
Mississippi
Lake Plan
30 May 2015

Mississippi Lakes Association

Ontario Trillium Foundation / Fondation Trillium de l'Ontario

Mississippi Valley Conservation Authority

Watersheds Canada
Your Lakes. Your Rivers. Your Future.

French Planning Services Inc.
www.lakeplan.com

Front page photo "*Jumpin' Jack*" is provided courtesy of Kristi Wells, Beck Shore, Mississippi Lake.

Jack is a fifth generation Mississippi Lake cottager. He took his first big running jumps into the lake on Canada Day 2014! He jumped until the sun went down. Sitting watching him brought us all back to those carefree days of childhood and the feeling like you were flying, even if it was just for a moment, until the cool refreshing water caught you with a thrill.

Other photos provided by the Mississippi Valley Conservation Authority, *Mississippi Belle*, Gardiner Shore Association, David Hands (air photos), Pamela Anthony Photography, and French Planning Services.

Preamble

This Mississippi Lake Plan represents the culmination of three years of effort by a dedicated team of community volunteers, township representatives, Watersheds Canada (formerly the Centre for Sustainable Watersheds) and the Mississippi Valley Conservation Authority, all led by members of the Mississippi Lakes Association. The Plan summarizes the issues and observations identified as a part of the Mississippi Lake Plan project, and provides a series of potential actions that could be taken to address the known issues.

We encourage everyone to review this Plan and related materials, which are posted on the Mississippi Lakes Association website (www.lakemississippi.ca), and provide comments to: misslakeplanorg.rb@gmail.com

The current list of Goals, Objectives and Actions is a solid starting point towards ensuring, and maintaining, a healthy lake environment. However, in time, with further study and information available, and as implementing activities progress on the 2015 Plan, other potential actions will no doubt become evident. Modifications and updates to this Plan will be undertaken as a necessary and logical next step towards ensuring that the Lake Plan meets the needs and aspirations of the community.

Acknowledgements

The Mississippi Lake Plan project has benefitted from the support and contributions of many groups and individuals including: volunteers from the lake community; members of municipal councils; staff from partner agencies; and funding partners. A big thank you to all of the individuals and groups listed below.

Mississippi Lakes Association:

- Rob Bell – Mississippi Lake Plan Committee Chair
- Andre Langlois
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- Jim Tye
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Municipal Representatives

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- Gail Code - Drummond N. Elmsley Township
- Rob Probert – Town of Carleton Place

Mississippi Valley Conservation Authority

- Alyson Symon
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Others

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- Gord Rodgers - French Planning Services (facilitator and advisor)

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- Kim O'Connor - Mississippi Lakes Association
- Lynne Preston- former Watershed Canada
- Peter Elliot - Mississippi Lakes Association
- Terry Kirkpatrick - Mississippi Lakes Association

Agency Partners

- Watersheds Canada – Lake Plan Committee, project management and funding
- Community Stewardship Council of Lanark County- Technical Advisory Committee
- French Planning Services – Facilitation and Advisory services
- Leeds, Grenville and Lanark District Health Unit - Technical Advisory Committee
- Mississippi Valley Conservation Authority- Lake Plan Committee and Technical Advisory Committee, project management and funding
- Ontario Ministry of the Environment and Climate Change - Technical Advisory Committee
- Ontario Ministry of Natural Resources and Forestry - Technical Advisory Committee
- Town of Carleton Place - Lake Plan Committee and Technical Advisory Committee
- Town of Mississippi Mills - Lake Plan Committee and Technical Advisory Committee
- Township of Beckwith- Lake Plan Committee and Technical Advisory Committee
- Township of Drummond North Elmsley- Lake Plan Committee and Technical Advisory Committee

Funding Partners

- RBC Bluewater Project
- TD Friends of the Environment Foundation
- The Ontario Trillium Foundation
- Valley Heartland

Some of Our Volunteers at a Public Forum

Executive Summary

The Overall Objectives of the Lake Plan

The purpose of the Mississippi Lake Plan is to identify and protect the significant social, natural and physical features that make the lake and its surrounding area a healthy natural environment and a desirable place for people to live and visit. The Plan provides a blueprint for action on Mississippi Lake, based on extensive community involvement, and an assessment of the current condition of the lake. A set of actions have been identified as ways and means to address the values and issues identified during the development of this plan.

The Process Used to Develop the Lake Plan

Early in 2012 a Planning Team and an Advisory Committee were formed. The process has been led by members of the Mississippi Lakes Association, with active participation by Watersheds Canada, the Mississippi Valley Conservation Authority, and area municipalities, with advice provided by French Planning Services Inc. Funding was obtained from the Ontario Trillium Foundation, the RBC Bluewater Project, TD Friends of the Environment Foundation and Valley Heartland.

A Community Survey was developed in April 2012, to gather advice and information from the people who live and cottage around the lake as well as other lake users. The survey was made available for 20 months, and formally closed in January, 2014. Twenty seven (27) % of the estimated 1200 lakefront property owners completed the survey, and provided information on: what they valued about the lake; the concerns or issues that need to be addressed; and the potential actions to be considered to protect the health of the lake.

A supporting report entitled Mississippi Lake Today was released in June 2014 and provides a snapshot of the state of the lake's environment, land uses and development levels, and its boating and recreational conditions. This report is a key building block in the Mississippi Lake planning process, and provides the best available information to develop a detailed plan that will guide stewardship action and land use policy for the long-term protection of the lake environment.

A public review process of the survey results was started in mid 2014 which consisted of two public forums at which key lake issues were determined and actions to address these issues identified. A total of six priority areas were identified from the issues and a goal was established for each priority.

Goals for Priority Areas

Water Quality

GOAL: Work towards maintaining high water quality in Mississippi Lake and its inflowing streams to support a healthy natural environment, and to support the use and enjoyment by residents and visitors.

Aquatic Vegetation/ Algae

GOAL: Work towards achieving a balance of aquatic vegetation to support the ecological needs of the lake and allow for the continued human enjoyment of the lake.

Water Levels and Flooding

GOAL: Work towards community awareness of water level management, to sustain natural ecosystems and to minimize risks from flooding.

Natural Environment

GOAL: Work towards maintaining a healthy and diverse ecosystem, including a healthy fishery

Land Use and Development

GOAL: Work towards future development that maintains the character of the lake and that protects the natural environment, water quality, and the social/recreational features of Mississippi Lake

Social and Recreational Activity

GOAL: Promote social and recreational activities that respect the natural environment, the residents and users of the lake, and help to build a sense of community.

Implementing the Identified Goals

The Planning Team and the Advisory Committee, with input from the Public Forums, determined specific actions that could be implemented to achieve the identified goals. These actions cover a wide range of activities and are enumerated in Chapter 4 of the Plan. See Chapter 6 for a summary of the Action Plan.

The Mississippi Lakes Association commits to investing leadership in helping to achieve these goals. This will be an ongoing effort that will include a formalized assessment on an annual basis to measure progress which will be made available to all stakeholders of the Plan.

For effective implementation, it is recommended that an Implementation Working Group be struck, with members representing the Mississippi Lakes Association, Mississippi Valley Conservation Authority, and the local municipalities.

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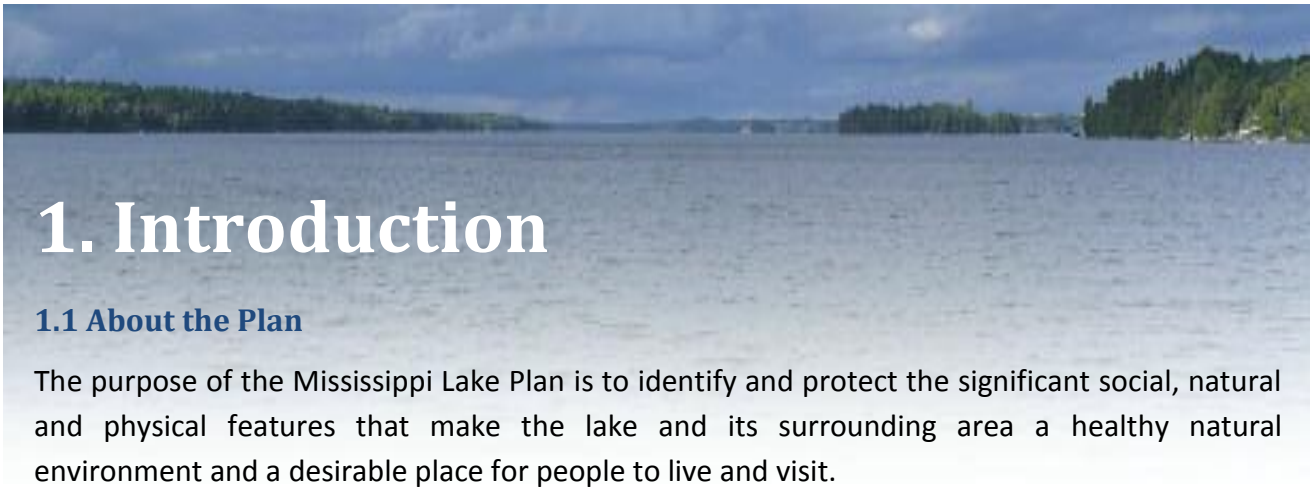


1. Introduction

1.1 About the Plan

The purpose of the Mississippi Lake Plan is to identify and protect the significant social, natural and physical features that make the lake and its surrounding area a healthy natural environment and a desirable place for people to live and visit.

The Plan provides a blueprint for action on Mississippi Lake and surrounding area, based on extensive community involvement, and an assessment of the current condition of the lake. Sixty-six actions are proposed as a ways and means to address the values and issues identified in the lake planning process. The actions may be short term or long term in nature, and implementation will depend on a cooperative program that engages everyone who has an interest in the lake – cottagers, residents, farm owners and operators, commercial operators on and near the lake, lake users such as fishermen and hunters, townships, conservation authority, and other government agencies. The Algonquins of Ontario (AOO) should also be invited to participate in carrying out relevant actions.

