pm

ONTARIO MINISTRY OF NATURAL RESOURCES

PARRY SOUND DISTRICT

MRWMP Standing Advisory Committee Meeting - Minutes

Meeting Information

Subject/Title:	**MRWMP Standing Advisory Committee Meeting**		
Date/Time:	February 15, 2007 5:00 p.m. **Sharp**	**Location:**	Bracebridge Area Office (High Falls) Parry Sound District

Meeting Participants

Meeting Chair: **Vice-Chair:**	**Stewart Martin** **Ben Boivin**
In Attendance: **Guests:** **Regrets:** **Recorder:**	Steve Taylor, David Servos, Tim Clarke, Rebecca Crockford, Patricia Arney, Andy Heerschap Brian Ingram, Steve Scholten Don Currie Theresa Haveling

Item	*Topic*	Lead

1	*Review Agenda*
	• Any items to be added
	  o New business
	  o Pat Arney - Request that Kim Benner be in attendance at meetings
	• Meeting called to order @ 6:00 p.m.
	• Don Curry sends his regrets
	• Round table – introduction – who's who and their involvement with the committee.
		Stewart Martin

2	*Review Minutes/Action Items from August 30, 2006 meeting* • No errors or omissions • Motion by Boivin to accept the minutes; Seconded by Rebecca Crockford • Motion carried.	Stewart Martin
3	*Overview of Effectiveness Monitoring Initiatives:* • Effectiveness Monitoring Plan Summary - Table 14.1 (table taken directly out of the water management plan) – circulated. Not all items in the handout will be addressed. • Both South Falls & Moon Falls are part of the plan • Automated flow and level recording- daily average, hourly for flow during walleye spawning south branch (not included on the summary)	Steve Scholten

- Achieving flow monitoring - Spot measurements are taken at the dams – 3 measurements taken/completed,
- Copies of the final report are available for anyone interested.
- Purpose some year in Plan for comparison/predictions;
- Concerns/suggestion – would like to see the river flow graduated;
- Discussion with Bob Bergmann at the time. Steve – do you agree with the conclusions and will this help naturalize the flows? Moving to a more natural flow; compare to specific circumstances.
- Operational standpoint – ½ logs (6" high) vs. full logs (12" high); potential for V-logs @ Camp and Tasso – brook trout stranding – has this been addressed in the plan. Year-round minimum flows are identified in the plan. Shut offs happened in the fall historically.
- Moon dam – not operated by OMNR but by OPG; FRI was not contracted to address this dam. Flows captured by an EC data logger at the Moon R. Information was not consolidated into Steve Scholten's report.
- Lake trout habitat – 2 components – view spawning at night contracted to a Barrie company, Azimuth Environmental; Draft report received this week. Similar to report as in other years – most activity at shoal #16
- 2nd part – deposition study – compared to the 2003 fall study – collecting eggs by depth. Didn't repeat the late winter component. Steve will do a one paragraph submission for the minutes. Meeting in May with Kawagama Cottage Association – Steve to discuss ongoing activities. KLCA may not be interested in shoal rehab.
- Reduced summer creel census – attempted to run a volunteer survey but it didn't happen; CFIP application has been submitted for the summer of 2007.
- Reduced creel: Did not conduct a winter creel due to late start of winter; we may do hut counts but it is not cost effective to do a full blown winter creel (not a typical winter).
- Discussion re: cancelling ice huts - huts must be registered in order to track the number of huts on the ice. Assess the impact of not allowing huts on ice.
- Summer Profundal Index Netting @ Kawagama Lake: Lead by Fisheries Assessment Unit & OMNR, Bracebridge Area Office for the last 3 years. Netting report circulated by Steve Sandstrom. General statement – Healthy population is indicated - stable, good range of sizes. They do not seem stress at this time. Lake has not been stocked in approx. 10 years. Netting results – may not be able to detect a change due to changes in water management. Egg mortality rate – 30 % vs. 10% (Lake of Bays). There may not be a direct relationship between fry production and ultimate population size due to other limiting factors in the lake. Variables and stresses – important that they are spawning at one location; lower egg mortality and spawning at more sites may add resiliency in response to other stresses.
- Mathiasville Reservoir spring spawning activity – Fisheries & Oceans produced a brief report – visual observation at various spring spawning habitat locations in the Mathias reservoir; south branch. Conclusion – very low risk to fish in spring (best management process will be beneficial); all probability it would have a positive effect vs. negative. No further work will be conducted; DFO report addresses the issues at hand. Acres document – supportive