The Mississippi Lake Plan is accompanied by a compilation of background information, presented in the Mississippi Lake Today report – coordinated and written by the Mississippi Valley Conservation Authority. The Mississippi Lake Today report provides more comprehensive information upon which the actions in this plan are based. The report can be obtained at www.lakemississippi.ca.

The Planning Process

Initial Set-up	*2012*
Community Survey	*2012-2013*
Mississippi Lake Today	*2013-2014*
Public Forum 1 - Values & Issues	*21 Jun 2014*
Forum 2 - Issues & Actions	*20 Sep 2014*
Prepare Draft Plan	*2014-2015*
Review Draft Plan	*21 Feb 2015*
Lake Plan 2015 Launch	*30 May 2015*

1.2 Preparing the Plan

The development of the Mississippi Lake Plan began in 2012, with the initiation of the Planning Team and the Advisory Committee, along with securing funding from Ontario Trillium Foundation. The process has been led by members of the Mississippi Lakes Association, with active participation by the Centre for Sustainable Watersheds, the Mississippi Valley Conservation Authority, and area municipalities, with advice provided by French Planning Services Inc.

A Community Survey was developed in April 2012, to gather advice and information from the

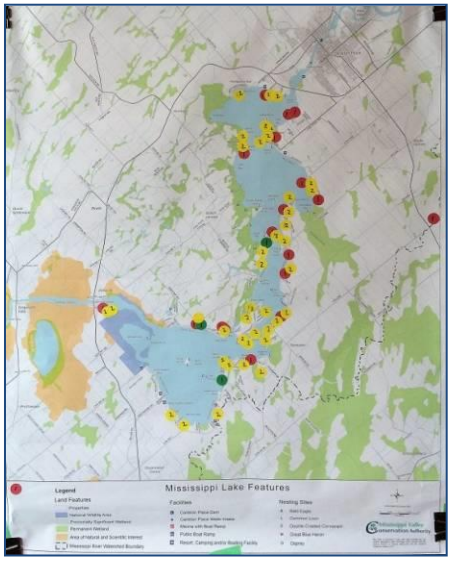
people who live and cottage around the lake. The survey was made available for 20 months, and formally closed in January, 2014. Twenty seven (27) % of the estimated 1200 lakefront property owners completed the survey, and provided information on: what they valued about the lake; the concerns or issues that need to be addressed; and the potential actions to be considered to protect the health of the lake.

The Mississippi Lake Today Report was released in June 2014 and provides a snapshot of the state of the lake's environment, land uses and development levels, and its boating and recreational conditions. This report is a key building block in the Mississippi Lake planning process, and provides the best available information to develop a detailed plan that will guide stewardship action and land use policy for the long-term protection of the lake environment.

Public Forum #1 was held on June 21st, 2014 and brought together people from around the lake to identify values, discuss issues and develop a preliminary list of actions to best address those issues.

The discussion paper titled "Reviewing Potential Actions for the Mississippi Lake Plan" was developed as a result of Public Forum #1 and released to the public in early September, 2014. The Discussion Paper provided a list of the issues and potential actions that were discussed at the first forum, together with other actions obtained through research and experience, in order to promote discussion at Public Forum #2.

Public Forum #2 took place on September 20, 2014, with the objective of reviewing and confirming the issues and potential actions that had been identified in the process to date, and documented in the Discussion Paper "Reviewing Potential Actions for the Mississippi Lake Plan".



Location of Participants' Properties
(Yellow – Forum 2; Red/green – Forum 1)

The Mississippi Lake Plan was then developed in draft form during the period Oct 2014 – April 2015. Several sessions were held to further consolidate the proposed issues to be covered by the Plan. In April, 2015 the draft Plan was submitted for review and comments by the township councils and the Technical Advisory Committee. Feedback was incorporated into the final draft of the Plan in May 2015. The Mississippi Lake Plan 2015 was launched at the Annual General Meeting of the Mississippi Lakes Association, on 30 May 2015.

All documents produced as a result of the planning process are available at www.lakemississippi.ca.

2. Characteristics of Mississippi Lake and its Watershed

2.1 The Mississippi River Watershed

Mississippi Lake lies in the middle of the Mississippi River Watershed, a 3750 sq. km drainage system that encompasses a vast network of lakes, rivers and streams that feed into the Mississippi River (Map 1 on following page). The river itself is about 200 km long, originating from its headwaters north of Mazinaw Lake and Bon Echo Provincial Park and flowing east for more than 100 kilometers through a number of large lakes before reaching Mississippi Lake. The river then flows north though the communities of Carleton Place, Almonte, Pakenham and Galetta before it outlets into the Ottawa River near Fitzroy Harbour.

There are 18 dams along the Mississippi River and its tributaries, most of which are owned and/or operated by Mississippi Valley Conservation Authority (MVCA) for a variety of purposes. In addition, there are 5 hydro generating stations, one that is owned by Ontario Power Generators (OPG) and 4 owned by private hydro generating companies. There is also a number of small private and or derelict water control structures on various watercourses throughout the watershed (Mississippi Valley Conservation Authority, 2014).

The upstream portion of the watershed consists of the more rugged landscape of the Canadian Shield, predominantly forested, with exposed bedrock and thin sandy soils and dotted with lakes and rivers. In the subwatershed immediately surrounding Mississippi Lake, the bedrock transitions from Canadian Shield granite in the west, to limestone and sandstone in the east, and the landscape shifts to include more agricultural land, and increased built-up areas. In the subwatershed downstream from Mississippi Lake, there is less forest and natural area as agricultural operations and urban areas increase.

Table 1 shows the land cover breakdown for the Mississippi River watershed. The Mississippi Lake Subwatershed (Map 1 and 2) is the area that this plan applies to. It encompasses a total area of 296 km^2 and has the highest concentration of wetlands (11% of land cover) then other areas in the watershed.

Map 1 - Mississippi River Watershed

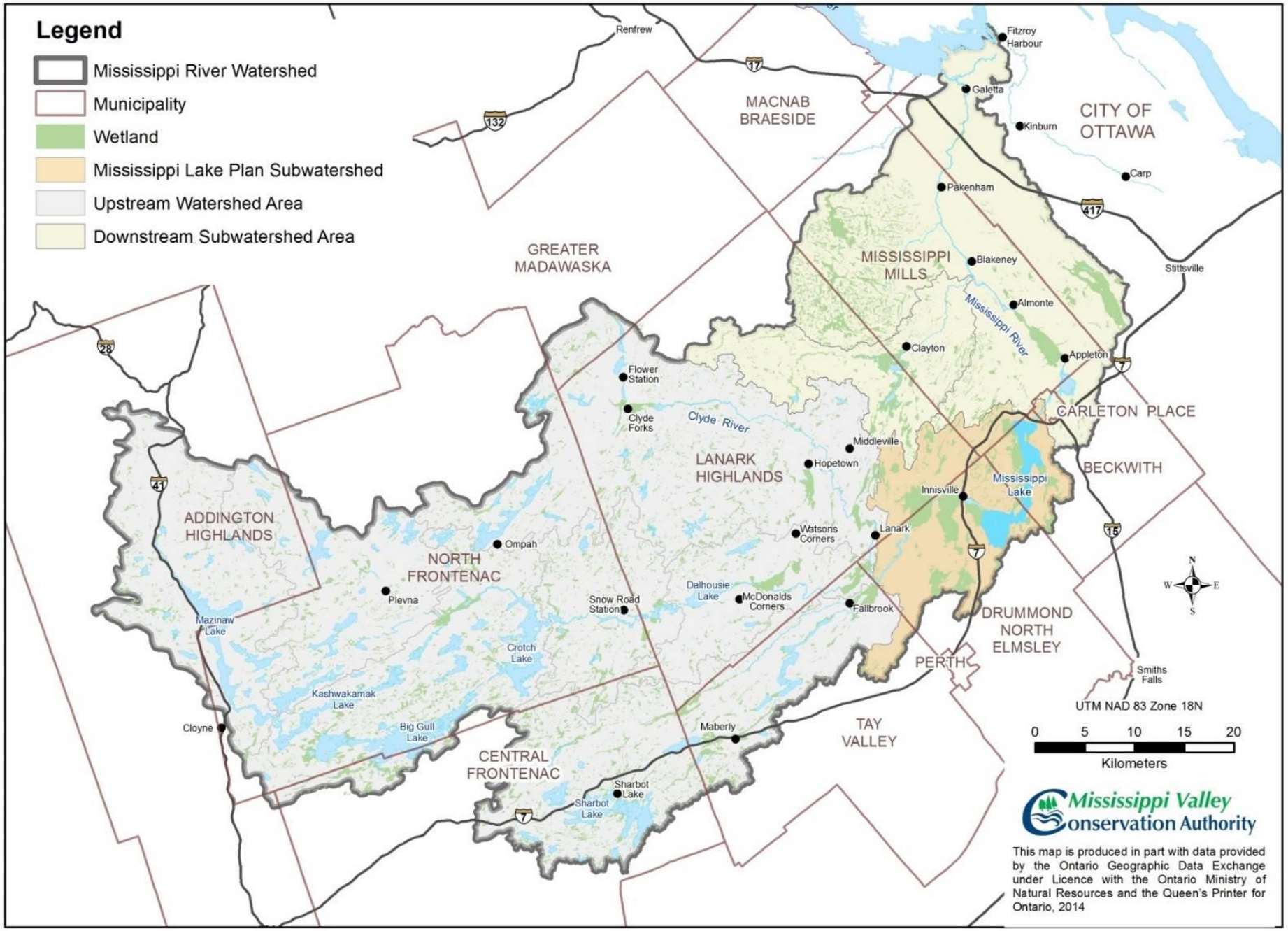


Table 1: Land Cover of the Mississippi River Watershed

	Total Area (km2)	Forest (%)	Agriculture (%)	Wetland (%)	Built Up (%)
Upstream Drainage Area	2577	92	3.8	3.8	0.4
Mississippi Lake Plan Drainage Area	296	72	16	11	0.6
Downstream Drainage Area	875	67	25	6	1.8
Total Watershed	**3748**				

(MVCA Geographic Information System, 2014)

2.2 Mississippi Lake

Mississippi Lake, located in the middle portion of the Mississippi River watershed (see Map 1 and 2), is in the jurisdiction of three townships (Beckwith, Drummond North Elmsley, and Mississippi Mills), and directly upstream of the Town of Carleton Place.

Unlike most lakes that are located at the upstream end of a river system, Mississippi Lake is in the unique position of sitting at the receiving end of a very large upstream drainage area. Its inlet is located in the southwest corner near Hwy #7 and Innisville, and its outlet is in the Town of Carleton Place, located at the northeast end of the lake.

Mississippi Lake has a total shoreline perimeter measurement of 64 km and a surface area of 24.5km^2. The total length of the lake is 14.19 km and the average lake depth is 2.7 m and maximum depth is 9.2 m. The lake is made up of 4 basins (Big Lake, third lake, second lake, first lake, as referenced in Mississippi Lake Today, Section 2.1). There is a significant number of tributaries that flow into Mississippi Lake (34 in total) that feed surface water runoff from surrounding forested, agricultural and built up areas located in the subwatershed.

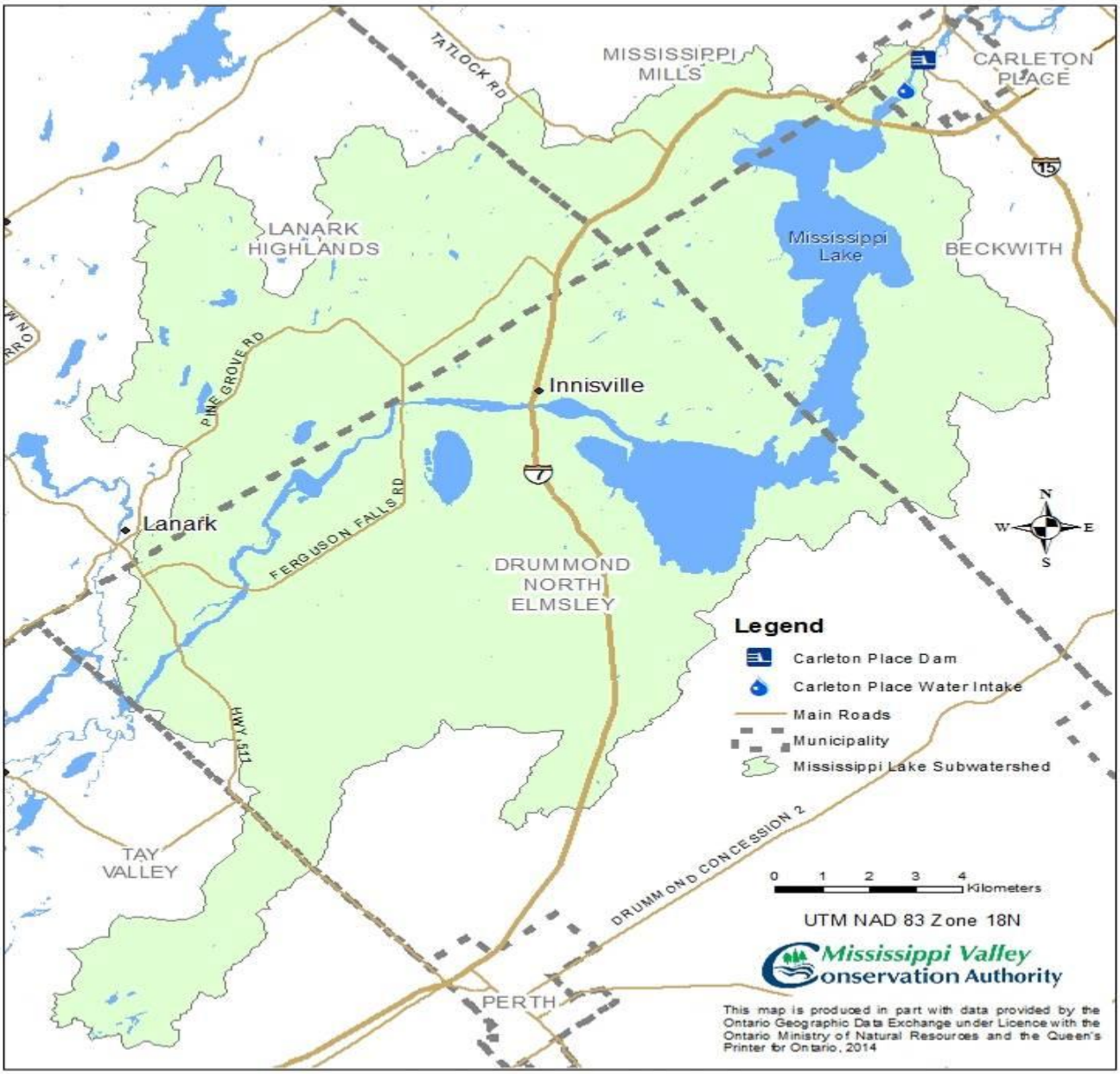
Although the beginnings of the size and shape of Mississippi Lake can be traced back to the first dam built in Carleton place almost 200 years ago (1820) by Edmund Morphy, the current shorelines are well established and water levels are carefully managed as part of an overall watershed program coordinated by the Mississippi Valley Conservation Authority.

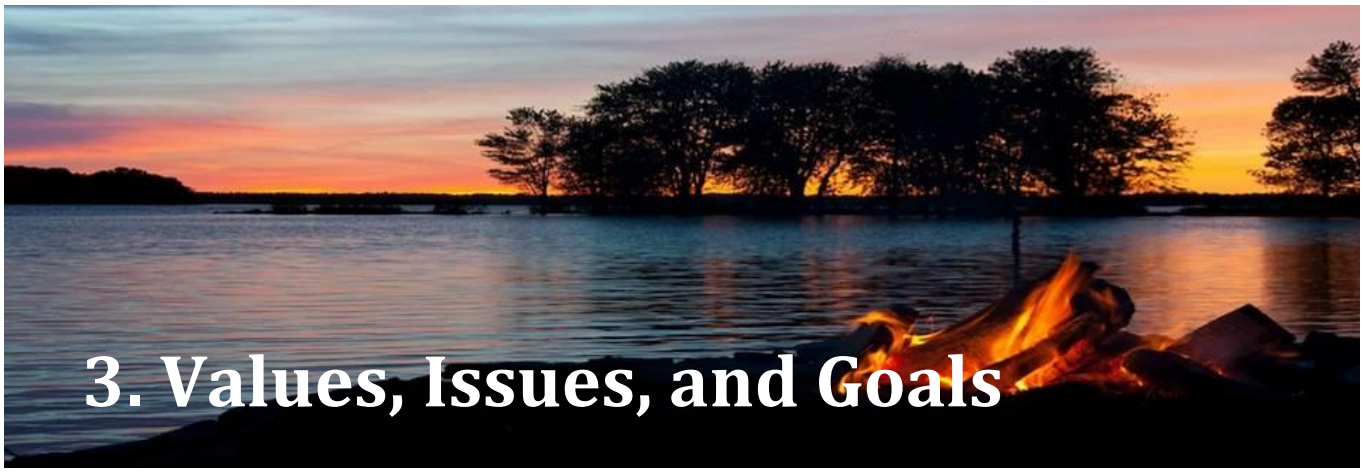
There is a total of 979 shoreline residential lots around the lake, including some empty lots, and 472 permanent and 477 seasonal dwellings. Backlot properties associated with the lake bring the total to approximately 1200; another 2000 or more properties are located with 2.5 km of the lake. As the largest lake within an easy commute of Ottawa, Mississippi Lake is experiencing a significant change in the amount and type of development around the lake. The recent twinning of Hwy 7, the major road linking the City of Ottawa and Carleton Place, has improved the commute from the city and the area is becoming more attractive as a bedroom

community and as a recreational get-away. Many additional visitors to the lake come to the lake from the surrounding area, or further afield, either for a day visit, or to stay at the four commercial campgrounds on the lake or other facilities in Carleton Place. Notably there is a very active recreational fishery (summer and winter) on the lake with Walleye and Bass as two key species of interest, with many participants originating from surrounding urban areas.

In summary, Mississippi Lake is an incredibly valuable natural asset which provides a lake based recreational experience for visitors, a seasonal get away for shoreline owners and renters, as well as a year round home for permanent residents.

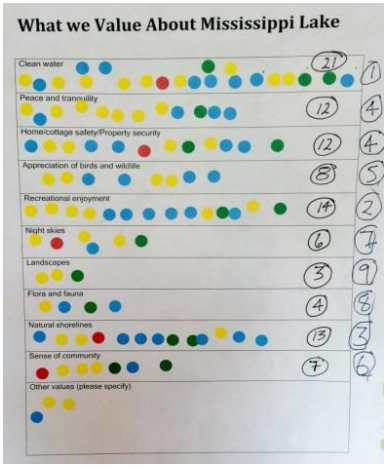
Map 2 -Mississippi Lake Plan Subwatershed





3. Values, Issues, and Goals

This Stewardship Plan is based on a set of values and issues identified by the community – cottagers, residents, municipalities, non-government and government organizations with an interest in Mississippi Lake. The values and issues allowed for the identification of six main goals upon which to focus effort. The goals are listed in Section 3.3.