	document within the Plan. • Brook trout monitoring – Big East River and tributaries. McCraney – FRI did the report (available). Found brook trout only at one location in main river at mouth of cold water tributary. Additional location – unregulated – Mink Creek – again they didn't find anything there. Head up the tributaries once water warms or become restricted to discrete areas. Main stem does not supply good quality brook trout year round – only seasonally. Done in 2006 – did not establish a base line – questionable whether it would be worth repeating. FRI conducted another study – electro fishing study when the Finlayson dam was removed. The two reports should be merged into one – same results in both reports (month of August); discussion around: the appropriate timing for the study; late May or early June when brook trout are more generally distributed vs. late summer when conditions are more limiting: can only sample under certain flows. Historical status: Time/nature has not had a chance to repair itself. Brook trout have diminished over time. • Moon River update – internal meetings being held to discuss results of walleye habitat survey – where to go with this project. 2005 data show clearly low supply of spawning habitat; impact of low water levels of Georgian Bay; Flows come up/down very quickly. Recognized that we hold back water at the Muskoka River causing less water being flushed down the Moon River. This is not a yearly event. Presentation by Dave Gonder's (lead) re: effects of holding back water. • Dam Operators will follow the guidelines/work with them to express the OMNR objectives to attenuate water in Lake Muskoka to reduce peak Moon flows. • Using the data collected by Dave Gondor - modeling to predict flow velocity, depths, etc. directly below the second chute. Spawning shoal design to be in place by the end of March. • Funds for Effectiveness Monitoring may be available from Peterborough OMNR for fiscal year 07/08. • Operational model using flood forecast has been submitted as a priority through capital funding for dams. • Minutes available on-line –i.e. minutes of the Eastern Georgian Bay, OMNR & OPG meeting; fisheries site. • Eric McIntyre – EGBSC Coordinator is developing a rehab plan including flow regime, habitat enhancement, stocking, harvest control and monitoring/assessment. Draft report is out today. To be posted on EBR.	
4	Review and action on Mary Lake Operating Plan Amendment Request: • Amendment request – Lake Association attended last meeting; maintain that last spring/early summer levels were too high • Lake Rule Curve – both new and old target lines presented and illustrates 11 year average mean water level. Proposed Best Management Practice (BMP) line also presented to address high water concerns (operating plan chart attached to the package handout illustrating the former); May 16th when the cottage association addressed their concerns. In the absence of rain OMNR brought the level up causing concern– didn't meet the target line until May	All

21st. Bracebridge Generation had concern that spring target peak elevation (May 6th) not met; Operational change to meet new Plan objectives – sequential placing of stop logs to bring the lake levels back up; higher level in spring with a gradual decline over the summer while maintaining minimum flows.

- Old vs. new target table provided– comparison of target lake level differences in 5-day periods from May 1-July 31. Also a comparison of 2006 actual levels to the 11-year average. Based on the concerns for the May 2006 period – proposed BMP comparison included.
- Proposed BMP can be implemented when watershed conditions permit – snow melt/rains= flows. Start higher in the spring – gradual decline/lower over the summer into early fall. Approximately 10 cm lower on May 16th as compared to target level. Key issue – how high and duration of higher water levels. Proposed changes – core objectives; Summary of current information for Mary Lake – Steve Scholten (environmental/aquatic); No concrete information. Not a lot of wetland area on the lake; Do not know the impact of either regime on Mary Lake.
- Wetland tutorial – 45 day objective; lower spring peak and still retain the 45 day draw down curve to September 15th. Kim did a MRWMP file review – no specific rationale documented for current rule curve and high spring levels. Reduced winter draw down for reduced lake trout egg mortality. Increased fall draw down to reduce water level reduction from spawning to hatch. It is assumed that the Acres ARSP modeling program in planning stage generated the new rule curve resulting in higher spring levels. Slower reduction to summer levels create long period of targeted higher levels as compared to old rule curve. Suggested that Acres (Larry King) be contacted to determine/verify rationale- new spring target peak.
- Proposed BMP – current peak (May 6th) with faster reduction in water levels to May 21st to balance all the Plan objectives. Not achieving the social goals of the Plan, as identified by public and lake association concerns. No specific concerns for spring/early summer were received during consultation (not until implementation in 2006).
- What initiatives/directives are coming out of Peterborough? - Aquatic Ecosystem Guidelines workshop didn't occur last winter. No direction provided to date on such issues concerning higher targeted levels.
- Summer levels are essentially "bankfull" already for recreational purposes. New spring/early summer target is significantly higher than previous rule curve. Use same criteria (natural flow regime principles) if this is going to be changed. Base case peak – 15 cm. above/below. No significant impact and no concerns from the public at that time; Concern of making changes at this time – essentially only one cottage association with concerns (and Huntsville resolution). How written in stone is the model and can it be adjusted? React to one cottage assoc. that water levels are back to previous target by May 24th. Not enough information at this time – will this happen again? One year's information. Once again, key issue is duration of high target levels. We have a theory but no biological data. Modelling issue – green line driven by the modeling. Previous spring peak level – 280.88; relatively small size of lake