3.1 Community Values

The community survey conducted in 2012-13 asked respondents to identify the level of importance that they would attach to the ten values listed in the survey. Respondents were also requested to add any further values that they felt were not being recognized in the survey. The survey was closed in January 2014.

Two public consultation sessions were held in June and September 2014 to review the findings of the survey, and to begin consolidating the various inputs into a coherent expression of the community's values. While ensuring that all feedback received due recognition, it became evident that there were many areas of common interest, from which four broad sets of values could be identified, as follows:

Four Common Community Values

1. **Good Water Quality** - Many people confirmed that good water quality is one of the most important priorities for the lake.
2. **Recreational Activities** - Enjoying recreational activities ranked second only to good water quality.
3. **Healthy Natural Environment** - The community recognizes and values the healthy natural features (aquatic life, wetlands, and extensive natural shorelines) and the abundance and variation of fish and wildlife. There is a desire to protect the natural environment.
4. **Social Well-Being** - The lake is a place where people can enjoy peace and tranquility and security of home and property. There was also recognition of the importance of maintaining a sense of community around the lake, and generally recognizing the importance of the lake to the community today and for future generations. Maintaining a visible night sky and pleasing landscapes rounded out the social values of importance.

3.2 Community Issues

The community survey also asked respondents to rate the importance of 19 possible issues and concerns, and to identify their top priorities for action that should be taken to preserve and enhance the lake. As was done with the feedback regarding values, these issues and concerns were discussed in a preliminary way at Public Forum #1, and more intensely at the second forum. The ranking in the community survey, the results of Public Forum discussions, combined with the information collected for the Mississippi Lake Today report, were consolidated into a list of nine key issues, as follows:

Nine Key Issues to be Addressed

1. **Deterioration of Water Quality** – enjoyment and use of the lake depends on good quality water, and the potential or actual deterioration of water quality was of concern to many community members.

2. **Aquatic Weeds and Algae** – Similar to the concerns about general water quality, the lake community identified high levels of weeds and algae as a concern, directly affecting their ability to enjoy the lake (swimming, boating).

3. **Water Levels and Flooding** – waterfront owners have expressed concerns about water levels, notably the flooding experienced in 1998.

4. **Effects of Climate Change** – There is a desire to understand better the effects of climate change and what can be done to adapt to, those effects.

5. **Potential Deterioration of the Fishery** – Because of the importance of fishing on Mississippi Lake, any deterioration of the fishery, both in terms of fish populations and distribution, is of concern.

6. **Maintaining the Natural Environment** –Action to maintain a healthy natural environment is important to community members.

7. **Impacts from new land uses and development** –The concern is to ensure that any future development minimizes negative effects on the natural environment and peoples' use and enjoyment of the lake.

8. **Impacts on the Social and Recreational Enjoyment of the Lake** – Concerns were expressed about unsafe boating, excessive boat wakes, and instances of disrespect (noise, boating too close to docks)

9. **Loss of Dark Night Skies** – Increasing urban lighting has reduced the natural dark night skies.

3.3 Goals

The table below lists the six goals of the Lake Plan, and indicates how these reflect the values and issues previously determined. In Chapter four, these goals are further developed into series of specific objectives and actions to be undertaken.

Table 2 - How Values and Issues are Reflected in Goal Statements

Mississippi Lake Goals	Values *(see Section 3.1)*				Issues *(see Section 3.2)*								
	Water Quality	Rec. Activities	Environment	Well-being	Water Quality	Aquatic Veg. and Weeds	Water Levels and Flooding	Effects of Climate Change	Fishery	Natural Environment	Impacts from development	Soc. / Rec. Enjoyment	Loss of Dark Night Skies
1. Water Quality Work towards maintaining high water quality in Mississippi Lake and its inflowing streams to support a healthy natural environment and to support the use and enjoyment by residents and visitors	1		3	4	1				5			8	
2. Aquatic Vegetation / Algae Work towards achieving a balance of aquatic vegetation to support the ecological needs of the lake and allow for the continued human enjoyment of the lake.		2	3			2			5	6			
3. Water Levels and Flooding Work towards community awareness of water level management, to sustain natural ecosystems and to minimize risks from flooding		2	3	4			3	4		6			
4. Natural Environment Work towards maintaining a healthy and diverse ecosystem, including a healthy fishery	1		3		1	2		4	5	6			9
5. Land Use and Development Work towards future development that maintains the character of the lake and that protects the natural environment, water quality, and the social/recreational features of Mississippi Lake	1			4	1		3				7		
6. Social And Recreational Activity Promote social and recreational activities that respect the natural environment, the residents and users of the lake, and help to build a sense of community.	1	2		4					5		7	8	9

4. Future Actions

This section of the plan addresses each of the six goals listed in Chapter 3. Specific objectives are presented under each of the goals, along with a brief discussion of relevant issues and observations. Chapter 6 (Table 6) summarizes all the Goals, Objectives, and Actions.

4.1 Water Quality

GOAL: Work towards maintaining high water quality in Mississippi Lake and its inflowing streams to support a healthy natural environment, and to support the use and enjoyment by residents and visitors.

Objective 1 - Monitor and assess overall water quality

Water quality ranked very high in importance in the community survey and this was confirmed during the Public Forums. There is a good record of water quality analysis that goes back to 1968 and although the methods of sampling and analysis have varied over the years, they have stayed consistent over the past 20 years. Samples collected under the Lake Partners program (since 1996) are analyzed for phosphorous and water clarity. Analysis for a wider array of parameters is conducted annually under the Mississippi Valley Conservation Authority's Watershed Watch program (i.e., annual sampling at 4 locations, 3 times per year; and conducts analysis for: total phosphorous; dissolved oxygen; temperature; water hardness; pH; water clarity; and chlorophyll a). Calcium is also sampled once per year under the Watershed Watch program.

Data from the 1970s and 1980s, although limited, suggest that the lake was more enriched than it is today. It would have been characterized as a marginally "eutrophic" lake, one with higher phosphorous levels, lower oxygen levels, and algae blooms and plant growth peaks. Sampling results from the 1990s until today indicate improvement in water quality, and that Mississippi Lake is a moderately nutrient enriched lake (mesotrophic status). There are still algae blooms and significant vegetation growth, but the phosphorous levels are lower, and oxygen levels higher. While phosphorous levels have varied over the past 20 years, they have remained

mostly within the range of 10 to 20 µg/L (levels that characterize a "mesotrophic" state).

Data from 2006 through 2011 suggest a possible trend of increasing phosphorous levels, with a high annual average for the decade of 22µg/L in 2011 (levels consistently above 20 would put Mississippi Lake back into a "eutrophic" category). At the time of preparing this plan, the MVCA is undertaking a "Nutrient Budget" study, work that will help to identify and quantify major sources of nutrient loading from upstream sub-watersheds (e.g., land uses, septic systems). Dissolved oxygen and temperature profiles indicate that there is sufficient oxygen in the water throughout the year to support the lake ecosystem, and the pH is consistently within the Provincial objective range for protecting aquatic life, with an average level of 7.5. But, the relatively high alkalinity of the lake, thanks to the underlying limestone bedrock, also means it is a suitable habitat for the Zebra Mussel, for example.

The Town of Carleton Place takes its municipal water supply from the Mississippi River, just upstream of the dam. Additional protection to this water source, including restrictions to certain land uses, is offered through the Source Water Protection Plan.

Phosphorous:

Why is it important? Just as phosphorous in fertilizers increases growth in one's garden, phosphorous entering a water body will increase the growth of aquatic plants (Algae, submerged and emergent vegetation). It occurs naturally, and is necessary for aquatic plant life. While the relationship between nutrients, water quality, and plant growth is a complex one, as a general rule, when phosphorous levels are observed to increase, there is greater potential for increased growth of weeds and algae.

Where does it come from? Phosphorous enters waterbodies from natural and man-made sources:

- forest run-off, from soils and animal waste
- Residential/cottage runoff, from lawns and lawn fertilizers, pet waste, car-washing soap
- Agricultural run-off, from fertilizers, soil erosion, and manure
- Septic systems, especially those that are not up to code or not well maintained.
- Discharges from municipal sewage treatment systems.
- Atmospheric deposition, the wind brings phosphorous in soil/dirt particles and drops them into water bodies
- Sediment in the lakes and rivers holds phosphorous, which can be released into the water column when the lake bottom is disturbed or the lake "turns over"

	Actions
Objective 1 **Monitor and assess overall water quality.**	· Continue to participate in the **Lake Partner** and **Watersheds Watch** programs
	· Continue supporting the conduct of a nutrient budget, as currently undertaken by the Mississippi Valley Conservation Authority (MVCA)
	· Assess current water quality monitoring programs and results and, in consultation with water quality experts, develop options as required to establish a comprehensive water quality monitoring program for the lake
	· Assess and report on water quality trends in relation to Provincially designated objectives
	· Promote research initiatives to better understand the relationships between nutrient concentrations in lake water and the growth of algae and aquatic vegetation

Objective 2 - Reduce the negative impact of surface runoff

Runoff from the land around the shore of the lake and along the watershed's 34 tributary rivers, streams and drains, can bring with it nutrients (e.g., phosphorous, nitrogen), and other contaminants such as chemical pesticides. General actions can be taken to reduce the impact of surface run-off, and when better information is available from the nutrient budget study, these actions can be refined and directed at problem areas. Such actions would target all sources of runoff, including residential/cottages (lawn and garden fertilizer, septic systems, animal feces), commercial (lawn fertilizer and pesticides), and agricultural properties (fertilizers, manure, soil erosion).

	Actions
Objective 2 **Reduce the negative impact of surface runoff.**	· Support and promote efforts to maintain and create natural buffers on the lake shore
	· Participate in and promote the Watersheds Canada **Love your Lake** program
	· Research, and apply as appropriate, available programs to assist communities in continuing "best management practices", such as the **Rural Clean Water** program
	· Seek agreement from municipalities to incorporate low-impact development (LID) practices in the design of developments

Objective 3 - Promote the proper operation of on-site sewage disposal systems.