can bring lake level up quickly due to minimal storage; hence higher new spring peak. Can react quickly depending on north branch watershed conditions. Period of record – will always maintain the minimum flow requirement downstream of Mary Lake.

- Review – value between current target and BMP – cubic meters/day – Bracebridge Generation's High Falls plant (largest facility) – Calculations shows the north branch flows fall below 27 cms on or about May 21st (High Falls facility maximum generation flow). Preliminary work by Bill McMullen/Nick Paroschy – loss of storage equals approximately 1/2 a day of High Falls generation station). Need the river flows – peak capacity – how much is being spilled at that time. What is the loss of revenue? Winter draw down- possible considerations to address high water concerns, but may not a viable alternatives due to lake trout mortality. No hard ecological science in spring for Mary Lake. Premature to make changes such as an Amendment after only one year. Better performance under the new plan.
- Conclusion – recommendation from SAC – must be made prior to spring. Determine the BMP that would best address and balance all objective; social, environmental, and economic. Aquatic objective for higher spring levels for a 45 day period, with no more than a 10-20 cm drop from spring peak important item identified in MRWMP and should be addressed with any proposed BMP. More homework needs to be done to determine the economic impact of a BMP. Complete a summary of the affects (positive and negative) on social, environmental, and economic objectives for any proposed BMP line to consider/determine appropriate option for change to operating plan.
- Suggestion that trying to meet the expressed concerns – when watershed conditions permit – lower target level than in 2006 (new Plan); present to the local press so that they know we are doing something. Steve Taylor to be the spokesperson for the group as he has the technical background.
- Proposed BMP still meeting the normal operational range. Section 17 re: amendments to the Muskoka River Management Plan, final version – any Amendments forwarded to the regional director for approval.
- Given a BMP approach, and still operating well within the normal operating range; a formal amendment is not required at this time. Lack of environmental information (and economic at this time), a formal amendment wouldn't be reasonable, at least until assessment efforts, science and information can support it.

Recommendation from SAC Committee:

- SAC requests that OMNR investigate the economic, social and environmental impacts in establishing a lower BMP target under that of the current target level when water shed conditions permit while maintaining the 45 day draw down guidelines and a recommendation of the numerical value and report back by Thursday, March 22, 2007.

Motion by Patricia Arney; Seconded by Ben Boivin
Carried/Passed
Concerns re: bringing forward to the press – send a letter to the cottage association

	with the attempt to make changes to the operation.	
5	*Compliance Monitoring Update* • Since last meeting – No Event Reports received where operators had deviated beyond operating range.	Steve T.
6	*Waterpower update* Renewable energy – general update • Bala North – Swift River Energy – discussion with their partners. 2 years to complete the process leading to construction. March 2008 to meet the EA and approval requirements leading to location Approval. First EA Notice of Commencement released – March 2006. Delay in furthering the EA was due to the Standard Offer Program not being in place; guarantees 11 cents kw/hr, and some business considerations. Request for an extension on the project will be required, and will likely be granted due to delay in Standard Offer Program. • Go Home Lake dam waterpower interest – complete application yet to be received. • Interest in Mary Lake and Baysville dams- other locations where interest has been shown	Steve T.
7	Walk on Items/Open Space - Nil	
8	Request for Kim Benner to attend MRWMP Standing Advisory Committee: • Request by the SAC member to A. Heerschap that Kim Benner be in attendance at meetings • Rationale - Kim has been a part of the MRWM Plan from the initial stages. Kim has been a valuable resource/support to the committee and a wealth of knowledge in regards to the water management plan. • OMNR discussion between Andy, supervisors and Kim has taken place re: her participation at meetings. • The other District Planner is going on a six month acting assignment to Region which means a realignment of her duties within the District and an increased workload for Kim. • Andy would like to see Kim used as a resource vs. direct involvement in meetings. • Kim's attendance at meetings will be agenda driven. Agenda information to be sent electronically prior to each meeting allowing the SAC to determine whether Kim is required to attend the upcoming meeting.	Andy H.
9	New Business: • Non OPS Expense Invoice – form circulated for claiming mileage @ a current rate of 40¢/km.	