An important factor in the health of a lake is the amount of pollution and/or nutrients it receives. Sewage from any source contributes to both of these levels, but human waste in particular can have a profound effect if not carefully processed. Poorly installed and/or maintained septic systems may allow release of contaminants and nutrients to the lake. These can also introduce harmful diseases that could affect the local population as well as communities downstream.

Concerns about faulty septic systems and the potential impact of these on water quality were expressed throughout the planning process. These concerns are usually directed to older development that may not have up-to-date or adequate septic systems. Additionally, the practice of using seasonal properties as year-round residences can put additional stress on systems not designed to handle the extra level of use. When a property undergoes a conversion where a building permit is obtained, a septic inspection is required and this may lead to improvements to the existing septic system where needed. Notwithstanding, any septic system, old or new, residential or commercial, that is not functioning properly will contribute to the degradation of the health of the lake.

Residents may allow their water from showers and sinks to run off onto their properties or into the lake without any treatment, potentially adding more nutrients to the lake. There are no specific data on how much of this may take place around Mississippi Lake, but better understanding of the impact of gray water, and means to control or treat it should be helpful to the lake community.

There is limited knowledge about the state of septic systems or the types of systems that are in use around the lake. The risk to human health is sufficiently large to warrant taking a proactive approach to developing precautionary measures. A robust education program is essential, and should be supported with a program to confirm that systems are operating effectively. As provided for in the Ontario Building Code, and as adopted by a growing number of communities, a mandatory inspection program is a prudent and effective method of reducing the risk of pollution and disease from faulty septic systems. The Lake Plan will pursue these initiatives with a view to ensuring the continued health and safety of the community.

	Actions
Objective 3 **To improve the performance of on-site sewage disposal systems.**	· Seek the cooperation of municipalities to implement an on-site sewage disposal system verification program
	· Investigate funding models adopted by other communities regarding septic inspections and repairs
	· Investigate program options for grey water recycling (see the **Greywater Reuse Pilot** program initiated by the City of Guelph)

Objective 4 - Increase the Lake Community's level of knowledge and awareness regarding water quality issues.

Maintaining and improving the water quality of Mississippi Lake will depend on the actions of the property owners and lake users. Best practices for managing one's property, including streams, shorelines and septic systems, should be provided to the community to better understand what individuals can do to improve water quality and shoreline habitat. Many actions related to education and awareness can be done in cooperation with MVCA and the

municipalities who may have existing initiatives related to these topics.

Objective 4	*Actions*
Increase the Lake Community's level of knowledge and awareness regarding water quality issues.	· Record, interpret, and report water quality results to the Community
	· Disseminate information regarding the potential impact of various fertilizers, pesticides, household cleaners, oil, gas, and other potentially harmful substances
	· Disseminate information regarding the importance of shoreline buffers
	· Disseminate information regarding the care and maintenance of septic systems

4.2 Aquatic Vegetation/Algae

GOAL: Work towards achieving a balance of aquatic vegetation to support the ecological needs of the lake and allow for the continued human enjoyment of the lake.

Objective 1 - Monitor aquatic vegetation and algae

Considerable concern was expressed about excessive vegetation/weeds and algae because it inhibits swimming and boating, and is aesthetically unpleasant to people along the shoreline. The shallow depth of Mississippi Lake and its relatively warm temperatures lead naturally to aquatic vegetation growth, which is part of a healthy environment. Increased growth can be expected during warm summers, and will increase further with higher levels of nutrients (e.g., phosphorous).

Data on the current state and growth of vegetation in the lake are very limited, so trends as well as existing conditions have not been documented. Work done in the 1960s and 1970s suggest a significant "weed problem" existed at the time, and observations from participants in this planning process suggest that the conditions today are not ideal. Recent observations (in 2014) have found invasive Eurasian Water Milfoil, a plant that can cover the water surface in a shallow bay and impede swimming and boat use.

Objective 1 **Monitor aquatic vegetation and algae**	*Actions*
	· Monitor the lake's algae and aquatic vegetation on a regular basis to compile a robust database for examining trends, and for developing control and management strategies.
	· Promote participation in the **Citizen Water Watch** program

Objective 2 - Monitor and Investigate Causes of Algae Blooms

Algae blooms were noted as a concern by participants in the survey and at the Public Forums. Participants reported that blooms were high in summer 2014, and four years ago. While the appearance and persistence of algae blooms are to be expected on Mississippi Lake, high levels of algae blooms may be attributed to increased nutrient enrichment combined with warm temperatures and extended calm periods. There was a documented blue-green algae bloom in 2014, and the potential for more is of concern, as these algae may produce a toxin dangerous to humans. In 2014 Rideau Valley Conservation Authority, Mississippi Valley Conservation Authority, and Carleton University initiated a study of algae and macrophytes in Eastern Ontario (primarily on the Canadian Shield), including work on Mississippi Lake. At the time of preparing this lake plan, results were not yet available.

Objective2 **Monitor and investigate causes of algae blooms**	*Actions*
	· Promote the establishment of a Warning, Reporting, and Recording system for incidents of algae blooms
	· In conjunction with the Ministry of Environment and Climate Change (MOECC) and the Leeds, Grenville, and Lanark District Health Unit (LGLDHU), develop improvements to the existing Action Protocol for reporting and investigating algae blooms
	· Encourage research projects to better understand the causes and impacts of algae blooms on the lake

Objective 3 - Increase the Lake Community's level of knowledge and awareness regarding aquatic vegetation

During consultation sessions in support of the development of this Plan, it was evident that a wide range of perceptions existed regarding aquatic vegetation. Very often, the term "weeds" was used to describe all vegetation, making no distinction between plants that might be harmful and plants that are an essential part of the ecosystem. To some, aquatic vegetation means weeds, unwanted and unsightly, that encumber boating and swimming, and ruin the lake view. For others, this same vegetation is a crucial part of the animal and fish habitats of the lake. This Plan seeks to promote a better understanding of the aquatic vegetation of the lake, and to promote responsible practices for managing it.

Objective3 **Increase the Lake Community's level of knowledge and awareness**	*Actions*
	· Provide information to the Community regarding approved means to control or remove excessive weeds/vegetation
	· Provide information to the Community regarding the value of aquatic vegetation to healthy natural environments
	· Provide information regarding algae (types, appearance, dangers, action to be taken, etc.)

Blue Green Algae (Cyanobacteria)

Algae are primitive microscopic plants that live in fresh water. During warm weather, populations rapidly increase to form a large mass called a bloom, often occurring in late summer and early fall.

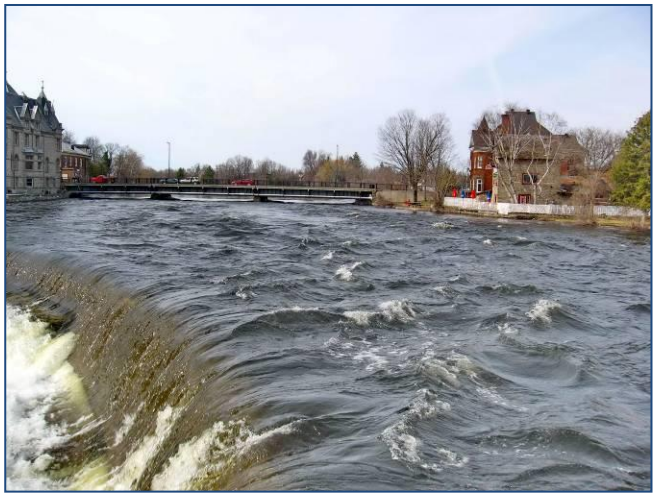
Blue-green algae often thrive in areas where the water is shallow, slow moving and warm, but can be present in deeper and cooler water. High levels of nutrients, such as phosphorus and nitrogen, can contribute to blooms. Some forms of blue-green algae can produce toxins that can be harmful to human health. Symptoms can include itchy, irritated eyes and skin. If swallowed symptoms can include headaches, fever, diarrhea, abdominal pain, nausea and vomiting.

If you see a bloom and suspect it's blue-green algae, avoid using the water and call the Ministry of the Environment Spills Action Centre at 1-800-268-6060.

4.3 Water Levels and Flooding

GOAL: Work towards community awareness of water level management, to sustain natural ecosystems and to minimize risks from flooding.

Objective 1 - Monitor Water Levels



Water levels are the third most significant concern expressed in the community survey. The Mississippi River is a managed system, with 19 dams that are owned and or operated by MVCA, together with an additional four private hydro generating stations and a number of smaller private structures. The system is managed according to management strategies and operation ranges set out in the Mississippi River Water Management Plan (2006). Mississippi Lake is the last in a series of lakes along the Mississippi River and the water levels under normal conditions are maintained by the Carleton Place Dam. This dam is owned and operated by MVCA and management takes into account various (and

occasionally competing) interests such as flood/drought mitigation, erosion/ shoreline damage from ice, fish/wildlife habitat, recreation/tourism and occasionally hydro generation.

There is substantial development in the low-lying floodplain areas around Mississippi Lake. Many of these areas were developed before regulations came into effect. With the conversion of a large number of these properties from seasonal to year round use, exposure to the impacts of flooding has increased. Flooding results from two distinct scenarios: spring snowmelt often combined with rainfall; or large rainfall events which can occur at any time of the year, as observed over the last several years. The water flowing into Mississippi Lake comes from a drainage area of approximately 2900 sq km that can be separated into two distinct basins: a controlled watershed above the Crotch Lake Dam of approximately 1000 sq km; and an uncontrolled watershed between Crotch Lake and Mississippi Lake of approximately 1900 sq km. The rate and timing of runoff from the uncontrolled section of the watershed influences the timing and magnitude of spring flooding on Mississippi Lake. When the dam is "opened," (stoplogs removed), the outflow from the lake is restricted by the river channel between Bridge Street and Mississippi Lake. In the spring of 1998, Mississippi Lake experienced its highest recorded flood since water levels began being collected on the lake in the mid 1970's.

	Actions
Objective1 **Monitor water levels**	· In cooperation with MVCA, maintain / improve the water level monitoring and reporting program currently in place on the MLA website.
	· Encourage the public to subscribe to water level and ice alerts via e-mails from the Mississippi Lakes Association (MLA)
	· Maintain good liaison/dialogue with MVCA regarding water level management policies and practices

Objective 2 - Increase the Lake Community's level of knowledge and awareness regarding water level management

Discussions at the Public Forums demonstrated that many in the community are not familiar with the water management regime used by the MVCA to control water levels across the Mississippi River watershed, and in particular, for Mississippi Lake.

Objective2	*Actions*
Increase the Lake Community's level of knowledge and awareness	· Provide / disseminate information regarding best practices and "what to expect" when living on or near a flood plain
	· Provide / disseminate information regarding natural shoreline processes and how to mitigate against erosion and flood damage

4.4 Natural Environment

GOAL: Work towards maintaining a healthy and diverse ecosystem, including a healthy fishery

Objective 1 - Maintain and enhance the natural environment

A large portion of the Mississippi Lake shoreline is natural area providing habitat for a diverse collection of wildlife. There are two Provincially Significant wetlands on the shores of the lake (Mississippi Lake Wetland and McEwen's Bay Wetland), as well as an "Area of Natural and Scientific Interest" and a National Wildlife Area. Some information is available from inventories conducted at the National Wildlife Area but information for the lake as a whole is incomplete.

The National Wildlife Area (McEwen Bay) includes significant wetlands and provides important refuge and breeding habitat for a variety of bird and fish species. The area is used extensively by waterfowl during fall migration, with as many as 10,000 birds passing through in a day; there are 15 species at risk that have been documented in the National Wildlife Area, located at the lake inlet. MLA members have been monitoring loons over the past seven years as a part of the Canadian Loon Watch program; based on these observations, the loon population appears to be doing well. The annual loon survey indicates a larger number of total adults (40 birds in 2013; 43 in 2014) since the start of surveying in 2007; surviving young are greater than in 2007 (total of 8 in 2007; 12 in 2014).

Table 3. Loon Counts 2007-2014

Number of Loons	2007	2010	2011	2012	2013	2014
Maximum Number of Adults	24	35	35	39	40	43
Maximum number of mated pairs	10	12	11	12	13	12
Number of surviving young	8	7	5	8	8	12

Covering roughly 19 km, or 1/3 of the shoreline, the wetland habitat around Mississippi Lake contributes significantly to the overall health of the lake and surrounding area. There is a need for better baseline information on wildlife for the lake environment as a whole.

	Actions
Objective1 **Maintain and enhance the natural environment**	• Promote existing programs such as **Turtle Watch**, **Frog Watch,** and **Canadian Lakes Loon Survey** to conduct inventories and monitor changes to the flora and fauna of the Lake
	• Develop similar additional programs to record data on other flora and fauna of the Lake
	• Develop and distribute educational material and programs on the natural environment of Mississippi Lake, including its wetlands, and how to protect and enhance them
	• Establish a reporting mechanism on the MLA website, and encourage the public to report algae blooms, other water quality issues, and general observations regarding the natural environment

Objective 2 - Prevent further loss of natural shorelines and re-naturalize altered shorelines

The shorelines of water bodies are considered the “ribbon of life” because of their importance to plant and animal (including fish) life functions. While a substantial amount of natural shorelines exists on Mississippi Lake, many shorelines have been hardened over the years, with natural vegetation removed, and grassed over (e.g., many existing and older properties have lawns to the water with no natural buffers). An inventory of the lake’s shoreline conditions has not been completed.

Natural shorelines will inhibit or capture run-off that might otherwise enter the lake. As well, natural features along the shoreline (in the water and adjacent to) provide important habitat for fish and other animals that inhabit the “ribbon of life.”

Objective2	*Actions*
Prevent further loss of natural shorelines and re-naturalize altered shorelines	• Work with MVCA to develop an education and awareness program about the importance of natural shorelines including buffers between lawns and the lakeshore
	• Disseminate information regarding native shoreline species; promote re-planting of these species

Objective 3 - Identify, and where possible, control invasive and nuisance species

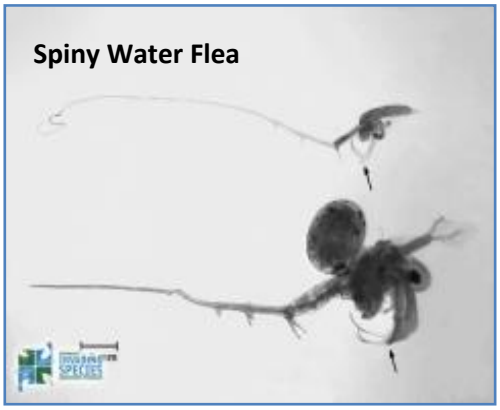
Plants and animals that have been introduced from other parts of the world may become well established and may disrupt the balance of existing ecosystems, crowd out native species, or cause harm to us or our life styles. Some work has been done at the Mississippi Lake National Wildlife Area to identify invasive species. The invasive plants and animals identified through that work are listed in Table 4. This does not represent a complete list of invasive species present in the area. There are several invasive species in the general area, but not yet formally confirmed in or around Mississippi Lake (e.g., Emerald Ash Borer, Spiny water flea). MVCA, through the Ontario Federation of Anglers and Hunters' Invasive Species program, samples the lake every year for invasive species (zebra mussels, spiny water flea) In addition to potential concerns related to invasive species, many residents expressed concerns about the numbers of cormorants and Canada Geese found on and around the lake, and the negative effects on the fishery and general enjoyment of one's property. These native species may find conditions that allow their populations to grow to nuisance levels, and residents want to find ways to discourage their presence.

Table 4. Invasive Species Identified at the Mississippi Lake National Wildlife Area
Common Buckthorn *Rhamnus cathartica*
Common Lilac *Syringa vulgaris*
Purple Loosestrife *Lythrum salicaria*
Scots Pine *Pinus sylvestris*
Tartarian Honeysuckle *Lonicera tatarica*
Eurasian Milfoil *Myriophyllum spicatum L.*
European Frogbit *Hydrocharis morsus-ranae*
Flowering-rush *Butomus umbellatus*
Zebra Mussel *Dreissena polymorpha*
Double-crested Cormorant *Phalacrocorax auritus*
Butternut Canker *Ophiognomonia clavigignenti-juglandacearum*


Phragmites


Purple Loosestrife


Emerald Ash Borer


Spiny Water Flea

	Actions
Objective3 **Identify, and where possible, control invasive and nuisance species**	• Disseminate information regarding identifying and reporting invasive species, via the **EDDMaps** program (Early Detection and Distribution Map System)
	• Disseminate information regarding controlling and/or coping with Canada Goose and Cormorant populations
	• Consider establishing an ALERT system on the MLA website to inform the community regarding emerging threats, and what to do about them
	• In cooperation with MOECC, MVCA, organize invasive species removal events
	• Continue supporting the **Invading Species** and **Aquatic Invasive Species Prevention and Monitoring** programs
	• Disseminate information regarding the dangers of invasive species propagation

Objective 4 - Identify and protect species at risk, and their habitats

A thorough understanding of the plants and animals native to the Mississippi Lake ecosystem is an important factor in determining which species are in fact invasive, and which species warrant protection. Some information is available from inventories conducted at the National Wildlife Area (NWA) at the south end of the lake, but information related to species at risk is incomplete for the lake as a whole.

The purpose of this objective is to achieve a much better understanding of the populations and habitats of native species, and to develop awareness programs regarding best practices to follow to ensure the continued existence and contribution of native species to a healthy environment.

	Actions
Objective 4 **Identify and protect species at risk and their habitats.**	• Liaise with governments and NGOs to secure funding and to conduct surveys of species at risk
	• Develop an awareness program to inform the public regarding existing species at risk, and the proper protocols to protect these species
	• Establish partnerships with existing programs (eg: **Adopt a Pond** program with the Toronto Zoo)

Objective 5 - Protect and maintain a healthy fishery

Fishing is an important recreational activity on Mississippi Lake. In the community survey, 53% of respondents indicated that they fished on the lake. Tournament fishing is popular as well; in the recent past, Mississippi Lake hosted about 10 tournaments each year. For 2015 the number

of tournaments is expected to be reduced to about five.

The lake is considered by the Ministry of Natural Resources and Forestry to be a self-sustaining "cool water" fishery with no stocking. It is managed primarily for Walleye and to a lesser extent for Northern Pike. The lake supports warm water species including Largemouth Bass, smallmouth bass, and a variety of panfish.

Fish habitat is plentiful, including spawning areas for Walleye at Innisville, for Pike in shallow weedy bays, and for Bass in shallow, but less weedy bays that have rocky bottoms. Several Walleye spawning rehabilitation projects have been completed at Innisville, and the Walleye fishery appears healthy.

Netting surveys that took place in 2003, 2007, and 2009 indicate that the most common species are panfish (bluegill, black crappie, pumpkinseed, with small numbers of yellow perch). The surveys indicate that Bass populations are increasing, while the Northern Pike population has decreased. Recent netting index surveys indicate Walleye populations are healthy, though there have been some concerns expressed from anglers that numbers appear to be in decline. Mississippi Lake is part of the Ministry's **Broad-Scale Fish Monitoring Program**, under which the fishery will be monitored every five years.