Meeting adjourned: 09:00 p.m.

Next Meeting: Thursday, March 22, 2007

ONTARIO MINISTRY OF NATURAL RESOURCES

PARRY SOUND DISTRICT

***MRWMP* Standing Advisory Committee Meeting - Minutes**

Meeting Information

Subject/Title:	**MRWMP Standing Advisory Committee Meeting**		
Date/Time:	March 22, 2007 5:00 p.m. **Sharp**	**Location:**	Bracebridge Area Office (High Falls) Parry Sound District

Meeting Chair: **Vice-Chair:**	**Stewart Martin** **Ben Boivin (regrets)**
In Attendance: **Guests:** **Regrets:** **Recorder:**	Steve Taylor, Tim Clarke, Rebecca Crockford, Don Currie Brian Ingram (Bracebridge Generation Ltd.), Steve Scholten; Andy Heerschap Pat Arney, David Servos; Ben Boivin Theresa Haveling

Item	*Topic/Discussion*	Lead
1	*Review Agenda* • Any items to be added • Meeting called to order @ 5:50 p.m. • Minutes from Help our Fisheries.com (next meeting)	Stewart Martin
2	*Review Minutes/Action Items from February 15, 2006 meeting* • Errors/omissions - Nil • Motion by Don Currie to accept the minutes; Seconded by Tim Clarke • Motion carried	Stewart Martin
3	*Mary Lake Dam / Best Management Practices (BMP):* **Recommendation from SAC Committee**: • SAC requested that OMNR investigate the economic, social and environmental impacts in establishing a lower BMP target under that of the current target level when water shed conditions permit while maintaining the 45 day draw down guidelines and a recommendation of the numerical value and report back by Thursday, March 22, 2007. • Ecological objectives as identified in the water management plan • Bill McMullen – retired engineer; Email from Bill circulated – proposed best management practice line for Mary Lake: 1. From May 3 (lake elevation of 280.90 m.) straight line to June 20th (lake elevation of 280.80 m.)	All

2. From June 20th – straight line to July 5th (lake elevation of 280.78 m.)
3. This proposal provides for a target water level reduction on May 5th of 0.1 m.

- Changes to Mary Lake plan and the effect of generation - north branch of the river; Nick Paroschy's analysis of loss of generation concurs with preliminary numbers presented at the last meeting. Brian Ingram also concurs.

- Letter from Bracebridge Generation – comments re: amending the water levels @ Mary Lake (letter circulated by B. Ingram):

1. If a BMP is adopted to address high late spring/early summer concerns, Mary Lake water levels should not be allowed to fall below identified BMP levels that would further reduce generation potentials at BG Ltd. Facilities north branch, Muskoka River.
2. Bracebridge Generation does not endorse changing the present water management plan, but in view of what is best for all parties will not oppose the proposed change.

- Discussion around the economic cost of losing the equivalent of ½ day (0.44 day calculated) of maximum generation. During the planning stage unwritten rule that financial information would not be released, therefore an actually dollar figure will not be released
- Reduction based on a 10 cm drop from the current peak.
- Difference between old/new objectives. Will this be satisfactory to Mary Lake Association and other key stakeholders? SAC is the interface with public groups.
- SAC concern that there has only been one season to date and with making a change to the plan so quickly. Preference would be to have at least two years data/trend (last year was an anomaly in terms of watershed conditions). Overall looking at the rule curve – early May 2006 was actually below/lower than target line. At this point we don't know what the norm is for level/flow responses under new WMP.
- Modeling and flow/level dynamics – possible concern that adjusting level objective could have a ripple affect on watershed downstream;
- What would be the effect on other lakes, i.e. downstream river courses and lakes
- A BMP would be implemented or affective when watershed conditions permit (i.e. less than average spring freshet/rains). The MRWMP and background documents – recommendations – nothing conclusive in regards to potential affects of changing level objectives. Implementing a BMP when watershed conditions permit; this will not create a deviation from the Plan – can be met from an operational approach for levels and flows. If we can meet the ideals of the BMP – better to follow that. Adaptive dam

operation decisions to best meet Plan intent and drawdown guidelines (45 day rule) for environmental objective.

- Steve Scholten's handouts – Late winter drawdown 20 cm higher than it used to be under old Plan; Peak of green (target) line of present Operating Plan is not a result of response to specific know habitat on Mary Lake, but a result of the modeling due to reduced spring lake storage as a result of reduced winter drawdown (to reduce lake trout egg/fry mortality).
- What we know of Mary Lake: existing info – aerial photos and file information; very little wetland habitat on Mary Lake proper – small tributaries and portion of north Muskoka River (upstream) that could be influenced by lake levels. Can not conclude anything at this time.
- Whatever the peak is if we maintain a slower rate of lake level decline through 45 day period post spring peak. Pursue further – could do a reconnaissance this spring to get an understanding of how wetlands may be impacted.
- Operating Plan graph - Red line presents 1995 to 2005 (11-year) average lake levels in spring; Blue line is actual daily levels at Mary Lake for 2006. Period of public concern for 2006 high levels is from approximately May 16th leading into the May long weekend. At that time, Mary Lake dam was operated to bring water level up to target line; lack of spring rains created sub-optimal (low) levels in early May.
- Main public concern is the duration of the high level of water, as much as the peak. Mid June and late July saw short periods of above-target levels due to high rainfall events. Historically the 11-year lake level average is what the residents see and have become familiar with: i.e. a line on the dock, rock in the lake, etc.
- If Mary Lake level is at the peak of the current spring target peak – could you maintain the level @ 280.10m. given the dam stop logs height? - Steve T.-yes: if flows and head of water at the dam are high enough.
- Andy – question re: loss of ½ day of generation- affect of water level Fluctuations?: generation loss only occurs if river flows exceed optimal generation in system; can't be avoided during high flow periods, and when high lake levels needs increased dam discharge.
- For Bracebridge Generation (after river flow falls below 27 cm) - Bracebridge Generation is calculated to be above 27 cms for 245 days of the year.
- Premature to be making changes – proposed BMP line (dotted line on graph) meets the objectives of the plan. The BMP could be better than target (green) line. Mary Lake has the smallest surface area; generally easier to control; lake levels through dam operations.
- Prefer 2 years data but one year would work; every year is different- a lot of variability in watershed year-to-year.

- For any decision on changing operation objectives, must weight the effect on hydro generation as well. Concern is the peak (freshet-driven) and related duration of higher levels.
- Possible backlash for other cottage associations - if we change for Mary Lake – why can't you change for us?- Mary Lake shown to have greatest increase in target line spring peak as compared to other lakes- relatively higher levels seen last year in Mary Lake as compared to other similar lakes.
- BMP proposed- 10 cm lower than the current spring peak target line as a starting point; BMP objective would be given "due regard", and met when existing watershed conditions/flows permit. Will address high water concerns on Mary Lake in May, 2006. Effects downstream – hydro generation loss at OPG facilities downstream insignificant with proposed change. Confirmed by Bob McEwen, OPG at the 2007 OMNR/Producer pre-freshet meeting.

- Last fall Eastern Georgian Bay Stewardship Council (EGBSC) meeting – Council want to increase spring Lake levels in managed lakes to reduce impact of flows on Moon Falls, Moon River walleye spawning location. EGBSC now understands the complexity of the watershed, and recognize that increased lake storage/water levels will not meet overall objectives of MRWMP (watershed approach).
- SAC in favor of staying where we are without formal Amendment to MRWMP. Endorse reducing spring lake levels somewhat to address high water concerns (when watershed conditions permit). T. Clarke in agreement – on average, catch the freshet approx. April 26th then follow the general draw down; keep somewhat between proposed BMP line and Operating Plan target line (green line on graph). Keep the ideals for the winter drawdown (lake trout reproduction). Attempt to avoid the spikes in levels whenever possible.
- **Resolution** – no formal MRWMP Amendment at this time and we will continue to gather more information. Is largely an *operational approach* to objectives – common practices; not requiring an Amendment. Potential impacts – loss of hydro generation, not likely a negative environmental impact. Direction allows for a BMP approach to issue, not a hard and fast target line approach.
- Operational approach to issue will attempt to reduce the (average) spring peak from 281.00m. to 280.95m., with resulting lake levels declining through to the end of June. The result will be lower lake levels than identified by the current operating plan, and equitably address the May, 2006 mid-May high water concerns.
- It is recognized that the potential loss of generation is acceptable to the hydro producers, and the overall negative affect on aquatic values is unknown but is felt to be minimal, if not a potential improvement (by reducing the potential for a significant decline in