	Actions
Objective5 **Protect and maintain a healthy fishery**	• Encourage the Ministry of Natural Resources and Forestry (MNRF) to conduct inventories and research to understand better the state of the fishery (populations; spawning and other habitats; need and opportunity for rehabilitation)
	• Develop, in concert with local fishing clubs and associations, a public education program about the fishery of Mississippi Lake, including good fishing practices and behaviour
	• Request that MNRF provide increased enforcement of fishing and ice fishing regulations
	• Engage fishing tournament organizers to formulate appropriate rules/regulations to minimize the impact of these events on the natural environment and overall well being of the lake

4.5 Land Use and Development

GOAL: Work towards future development that maintains the character of the lake and that protects the natural environment, water quality, and the social/recreational features of Mississippi Lake

Objective 1 - Ensure that future development on the lake takes place with minimal impact on water quality and the natural environment

As the largest lake within an easy commute of Ottawa, Mississippi Lake is experiencing a significant change in the amount and type of development around the lake. The recent twinning of Hwy 7, the major road linking the City of Ottawa and Carleton Place, has improved the commute from the city and the area is becoming more attractive as a bedroom community and as a recreational getaway. Population estimates indicate the lake area may see increased development pressure from the growing surrounding municipalities.

There are approximately 1000 shoreline properties around Mississippi Lake; backlot properties associated with the lake bring the total to approximately 1200; another 2000 or more properties are located with 2.5 km of the lake, not including the Town of Carleton Place. The four municipalities estimate that the breakdown by number of shoreline lots is: 472 permanent residences; 477 seasonal/cottage properties; 16 commercial properties, and a small number of vacant lots. New development around the lake is to be expected, but will be restricted by the number of vacant lots, and by municipal policies restricting development on private roads. A trend toward converting cottages to permanent residences is taking place, often accompanied by renovation and expansion of the cottage buildings. The municipality of Drummond-North Elmsley estimates a rate of conversion in their township of about 10-15 properties per year. In future, there may also be a demand for the redevelopment of residential or commercial lots to multiple-unit properties or for the conversion of existing tent and trailer

parks to condominium developments; any such demand would require a zoning bylaw change, and potentially an official plan amendment.

	Actions
Objective1 **Ensure that future development on the lake takes place with minimal impact on water quality and the natural environment.**	· Work with municipalities to develop coordinated municipal Official Plans, by-laws, and other regulations that reflect Lake Plan aims and initiatives
	· Sensitize municipalities with the concerns of the community regarding development on the lake
	· Lobby for municipal initiatives to shape development such as tax incentives for Low Impact Development (LID) projects
	· Participate in the Official Plan review process of the municipalities

Objective 2 - Improve the level of coordination of Governance across the lake

Planning and regulatory decisions on Mississippi Lake are governed by four different municipalities, the Mississippi Valley Conservation Authority, and other provincial agencies including the Ministry of the Environment and Climate Change and the Ministry of Municipal Affairs and Housing. As such, there is no overall oversight and consistency to the creation and application of planning policies and regulations. The Mississippi Lake Today report in June 2014 (Tables 16, 17) highlighted the variation in approach among the municipalities, regarding residential and commercial zoning provisions and by-laws.

Implementation of this plan provides an opportunity to bring together the various agencies and authorities to promote a coordinated approach to issues common to the lake community.

	Actions
	· Work with municipalities to streamline and co-ordinate municipal planning provisions, policies, by-laws, and regulations and apply these consistently across the lake
Objective2 **Improve the level of coordination of Governance across the lake**	· Nurture partnerships with the four surrounding municipalities, government agencies, and non-government agencies to ensure a coordinated and proactive approach in furthering the goals of the Lake Plan
	· Request municipalities to provide the MLA with notices of development applications (plans of subdivisions, zoning changes, cottage conversions, minor variances, and other significant planning applications)
	· Encourage municipalities to promote and cite the Lake Plan in their Official Plans

4.6 Social and Recreational Activity

GOAL: Promote social and recreational activities that respect the natural environment, the residents and users of the lake, and help to build a sense of community.

Objective 1 - Address overall concerns about boat traffic and conduct of lake users

Boating was the second most popular activity determined by the Community Survey. A boating census conducted by volunteers in August of 2014 documented 1266 moored boats on the lake. Comments provided by survey respondents indicate many people are concerned with boating and swimming safety on the lake, due to boat traffic levels, which has increased as a result of new developments around the lake. Concerns include: excessive and inconsiderate speed; large wakes that impact shoreline areas; boaters passing too close to swimmers, docks; excessive time in one area by personal watercraft, water skiers/tubers; anglers who fish too close to lakeside properties. Large numbers of boats associated with fishing derbies cause some residents concern with noise and wakes. Some concern was also expressed about noise from loud parties and fireworks displays throughout the summer season.

	Actions
Objective 1 **Address overall concerns about boat traffic and conduct of lake users**	· Establish a broad-based education program with focus on safety and respectful lake use, to include: speed limits, rules of conduct, management of boat wakes, noise abatement, and pollution control
	· Develop a Code of Conduct brochure for boating and lake use, to be distributed widely
	· Work with municipalities, marinas, and boat launch owners to help inform the public regarding boating on the lake, and to provide additional services such as: public washrooms, garbage and toxic waste disposal/recycling facilities, and fueling facilities
	· Develop and implement a shoreline maintenance and cleanup program
	· Invite the OPP to participate in, and make presentations at, MLA sponsored Boat Safety seminars
	· Promote the MLA and the Lake Plan initiatives by producing and distributing/selling decals or flags (for boats, cars, lakefront flagpoles, etc.)

Objective 2 - Promote light pollution reduction measures

As articulated in some detail in the State of the Lake Report “Mississippi Lake Today” (Feb 2015), light pollution has a detrimental effect on both the natural habitat and human quality of life. A great many species, humans included, are affected adversely to some degree by altering

the natural light/dark (diurnal) cycle of nature.

Feedback from the community has reflected the high value placed on the peaceful natural environment of the lake, and concern was expressed regarding the steady erosion of this environment as a result of light pollution. An important objective of the Lake Plan, therefore, is to promote initiatives to retain and enhance dark skies as an essential element of the character of the lake.

The effects of light pollution on plants and animals in the environment are numerous, and are becoming more known. In general, the most common action is that light pollution alters and interferes with the timing of necessary biological activities. Nocturnal species that begin their daily activities at sundown can be negatively impacted by artificial lights at night. It can confuse animal navigation, alter competitive interactions, change predator-prey relations, and cause physiological harm. It is not well appreciated that, although humans are mainly a day-time species, a large majority of the ecosystem (for both plants and animals) is in fact more active at night.

Although current levels of light pollution (2015) are assessed to be moderate, there is already much that can be done to reduce the impact of unnecessary lighting. This includes a broad education program to assist and encourage residents to cut down on direct light pollution from their properties. Additionally, in view of the rapid growth of the region and therefore increased human activity, increased sky glow is inevitable, but the impact can be minimized through the proper design, placement, and use of artificial lighting. The Township of Mississippi Mills (By-Law # 03-62) has shown leadership in this, which provides a good model for consideration. Now is the time for education and action, to ensure that the lake community and surrounding region can continue to enjoy the peace and beauty of the lake far into the future.

	Actions
Objective 2 **Promote light pollution reduction measures**	· Promote awareness of the importance of reducing light pollution to the social enjoyment and ecological well being of the lake
	· Provide educational materials to lake residents and users that will help shift lighting habits to improve night sky conditions around Mississippi Lake
	· Promote **Good Neighbour Lighting** practices, including the identification of suitable lighting fixtures, and appropriate retailers

	· Engage the municipalities to enact bylaws similar to the Mississippi Mills dark sky by-law No. 03-62 (9 Sep 2003)

5. Implementing the Lake Plan

The preparation of the Mississippi Lake Plan has provided a good opportunity to engage the community in dialogue about their lake and allowed people to have a voice in local matters. The content of the plan has been built upon their concerns and suggestions, and reflects what they consider to be important factors to ensure the continued health of the lake environment.

The implementation phase that follows the plan will bring new opportunities to engage and revitalize the community. The list of actions in the plan offers a multi-year agenda. It will be progressed based on the availability of funding sources and willing participants and partners. Implementation will require a dedicated and combined effort from:

- Mississippi Lakes Association
- Cottagers, residents, and other lake users
- Shore and road Associations
- Townships of Drummond North Elmsley, Beckwith
- Towns of Carleton Place, Mississippi Mills
- Mississippi Valley Conservation Authority
- Community Stewardship Council of Lanark County

For effective implementation, a working group must be struck, including members representing the Mississippi Lakes Association, Mississippi Valley Conservation Authority, and the local municipalities. This "Mississippi Lake Implementation Working Group" would take responsibility for the implementation of the plan, including:

- Confirming priorities for action;
- Seeking individuals and organizations to carry out actions;
- Obtaining funding for actions;
- Monitoring and commenting on planning proposals;
- Ensuring a continued sharing with the lake community of the results of actions taken; and
- Overseeing or directing an annual "report card" on implementing the plan's activities and conduct plan updates as needed.

The working group should be established as soon as possible following the launching of the Plan.

6. Mississippi Lake Action Plan Summary

Table 6 on the following pagers consolidates all the proposed actions of this Plan into one location for ease of reference.