	levels over a spring 45-day period). Ongoing investigations will help to determine aquatic impact of reduced late spring/early summer levels, as well as future science and information. • Recommend that Steve Scholten complete a one-day initial assessment on Mary Lake to assess potential inshore affects on aquatic habitat (i.e. northern pike spawning sites) as a result of planned water level management ; • Contact with Mary Lake Cottage Association – we are responding to concerns in a reasonable manner. Will continue to monitor and assess any positive and negative affects. • SAC – should liaison with Mary Lake Association to communicate SAC recommendations to address 2006 concerns. SAC responsible for general public consultation and providing information, including general correspondence to applicable stakeholders. • Communications – MRWMP will not be amended .Will monitor. Joint response OMNR to draft letter of decisions concerning Mary Lake late spring/early summer water levels. • Mary Lake Association- July 28, 2006 submission request for water level change acknowledged and on record. • Mary Lake – a managed Lake Trout Lake; importance of reduced winter drawdown to reduce egg/fry mortality is very important component of ecological objective.	
4	*Kawagama Lake Overview*: • Last meeting – draft copy of the consultant egg/fry mortality report presented. • Final copy is now available (PDF format – full report if anyone is interested) – Steve S. presented one-page summary of what the survey found lake- wide, with comparison to similar 2003 study. Two primary sites where fish were seen – Shoals 5 and 16, as well as Shoal #26 (not seen here 2003 study). Fish spawning deep in some cases and difficult to see during study. • Contrast – more fish seen at shoals 17.1 and 17.2 • Repeat egg deposition study –not worth repeating 2003 study; spawning still occurs mainly at same sites. • Quite a difference compared to 2003 in proportion of eggs at different depths • Verifies what was thought to be occurring in past; winter drawdowns can have a significant negative impact on incubating eggs and emerged fry. • Up to 70 % of eggs could have been dewatered under old rule curve - reinforces that we are doing the right thing by reducing extent of winter drawdown. • observation done during spawning during the last couple of weeks of October – cooler temperatures were observed in fall of 2006	S. Scholten

5	*Review "Terms of Reference"* • Two (2) sets of ToR – circulated – current ToR for the Standing Advisory Committee (SAC) and Public Advisory Committee (PAC) and how the committee was established. • PAC provided advise/comments during the Muskoka River Water Management Plan process. • Routine meetings – 2/year and additional meetings as required • SAC Steering Committee consists of senior managers from both the OMNR and local water power companies, and a DFO and First Nation representative. • Discussion re: the steering committee being part of the regular meeting and their direct involvement at the meetings. Is their involvement at meetings changing the decision being made by the committee? SAC feel that having them attend meetings is a valuable asset to the SAC and that the information being provided by the Steering Committee is invaluable. • SAC accepts having the Steering Committee in attendance and participating at meetings. • Steering Committee should be involved in any formal Amendment request/process to the MRWMP and if there are issues that the SAC cannot agree upon. • Steering Committee should receive all correspondence, including minutes from past and future SAC meetings. • Any public requests to speak to the chair, co-chair, or members should be addressed through the chairperson who will address or forward as required. Prefer email contact, and then phone. • Specific SAC-related concerns or requests for information or follow-up for members; Process – pass through Stewart Martin (Chair); Information that OMNR needs to spend time on and gather for consideration by the SAC should also go through Stewart and then shared with the remainder of the committee, and OMNR (Steve Taylor). •	All
6	*New Business:* • Nothing to report since February meeting • Travel expenses – year end closed today • Water Management Plan –report will be written after one year; Plan implemented on April 20, 2006 (one year target). Consider calendar year approach with a report date by December 31. • **MRWMP** Minutes are public documents as per Terms of Reference – copy of the minutes will be sent to the Mary Lake association, as per their request. •	S. Martin

Meeting adjourned: 8:00 p.m.
Next Meeting: No date set - hold at this time until required.

Appendix 7 – OMNR Reconnaissance Reports (2007)

First OMNR Reconnaissance Report – May 24th, 2007

A half day reconnaissance of wetlands on Mary Lake and its tributaries was conducted on May 24, 2007. The purpose of the study was to scope the potential impact of water level management on wetlands and their use by fish. Current consternation of Mary Lake property owners over the rule curve for Mary Lake under the Muskoka River Water Management Plan (2006) was the impetus of the review. The new rule curve enshrines principles of the Aquatic Ecosystem Guidelines; specifically, the plan calls for a gradual decline in water level from the spring peak. The intent is that wetlands that are inundated and used by fish for spawning will retain water for the spawning and nursery period.

The water levels:

Survey Date: 280.85
New peak: 281.00
Old peak: 280.88
Old summer: 280.73

Mary Lake proper has very little wetland habitat. The vast majority is found on tributary streams. A summary of the main wetland areas observed and assessment of the potential impact of an abrupt decline of the water level on northern pike follows:

Location	Description	Assessment – Impact on Fish
Mary Lake – mouth of North Muskoka River	Shallow sand bars on either side of river mouth. Limited vegetation at time of survey. No backshore wetland. Exposed to wind and wave action. August update: Scattered reeds throughout this area	Minimal wetland habitat. Will remain watered at normal summer level.
Lancelot Creek system	Stream is a deep water channel up into Spider Lake (navigation is blocked by low bridge). The stream is bordered by a narrow band of fringing wetland vegetation with direct access to deep water throughout.	The connecting stream between Mary Lake and Spider Lake is not susceptible to impact as it is narrow and close to deep water.
	Spider Lake itself is a large wetland and was not included in the evaluation	The impact of water level fluctuation on Spider Lake wetland is unknown. This is the largest wetland directly affected by Mary Lake and should be investigated further.
Unnamed stream, NW	Mary Lake is separated from the stream wetland by a road. The water level on	The wetland is not influenced by the Mary

side of Mary Lake	the upstream side is 0.6 m on the upstream side of the road	Lake level. The road culvert is blocking access to the wetland.
Unnamed stream, N end of Mary Lake	Wetland is separated from Mary Lake by a beaver dam at the upstream side of the road culvert. A second beaver dam is about 100 m upstream. The water level in most of the wetland is well above the Mary Lake level	The wetland is not influenced by the Mary Lake level. The road culvert and beaver dams are blocking access to the wetland.
North Muskoka River – backwater	Old river channel that has become sheltered by a sand bar. Gets gradually shallower toward back. Little vegetation	No impact.
North Muskoka River – margins	Scattered areas of fringing wetland; mostly cattail with depth of about 35 cm at end of open water;	Edges are accessible; may be some isolated pockets as water level drops
North Muskoka River tributary mouths	Small streams with broad wetlands at mouth; shrub zone transitioning from dry inland to floating at edge; shallow side channels with organic bottom (probably submerged vegetation in the summer	Fish could access side channel that may get shallow and isolated. If used, fish probably use the more accessible open water areas

Lancelot Creek looking up toward Spider Lake. Narrow band of vegetation on edge of deep water channel. Extensive Spider Lake wetland in background.

Lancelot Creek – small area of wetland that would be inundated at higher water level.

	
Backwater area on river. Mostly deep water with no vegetation.	Fringing wetland on North Muskoka River.

In summary, most of the wetland area is on the North Muskoka River and Spider Lake. Spider Lake was not visited and requires further investigation. For the remaining areas, the water depth and slope (close access to deeper water) are such that these areas do not appear to be greatly susceptible to stranding or dewatering of pike eggs and fry. There is no clear benefit of one rule curve over the other with regard to pike spawning.

Wetlands by nature are adapted to changing water levels and the differences between the two rule curves are relatively small. I do not expect to see any significant changes to the wetland communities.

Stephen Scholten
June 2007

Second OMNR Reconnaissance Report – August 29, 2007

Report on Site Visit to Spider/Penfold Lake Wetlands
Jan McDonnell and Stephen Scholten
August 29, 2007

Background

The rule curve for operating the dam controlling water levels in Mary Lake was adjusted in 2006 as part of the Muskoka River Water Management Plan. Guiding principles of the new curve included providing a water level regime that was more natural to provide benefits to littoral and wetland areas; and reducing winter drawdown to protect lake trout egg and fry from desiccation. The new rule curve has a high Spring peak and gradual reduction rather than the abrupt decline to summer level that occurred in the past. This has resulted in concern amongst property owners on Mary Lake who have found that the new regime results in water levels that are much higher in the spring and early summer than occurred under the previous regime.