GOAL: Water Quality

Work towards maintaining high water quality in Mississippi Lake and its inflowing streams to support a healthy natural environment and to support the use and enjoyment by residents and visitors

Table 6. Summary of Actions

OBJECTIVE	ACTION
Monitor and assess overall water quality	Continue to participate in the **Lake Partner** and **Watersheds Watch** programs
	Continue supporting the conduct of a nutrient budget, as currently undertaken by the Mississippi Valley Conservation Authority (MVCA)
	Assess current water quality monitoring programs and results and, in consultation with water quality experts, develop options as required to establish a comprehensive water quality monitoring program for the lake
	Assess and report on water quality trends in relation to Provincially designated objectives
	Promote research initiatives to better understand the relationships between nutrient concentrations in lake water and the growth of algae and aquatic vegetation
Reduce the negative impact of surface runoff	Support and promote efforts to maintain and create natural buffers on the lake shore
	Participate in and promote the Watersheds Canada **Love your Lake** program
	Research, and apply as appropriate, available programs to assist communities in continuing “best management practices”, such as the **Rural Clean Water** program
	Seek agreement from municipalities to incorporate low-impact development (LID) practices in the design of developments
Promote the proper operation of on-site sewage disposal systems	Seek the cooperation of municipalities to implement an on-site sewage disposal system verification program
	Investigate funding models adopted by other communities regarding septic inspections and repairs
	Investigate program options for grey water recycling (see the **Greywater Reuse Pilot** program initiated by the City of Guelph)
Increase the Lake Community’s level of knowledge and awareness of water quality issues	Record, interpret, and report water quality results to the Community
	Disseminate information regarding the potential impact of various fertilizers, pesticides, household cleaners, oil, gas, and other potentially harmful substances
	Disseminate information regarding the importance of shoreline buffers
	Disseminate information regarding the care and maintenance of septic systems

GOAL: Aquatic Vegetation / Algae

Work towards achieving a balance of aquatic vegetation to support the ecological needs of the lake and allow for the continued human enjoyment of the lake.

Table 6. Summary of Actions

OBJECTIVE	ACTION
Monitor aquatic vegetation and algae	Monitor the lake's algae and aquatic vegetation on a regular basis to compile a robust database for examining trends, and for developing control and management strategies.
	Promote participation in the **Citizen Water Watch** program
Monitor and investigate causes of algae blooms	Promote the establishment of a Warning, Reporting, and Recording system for incidents of algae blooms
	In conjunction with the Ministry of Environment and Climate Change (MOECC) and the Leeds, Grenville, and Lanark District Health Unit (LGLDHU), develop improvements to the existing Action Protocol for reporting and investigating algae blooms
	Encourage research projects to better understand the causes and impacts of algae blooms on the lake
Increase the Lake Community's level of knowledge and awareness regarding aquatic vegetation	Provide information to the Community regarding approved means to control or remove excessive weeds/vegetation
	Provide information to the Community regarding the value of aquatic vegetation to healthy natural environments
	Provide information regarding algae (types, appearance, dangers, action to be taken, etc.)

GOAL: Water Levels and Flooding

Work towards community awareness of water level management, to sustain natural ecosystems and to minimize risks from flooding

Table 6. Summary of Actions

OBJECTIVE	ACTION
Monitor water levels	In cooperation with MVCA, maintain / improve the water level monitoring and reporting program currently in place on the MLA website.
	Encourage the public to subscribe to water level and ice alerts via e-mails from the Mississippi Lakes Association (MLA)
	Maintain good liaison/dialogue with MVCA regarding water level management policies and practices
Increase the Lake Community's level of knowledge and awareness regarding water level management.	Provide / disseminate information regarding best practices and "what to expect" when living on or near a flood plain
	Provide / disseminate information regarding natural shoreline processes and how to mitigate against erosion and flood damage

GOAL: Natural Environment

Work towards maintaining a healthy and diverse ecosystem, including a healthy fishery

Table 6. Summary of Actions

OBJECTIVE	ACTION
Maintain and enhance the natural environment	Promote existing programs such as **Turtle Watch**, **Frog Watch,** and **Canadian Lakes Loon Survey** to conduct inventories and monitor changes to the flora and fauna of the Lake
	Develop similar additional programs to record data on other flora and fauna of the Lake
	Develop and distribute educational material and programs on the natural environment of Mississippi Lake, including its wetlands, and how to protect and enhance them
	Establish a reporting mechanism on the MLA website, and encourage the public to report algae blooms, other water quality issues, and general observations regarding the natural environment
Prevent further loss of natural shorelines and re-naturalize altered shorelines	Work with MVCA to develop an education and awareness program about the importance of natural shorelines including buffers between lawns and the lakeshore
	Disseminate information regarding native shoreline species; promote re-planting of these species
Identify, and where possible, control invasive and nuisance species	Disseminate information regarding identifying and reporting invasive species, via the **EDDMaps** program
	Disseminate information regarding controlling and/or coping with Canada Goose and Cormorant populations
	Consider establishing an ALERT system on the MLA website to inform the community regarding emerging threats, and what to do about them
	In cooperation with MOECC, MVCA, organize invasive species removal events
	Continue supporting the **Invading Species** and **Aquatic Invasive Species Prevention and Monitoring** programs
	Disseminate information regarding the dangers of invasive species propagation
Identify and protect species at risk and their habitats	Liaise with governments and NGOs to secure funding and to conduct surveys of species at risk
	Develop an awareness program to inform the public regarding existing species at risk, and the proper protocols to protect these species
	Establish partnerships with existing programs (eg: **Adopt a Pond** program with the Toronto Zoo)
Protect and maintain a healthy fishery	Encourage the Ministry of Natural Resources and Forestry (MNRF) to conduct inventories and research to understand better the state of the fishery (populations; spawning and other habitats; need and opportunity for rehabilitation)
	Develop, in concert with local fishing clubs and associations, a public education program about the fishery of Mississippi Lake, including good fishing practices and behaviour
	Request that MNRF provide increased enforcement of fishing and ice fishing regulations
	Engage fishing tournament organizers to formulate appropriate rules/regulations to minimize the impact of these events on the natural environment and overall well being of the lake

GOAL: Land Use and Development

Work towards future development that maintains the character of the lake and that protects the natural environment, water quality, and the social/recreational features of Mississippi Lake

Table 6. Summary of Actions

OBJECTIVE	ACTION
Ensure that future development on the lake takes place with minimal impact on water quality and the natural environment	Work with municipalities to develop coordinated municipal Official Plans, by-laws, and other regulations that reflect Lake Plan aims and initiatives
	Sensitize municipalities with the concerns of the community regarding development on the lake
	Lobby for municipal initiatives to shape development such as tax incentives for Low Impact Development (LID) projects
	Participate in the Official Plan review process of the municipalities
Improve the level of coordination of Governance across the lake	Work with municipalities to streamline and co-ordinate municipal planning provisions, policies, by-laws, and regulations and apply these consistently across the lake
	Nurture partnerships with the four surrounding municipalities, government agencies, and non-government agencies to ensure a coordinated and proactive approach in furthering the goals of the Lake Plan
	Request municipalities to provide the MLA with notices of development applications (plans of subdivisions, zoning changes, cottage conversions, minor variances, and other significant planning applications)
	Encourage municipalities to promote and cite the Lake Plan in their Official Plans

GOAL: Social and Recreational Activity

Promote social and recreational activities that respect the natural environment, the residents and users of the lake, and help to build a sense of community.

Table 6. Summary of Actions

OBJECTIVE	ACTION
Address overall concerns about boat traffic and conduct of lake users	Establish a broad-based education program with focus on safety and respectful lake use, to include: speed limits, rules of conduct, management of boat wakes, noise abatement, and pollution control
	Develop a Code of Conduct brochure for boating and lake use, to be distributed widely
	Work with municipalities, marinas, and boat launch owners to help inform the public regarding boating on the lake, and to provide additional services such as: public washrooms, garbage and toxic waste disposal/recycling facilities, and fueling facilities
	Develop and implement a shoreline maintenance and cleanup program
	Invite the OPP to participate in, and make presentations at, MLA sponsored Boat Safety seminars
	Promote the MLA and the Lake Plan initiatives by producing and distributing/selling decals or flags (for boats, cars, lakefront flagpoles, etc.)
Promote light pollution reduction measures	Promote awareness of the importance of reducing light pollution to the social enjoyment and ecological well being of the lake
	Provide educational materials to lake residents and users that will help shift lighting habits to improve night sky conditions around Mississippi Lake
	Promote **Good Neighbour Lighting** practices, including the identification of suitable lighting fixtures, and appropriate retailers
	Engage the municipalities to enact bylaws similar to the Mississippi Mills dark sky by-law No. 03-62 (9 Sep 2003)

Associated Programs

Program	Sponsors	Web Site
Lake Partner	Federation of Ontario Cottagers' Associations	http://foca.on.ca
Watersheds Watch	Mississippi Valley Conservation Authority	http://mvc.on.ca
Love Your Lake	Watersheds Canada Canadian Wildlife Federation	http://loveyourlake.ca
Rural Clean Water	Mississippi Valley Conservation Authority	http://mvc.on.ca
Citizen Water Watch	Ontario Trillium Foundation Carleton University Friends of the Tay Association Mississippi Valley Conservation Authority Rideau Valley Conservation Authority	
Good Neighbour Lighting	Township of Mississippi Mills Mississippi Valley Conservation Authority Royal Astronomical Society of Canada International Dark Sky Association	www.mississippimills.ca http://mvc.on.ca www.rasc.ca www.darksky.org
Adopt a Pond **FrogWatch Ontario** **Ontario Turtle Tally**	Toronto Zoo	www.torontozoo.com
Canadian Lakes Loon Survey	Bird Studies Canada BirdLife International	www.bsc.eoc.org
Greywater Reuse Pilot	City of Guelph	http://guelph.ca
EDDMaps Ontario	Ontario Federation of Anglers and Hunters Invasive Species Centre Invading Species Awareness Program Ontario Trillium Foundation	www.eddmaps.org
Invading Species	Ontario Federation of Anglers and Hunters Ontario Ministry of Natural Resources and Forestry	www.invadingspecies.com
Aquatic Invasive Species	Federation of Ontario Cottagers' Association	http://foca.on.ca
Prevention and Monitoring	Ontario Ministry of Natural Resources and Forestry	
Broad-Scale Fish Monitoring	Ontario Ministry of Natural Resources and Forestry	https://www.ontario.ca