The new curve was devised without specific knowledge of the wetland areas on Mary Lake. An initial reconnaissance was conducted on May 24, 2007 to determine the location, extent and nature of wetlands on the lake. It was found that the most extensive wetlands were not on Mary Lake proper, but on the Lancelot Creek system, which flows into the west side of Mary Lake. A site visit was conducted on August 29, 2007 to characterize the wetlands on this system and attempt to evaluate what impact the different water level management strategies. These wetlands are not evaluated. If evaluated, the Spider/Penfold Lake wetland would likely be provincially significant, judging from its' size.

Water Levels:

August 29:	280.65
New peak:	281.00
Old peak:	280.88
Old summer:	280.73

Observations

Spider Lake is connected to Mary Lake by a navigable, deep-water channel (Lancelot Creek). It is possible to boat up to a beaver dam at the outlet of Penfold Lake. The beaver dam has been in existence for some time as evidenced by the amount of material in the dam and the shrub and small tree growth on the top of the dam. The dam is currently holding a low head of water (<0.5 m); Penfold Lake is not impacted at all by water management on Mary Lake.

The open water areas of the creek and Spider lake had communities of submerged aquatics including bladderwort (*Utricularia* spp.), tape grass (*Vallisneria americana*), several species of pondweeds (*Potomogeton* spp.); and floating-leaved aquatics including white water lily (*Nymphaea odorata*) and yellow water lily (*Nuphar variegatum*). These communities are resilient to water level changes. It is unlikely that the relatively small difference between the old and new rule curve would have any impact on these communities

Virtually all of Spider Lake and much of the connecting channel and are bordered by emergent wetland vegetation. These communities are dominated by cattails (Typha latifolia), sweet gale (*Myrica gale*), spirea (*Spirea latifolia*), pickerelweed (*Pontederia cordata*), and leatherleaf

(*Chamaedaphne calyculata*). Much of this vegetation at the edge of the open water grows in a floating mat and it is very hummocky. Mosses grow on some of the hummocks.

Floating mats tend to develop at the outside edges of wetland areas. The roots and stems of plant species spread out over the surface of the water; the root mat and decaying organic material create a surface upon which other wetland species can grow. Peat develops under the mats and eventually the mats no longer float. The water level regime of these wetlands is seasonally flooded (this information from the *Field Guide to the Wetland Ecosystem Classification System for Northwestern Ontario*).

The impact of the new water level regime as compared to the old one is difficult to predict. The impact on the vegetation is more than likely undetectable because this is a very resilient wetland community that develops under conditions of seasonal flooding. It is difficult to determine whether the additional changes in water level due to management would change the wetland community more than it would have changed under a natural scenario. That is, changes due to water level management can be easily masked by a high level of natural variation and a long response time.

A specific potential benefit of following a more natural rule curve is to provide suitable conditions for spawning and incubation of the eggs of fish that use wetlands to spawn; specifically northern pike. Northern pike spawning areas have not been identified on Mary Lake. Spider Lake and the small creek mouths on the North Muskoka River appear to be the most likely locations. The northern pike population has not been assessed.

A different question is the impact of managed water levels on wildlife populations that use wetlands, such as reptiles (turtles), amphibians (mainly frogs), and mammals (beaver, muskrat, meadow voles). In general, the principal of allowing water levels to fluctuate in a way that would emulate nature is the best approach. Most of these animals go into hibernation by burrowing in to the mud below the frost line (turtles, frogs), or prepare winter quarters based on fall the fall water level. A water level regime that varies from natural can threaten the survival of these animals. For example, drawdowns of about 40 cm that typically occur over the winter may cause frost to penetrate into the substrate where reptiles and amphibians are hibernating, causing mortality. Similarly, falling water levels when animal such as beaver and muskrat are in their dens could have a negative impact on these animals.

In the spring, as a general principle, it would be better to allow water levels to return to normal summer levels in a way that would emulate nature; that is, gradually, rather than abruptly. A short duration peak during the freshet is probably not important.